Neonatal Intensive Care Outcomes Research and Evaluation (NICORE)

Neonatal Care in Northern Ireland, 2012

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Foreword

"Neonatal Care in Northern Ireland, 2012" is the thirteenth report of the Neonatal Intensive Care, Outcomes, Research & Evaluation (NICORE) group. This report provides: 1) an overview of the care provided to all infants, admitted to neonatal care in Northern Ireland, born in 2012; 2) additional data for assessing trends and for benchmarking; 3) opportunities for quality improvement & research, and; 4) help with identifying key priorities for the future. As always, we welcome feedback from you regarding the structure and content of this report as the NICORE team are committed to keeping the data analyses relevant to current issues in clinical practice.

Since our last report, the NICORE team has been incorporated as the information arm of the newly established Neonatal Network Northern Ireland (NNNI). Membership of the group (Appendix One) has evolved to include representatives from other important information areas of perinatal and child health namely, the Northern Ireland Maternity System (NIMATS) and the Child Health System (CHS). This is a crucial step towards the exploration of data linkage, minimisation of duplication and the facilitation of 'translational' thinking.

The NICORE team recognises the value of high quality data for performance measurement, national & international benchmarking and for informed decision making: for this we are indebted to the hard working clinical teams who input data in their respective units. The BadgerNet™ system has now been firmly embedded in all units within the NNNI and both the quality and completeness of data are showing demonstrable improvements. The 2013 data report, based on our first electronic data downloads from BadgerNet™: will be published soon after this report and the 2014 data are ready for analyses. The first Northern Ireland BadgerNet™ User Group meeting has been scheduled for 30th September 2015 and this will promote knowledge transfer throughout the NNNI. Ms Helen Bell (Customer Support/ Product Specialist, Clevermed Ltd.) will be in attendance and will provide updated BadgerNet™ training.

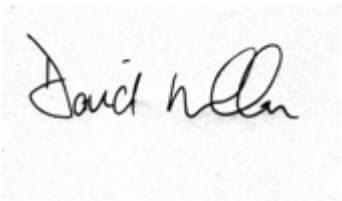
NICORE continues to work closely with colleagues in the Public Health Agency (PHA), the Neonatal Units (NNUs) and academia (Queen's University Belfast) via the NICORE group and by responding to approved information requests pertaining to relevant public health, clinical or research questions. Going forward, optimal use of BadgerNet™ as a valuable,

reliable resource is of paramount importance; and working together this wealth of information can be instrumental in initiating and sustaining improvements in service delivery to this vulnerable group of infants and their families.

I would like to take this opportunity to thank Dr Stan Craig for his dedication and focus in leading NICORE through uncertain times and for easing the transition of chairmanship to me following the establishment of the NNNI. I hope to build on the strong foundations laid down by both Dr Craig and, his predecessor, Dr John Jenkins by ensuring that NICORE data inform decision making processes so that every infant admitted to neonatal care in NI receives the best evidence-based care.

Finally, on behalf of the NICORE team I wish to record our thanks to colleagues who have retired since the publication of our last report, namely: Sister Marian Campbell, Sister Phil Farrell and Sister Sandra Rankin. I would also like to acknowledge two very close colleagues and friends, who helped tremendously with NICORE over the years, who have sadly passed away since the last full report: Dr Hugo Lambrechts and Ms Pauline Armstrong are missed by us all.

I would also like to thank the medical and nursing staff for completing the 2012 NICORE data collection proformas and for their continued support for the work of NICORE. We also wish to thank Ms Amy McAuley for her service to NICORE over the last seven years and wish her well in her future career.



Dr David Millar

Clinical Information Lead (NNNI) and NICORE Chair

Executive Summary

"Neonatal Care in Northern Ireland, 2012"

This report provides information and analyses for all infants who were born between 1st January 2012 and 31st December 2012 and admitted to a neonatal unit (NNU) in Northern Ireland (NI) for intensive care (IC), high dependency care (HDC) or special care (SC).

The aims are to: 1) give an overview of the care provided for all infants born in 2012 and admitted to a NNU across NI, 2) provide NICORE 2011or NICORE 2009 comparison data where appropriate, 3) highlight areas for quality improvement and/or research and 4) establish priorities for the future.

Key findings of "Neonatal Care in Northern Ireland, 2012"

- There has been a 2.1% increase in the absolute numbers of infants receiving neonatal care from 1838 in 2011 to 1877 in 2012. There has been no statistically significant difference in the proportion of live born infants admitted to neonatal care in 2012 (1877 of 25590, 7.3%) when compared to 2011 (1838 of 25596, 7.2%).

- The total number of neonatal care days has increased by 3.4% from 29204 days in 2011 to 30205 in 2012.

- There has been a statistically significant improvement in the survival rate for extremely low gestational age (less than 26 weeks' gestation) infants in 2012 (21 of 26, 80.8%) when compared to 2011 (19 of 34, 55.9%).

- Late onset sepsis (after day three of life) remains a major morbidity. However, since the last baseline NICORE report (2009 data) there has been a statistically significant reduction in the proportion of infants with at least one proven episode of late sepsis (any pathogen) in 2012 (88 of 1379, 6.4%) when compared to 2009 (148 of 1320, 11.2%).

- There has been no statistically significant change in the proportion of infants less than or equal to 32 weeks' gestation with chronic lung disease (CLD) (oxygen use at

36 weeks' corrected gestation) in 2012 (67 of 353, 19.0%) when compared to 2009 (74 of 357, 20.7%).

- Across NNNI seventeen infants greater than or equal to 36 weeks' gestation received whole body therapeutic hypothermia.

- The proportion of "at-risk" infants (surviving to screen due date) being screened for retinopathy of prematurity (ROP) has reached 94.3% (262 of 278) in 2012 including those infants discharged home with outpatient appointments.

- There has been no statistically significant change in the proportion of infants admitted to neonatal care in NI with congenital malformations during 2012 (183 of 1877, 9.7%) when compared to 2009 (162 of 1769, 9.2%). However, there has been a 13.0% increase in terms of absolute numbers of infants admitted. These infants received a 13.8% increase in days of neonatal care.

- On the whole NNNI benchmarking standards compare favourably to the National Neonatal Audit Programme (NNAP) performance and are above the recommended standard for use of antenatal steroids and for temperature measurement within 1 hour of admission. NNNI ROP screening of eligible infants prior to discharge, although similar to that achieved by NNAP, is still below the recommended standard of 100%. Hypothermia on admission remains problematic for both the NNNI and NNAP.

- Benchmarking against NNAP: Infants less than 33 weeks' gestation: 30.5% are receiving some human milk at discharge home from neonatal care compared to 58%.

Points for consideration by NNNI

- A review of term admissions to neonatal care in line with UK priorities.

- A review of infants less than 27 weeks' gestation born and receiving initial neonatal care outside regional centre.

- Provision of Northern Ireland survival data along with and without major morbidity for obstetricians and paediatricians to counsel parents.

- Continued collaboration with colleagues in PHA to gain an insight into activity and workload associated with higher order births.

- Compilation and implementation of Network evidence-based heat loss prevention guidelines for delivery rooms and theatres.

- Continued collaboration between NNNI and the 'Northern Ireland Breast Feeding Strategy Implementation Group (BSISG): Monitoring and Indicators Work Stream' to promote breast feeding within neonatal units and to provide robust, reliable, standardised feeding data extracted from the BadgerNet^{TM} system.

- Continued liaison with Ophthalmologists in order to obtain robust epidemiological data on ROP screening in NNNI.

- Continued monitoring and benchmarking of late onset sepsis data with NNAP and Vermont Oxford Network and to promote quality improvement activities.

- Continued co-operation with Clevermed (Ltd.) regarding the development of standardised network reporting in line with the National Neonatal Clinical Reference Group.

Concluding remarks

This report provides evidence of the high-quality neonatal care provided throughout the NNNI within the resources available. Opportunities for further improvement are highlighted and these issues coupled with parental experiences and national priorities will drive the NNNI quality agenda. Strategies to reduce nosocomial infections, to keep vulnerable infants warmer and to increase breastfeeding rates in the neonatal population will be explored further. From this point forward NICORE reporting will be dependent upon the extraction of data from the BadgerNet^{TM} system. This will improve both the timeliness and breadth of reporting to the NNNI.

Section 1.0 Introduction

1.1 Background

"Neonatal Care in Northern Ireland, 2012" provides information relating to all infants born and admitted to neonatal care (NC) in Northern Ireland (NI) during the time period 1st January 2012 to 31st December 2012. This report provides a summary of neonatal care activities within the Neonatal Network Northern Ireland (NNNI); outcomes in terms of mortality and morbidities; and an assessment of performance against national and local (NICORE) evidence-based key quality standards. Denominator data for live births (resident and non-resident live infants born in NI hospitals, at home or en route) have been sourced from the Northern Ireland Maternity Administration System (NIMATS) held by the Public Health Agency (PHA). The NICORE core dataset includes the Vermont Oxford Network (VON) dataset[1], the British Association of Perinatal Medicine (BAPM) minimum dataset[2], the EuroNeoStat (ENS) dataset[3] and local NICORE specific data items. All infants are allocated to calendar year by date of birth as with other perinatal datasets. All key data definitions reported are provided in Appendix Two.

1.2 Method

Each neonatal unit (NNU) routinely provided a range of socio-demographic, obstetric, neonatal process and outcome data via the NICORE data collection form where each form corresponded to one episode of care. Medical and/or nursing staff completed this dataset using the definitions provided (Appendix Two). The data were then analysed centrally in the School of Nursing and Midwifery, Queen's University Belfast (QUB) using the Predictive Analysis Software, PASW® Statistics 18 (SPSS Inc, Chicago, Illinois, USA).[4]

Each eligible infant was assigned a Baby Unique Identifier (BUI) on first admission to a NNU which enabled linkage of his/her data throughout the region if an inter-unit transfer occurred. The BUI number also enabled data to be analysed and presented on a regional basis by the elimination of duplicate entries. All NICORE log books linking the BUI to hospital numbers were retained within the NNU.

1.3 Limitations of the 2012 NICORE neonatal dataset

- infants born in 2011 and admitted to neonatal care during 2012 are excluded;
- infants re-admitted to neonatal care from home are excluded;
- data pertaining to the provision of level 3 (special care) on postnatal wards are excluded; and
- infants who died in delivery suite are excluded.

1.4 Report focus

- neonatal activity and workloads;
- location of birth and initial neonatal care;
- neonatal outcomes in terms of mortality and key morbidities; and
- benchmarking: national and local (NICORE) key evidence-based quality standards.

1.5 Aims

This report aims to:

- give an overview of the care provided for all infants who were born and admitted to NNUs across NI during the time period 1st January 2012 and 31st December 2012 with comparative data for 2011or 2009 where appropriate;
- highlight areas for future quality improvement initiatives and research; and
- establish ongoing priorities for the NNNI.

Section 2.0 Neonatal Activity & Workloads

2.1 Requirement for admission to neonatal care

From 1st January 2012 to 31st December 2012, there were 25590 live born infants in NI hospitals, en route or at home (resident and non-resident to NI). During the same time period 2186 episodes of neonatal care were provided for 1877 infants. This equates to 7.3% of live born infants requiring admission to NNUs in Northern Ireland and 1259 live born infants (4.9%) receiving intensive care (IC) and/or high dependency (HDC) during their stay in neonatal care.[5] Infants are categorised according to completed weeks' gestation[6] as follows:

	Extremely preterm (less than 28 weeks' gestation) EPT
	Very preterm (28 to 31 weeks' gestation) VPT
	Moderately preterm (32 to 33 weeks' gestation) MPT
	Late preterm (34 to 36 weeks' gestation) LPT
	Term (greater than or equal to 37 weeks' gestation) T

Table 1 Live born infants in NI & number of infants admitted to neonatal care by gestation during 2012 and 2011.

Gestation (weeks)	[1]Live born infants NI 2012	Infants receiving neonatal care 2012	[2]Live born infants NI 2011	Infants receiving neonatal care 2011
<22	10	-	16	-
22	7	-	14	2
23	7	3	6	2
24	*8	*11	17	16
25	12	12	15	14
26	*19	*20	18	18
27	29	29	*16	*20
Sub-total EPT	**92**	**75 (81.5%)**	**102**	**72 (70.6%)**
28	29	28	38	37
29	41	35	*32	*34
30	*53	*55	55	52
31	*66	*70	*56	*58
Sub-total VPT	**189**	**188 (99.5%)**	**181**	**181 (100.0%)**
32	91	90	83	79
33	152	143	162	163
Sub-total MPT	**243**	**233 (95.9%)**	**245**	**242 (98.8%)**
34	247	193	246	196
35	367	162	379	159
36	732	152	706	157
Sub-total LPT	**1346**	**507 (37.7%)**	**1331**	**512 (38.5%)**
# ≥ 37 T	23720	874 (3.7%)	23736	831 (3.5%)
NK	-	-	1	-
Total	**25590**	**1877 (7.3%)**	**25596**	**1838 (7.2%)**

[1] Northern Ireland Maternity Administration System (NIMATS), [2]Child Health System Bureau Service.
* Discrepancies in the recording of gestational age across data sources.

Benchmarking Key Audit Question 1 (KAQ1): How many babies, born between 32 to 36 and ≥ 37 weeks' gestation, receive care in NI NNUs?

During 2012, 3.7% (874 of 23720) live born term infants (greater than or equal to 37 weeks' gestation) received neonatal care and 46.6% (740 of 1589) live born infants of 32 to 36 weeks' gestation, received neonatal care.

2.2 Activity data

Tables 2a to 10b provide activity data for the NNNI and for each NNU for all admissions (episodes of care) and for first admissions to neonatal care in NI. Levels of care (LOC) are defined in accordance with the British Association of Perinatal Medicine (BAPM) categories of care (2011) for intensive level 1 care (IC), high dependency level 2 care (HDC) and special level 3 care (SC).[5] Table 11a, details the final total length of stay TLOS (days) based on total length of stay for each infant across all episodes of care by completed weeks' gestation during 2012 and during 2011. Table 11b, details the total and mean level of care (LOC) days for singletons and higher order infants for all infants admitted and for survivors to discharge from neonatal care.

NI Regional Activity

Table 2a Neonatal activity levels of care by NNU based on BAPM categories of care during 2012 and 2011 – <u>all episodes of care.</u>

	Episodes		Infants		IC/ Level 1 days		HDC/ Level 2 days		SC/Level 3 days		Total days	
NNU	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
ALT	271	306	266	297	801	875	846	997	2099	2289	3746	4161
ANT	290	272	286	271	678	653	804	664	3710	3521	5192	4838
CAH	351	328	336	311	719	691	685	693	3191	2797	4595	4181
DH	184	158	169	145	36	24	91	79	1498	1337	1625	1440
RMH	591	572	585	567	2672	2531	2167	2317	4278	4349	9117	9197
SWAH	134	119	130	110	62	92	110	52	1243	1199	1415	1343
ULST	346	343	339	336	447	329	1297	787	2771	2928	4515	4044
Regional Total	**2167**	**2098**	**1877**	**1838**	**5415**	**5195**	**6000**	**5589**	**18790**	**18420**	**30205**	**29204**

Note: 'Regional Total' - infant counted only once but could have been admitted to several NNUs.

NNUs: Altnagelvin Area Hospital (ALT), Antrim Area Hospital (ANT), Craigavon Area Hospital (CAH), Daisy Hill Hospital (DH), Royal Maternity Hospital (RMH), South West Acute Hospital (SWAH) and Ulster Hospital (ULST).

Table 2b **Neonatal activity levels of care by NNU based on BAPM categories of care during 2012 and 2011 – <u>first admission to neonatal care (NI only)</u>.**

	Infants		IC/ Level 1 days		HDC/ Level 2 days		SC/Level 3 days		Total days	
NNU	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
ALT	254	288	696	776	763	870	1889	2060	3348	3706
ANT	238	229	573	610	521	535	2662	2596	3756	3741
CAH	293	280	589	534	449	464	2533	2040	3571	3038
DH	143	126	36	22	54	41	926	738	1016	801
RMH	533	521	2162	1976	1874	2003	3906	4054	7942	8033
SWAH	118	104	61	76	44	30	1002	941	1107	1047
ULST	298	290	307	297	879	579	2157	2036	3343	2912
Total	**1877**	**1838**	**4424**	**4291**	**4584**	**4522**	**15075**	**14465**	**24083**	**23278**

Table 2c **Neonatal activity levels of care by gestational age group based on BAPM categories of care (2011) during 2012 and 2011 - <u>all episodes of care</u>.**

	Infants		IC/Level 1 days		HDC/Level 2 days		SC/Level 3 days		Total days	
Gestation (weeks)	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
< 28	75	72	2223	2061	1679	1480	2170	1761	6072	5302
≥ 28 & ≤ 31	188	181	1273	1369	1741	1793	5450	5639	8464	8801
≥ 32 & ≤ 33	233	242	481	456	706	653	3697	3823	4884	4932
≥ 34 & ≤ 36	507	512	745	696	728	691	4201	3901	5674	5288
≥ 37	874	831	693	613	1146	972	3272	3296	5111	4881
Total	**1877**	**1838**	**5415**	**5195**	**6000**	**5589**	**18790**	**18420**	**30205**	**29204**

Royal Maternity Hospital (Belfast Health & Social Care Trust)

Table 3a **Neonatal activity levels of care by gestational age group during 2012/2011 NNU: RMH – <u>all episodes of care</u>.**

	Infants		IC/Level 1 days		HDC/Level 2 days		SC/Level 3 days		Total days	
Gestation (weeks)	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
< 28	50	49	1253	1185	580	751	353	614	2186	2550
≥ 28 & ≤ 31	74	72	543	530	525	623	1137	1126	2205	2279
≥ 32 & ≤ 33	66	69	125	170	263	187	819	782	1207	1139
≥ 34 & ≤ 36	138	157	426	355	322	308	1043	1001	1791	1664
≥ 37	257	220	325	291	477	448	926	826	1728	1565
Total	**585**	**567**	**2672**	**2531**	**2167**	**2317**	**4278**	**4349**	**9117**	**9197**

Table 3b **Neonatal activity levels of care by gestational age group during 2012/ 2011 NNU: RMH – <u>first admissions to neonatal care only</u>.**

	Infants		IC/Level 1 days		HDC/Level 2 days		SC/Level 3 days		Total days	
Gestation (weeks)	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
< 28	43	43	1144	931	520	589	330	546	1994	2066
≥ 28 & ≤ 31	64	60	331	412	414	564	1047	1051	1792	2027
≥ 32 & ≤ 33	60	66	105	150	206	173	677	751	988	1074
≥ 34 & ≤ 36	129	152	317	257	295	290	973	956	1585	1503
≥ 37	237	200	265	226	439	387	879	750	1583	1363
Total	**533**	**521**	**2162**	**1976**	**1874**	**2003**	**3906**	**4054**	**7942**	**8033**

Altnagelvin Area Hospital (Western Health & Social Care Trust)

Table 4a **Neonatal activity levels of care by gestational age group during 2012/2011 NNU: ALT – <u>all episodes of care</u>.**

	Infants		IC/Level 1 days		HDC/Level 2 days		SC/Level 3 days		Total days	
Gestation (weeks)	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
< 28	16	14	386	555	397	181	494	164	1277	900
≥ 28 & ≤ 31	24	26	212	191	188	410	408	766	808	1367
≥ 32 & ≤ 33	31	41	61	30	55	152	396	467	512	649
≥ 34 & ≤ 36	62	94	37	27	51	126	388	553	476	706
≥ 37	133	122	105	72	155	128	413	339	673	539
Total	**266**	**297**	**801**	**875**	**846**	**997**	**2099**	**2289**	**3746**	**4161**

Table 4b **Neonatal activity levels of care by gestational age group during 2012/2011 NNU: ALT – <u>first admissions to neonatal care only</u>.**

	Infants		IC/Level 1 days		HDC/Level 2 days		SC/Level 3 days		Total days	
Gestation (weeks)	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
< 28	12	13	298	498	334	145	365	161	997	804
≥ 28 & ≤ 31	23	24	209	182	176	359	404	641	789	1182
≥ 32 & ≤ 33	29	38	60	26	53	132	357	449	470	607
≥ 34 & ≤ 36	59	92	37	27	48	125	364	530	449	682
≥ 37	131	121	92	43	152	109	399	279	643	431
Total	**254**	**288**	**696**	**776**	**763**	**870**	**1889**	**2060**	**3348**	**3706**

Antrim Area Hospital (Northern Health & Social Care Trust)

Table 5a **Neonatal activity levels of care by gestational age group during 2012/2011 NNU: ANT – <u>all episodes of care</u>.**

	Infants		IC/Level 1 days		HDC/Level 2 days		SC/Level 3 days		Total days	
Gestation (weeks)	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
< 28	13	10	156	106	129	191	293	394	578	691
≥ 28 & ≤ 31	53	37	223	245	378	176	1587	1041	2188	1462
≥ 32 & ≤ 33	45	47	147	116	143	100	699	828	989	1044
≥ 34 & ≤ 36	76	79	95	93	77	104	724	779	896	976
≥ 37	99	98	57	93	77	93	407	479	541	665
Total	**286**	**271**	**678**	**653**	**804**	**664**	**3710**	**3521**	**5192**	**4838**

Table 5b **Neonatal activity levels of care by gestational age group during 2012/2011 NNU: ANT – <u>first admissions to neonatal care only</u>.**

	Infants		IC/Level 1 days		HDC/Level 2 days		SC/Level 3 days		Total days	
Gestation (weeks)	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
< 28	6	5	87	79	0	102	0	176	87	357
≥ 28 & ≤ 31	33	27	196	236	234	166	1034	732	1464	1134
≥ 32 & ≤ 33	38	38	141	113	141	85	627	616	909	814
≥ 34 & ≤ 36	64	68	92	92	69	95	611	640	772	827
≥ 37	97	91	57	90	77	87	390	432	524	609
Total	**238**	**229**	**573**	**610**	**521**	**535**	**2662**	**2596**	**3756**	**3741**

Craigavon Area Hospital (Southern Health & Social Care Trust)

Table 6a **Neonatal activity levels of care by gestational age group during 2012/2011 NNU: CAH – <u>all episodes of care</u>.**

	Infants		IC/Level 1 days		HDC/Level 2 days		SC/Level 3 days		Total days	
Gestation (weeks)	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
< 28	21	13	261	159	355	206	677	222	1293	587
≥ 28 & ≤ 31	42	51	163	278	186	380	1019	1321	1368	1979
≥ 32 & ≤ 33	61	50	93	61	43	40	641	606	777	707
≥ 34 & ≤ 36	98	92	120	108	39	27	529	401	688	536
≥ 37	114	105	82	85	62	40	325	247	469	372
Total	**336**	**311**	**719**	**691**	**685**	**693**	**3191**	**2797**	**4595**	**4181**

Table 6b **Neonatal Activity by gestational age group during 2012/ 2011 NNU: CAH – <u>first admissions to neonatal care only</u>.**

	Infants		IC/Level 1 days		HDC/Level 2 days		SC/Level 3 days		Total days	
Gestation (weeks)	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
< 28	10	8	169	119	181	102	296	50	646	271
≥ 28 & ≤ 31	36	39	152	195	151	268	899	817	1202	1280
≥ 32 & ≤ 33	53	46	87	58	36	37	569	566	692	661
≥ 34 & ≤ 36	93	86	119	96	36	23	496	375	651	494
≥ 37	101	101	62	66	45	34	273	232	380	332
Total	**293**	**280**	**589**	**534**	**449**	**464**	**2533**	**2040**	**3571**	**3038**

Ulster Hospital (South Eastern Health & Social Care Trust)

Table 7a **Neonatal activity levels of care by gestational age group during 2012/2011 NNU: ULST – all episodes of care.**

	Infants		IC/Level 1 days		HDC/Level 2 days		SC/Level 3 days		Total days	
Gestation (weeks)	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
< 28	8	8	166	55	170	151	251	225	587	431
≥ 28 & ≤ 31	41	30	113	73	452	156	744	753	1309	982
≥ 32 & ≤ 33	36	36	35	44	134	139	430	508	599	691
≥ 34 & ≤ 36	84	89	32	98	189	123	618	713	839	934
≥ 37	170	173	101	59	352	218	728	729	1181	1006
Total	**339**	**336**	**447**	**329**	**1297**	**787**	**2771**	**2928**	**4515**	**4044**

Table 7b **Neonatal activity levels of care by gestational age group during 2012/2011 NNU: ULST – first admissions to neonatal care only.**

	Infants		IC/Level 1 days		HDC/Level 2 days		SC/Level 3 days		Total days	
Gestation (weeks)	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
< 28	3	2	51	26	37	28	45	28	133	82
≥ 28 & ≤ 31	24	16	88	71	214	96	452	340	754	507
≥ 32 & ≤ 33	28	33	35	44	121	137	379	462	535	643
≥ 34 & ≤ 36	76	69	32	97	164	105	583	508	779	710
≥ 37	167	170	101	59	343	213	698	698	1142	970
Total	**298**	**290**	**307**	**297**	**879**	**579**	**2157**	**2036**	**3343**	**2912**

Daisy Hill Hospital (Southern Health & Social Care Trust)

Table 8a **Neonatal activity levels of care by gestational age group during 2012/2011 NNU: DH – <u>all episodes of care</u>.**

	Infants		IC/Level 1 days		HDC/Level 2 days		SC/Level 3 days		Total days	
Gestation (weeks)	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
< 28	4	3	1	0	0	0	75	107	76	107
≥ 28 & ≤ 31	8	14	1	9	0	25	209	335	210	369
≥ 32 & ≤ 33	27	14	11	5	64	20	420	276	495	301
≥ 34 & ≤ 36	54	27	9	3	18	3	502	195	529	201
≥ 37	76	87	14	7	9	31	292	424	315	462
Total	**169**	**145**	**36**	**24**	**91**	**79**	**1498**	**1337**	**1625**	**1440**

Table 8b **Neonatal activity levels of care by gestational age group during 2012/2011 NNU: DH – <u>first admissions to neonatal care only</u>.**

	Infants		IC/Level 1 days		HDC/Level 2 days		SC/Level 3 days		Total days	
Gestation (weeks)	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
< 28	1	0	1	0	0	0	0	0	1	0
≥ 28 & ≤ 31	2	5	1	7	0	0	71	39	72	46
≥ 32 & ≤ 33	15	10	11	5	27	7	159	154	197	166
≥ 34 & ≤ 36	50	27	9	3	18	3	432	185	459	191
≥ 37	75	84	14	7	9	31	264	360	287	398
Total	**143**	**126**	**36**	**22**	**54**	**41**	**926**	**738**	**1016**	**801**

South West Acute Hospital (Western Health & Social Care Trust)

Table 9a **Neonatal activity levels of care by gestational age group during 2012/2011 NNU: SWAH – <u>all episodes of care</u>.**

	Infants		IC/Level 1 days		HDC/Level 2 days		SC/Level 3 days		Total days	
Gestation (weeks)	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
< 28	2	1	0	1	48	0	27	35	75	36
≥ 28 & ≤ 31	8	11	18	43	12	23	346	297	376	363
≥ 32 & ≤ 33	14	13	9	30	4	15	292	356	305	401
≥ 34 & ≤ 36	40	21	26	12	32	0	397	259	455	271
≥ 37	66	64	9	6	14	14	181	252	204	272
Total	**130**	**110**	**62**	**92**	**110**	**52**	**1243**	**1199**	**1415**	**1343**

Table 9b **Neonatal activity levels of care by gestational age group during 2012/2011 NNU: SWAH – <u>first admissions to neonatal care only</u>.**

	Infants		IC/Level 1 days		HDC/Level 2 days		SC/Level 3 days		Total days	
Gestation (weeks)	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
< 28	0	1	0	1	0	0	0	0	0	1
≥ 28 & ≤ 31	6	10	17	34	6	3	229	190	252	227
≥ 32 & ≤ 33	10	11	9	25	4	15	218	287	231	327
≥ 34 & ≤ 36	36	18	26	11	24	0	379	214	429	225
≥ 37	66	64	9	5	10	12	176	250	195	267
Total	**118**	**104**	**61**	**76**	**44**	**30**	**1002**	**941**	**1107**	**1047**

Table 10a NI birth weight (BW) categories for 2012/2011 for infants born and admitted to NC.

Birth weight (BW) Group (g)	NI		
	2012	2011	Pearson's Chi-Squared test
Low Birth Weight (LBW, < 2500g)	814 (43.4%)	846 (46.0%)	χ^2 (1, N=3715) = 2.661, p=0.103
Very Low Birth Weight (VLBW, < 1500g)	212 (11.3%)	212 (11.5%)	χ^2 (1, N=3715) = 0.053, p=0.818
Extremely Low Birth Weight (ELBW, <1,000g)	63 (3.4%)	82 (4.5%)	χ^2 (1, N=3715) = 0.3.023, p=0.082
Denominator (infants admitted to neonatal care)	**1877**	**1838**	

There has been no statistically significant change in the proportion of infants of LBW, VLBW or ELBW admitted to NC in 2012 when compared to 2011.

Table 10b Birth weight (BW) group for each NNU - <u>first admissions to neonatal care (NI only)</u>.

Birth weight (BW) Group (g)	ALT		ANT		CAH		DH		SWAH		RMH		ULST		NI	
	2012	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**
≤ 999	8	17	6	5	5	9	2	0	0	2	40	47	2	2	63	82
1000 to 1499	17	17	22	23	31	29	2	4	4	6	53	41	20	10	149	130
1500 to 2499	91	113	88	88	107	96	37	34	39	29	158	186	82	88	602	634
≥ 2500	138	141	122	113	150	146	102	88	75	67	282	247	194	190	1063	992
Total	**254**	**288**	**238**	**229**	**293**	**280**	**143**	**126**	**118**	**104**	**533**	**521**	**298**	**290**	**1877**	**1838**

Table 11a Final total length of stay (TLOS) [days] based on total length of stay for each infant across all episodes of care by gestation.

Gestation (weeks)	Infants		Median TLOS days		Total days		Survivors to discharge from NNU		Median TLOS Survivors days		Total days Survivors	
	2012	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012	2011
22	-	2		2.0	-	4	-	0 (0.0%)	-	0	-	0
23	3	2	8.0	67.0	40	134	0 (0.0%)	1 (50.0%)	0	119.0	0	119
24	11	16	109.0	94.5	1034	1442	9 (81.8%)	11 (68.8%)	114.0	108.5	1029	1373
25	12	14	84.5	88.0	1098	942	12 (100.0%)	7 (50.0%)	84.5	116.0	1098	797
26	20	18	89.5	75.5	1891	1302	18 (90.0%)	14 (77.8%)	90.0	82.0	1888	1295
27	29	20	74.0	75.5	2061	1495	25 (86.2%)	19 (95.0%)	75.0	76.0	2044	1491
28	28	37	59.5	70.0	1569	2782	26 (92.9%)	35 (94.6%)	60.5	70.0	1548	2686
29	35	34	51.0	53.0	2099	1865	34 (97.1%)	33 (97.0%)	50.5	53.0	1976	1844
30	55	52	40.0	44.0	2499	2406	53 (96.4%)	52 (100.0%)	41.0	44.0	2494	2406
31	70	58	33.0	29.0	2339	1783	69 (98.6%)	58 (100.0%)	33.0	29.0	2335	1783
32	90	79	23.0	22.0	2224	1901	89 (98.9%)	75 (94.9%)	23.0	23.0	2223	1880
33	143	163	17.0	17.0	2695	3106	143 (100.0%)	161 (98.8%)	17.0	17.0	2695	3097
34	193	196	13.0	12.0	2647	2397	191(99.0%)	196 (100.0%)	13.0	12.0	2545	2397
35	162	159	10.0	10.0	1940	1653	162 (100.0%)	155 (97.5%)	10.0	10.0	1940	1596
36	152	157	7.0	7.0	1243	1415	151 (99.3%)	154 (98.0%)	7.0	7.0	1241	1299
37	147	141	4.0	5.0	921	1004	145 (98.6%)	140 (99.2%)	4.0	5.0	916	999
≥38	727	690	4.0	4.0	4465	4171	716 (98.5%)	682 (98.8%)	4.0	4.0	4339	4140
NI	**1877**	**1838**	**9.0**	**9.0**	**30765**	**29802**	**1843 (98.2%)**	**1793 (97.6%)**	**9.0**	**9.0**	**30311**	**29202**

Final total length of stay for each infant across all episodes of care until final discharge from neonatal care 'Final total length of stay' (TLOS) was calculated as follows: (the final date of discharge from neonatal care minus the date of first admission to neonatal care) plus one day. If an infant was transferred to RBHSC or another NNU outside NI and then transferred back to neonatal care within NI without being discharged home then these days were accounted for in the 'Final total length of stay'.

Table 11b **Total, mean and median levels of care (LOC) days for: all infants, singletons (S) and higher order infants (M) born (2012), admitted to neonatal care (2012) and surviving to discharge.**

	IC All	IC S	IC M		HDC All	HDC S	HDC M		SC All	SC S	SC M		SUM
Total LOC (days)	5415	4205	1210		6000	4817	1183		18790	14313	4477		**30205**
Mean - all	2.9	2.6	4.4		3.2	3.0	4.3		10.0	8.9	16.2		**16.09**
Mean - survivors	2.7	2.5	4.0		3.2	3.0	4.4		10.2	9.1	16.5		**16.15**

Section 3.0 Location of Birth & Initial Neonatal Care

3.1 Location of birth

The NI historical standard of best clinical practice for infants born at less than 26 weeks' gestation was that the delivery should have taken place in the regional NICU (RMH) whenever possible. Tables 12a, 12b & 12c provide location of birth, location of first NC (inborn (IB) and out born (OB)) by gestational age group.

Table 12a Location of birth by gestation during 2012.

Gest. (weeks)	ALT	ANT	CAH	DH	SWAH	RMH	ULST	MT	CW	LV	HER	Other	NI
≤ 27	12	4	10	1	0	40	3	1	1	0	1	2	75
≥ 28 & ≤ 31	23	30	36	1	6	64	22	0	1	0	3	2	188
≥ 32 & ≤ 33	29	36	53	14	10	60	27	0	2	0	1	1	233
≥ 34 & ≤ 36	59	55	90	49	35	123	75	9	8	0	1	3	507
≥ 37	124	71	96	74	66	194	159	47	35	6	1	1	874
Total	**247**	**196**	**285**	**139**	**117**	**481**	**286**	**57**	**47**	**6**	**7**	**9**	**1877**

MT: *Mater,* **CW***: Causeway,* **LV***: Lagan Valley*, **HER:** *at home/en route*

Table 12b Location of initial neonatal care (FIRST admission) by gestation during 2012.

Gestation (weeks)	ALT	ANT	CAH	DH	SWAH	RMH	ULST	NI
≤ 27	12	6	10	1	0	43	3	75
≥ 28 & ≤ 31	23	33	36	2	6	64	24	188
≥ 32 & ≤ 33	29	38	53	15	10	60	28	233
≥ 34 & ≤ 36	59	64	93	50	36	129	76	507
≥ 37	131	97	101	75	66	237	167	874
Total	**254**	**238**	**293**	**143**	**118**	**533**	**298**	**1877**

Benchmarking Key Audit Question 2 (KAQ2): How may infants < 26 weeks' gestation are born and receive their first neonatal care outside the regional NICU (Royal Maternity)?

During 2012, 9 of 26 (34.6%) infants less than 26 weeks' gestation were born outside the regional centre and 7 of 26 (26.9%) were born AND received the first episode of neonatal care OUTSIDE the regional centre.

During 2012, 18 of 46 (39.1%) infants less than 27 weeks' gestation were born outside the regional centre and 16 of 46 (34.8%) were born AND received the first episode of neonatal care OUTSIDE the regional centre.

Table 12c Location of initial neonatal care (first admission) and location of birth: inborn (IB) and out born (OB) during 2012/2011.

NNU (Initial care)	Live born infants		Inborn (IB)		Out born (OB)		Total (IB + OB)	
	*2012	#2011	2012	2011	2012	2011	2012	2011
ALT	2860	2969	247	276	7	12	254	288
ANT	2668	2659	195	204	43	25	238	229
CAH	4222	4000	285	277	8	3	293	280
DH	1955	1987	139	126	4	0	143	126
RMH	5587	5581	480	482	53	39	533	521
SWAH	1250	1225	117	103	1	1	118	104
ULST	4116	4152	285	274	13	16	298	290
Other	**2932**	**3023**	**-**	**-**	**-**	**-**	**-**	**-**
Total	**25590**	**25596**	**1748**	**1742**	**129**	**96**	**1877**	**1838**

*NIMATS. #Child Health System

'Other': Causeway, Downe, Lagan Valley, Mater, undefined home births.

3.2 Birth details

Those infants admitted to neonatal care were 39.3% female and 60.6% male and one infant was classified as 'indeterminate'. The majority of infants 56.2% (1054 of 1877) were delivered by caesarean section (Table 13). There were 1601 of 1877 (85.3 %) infants from singleton births and 276 of 1877 (14.7%) from multiple births. Tables 14a & 14b provide further information pertaining to higher order births with respect to place of birth.

Table 13 Mode of delivery for infants admitted to neonatal care (first admission) during 2012.

NNU (Initial NC)	Mode of Delivery					Total
	Caesarean Section (CS)	EM CS	EL CS	NK CS	Vaginal	
ALT	137 (53.9%)	84	52	1	117 (46.1%)	254
ANT	131 (55.0%)	86	45	0	107 (45.0%)	238
CAH	190 (64.9%)	120	70	0	103 (35.2%)	293
DH	77 (53.9%)	58	18	1	66 (46.2%)	143
RMH	311 (58.4%)	206	104	1	222 (41.7%)	533
SWAH	57 (48.3%)	33	24	0	61(51.7%)	118
ULST	151(50.7%)	115	36	0	147 (49.3%)	298
Total	**1054 (56.2%)**	**702**	**349**	**3**	**823 (43.9%)**	1877

NK CS: Caesarean section but reason for delivery i.e. elective or emergency is not recorded.

Table 14a Multiple births: number of infants delivered this pregnancy by NNU (first admissions) to neonatal care during 2012.

NNU	Singleton	Two	Three	Total infants	% Multiple birth
ALT	203	51	0	254	20.0%
ANT	205	30	3	238	13.9%
CAH	227	63	3	293	22.5%
DH	124	19	0	143	13.3%
RMH	451	70	12	533	15.4%
SWAH	106	12	0	118	10.2%
ULST	285	13	0	298	4.4%
Total	**1601 (85.3%)**	**258 (13.8%)**	**18 (1.0%)**	**1877**	**14.7%**

Table 14b Place of birth for multiple births (number of infants delivered this pregnancy) during 2012.

NNU	Singleton	Two	Three	Total
ALT	196	51	0	247
ANT	168	25	3	196
CAH	221	61	3	285
DH	120	19	0	139
RMH	401	68	12	481
SWAH	105	12	0	117
ULST	273	13	0	286
CW	44	3	0	47
LV	6	0	0	6
MT	55	2	0	57
Other	12	4	0	16
Total	**1601**	**258**	**18**	**1877**

CW: *Causeway*, **LV:** *Lagan Valley*, **MT:** *Mater*

Section 4: Neonatal Outcomes

4.1 Mortality and key morbidity

This section provides an overview of mortality and key morbidity outcomes of neonatal care for infants born and admitted to NNU during 2012. Comparison data for infants born and admitted to NNU in 2011 are given where available.

4.2 Survival to discharge from neonatal care

Tables 15a, 15b, 15c, 16 and 17 focus on survival to discharge from neonatal care and survival to discharge with no major morbidity which has been defined as: those survivors who DO NOT have any of the following morbidities: i) oxygen at 36 weeks' corrected gestational age; ii) necrotising enterocolitis (NEC); iii) NEC surgery; iv) retinopathy of prematurity (ROP) stage 3 and above; v) ROP treatment; vi) periventricular-intraventricular haemorrhage grade 3 and above and; vii) cystic periventricular leukomalacia. This definition was based on available evidence in 2012.[7] This definition will be revised by NNNI for future reports in light of updated current literature. Table 18 details cause of death.

Table 15a Survival to discharge from neonatal care by gestation during 2012/2011.

Gestation (weeks)	Infants		Deaths		Survivors to discharge		Survivors to discharge – no major morbidity n/N (%)
	2012	2011	2012	2011	2012	2011	2012
22	-	2	-	2	-	0.0%	-
23	3	2	3	1	0.0%	50.0%	0/3 (0.0%)
24	11	16	2	5	81.8%	68.8%	0/11(0.0%)
25	12	14	0	7	100.0%	50.0%	2/12 (16.7%)
26	20	18	2	4	90.0%	77.8%	4/20 (20.0%)
27	29	20	4	1	86.2%	95.0%	12/29 (41.4%)
28	28	37	2	2	92.9%	94.6%	20/28 (71.4%)
29	35	34	1	1	97.1%	97.0%	25/35 (71.4%)
30	55	52	2	0	96.4%	100.0%	45/55 (81.8%)
31	70	58	1	0	98.6%	100.0%	64/70 (91.4%)
32	90	79	1	4	98.9%	94.9%	86/90 (95.6%)
33	143	163	0	2	100.0%	98.8%	141/143 (98.6%)
34	193	196	2	0	99.0%	100.0%	188/193 (97.4%)
35	162	159	0	4	100.0%	97.5%	153/162 (94.4%)
36	152	157	1	3	99.0%	98.0%	151/152 (99.3%)
37	147	141	2	1	98.6%	99.2%	145/147 (99.3%)
≥38	727	690	11	8	98.5%	98.8%	712/727 (97.9%)
NI	**1877**	**1838**	**34**	**45**	**98.2%**	**97.6%**	**1748/1877 (93.1%)**

Table 15b NI Survival for infants (401 to 1500g birth weight) born and admitted to neonatal care by completed weeks' gestation 1999/2000 to 2012 inclusive by gestational age group.

Gestation (weeks)	1999/ 2000	2000/ 2001	2001/ 2002	2004	2005	2006	2007	2008	2009	2010	*2011	2012	Overall All Years
< 28	47/75 (62.7%)	53/92 (57.6%)	49/65 (75.4%)	64/91 (70.3%)	59/90 (65.6%)	73/91 (80.2%)	45/63 (71.4%)	69/85 (81.2%)	71/93 (76.3%)	51/79 (86.4%)	49/70 (70.0%)	63/74 (85.1%)	693/968 (71.6%)
≥ 28 & ≤ 30	67/70 (95.7%)	68/71 (95.8%)	89/96 (92.7%)	87/89 (97.8%)	87/93 (93.5%)	103/108 (95.4%)	99/107 (92.5%)	98/106 (92.5%)	77/79 (97.5%)	80/86 (93.0%)	96/98 (98.0%)	86/90 (96.0%)	1037/1093 (94.9%)
≥ 31	39/40 (97.5%)	45/48 (93.8%)	45/48 (93.8%)	41/44 (93.1%)	56/57 (98.2%)	49/51 (96.1%)	51/52 (98.1%)	51/54 (94.4%)	63/64 (98.4%)	72/74 (98.7%)	41/43 (95.4%)	54/54 (100.0%)	607/629 (96.5%)
NK	2/2	-	-	-	-	-	-	-	-	-	-	-	2/2 (100.0%)
NI	**155/187 (82.9%), 1nk**	**166/211 (78.7%)**	**183/209 (87.6%)**	**192/224 (85.7%)**	**202/240 (84.2%)**	**225/250 (90.0%)**	**195/222 (87.8%)**	**218/245 (89.0%)**	**211/236 (89.4%)**	**203/239 (84.9%)**	**186/211 (88.2%)**	**203/218 (93.1%)**	**2339/2692 (86.9%)**

Note: Delivery room deaths are excluded.

For the purpose of this analysis infants BW < 401g are excluded. During 2012 there were no infants admitted to NC with BW < 401g.

*During 2011 there were two infants with BW < 401g both of whom survived. From 2013 onwards new baseline data looking at all infants BW < 1500g will be processed.

Table 15c **NI Survival for infants (401 to 1500g birth weight) born and admitted to neonatal care by completed weeks' gestation 1999/2000 to 2012 inclusive.**

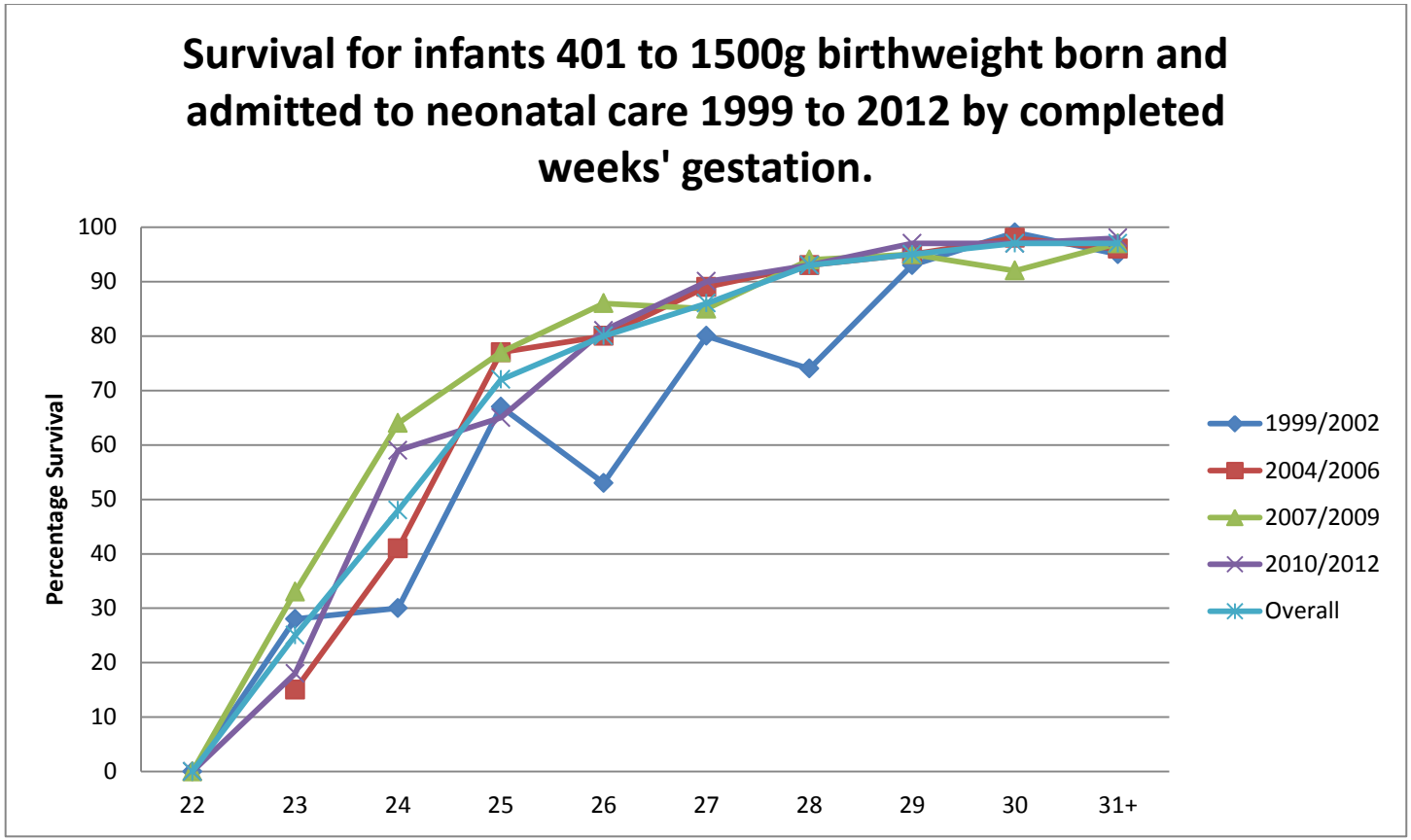
Gestation (weeks)	1999/ 2002	2004/ 2006	2007/ 2009	2010/ 2012	Overall All Years
22	0/1 (0.0%)	-	0/1(0.0%)	0/4(0.0%)	0/6 (0.0%)
23	5/18 (27.8%)	2/13 (15.4%)	6/18 (33.3%)	2/11(18.2%)	15/60 (25.0%)
24	8/27 (29.6%)	20/49 (40.8%)	21/33 (63.6%)	19/32 (59.4%)	68/141 (48.2%)
25	36/54 (66.7%)	40/52 (77.0%)	37/48 (77.1%)	30/46 (65.2%)	143/200 (71.5%)
26	40/57 (53.3%)	57/71 (80.3%)	51/59 (86.4%)	48/59 (81.4%)	196/246 (79.7%)
27	60/75 (80.0%)	77/87 (89.0%)	70/82 (85.4%)	64/71 (90.1%)	271/315 (86.0%)
28	62/67 (74.0%)	81/87 (93.1%)	90/96 (93.8%)	83/89 (93.3%)	316/339 (93.2%)
29	90/97 (92.8%)	102/107 (95.3%)	111/117 (94.9%)	85/88 (96.6%)	388/409 (94.9%)
30	72/73 (98.6%)	94/96 (97.9%)	73/79 (92.4%)	94/97 (96.9%)	333/345 (96.5%)
31+	129/136 (94.9%)	146/152 (96.1%)	165/170 (97.1%)	167/171 (97.7%)	607/629 (96.5%)
NK	2/2	-	-	-	2/2
NI	**504/607 (83.0%)**	**619/714 (86.7%)**	**624/703 (88.8%)**	**592/668 (88.6%)**	**2339/2692 (86.9%)**

Note: Delivery room deaths are excluded.

For the purpose of this analysis infants BW < 401g are excluded. During 2012 there were no infants admitted to NC with BW < 401g.

*During 2011 there were two infants with BW < 401g. From 2013 onwards new baseline data looking at all infants BW < 1500g will be processed.

Figure 1.0



Note: Delivery room deaths are excluded.

For the purpose of this analysis infants BW < 401g are excluded. During 2012 there were no infants admitted to NC with BW < 401g.

*During 2011 there were two infants with BW < 401g. From 2013 onwards new baseline data looking at all infants BW < 1500g will be processed.

Table 16 Discharge status for infants born & admitted to neonatal care 2012.

Destination on Discharge	All care episodes	Final care episode
Home	1591 (73.4%)	1591 (84.8%)
Postnatal ward/ other ward	131 (6.1%)	124 (6.6%)
Other hospital/neonatal unit	411 (19.0%)	128 (6.8%)
Died	34 (1.6%)	34 (1.8%)
Total	**2167**	**1877**

Table 17 Survival to discharge from neonatal care for singleton and multiple births (infants delivered) 2012/2011 by gestation.

Gestation (weeks)	All infants Survival		Singleton Survival		Multiple Survival	
	2012	**2011**	**2012**	**2011**	**2012**	**2011**
22	-	0 (0.0%)	-	-	-	0/2 (0.0%)
23	0 (0.0%)	1 (50.0%)	0/3 (0.0%)	1/2 (50.0%)	-	-
24	9 (81.8%)	11 (68.8%)	6/7 (85.7%)	9/11(81.8%)	3/4(75.0%)	1/5 (20.0%)
25	12 (100.0%)	7 (50.0%)	10/10 (100.0%)	6/12 (50.0%)	2/2(100.0%)	1/2 (50.0%)
26	18 (90.0%)	14 (77.8%)	15/17 (88.2%)	12/16(75.0%)	3/3(100.0%)	2/2 (100.0%)
27	25 (86.2%)	19 (95.0%)	19/21(90.5%)	15/16(93.8%)	6/8(75.0%)	4/4 (100.0%)
28	26 (92.9%)	35 (94.6%)	14/16 (87.5%)	21/23 (91.3%)	12/12(100.0%)	14/14 (100.0%)
29	34 (97.1%)	33 (97.0%)	24/24(100.0%)	27/28 (96.4%)	10/11(90.9%)	6/6 (100.0%)
30	53 (96.4%)	52 (100.0%)	36/38(94.7%)	31/31(100.0%)	17/17 (100.0%)	21/21 (100.0%)
31	69 (98.6%)	58 (100.0%)	45/46(97.8%)	46/46 (100.0%)	24/24 (100.0%)	12/12 (100.0%)
32	89 (98.9%)	75 (94.9%)	66/67(98.5%)	57/60 (95.0%)	23/23 (100.0%)	18/19 (94.7%)
33	143 (100.0%)	161 (98.8%)	104/104(100.0%)	101/103(98.1%)	39/39 (100.0%)	60/60 (100.0%)
34	191(99.0%)	196 (100.0%)	135/137 (98.5%)	134/134 (100.0%)	56/56 (100.0%)	62/62 (100.0%)
35	162 (100.0%)	155 (97.5%)	127/127 (100.0%)	124/127(97.6%)	35/35 (100.0%)	32/32 (100.0%)
36	151 (99.0%)	154 (98.0%)	129/130(99.2%)	123/126 (97.6%)	22/22 (100.0%)	31/31 (100.0%)
37	145 (98.6%)	140 (99.2%)	128/130 (98.5%)	118/118 (100.0%)	17/17 (100.0%)	22/23 (95.6%)
≥38	716 (98.5%)	682 (98.8%)	713/724 (98.5%)	673/681 (98.8%)	3/3 (100.0%)	9/9 (100.0%)
Total	**1843 (98.2%)**	**1793 (97.6%)**	**1571/1601 (98.1%)**	**1458/1501 (97.1%)**	**272/276 (98.6%)**	**295/304 (97.0%)**

Table 18 Primary cause of death and post-mortem rates during 2012.

Cause of death	Post Mortem			
	Done	Not Requested	Requested/consent refused	Total
Withdrawal of care	4	0	5	9
Respiratory failure	2	1	8	11
Sepsis	1	1	0	2
Neurological	0	0	1	1
Congenital malformation	1	3	7	11
Total	**8**	**5**	**21**	**34**

Note: Two additional palliative care infants: one discharged home, one discharged Children's ward Daisy Hill.

4.3 Key neonatal morbidity outcomes

All data definitions for key morbidity outcomes are provided alphabetically in Appendix 1.

4.3.1 KEY MORBIDITY: EARLY AND LATE SEPSIS

Table 19a Early and late sepsis (blood and/or cerebral spinal fluid culture) 2012, NA: not in hospital after day 3 of life, NK: not known.

Outcome or treatment	All infants (%)	VLBW infants
Early sepsis NK: Not known	19/ 1876 (1.0%), 1NK	4/212 (1.9%)
At least one episode of late proven sepsis all infants (any pathogen).	88/1379 (6.4%), 498 NA	48/203 (23.6%), 9 NA
Late proven sepsis all infants: Pure growth of pathogen (excluding commensals (CoNS) and mixed growths)	33/1379 (2.4%), 498 NA	17/203 (8.4%), 9 NA
Late proven sepsis all infants (mixed growth pathogen other than CoNS plus CoNS OR pure growth of CoNS)	61/1379 (4.4%), 498 NA	35/203 (17.3%), 9 NA

Coagulase-negative staphylococci (CoNS) includes over 30 species most common: *S. capitis, S. haemolyticus, S. hominis, S. lugdunensis, S. saccharolyticus, and S. saprophyticus.*

Table 19b Total episodes of late proven sepsis (blood and/or cerebral spinal fluid culture) 2012.

Episodes of late proven sepsis	All infants	VLBW infants
0	1291/1379 (93.6%)	155/203 (76.4%)
1	69/1379 (5.0%)	33/203 (16.3%)
2	13/1379 (0.9%)	9/203 (4.4%)
3	2/1379 (0.2%)	2/203 (1.0%)
4	2/1379 (0.2%)	2/203 (1.0%)
5	2/1379 (0.2%)	2/203 (1.0%)
Total	**119 sepsis episodes (88 infants)**	**75 sepsis episodes (48 infants)**

Note: All infants (498 NA), VLBW infants (9NA).

Table 19c Bacterial pathogens for proven late sepsis during 2012.

Proven late sepsis	Episodes – all infants	Episodes - VLBW infants
Pure growth pathogen other than CoNS	42/119 (35.3%)	25/75 (33.3%)
Pure growth CoNS	76/119 (63.9%)	49/75 (65.3%)
Mixed growth pathogen other than CoNS and CoNS	1/119 (0.8%)	1/75 (1.3%)
Total	**119 episodes of proven sepsis (88 infants)**	**75 episodes of proven sepsis for 48 infants**

Note: in addition, two infants were recorded as having one episode of proven fungal sepsis (Candida Albicans).

4.3.2 KEY MORBIDITY: RESPIRATORY SYSTEM

Table 20 Respiratory system outcomes and treatment during 2012.

Outcome or treatment	Infant (%)
Respiratory distress syndrome (RDS) for infants < 37 weeks' gestation	419/1003 (41.8%)
Pneumothorax (PTX)	94/1786 (5.3%), 1 NK
PTX with chest drain	46/93(49.5%), 1NK
PTX without chest drain	47/93 (50.5%), 1 NK
Supplemental Oxygen at 36 weeks' corrected gestational age for infants' ≤ 32 weeks' gestation.	67/353 (19.0%)
Steroids for chronic lung disease (CLD)	13/1876 (0.7%), 1NK
Supplemental Oxygen on discharge from neonatal care.	41/1877 (2.2%) 41: 10 home, 5 died, 26 other hospital.

4.3.3 KEY MORBIDITY: CARDIOVASCULAR SYSTEM

Table 21 Cardiovascular system outcomes and treatment during 2012.

Outcome or treatment	Infant (%)			
	≤ 750g	**751 to 1000g**	**> 1000g**	**Total**
Patent ductus arteriosus (PDA)	16/26 (61.5%)	21/43 (48.8%)	70/1807 (3.9%), 1nk	107/1876 (5.7%), 1nk
PDA surgery	5	1	1, 1NK	7, 1 NK

4.3.4 KEY MORBIDITY: GASTROINTESTINAL SYSTEM

Table 22 Gastrointestinal system outcomes and treatment during 2012.

Outcome or treatment	Infant (%)
Necrotizing Enterocolitis (NEC) (Infants ≤ 34 weeks' gestation or < 1500g birth weight)	11/695 (1.6%)
NEC surgery (Infants ≤ 34 weeks' gestation or < 1500g birth weight)	6/695 (0.9%)
Focal gastrointestinal perforation (FGI)	7/1876 (0.4%). 1 NK.

Note: Two additional infants were recorded as having NEC (no surgery) outside GA/BW criteria.

4.3.5 KEY MORBIDITY: CENTRAL NERVOUS SYSTEM

Table 23 Central nervous system outcomes and treatment during 2012.

Outcome or treatment	Infant (%)
Infants undergoing cranial imaging (CI) on or before day 28 of life (< 32 weeks' gestation)	246/263 (93.5%)
Periventricular-intraventricular haemorrhage (P-IVH) present (< 32 weeks' gestation)	54/246 (22.0%)
Worst grade (P-IVH) (< 32 weeks' gestation)	Grade 1: 22 Grade 2: 27 Grade 3: 8 Grade 4: 7
Cystic-periventricular leukomalacia (CPVL) (< 32 weeks' gestation)	5 infants
Outcome or treatment	**Infant (%)**
Hypoxic ischaemic encephalopathy (HIE), for infants ≥ 36 weeks' gestation.	57/1025 (5.6%), 1 NK.
Severity of HIE (Sarnat Grading)[8]	Mild: 34 Moderate: 17 Severe: 5 NK: 1
Therapeutic hypothermia	17/57 (29.8%) All whole body.
HIE within 3 days after birth for infants ≥ 35 weeks' gestation.	Not available from NICORE 2012 data
Seizures within first 3 days after birth (all infants) NA: first admission to NNU (NI) after day 3.	45/1846 (2.4%), 1NK. 30 NA infants admitted after day 3.

4.3.6 KEY MORBIDITY: MAJOR SURGERY

Table 24 Major surgery during 2012.

	Infant (%)
Major Surgery & re-admitted to NNU	32/1877 (1.7%)
Transferred for surgery & not re-admitted to NNU	54/1877 (2.9%)
Surgical Categories (re-admitted to NNU)	
Head & neck	5
Thorax	3
Abdomen	14
Genito-urinary	3
Open heart or vascular procedures	2
Central nervous system	8
***Total infants**	***32**

*Three infants had procedures falling within in two surgical categories. Details of each surgical procedure are also available within the NICORE dataset.

4.3.7 KEY MORBIDITY: OPHTHALMOLOGY

Table 25a Ophthalmic outcomes and treatment during 2012: neonatal screens.

Eligibility, screening, outcome & treatment	Infant (%)
Infants eligible for ROP screening (< 32 weeks' gestation or <1501g birth weight).	294
Survivors to first screen due date.	278
Screened prior to discharge from neonatal care.	221/278 (79.4%)
Not screened prior to discharge but discharged home OP appointment.	41/278 (14.8%)
Not screened prior to discharge nor recorded as having an OP appointment.	16/278 (5.8%)
Screen prior to discharge for eligible survivors in hospital when screen due.	212/233 (91.0%)

Overall, 16 of 278 (5.8%) of infants fulfilling the criteria for ROP screening were not recorded as having been screened. Two infants were transferred out of neonatal care to ROI and Causeway hospital. Fourteen infants and were recorded as being 'inappropriate for screening'. Gestations (completed weeks) and birth weights (g) were as follows: (30, 1345), (30, 1125), (31, 1870) (31, 1940), (32, 1290), (32, 1400), (32, 1240), (33, 1415), (33, 1465), (33, 1270), (33, 1260), (35, 1380), (35, 1240), (37 (1450). Two (14.3 %) of these infants were small for gestational age (< 9th Centile for gestational age using the UK WHO Neonatal and Infant Close Monitoring Charts).[10]

Table 25b ROP Screening and outcomes by gestation.

Gestation (weeks)	Eligible Infants	Survivor to date screen due	*Screened prior to discharge	Survivor to date screen due & still inpatient	Screened prior to discharge	No ROP	Retinal cryo and/or laser surgery	#Anti-VEGF Drug
23	**3**	0	-	0	**-**	**-**	**-**	**-**
24	**11**	9	**9 (100.0%)**	9	**9 (100.0%)**	**0**	**4**	**1**
25	**12**	12	**12 (100.0%)**	12	**12 (100.0%)**	**0**	**5**	**0**
26	**20**	18	**18 (100.0%)**	18	**18 (100.0%)**	**3**	**4**	**0**
27	**29**	25	**24 (96.0%)**	25	**24 (96.0%)**	**17**	**2**	**0**
28	**28**	26	**23 (88.5%)**	25	**23 (92.0%)**	**17**	**0**	**0**
29	**35**	35	**34 (97.1%)**	35	**34 (97.1%)**	**31**	**0**	**0**
30	**55**	53	**46 (86.8%)**	50	**45 (90.0%)**	**41**	**0**	**0**
31	**70**	69	**41 (59.4%)**	42	**36 (85.7%)**	**33**	**2**	**0**
≥ 32 & < 1501g	**31**	31	**14 (45.2%)**	17	**11 (64.7%)**	**11**	**0**	**0**
Total	**294**	**278**	**221 (79.5%)**	**233**	**212 (91.0%)**	**153 (72.2%)**	**17**	**1**

*** Nine infants who were discharged prior to the due date of first screen were screened prior to discharge from NNU.**

 # ROP treatment with anti-vascular endothelial growth factor (VEGF) drugs.

4.3.8 KEY MORBIDITY: CONGENITAL MALFORMATIONS

For ease of analyses, the NICORE congenital malformation data for 2012 have been peer reviewed by the Clinical Information Lead for the NNNI and the data have been categorised into broader groups as reported in Table 26b. Further breakdown of malformations are available upon request.

Table 26a Congenital malformations by gestation (completed weeks) during 2012.

Gestation (weeks)	Infants with at least one reported congenital malformation 2012
23	0/3(0.0%)
24	0/11(0.0%)
25	0/12(0.0%)
26	1/20 (5.0%)
27	2/29 (6.9%)
28	1/28 (3.6%)
29	3/35(8.6%)
30	3/55(5.5%)
31	3/70(4.3%)
32	4/90(4.4%)
33	2/143(1.4%)
34	7/193(3.6%)
35	12/162(7.4%)
36	20/152(13.2%)
37	20/147(13.6%)
≥38	105/727(14.4%)
NI	**183/1877 (9.7%)**

During 2012, 20 of 183 (10.9%) infants admitted to neonatal care and diagnosed with a congenital malformation died during the stay in hospital. This represents 58.8% (20 of 34) of total deaths in neonatal care. These infants were categorised as follows: (recognised trisomy/chromosomal syndromes, two infants), (recognised trisomy syndromes plus cardiovascular system, two infants), (respiratory system, four infants), (cardiovascular system, three infants), (central nervous system, three infants), (recognised malformation syndromes, one infant), (musculoskeletal, one infant) and (multiple categories, four infants).

Table 26b Categories of congenital malformations during 2012.

Category of congenital malformation	Infants
Recognised trisomy/chromosomal syndromes	33
Respiratory system (e.g. pulmonary hypoplasia, diaphragmatic hernia, other respiratory)	29
Cardiovascular system	70
Central nervous system (e.g. neural tube defect, other)	26
Gastrointestinal (e.g. gastroschisis, exompholos, other)	31
Recognised malformation syndromes (e.g. vater, CAA, potter's sequence)	21
Genito-urinary	15
Musculo-skeletal	8
Undiagnosed dysmorphic syndromes	13
Hydrops fetalis (non-immune, iso-immunisation)	1
Endocrine	1
Uncategorised	1
Total number of malformations	**249**
Total number of infants with at least one of the above congenital malformations NI.	**183**

Section 5.0 NNNI Quality Dashboard 2012

Benchmarking Key Audit Question (KAQ)	NI Performance	*NNAP Standard	NNAP Performance
How many infants, born between 32 and 36 weeks' gestation receive care on NI NNUs? (denominator: live births)	46.6%	-	No data available for 2012
How many infants, born at ≥ 37 weeks' (term) gestation, receive care on NI NNUs? (denominator: live births)	3.7%	-	No data available for 2012
How many infants < 27 weeks' gestation are born and receive their first neonatal care outside the regional centre (Royal Maternity)?	39.1%	-	-
Are all mothers who deliver between 24 and 34 weeks' gestation given any dose antenatal steroid?	87.4%	85%	80%
Are all mothers at risk of preterm birth < 32 weeks' gestation given Magnesium Sulphate?	22.1%	-	-
Do all babies ≤ 28 weeks' gestation have temperature taken within one hour of admission?	100%	98 to 100%	89%
Temperature on admission 36.0 to 36.5^{0}C	24.8%	10%	27%
Temperature on admission 36.6 to 37.4^{0}C	46%	90%	46%
Temperature on admission > 37.4^{0}C	10%	-	-
Do all infants undergo hearing screening prior to discharge home from neonatal care?	74%	-	-
What proportion of infants < 33 weeks' gestation at birth, are receiving their own *mother's milk when discharged home from neonatal care? (*NICORE human milk). (Note: discharged home directly from single admission to NC)	30.5% *Some human milk*	No standard set yet	58%
Do all eligible babies (still an inpatient) undergo 1st ROP screening as per current guidelines?	80%	100%	79%

*** NNAP – National Neonatal Audit Programme**

5.1 Introduction

The following key evidence-based audit questions (KAQ1, 3, 5, 7, 8 & 9) are derived from those required by the National Neonatal Audit Programme (NNAP).[11] These have facilitated national benchmarking of NI 2012 performance with other NNUs in the United Kingdom (UK) during the same time period.[12]

The remaining key evidence- based audit questions (KAQ2, 4 and 6) are deemed to be of clinical relevance to NNNI.

Benchmarking Key Audit Question 1 (KAQ1): How many babies, born between 32 to 36 and ≥ 37 weeks' gestation, receive care on NI NNUs?

NNAP Standard: No data available for 2012

For NI, during 2012, 3.7% (874 of 23720) live born term infants (greater than or equal to 37 weeks' gestation) received NC and 46.6% (740 of 1589) live born infants of 32 to 36 weeks' gestation, received neonatal care.

Benchmarking Key Audit Question 2 (KAQ2): How may infants < 26 weeks' gestation are born and receive their first NC outside the regional centre (Royal Maternity)?

During 2012, 9 of 26 (34.6%) infants less than 26 weeks' gestation were born outside the regional centre and 7 of 26 (26.9%) were born AND received the first episode of neonatal care OUTSIDE the regional centre.

During 2012, 18 of 46 (39.1%) infants less than 27 weeks' gestation were born outside the regional centre and 16 of 46 (34.8%) were born AND received the first episode of neonatal care OUTSIDE the regional centre.

Benchmarking Key Audit Question 3 (KAQ3): Are all mothers who deliver between 24 and 34 weeks' gestation given any dose of antenatal steroid?

[12]NNAP STANDARD: 85% NNAP 2012 performance: 80%

For NI, during 2012 there were 686 infants between 24 and 34 weeks' gestation admitted to NC with 598 of 684 (87.4%) of mothers receiving any dose of antenatal steroid. Information was unavailable in two cases. Note: Mothers who deliver more than one infant are counted for each infant.

Benchmarking Key Audit Question 4 (KAQ4): Are all mothers at risk of preterm birth < 32 weeks' gestation given Magnesium Sulphate?

For NI, during 2012, there were 263 infants of less than 32 weeks' gestation admitted to neonatal care with 51 of 231 (22.1%) of mothers receiving Magnesium Sulphate. Information was unavailable in 32 cases. Note: Mothers who deliver more than one infant are counted for each infant.

Benchmarking Key Audit Question 5 (KAQ5): Do all babies ≤ 28 weeks' gestation have their temperature taken within the first hour of birth?

[12]NNAP STANDARD: 98 to 100%, NNAP 2012 performance: 89%

[12]NNAP STANDARD: 90% at 36.6 to 37.4ºC, NNAP 2012 performance: 46%

[12]NNAP STANDARD: 10% at 36.0 to 36.5ºC, NNAP 2012 performance: 27%

For NI, FIRST admissions to neonatal care during 2012, 103 of 103 (100%) infants less than or equal to 28 weeks' gestation had their temperature taken/ attempted within one hour of *admission. Two temperatures were unrecordable. Forty-six of 101 (45.5%) of admission temperature were between 36.6 and 37.4 ºC, 25 of 101 (24.8%) were between 36.0 and 36.5ºC. Ten infants (9.9%) had their temperature greater than 37.4ºC (ranging from 37.5, to 39.2 ºC).

Benchmarking Key Audit Question 6 (KAQ6): Do all babies undergo hearing screening prior to discharge home from neonatal care?

The UK National Screening Committee has recommended that all newborn infants are offered hearing screening. In October 2005 the hearing screening programme for all newborn babies was introduced in NI.[13] It is recognised that early detection of a hearing loss and the provision of hearing aids result in better outcomes for speech and language development in later life.

For NI, during 2012, 1377 of 1871 (73.6%) of infants underwent hearing screening prior to discharge from neonatal care. Information was unavailable in six cases. Those infants not screened were discharged to postnatal ward (16.8%), home (57.5%), 'other' hospital (18.8%). In addition, 34 infants died.

Benchmarking Key Audit Question 7 (KAQ7): What proportion of babies < 33 weeks' gestation at birth, are receiving their own mother's milk when discharged from a neonatal unit?

[12]NNAP STANDARD: No standard set as yet, NNAP performance 2012: 58%

There were 237 infants less than 33 weeks' gestation that had only one admission to neonatal care with 213 discharged directly home, nine transferred to another hospital and 15 died. Overall, for those infants discharged home 65 of 213 (30.5%) infants were receiving some human milk at the time of discharge.

Benchmarking Key Audit Question 8 (KAQ8): Do all babies < 1501g or gestational age at birth < 32 weeks and still an inpatient undergo 1st Retinopathy of Prematurity (ROP) screening as per current guideline recommendation?

[12]NNAP Standard: 100%, NNAP performance 2012: 79%

For NI, during 2012 there were 294 infants eligible for ROP screening. Of these, 278 survived to screen due date, as per current guideline recommendations with 221 of 278 (79.5%) undergoing an ROP screen prior to final discharge from neonatal care with a further 41 of 278 (14.7%) discharged from NC with an out-patient appointment for first screen.

5.2 Key processes of care

KEY PROCESS: FEEDING & NUTRITION

Table 27a: Feeding at final discharge from NC by destination on discharge.

	None	Breast milk only	Formula milk only	Breast milk plus formula or fortifier	Total
Home	1	296	1006	287	**1590**
Postnatal ward/other ward	0	47	64	12	**123**
Died	34	0	0	0	**34**
Other hospital	43	18	59	8	**128**
Total	**78**	**361**	**1129**	**307**	**1875**

Information regarding feeding at final discharge from neonatal care was unavailable in two cases.

For NI, during 2012, there were 353 infants less than 33 weeks' gestation of whom 335 (94.9%) survived to discharge from NC. Three hundred and nineteen of these infants were discharged home. Of these infants, 31 (9.7%) were exclusively receiving human milk, 74

(23.2%) human milk plus fortifier and 214 (67.1%) exclusively formula milk on the day of discharge home. Therefore, overall 32.9% of infants less than 33 weeks' gestation discharged home from NC were receiving some human milk at discharge. Note: At this time NICORE does not differentiate between mother's milk and donor milk. Table 27b shows feeding at discharge for those infants less than 33 weeks' gestation that had only one admission to NC and were discharged home from that unit. Overall, 65 of 213 (30.5%) infants were receiving some human milk at discharge home.

Table 27b Feeding at discharge home for infants < 33 weeks' gestation with one admission to NC and discharged home directly by NNU.

	Feeding at discharge home			
NNU	**Breast milk only**	**Formula milk only**	**Breast milk plus Formula/fortifier**	**Total**
ALT	3	21	15	**39**
ANT	2	34	2	**38**
CAH	8	28	6	**42**
DH	0	3	1	**4**
RMH	7	40	6	**53**
SWAH	1	5	2	**8**
ULST	1	17	11	**29**
Total	**22 (10.3%)**	**148 (69.5%)**	**43 (20.2%)**	**213**

Table 28 Discharge weight (DW) by final discharging NNU during 2012 for infants discharged home or to postnatal ward/other ward.

NNU	Infants - final discharge	Infants – final discharge survivors	Missing data survivors	Discharges Home or postnatal	Missing data	Mean (SD) DW (g)	Median DW (g)	Range DW (g)
ALT	**255**	**252**	4	**243**	**3**	2882 (882)	2695	3360
ANT	**263**	**262**	1	**233**	**1**	2865 (620)	2735	3435
CAH	**286**	**285**	64	**277**	**63**	2639 (714)	2410	2920
DH	**156**	**156**	53	**153**	**51**	2734 (748)	2425	3520
RMH	**462**	**435**	28	**361**	**14**	2849 (729)	2780	3830
SWAH	**128**	**128**	4	**127**	**4**	2957 (696)	2825	3145
ULST	**327**	**325**	28	**321**	**27**	2850 (774)	2750	5350
Total	1877	1843	182	1715	163	2828 (749)	2700	5815

Note: Statistics include valid data only.

Probiotics

During 2012, no infants were recorded as having received probiotics. This was a new data item in 2012.

KEY PROCESS: CONTROLLED / THERAPEUTIC HYPOTHERMIA

In total 17 of 1026 (1.7%) infants greater than or equal to 36 weeks' gestation received therapeutic hypothermia (all whole body). One additional infant of 35 weeks' gestation also received therapeutic hypothermia (HIE grade 1) in Altnagelvin.

Table 29a Infants ≥ 36 weeks' gestation by NNU.

NNU	< 36 weeks' gestation	≥ 36 weeks' gestation	NNU Total Infants
ALT	110	156	266
ANT	166	120	286
CAH	198	138	336
DH	78	91	169
SWAH	52	78	130
RMH	287	298	585
ULST	142	197	339
***NI Total**	**851**	**1026**	**1877**

* One infant can be admitted to more than one NNU.

Table 29b Therapeutic hypothermia NNU where cooling was first documented in NICORE dataset.

NNU	Infants
ANT	3
CAH	4
RMH	10
Total	17

Section 6.0 Conclusions & The Way Forward

6.1 Conclusions

- There has been a 2.1% increase in the absolute numbers of infants receiving neonatal care from 1838 in 2011 to 1877 in 2012. There has been no statistically significant difference in the proportion of live born infants admitted to neonatal care in 2012 (1877 of 25590, 7.3%) when compared to 2011 (1838 of 25596, 7.2%). Pearson's Chi-Square test: χ^2 (1, N = 51186) = 0.451, p = 0.502).

- The total number of neonatal care days has increased by 3.4% from 29204 days in 2011 to 30205 in 2012. The final infant-based median total length of stay (TLOS) for survivors of neonatal care has remained constant at 9.0 days, between 2011 and 2012.

- There has been a statistically significant improvement in the survival rate for extremely low gestational age (less than 26 weeks' gestation) infants in 2012 (21 of 26, 80.8%) when compared to 2011 (19 of 34, 55.9%), Pearson's Chi-Square test: χ^2 (1, N= 60) = 4.106 , p < 0.05).

- Late onset sepsis (after day three of life) remains a major morbidity particularly due to coagulase negative staphylococcus (CoNS) species. However, since the last baseline NICORE report (2009 data) there has been a statistically significant change decrease in the number of infants with at least one proven episode of late sepsis (any pathogen) in 2012 (88 of 1379, 6.4%) when compared to 2009 (148 of 1320, 11.2%) Pearson's Chi-Square test: χ^2 (1, N= 2699) = 19.723, p < 0.001). This is reflective of the "in house" quality improvement initiatives carried out in neonatal units during the intervening three years. For VLBW infants 23.6% (48 of 203) had at least one episode of proven late onset sepsis (all pathogens) in 2012 which reduction from 32% (66 of 204) as reported in 2011* although statistically this is not significant (Pearson's Chi-Square test: χ^2 (1, N= 407) = 3.826, p = 0.05).

  * Vermont-Oxford Network 2011 dataset.

- There has been a slight decrease in the proportion of infants less than or equal to 32 weeks' gestation with chronic lung disease (CLD) (oxygen use at 36 weeks' corrected gestation) in 2012 (67 of 353, 19.0%) when compared to 2009 (74 of 357,

20.7%) Pearson's Chi-Square test: χ^2 (1, N= 710) = 0.341, p= 0.559) and in the use of steroids for CLD in 2012 (13 of 1876, 0.7%) when compared to 2009 (15 of 1764, 0.9%) Pearson's Chi-Square test: χ^2 (1, N= 3640) = 0.295, p= 0.587). However, these decreases are not statistically significant.

- In total seventeen infants greater than or equal to 36 weeks' gestation received whole body therapeutic hypothermia.

- The proportion of "at-risk" infants (surviving to screen due date) being screened for retinopathy of prematurity (ROP) has reached 94.3% (262 of 278) in 2012 including those infants discharged home with outpatient appointments. An ROP screen was carried out for 212 of 233 (91%) of "at risk" infants surviving to discharge and in hospital when screen was due. This could be reflective of improved data collection for ROP screening data and raised awareness amongst neonatal units.

- There has been no change in the proportion of infants admitted to neonatal care in NI with congenital malformations during 2012 (183 of 1877, 9.7%) when compared to 2009 (162 of 1769, 9.2%). Pearson's Chi-Square test: χ^2 (1, N= 3646) = 0.372, p= 0.542). However, there has been a 13.0% increase in terms of absolute numbers of infants admitted. These infants received 3209 (889 IC, 770 HDC, 1550 SC) days of care in 2012 compared to 2821 in 2009. This represents a 13.8% increase in days of neonatal care. There may be some subjective differences in the allocation of coding categories across the two years.

- The KAQ benchmarking standards compare favourably to the NNAP performance and are above the recommended standard for use of antenatal steroids (KAQ 4) and for temperature measurement within 1 hour of admission to NC (KAQ 6). NI ROP screening of eligible infants prior to discharge from NC although similar to that achieved by NNAP is still below the recommended standard of 100%. Hypothermia on admission to NC remains problematic for both NI and NNAP with more infants (24.8% and 27%) with a temperature between 36.0 to 36.5ºC than the recommended 10% and fewer that the recommended 90% infants (46% and 46%) within the 36.6 to 37.4 ºC group.

- For infants less than 33 weeks' gestation, 30.5% are receiving some human milk at discharge home from NC (single admission only); this is well below the NNAP performance of 58%.

6.2 The way forward: considerations for the NNNI

- To conduct a review of term admissions to neonatal care in line with national priorities (Patient Safety Domain within NHS England: reducing term admissions to neonatal units as part of Indicator 5.5 of the Outcomes Framework.)[14]

- To conduct a review of infants less than 27 completed weeks' gestation born and receiving initial neonatal care outside regional centre.

- To provide accurate local survival data with and without 'major morbidity' to obstetricians and paediatricians which will be useful for guiding parents.

- To continue to work with colleagues in PHA to gain an insight into activity and workload associated with higher order births.

- To consider the compilation and implementation of evidence-based heat loss prevention guidelines for delivery room and theatres e.g. check lists / care bundles.

- To continue to work with the Northern Ireland Breast Feeding Strategy Implementation Group (BSISG): Monitoring and Indicators Work Stream to promote breast feeding within neonatal units and to provide robust, reliable, standardised feeding data extracted from the BadgerNet™ Platform Neonatal Data Management System (Clevermed Ltd.).

- To continue to liaise with Ophthalmologists to facilitate the completion of the Badger Net™ Ophthalmology Discharge Screens in order to obtain robust epidemiological data on ROP screening in NI including post-discharge information.

- To continue to monitor and benchmark late onset sepsis data with NNAP and VON and to promote quality improvement activities.

- To continue to work with Clevermed (Ltd.) to develop reporting structures to facilitate network reporting in line with the National Neonatal Clinical Reference Group (England).[15]

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APPENDIX ONE: NICORE GROUP MEMBERSHIP 2014/15

Name & Title	Organisation
David Millar (NICORE Chair), Consultant Neonatologist & Clinical Information Lead NNNI	**Belfast Health & Social Care Trust (BHSCT)**
Fiona Alderdice, Professor School of Nursing & Midwifery	Queen's University Belfast (QUB)
Denise Boulter, Midwife Consultant	Public Health Agency (PHA)
Adele Graham, Senior Health Intelligence Manager	Public Health Agency (PHA
Michelle Clarke, Project Assistant NNNI	Health & Social Care Board (HSCB)
Heather Flemming, Senior Information Officer	Health & Social Care Board (HSCB)
Clifford Mayes, Consultant Neonatologist & Clinical Lead NNNI	Belfast Health & Social Care Trust (BHSCT)
Amy McAuley, Health Research Assistant (NICORE)	Public Health Agency (PHA)
Emma McCall, Project Manager (NICORE)	Queen's University Belfast (QUB)
Claire McGinley, Project Manager (NNNI)	Health & Social Care Board (HSCB)
Heather Reid, Public Health Specialist	Public Health Agency (PHA)
Gillian Weir, Senior Information Standards & Quality Officer	Health & Social Care Board (HSCB)

NNNI: Neonatal Network Northern Ireland.

APPENDIX TWO: KEY DATA DEFINITIONS

* Vermont Oxford Network (VON) data definition: refer to the web address below for the full VON definitions and data responses:
https://public.vtoxford.org//wp-content/uploads/2014/03/Manual_of_Operations-Part-2-Annual-Definitions-and-Forms-2012_v16_4_F.pdf

***Antenatal magnesium sulphate:**

Magnesium Sulphate was administered intravenously to the mother during pregnancy at any time prior to delivery.

***Antenatal steroids:**

Corticosteroids were administered IM or IV to the mother during pregnancy at any time prior to delivery. **Corticosteroids include betamethasone, dexamethasone, hydrocortisone.**

Incomplete course if delivery occurred less than 24 hours after the first dose of corticosteroids, or more than one week after the last dose of corticosteroid.

Complete course if delivery occurred more than 24 hours and less than one week after a dose of corticosteroids.

Other if the mother was on for example long-term steroids and specify.

***Best estimate of gestational age at delivery:**

Best estimate of gestational age in weeks and days using the following hierarchy:

1. Obstetrical measures based on last menstrual period, obstetrical parameters, and prenatal ultrasound as recorded in the maternal chart.
2. Neonatologist's estimate based on physical criteria, neurological examination, combined physical and gestational age exam (Ballard or Dubowitz), or examination of the lens.

The best estimate should be recorded in **weeks and days**. In instances when the best estimate of gestational age is an exact number of weeks, enter the number of the weeks in the space provided for weeks and enter '0' in the space provided for days.

***Birthweight (grams):**

Birthweight in grams. Since many weights may be obtained on an infant shortly after birth, record the weight from the labour and delivery record if available and judged to be accurate. If unavailable or judged to be inaccurate, use the weight on admission to the neonatal unit or lastly, the weight obtained on autopsy (if the infant expired within 24 hours of birth).

***Congenital Malformations (birth defects)**

Infant was diagnosed as having one or more of the birth defects listed (See VON Manual)

To be considered as lethal or life threatening a birth defect must either; 1) be the primary cause of death, or 2) be treated prior to discharge with specific surgical or medical therapy to correct a major anatomic defect or a life threatening physiologic dysfunction.

The following conditions should <u>NOT</u> be coded as birth defects:

Cleft lip without cleft palate, Club feet, Congenital dislocation of the hips, Congenital CMV

Extreme prematurity, Fetal alcohol syndrome, Hypospadias, Hypothyroidism, Intrauterine growth retardation, Intrauterine infection, Limb abnormalities, Patent ductus arteriosis, Persistent Pulmonary Hypertension (PPHN), Polydactyly, Pulmonary hypoplasia (select bilateral renal agenesis, or oligohydramnios sequence, if applicable), Small size for gestational age, Syndactyly

<u>*Controlled hypothermia/ therapeutic hypothermia</u>

The infant received controlled hypothermia (selective head cooling or whole body) for HIE (a core body temperature of 34°C).

Selective head cooling: Active cooling restricted to the head and brain. This is an intervention to reduce the temperature of the head and brain by exposing the head to lower than environmental temperature. Specially designed head cooling devices, other cooling devices and ice packs applied to the head would be considered active cooling. Passive exposure to environmental temperature and cooling of the face for treatment of supraventricular tachycardia are NOT considered active cooling of the head and brain.

Whole Body cooling: Active cooling of the body not restricted to the head and brain. This is an intervention to reduce the core body temperature and temperature of the brain by exposing body to lower than environmental temperature. Cooling blankets, other cooling devices and ice packs applied to the body would be considered active cooling. Passive exposure to environmental temperature would not be considered active cooling. Whole body cooling may include cooling of the head in addition to the rest of the body.

***Core body temperature:** may be measured by taking a rectal, oesophageal, tympanic or axillary temperature.

If the infant's core body temperature was measured and recorded within the first hour after admission to your NICU, enter the infant's temperature in degrees centigrade to the nearest 10^{th} of a degree. If the infant's temperature is measured multiple times within the first hour after admission to your NICU, enter the value of the first temperature measurement.

Use rectal temperature or if not available, oesophageal temperature, tympanic temperature or axillary temperature in that order. If the infant's core body temperature was not measured within the first hour after admission to the NICU, this item is not applicable and should be left blank.

***Cranial Imaging (US/CT/MRI done on or before 28 days of life:**

At least one cranial ultrasound, cranial CT or cranial MRI was performed on or before day 28.

***Cranial imaging - IVH**

If a cranial ultrasound, CT or MRI was performed on or before day 28, enter MOST SEVERE **grade** based on the criteria below.

Grade 0: No subependymal or intraventricular haemorrhage

Grade 1: Subependymal germinal matrix haemorrhage only

Grade 2: Intraventricular blood, no ventricular dilation

Grade 3: Intraventricular blood, ventricular dilation

Grade 4: Intraparenchymal haemorrhage.

***Discharge Weight:**

The **weight in grams** as recorded in the chart on the date of disposition, transfer or death. If the infants weight was **not recorded on the date of disposition** and was **recorded on the previous day**, **enter the weight in grams as recorded in the chart from the previous day**.

***Early proven BACTERIAL sepsis (first 72 hours):**

A bacterial pathogen from the VON list was recovered from a blood and/or cerebrospinal fluid culture obtained on day 1,2 or 3 of life. ***Note: The date of birth counts as day 1 regardless of the time of birth. For an infant born at 1:59PM on September 1, day 3 will be September 3rd***

***Enteral Feeding at discharge:**

Breast milk only if the infant was discharged receiving human milk as their only enteral feeding, either by being breast fed and/or by receiving pumped human milk.

Formula only if the infant was discharged receiving formula milk as their only enteral feeding.

Breast milk in plus formula or fortifier if the infant was discharged receiving human milk, plus human milk fortifier and/or formula milk.

Enteral feedings may be given by any method including breast, bottle, gavage tube, gastronomy tube, feeding cup, etc. Formula milk includes all standard newborn formulas, premature formulas, and special formulas. Please answer this question based only on the enteral feedings at discharge. Do not consider parenteral feedings when answering this item. For example, if an infant was discharged on IV TPN as well as human milk, the correct response would be 'Human milk only' since human milk was the only enteral feeding.

***Enteral feeding at discharge**, based on enteral feedings received during the 24 hour period prior to discharge, transfer or death.

***Focal GI perforation:**

The infant has a focal gastrointestinal perforation separate from necrotizing enterocolitis. This diagnosis will be based on visual inspection of the bowel at the time of surgery or post-mortem examination that demonstrates a single focal perforation with the remainder of the bowel appearing normal.

***Hypoxic-ischaemic enceohalopathy (HIE):**

This item only applies to infants with a gestational age of 36 weeks and 0 days or more.

The infant was diagnosed with hypoxic–ischaemic encephalopathy as defined below.

The diagnosis of hypoxic–ischaemic encephalopathy requires the presence of all 3 of the following criteria

1. The presence of a clinically recognized encephalopathy within 72 hours of birth.

Encephalopathy is defined as the presence of **3 or more** of the following findings within the first 72 hours after birth:

a. abnormal level of consciousness: hyperalertness, lethargy, stupor or coma
b. abnormal muscle tone: hypertonia, hypotonia or flaccidity
c. abnormal deep tendon reflexes: increased , depressed or absent
d. seizures: subtle, multifocal, or focal clonic
e. abnormal Moro reflex:exaggerated, incomplete or absent
f. abnormal suck: weak or absent
g. abnormal respiratory pattern: periodic, ataxic or apneic
h. oculomotor or pupillary abnormalities: skew deviation, absent or reduced Doll's eyes or fixed unreactive pupils

AND

2. Three or more supporting findings from the following list:

a. arterial cord pH<7.00
b. APGAR score at 5 minutes of 5 or less
c. evidence of multiorgan system dysfunction (see below)
d. evidence of fetal distress on antepartum monitoring: persistent late decelerations, reversal of end-diastolic flow on Doppler flow studies of the umbilical artery or a biophysical profile of 2 or less
e. evidence on CT, MRI, technetium or ultrasound brain scan performed within 7 days of birth of diffuse or multifocal ischaemia or of cerebral edema
f. abnormal EEG: low amplitude and frequency, periodic, paroxysmal or isoelectric

AND

3. The absence of an infectious cause, a congenital malformation of the brain or an Inborn error of metabolism, which could explain the encephalopathy.

Multi organ system dysfunction requires evidence of dysfunction of one or more of the following systems within 72 hours of birth,

a. renal: oliguria or acute renal failure
b. GI: necrotizing entercolitis, hepatic dysfunction
c. hematological: thrombocytopenia, disseminated intravascular coagulopathy
d. endocrine:hypoglycemia, hyperglycemia,hypercalcemia, syndrome of inappropriate ADH secretion (SIADH)
e. pulmonary: persistent pulmonary hypertension
f. cardiac: myocardial dysfunction, tricuspid insufficiency.

***Hypoxic ischaemia encephalopathy - severity:**

If the infant was diagnosed with hypoxic-ischemic encephalopathy, record the worst stage observed during the first 7 days following birth based on the infant's level of consciousness and response to arousal maneuvers such as persistent gentle shaking, pinching, shining a light or ringing of a bell:

'Mild' if normal or hyper alert. Infants in this category are alert or hyper alert with either a normal or exaggerated response to arousal.

'Moderate' if lethargic or mild stupor. Infants in this category are arousable but have a diminished response to arousal maneuvers.

'Severe' if deep stupor or coma. Infants in this category are not arousable in response to arousal maneuvers.

***Cystic periventricular leukomalacia:**

Evidence of cystic periventricular leukomalacia on a cranial ultrasound, CT, or MRI scan obtained at any time.

Select **'No'** if there is no evidence of cystic periventricular leukomalacia on a cranial ultrasound, CT, or MRI and at least one cranial imaging study was done.

Note: To be considered cystic periventricular leukomalacia there must be multiple small periventricular cysts identified. **Periventricular echogenicity without cysts should not be coded as cystic periventricular leukomalacia.** A porencephalic cyst in the area of previousluy identified intraparenchymal haemorrhage should not be coded as cystic periventricular leukomalacia. Periventricular abnormalities on CT or MRI should not be coded as cystic periventricular leukomalacia unless multiple small periventricular cysts are identified.

***LATE SEPSIS AND/OR MENINGITIS THIS ADMISSION AFTER DAY 3**

Bacterial pathogen from the list VON list (See Manual of Operations 2012) is recovered from a blood and/or cerebral spinal fluid culture obtained after day 3 of life. The date of birth counts as day 1 regardless of the time of birth. For an infant born at 11.59 PM on September 1, day 3 will be September 3.

Not Applicable if infant died or was discharged on day 1, 2 or 3.

Total episodes of PROVEN BACTERIAL sepsis FOR THIS ADMISSION ONLY:

Enter total number of episodes

Bacterial pathogen recovered for each episode of sepsis for this admission:

List all pathogens recovered from a blood and/or cerebral spinal fluid culture obtained for EACH episode of sepsis after day 3 of life.

***NOTE FOR COAGULASE NEG STAPH:**

Infant has all 3 of the following:

1. Coagulase negative staphylococcus is recovered from a blood culture obtained from either a central line, or peripheral blood sample and/or is recovered from cerebrospinal fluid obtained by lumbar puncture, ventricular tap or ventricular drain.

AND

2. Signs of generalized infection (such as apnea, temperature instability, feeding intolerance, worsening respiratory distress or hermodynamici nstability).

AND

3. Treatment with 5 or more days of intravenous antibiotics after the above cultures were obtained. If the infant died, was discharged, or transferred prior to the completion of 5 days of intravenous antibiotics, this condition would still be met if the intention were to treat for 5 or more days.

Fungal pathogen recovered for each episode of sepsis for this admission:

List all fungal pathogens recovered from a blood and/or cerebral spinal fluid culture obtained for EACH episode of sepsis after day 3 of life. The date of birth counts as day 1 regardless of the time of birth. For an infant born at 11.59 PM on September 1, day 3 will be September 3.

Not Applicable if infant died or was discharged on day 1, 2 or 3.

Total episodes of PROVEN FUNGAL sepsis FOR THIS ADMISSION ONLY:

Enter total number of episodes

***Major surgery:**

Surgical procedure included in the VON (See Manual of Operations 2012) was performed for the infant OR if the specific surgical procedure is not specifically identified on the Surgery Codes list and the procedure was performed under general or spinal anesthesia OR other cardiac catheterization procedures are performed (regardless of whether spinal/general anesththesia were used). Not applicable if the infant only had PDA Ligation, ROP surgery or NEC surgery. Central lines are not considered other surgery.

Please do not consider any of the following as other surgery: Broviac catheters, percutaneous venous catheters, POICC lines, umbilical artery lines, umbilical venous lines, or any other intravascular catheter. We recognise that some of these lines may be placed while the infant is under anesthesia for other procedures. Do not code any lines as surgery even if they are placed under general or spinal anaesthesia. **ECMO, ECMO cannulation and ECMO decannulation are not considered Other Surgery.** Please do not code ECMO, ECMO cannulation, or decannulation as surgery even if the procedures are performed under anaesthesia.

Chest tube placement is not considered Other Surgery. Peritoneal diaylsis and placement or removal of peritoneal dialysis catheters are not considered Other Surgery.

***Mode of Delivery:**

Vaginal: any vaginal delivery (spontaneous or induced).

Caesarean section: any caesarean delivery (elective or emergency).

***Necrotising enterocolitis:**

The infant had necrotising enterocolitis (NEC) diagnosed at surgery, at post-mortem examination or clinically and radiographically using the following criteria:

A. One or more of the following clinical signs present:

1. Bilious gastric aspirate or emesis
2. Abdominal distension
3. Occult or gross blood in stool (no fissure)

AND

B. One or more of the following radiographic findings present:

1. Pneumatosis intestinalis
2. Hepato-biliary gas
3. Pneumoperitoneum

***NEC surgery:**

One or more of the following procedures: laparotomy, bowel resection or intraperitoneal drain placement were performed for necrotizing enterocolitis, suspected necrotizing enterocolitis, or bowel perforation.

***Number of infants delivered this pregnancy:**

Number of infants actually delivered (count both live and still born**) this pregnancy.** Do not count fetuses which have been re-absorbed *in- utero* and are not delivered.

***Oxygen at 36 weeks:**

The infant was hospitalised and received any supplemental oxygen on the date that the infant was 36 weeks adjusted gestational age.

NOTE: 21% oxygen is room air. This is not considered supplemental oxygen, no matter how administered.

***Pneumothorax:**

The infant had extrapleural air diagnosed by chest radiograph or needle aspiration (thoracentesis). Indicate whether a chest drain was inserted.

Infants thoracic surgery and then later developed extrapleural air diagnosed by CXR or needle thoracentesis. Indicate whether a chest drain was inserted.

***Patent ductus arteriosus:**

At least one of the following findings is present:

1-clinical evidence of left to right or bidirectional ductal shunt on Doppler echo

2-systolic or continuous murmur **AND** at least **two** of the following findings are present,

a) Hyperdynamic precordium

b) Bounding pulses

c) Wide pulse pressure,

d) Pulmonary vascular congestion, cardiomegaly or both

***PDA Surgery:**

Surgical ligation of the ductus arteriosus was attempted either in the operating room or NICU. This item can be ticked even if an infant did not meet the definition of PDA given 98 (patent ductus arteriosus).

***Probiotics**

The infant received probiotics containing live bacteria. This may include formulas containing probiotics or probiotic supplements added to formula or breast milk feeds. Yoghurt is **not** considered a probiotic supplement.

NOTE: Probiotics must contain live microorganisms administered enterally with feedings or as feeding supplements. Probiotics are to be distinguished from prebiotics,

which are non-digestible carbohydrates meant to encourage proliferation of desirable gut flora. Yoghurt should <u>not</u> be considered a probiotic for this question.

<u>*Respiratory distress syndrome:</u>

The infant had respiratory distress syndrome (RDS) defined as:

A. A PaO_2 <50mmHg in room air, central cyanosis in room air, or a requirement for supplemental oxygen to maintain PaO_2 >50 mmHg, or a requirement for supplemental oxygen to maintain a pulse oximeter saturation over 85% **<u>within the first 24 hours of life</u>**.

<u>AND</u>

B A chest radiograph consistent with RDS (low lung volumes and reticulogranular appearance to lung fields, with or without low lung volumes and air bronchograms) **within the first 24 hours of life.**

<u>*Seizures:</u>

Clinical evidence of subtle seizures, or of focal or multifocal clonic or tonic seizures within the first 3 days after birth.

<u>*Shunt for post haemorrhagic hydrocephalus:</u>

Insertion of a ventriculo – peritoneal shunt or an access device for CSF drainage, following post haemorrhagic hydrocephalus occurred.

<u>*Steroids for chronic lung disease this admission:</u>

Systemic corticosteroids were used after birth to treat or prevent bronchopulmonary dysplasia or chronic lung disease. Inhaled corticosteroids are not considered systemic corticosteroids.

***Treatment of ROP with Anti-VEGF Drug**

The infant received bevacizumab (Avastin) or other vascular endothelial growth factor (anti-VEGF) drug in one or both eyes for the treatment of retinopathy of prematurity (ROP).

APPENDIX THREE: NICORE AD HOC DATA REQUESTS

Requestor(s)	Nature of Request	Progress
Ms Alison McNulty, CEO TinyLife. Mr Danny Beales, Senior Policy and Campaigns Officer, Bliss.	**Northern Ireland Neonatal Admission Request:** • What is the total number of babies admitted to neonatal units in Northern Ireland broken down by Health & Social Care Trust? To use the information for upcoming report and communications including Public Relations for the launch. The Bliss/TinyLife report looks at the cost families' face when having a baby admitted to neonatal units.	Standard tables from the provisional NICORE 2012 data report were provided. Completed: 29th September 2014.
Dr Alsion Verner, Consultant Neonatologist, Regional Neonatal Unit, Royal Maternity Hospital (RMH).	**Regional Neonatal Unit Request:** • What are the occupancy levels for intensive/high dependency care for all units in the neonatal network in 2012 and activity levels in RJMS and in Northern Ireland for infants less than 27 weeks' gestation and/or <1000g at birth? • How many babies in Northern Ireland received therapeutic hypothermia in 2012 and how many were in Royal Maternity Hospital (RMH)? To ensure accurate data is presented to the neonatal services review team.	Completed: 10th July 2014.
Ms Julie Neill, Health Intelligence Manager, Public Health Agency (PHA).	**Breast Feeding Strategy Group Request:** • How many babies receive breast milk on discharge from neonatal units and at final discharge from neonatal care during 2012? Data required to link in with the NI Breast Feeding Strategy Group (NIBFSG): Monitoring and Indicators Work Stream.	Completed: 15th April 2014. Ongoing provision of agreed data tables annually.
Dr John Jenkins, Honorary Senior Lecturer in Child Health, Queen's University Belfast.	**Small for Dates Request:** • What are the mortality rates for small for dates infants (less than 9th centile for gestation, or as defined on charts in use at that time), and normally grown infants for comparison, at 26 and 27 weeks gestation, who were born and admitted to NIC in N Ireland in 2011? Dr Jenkins was asked by the HSC Business Services Organisation to comment on the difference (if any) in mortality rates for small for dates infants (and normally grown infants for comparison) at 26 and 27 weeks gestation who were born and admitted to NIC in N Ireland in 2011. Local NICORE data was required to supplement a variety of published data relating to elsewhere.	Completed: 4th April 2014.

Requestor(s)	Nature of Request	Progress
Dr Akila Anbazhagan, Consultant Obstetrics & Gynaecology, Royal Jubilee Maternity Service, (RMH).	**Royal Maternity Survival Request:** • How many infants survive to discharge from neonatal care for live born infants, admitted to Royal Maternity Neonatal Unit for initial care during 2011 and at any time during the neonatal journey? Data required for the Trust Perinatal Meeting.	Completed: 6th March 2014.
Ms Barbara Spratt, Breast feeding co-ordinator, Royal Maternity.	**Enteral Feeding on Discharge from Neonatal Care Request:** • What proportion of infants receive breast milk on discharge from the Regional Neonatal Unit, RMH? To satisfy the requirements for the "Small Wonders DVD." Small Wonders DVD and National Change Programme: http://www.bestbeginnings.org.uk/small-wonders	Completed: 14th February 2014.
Dr Fiona Kennedy, Consultant in Public Health, Public Health Agency.	**Multiple Birth Request: Neonatal Survival and Activity 2011, 2009 and 2006.** • Are multiples more likely than singletons to require admission to neonatal care? • Do multiples stay longer in neonatal care than singletons? To be included in a PHA Report Annex: Multiple Births in Northern Ireland: Analysis of data obtained from NISRA, NIMATS, NICORE, NIMACH, & the HSC Board's ECR database, January 2014.	Completed: 4th February 2014.
Ms Heather Reid, Public Health Specialist, Public Health Agency.	**Location of Birth Request:** • What proportion of infants less than 27 weeks' gestation OR less than 1,000g had their first episode of neonatal care in Royal Maternity? (2011 NICORE data). To inform the Terms Of Reference for the 2014 Neonatal Service Review.	Completed: 11th November 2013.
Ms Eibhlin McLoone, Consultant Ophthalmologist.	**Retinopathy of Prematurity Request:** Key variables associated with infants eligible for screening for ROP 2012 for an ongoing epidemiological study of ROP IN Northern Ireland in association with the Centre for Statistical Science and Operational Research CenSSOR, Queen's University Belfast.	Completed: July 2013.

APPENDIX FOUR: NICORE PUBLICATIONS

PEER REVIEWED JOURNALS

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