

Annual Report-2016

Neonatal Unit

James Cook University Hospital



Contents

LIST OF ABBREVIATIONS	3
DEFINITIONS.....	4
INTRODUCTION.....	6
UNIT STAFFING.....	7
MATERNITY STATISTICS-2016	9
NEONATAL UNIT ADMISSIONS AND ACTIVITY	10
NEONATAL TRANSPORT ACTIVITY:	14
BREAST FEEDING RATES	14
NEONATAL FOLLOW-UP.....	15
MORTALITY AND SURVIVAL STATISTICS.....	16
KEY MORBIDITIES	18
CLINICAL GOVERNANCE	21
EDUCATIONAL AND RESEARCH ACTIVITIES.....	22
NURSE STAFFING & ACTIVITY.....	23
ADDITIONAL INPUT	24
NEONATAL RESEARCH ACTIVITY 2016	25
PEER REVIEWED PUBLICATIONS (2016, in alphabetical order).....	26
OTHER RESPOSNSIBILITES AND CONSTRIBUTIONS.....	27
2016: THE HIGHLIGHTS.....	28

Data for this report was extracted from BadgerNet, Transport database and other unit based resources.

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Jane Hall, Neonatal Unit Manager (Transport data, cot occupancy data, nursing update)

Dr Lynne Paterson, Nurse Consultant (Nursing Update)

Dr Helen Simpson, Consultant Obstetrician; Barbara Woodward, Obstetric Data Manager

LIST OF ABBREVIATIONS

ANNP	Advanced Neonatal Nurse Practitioner
BAPM	British Association of Perinatal Medicine
BPD (CLD)	Broncho-Pulmonary Dysplasia (Chronic Lung Disease)
CDOP	Child Death Overview Panel
CPAP	Continuous Positive Airway Pressure
FHN	Friarage Hospital Northallerton
HD	High Dependency Care
HFNC	High Flow Nasal Cannula
HFOV	High Frequency Oscillation Ventilation
HIE	Hypoxic Ischaemic Encephalopathy
IC	Intensive Care
IVH	Intra-ventricular Haemorrhage
JCUH	James Cook University Hospital
LSCS	Lower Segment Caesarean Section
NEC	Necrotising Enterocolitis
NICU	Neonatal Intensive Care Unit
ONS	Office of National Statistics
PDA	Patent Ductus Arteriosus
RCPCH	Royal College of Paediatrics and Child Health
RCT	Randomised Controlled Trial
ROP	Retinopathy of Prematurity
SC	Special Care
SCBU	Special Care Baby Unit
SVD	Spontaneous Vaginal Delivery
TC	Transitional Care

DEFINITIONS

Early neonatal death: Death of a live-born baby occurring less than 7 days from the time of birth.

Late neonatal death: Death of a live-born baby occurring after the 7th day and before 28 completed days from the time of birth.

Stillbirth rate: Number of stillbirths per 1000 total births.

Early neonatal mortality rate: Number of early neonatal deaths per 1000 live births.

Perinatal mortality rate: Number of stillbirths and early neonatal deaths per 1000 total births.

Neonatal mortality rate: Number of neonatal deaths per 1000 live-births.

NICU mortality rate: Percentage of total number of deaths until discharge out of total number of admissions in neonatal unit.

BAPM 2011 LEVELS OF CARE FOR WORKLOAD DEFINITION

1. **Intensive care** – This is care provided for babies who are the most unwell or unstable and have the greatest needs in relation to staff skills and staff to patient ratios.

Definition of Intensive Care Day

- Any day where a baby receives any form of mechanical respiratory support via a tracheal tube
- **BOTH** non-invasive ventilation (e.g. nasal CPAP, SIPAP, BIPAP, vapotherm) and PN
- Day of surgery (including laser therapy for ROP)
- Day of death
- Any day receiving any of the following
 - Presence of an umbilical arterial line or umbilical venous line
 - Presence of a peripheral arterial line
 - Insulin infusion
 - Presence of a chest drain
 - Exchange transfusion
 - Therapeutic hypothermia
 - Prostaglandin infusion
 - Presence of repleg tube
 - Presence of epidural catheter
 - Presence of silo for gastroschisis
 - Presence of external ventricular drain
 - Dialysis (any type)

2. **High Dependency Care:** This is care provided for babies who require highly skilled staff but where the ratio of nurse to patient is less than intensive care.

Definition of High Dependency Care Day

Any day where a baby does not fulfil the criteria for intensive care where any of the following apply:

- Any day where a baby receives any form of non-invasive respiratory support (E.g. nasal CPAP, SIPAP, BIPAP, HHFNC)
- Any day receiving any of the following:
 - Parenteral nutrition
 - Continuous infusion of drugs (except prostaglandin &/or insulin)
 - Presence of a central venous or long line (PICC)
 - Presence of a tracheostomy
 - Presence of a urethral or suprapubic catheter
 - Presence of trans-anastomotic tube following oesophageal atresia repair
 - Presence of naso-pharyngeal airway/nasal stent
 - Observation of seizures / cerebral function monitoring
 - Barrier nursing
 - Ventricular tap

3. **Special Care:** special care is provided for babies who require additional care delivered by the neonatal service but do not require either Intensive or High Dependency care.

Definition of Special Care Day

Any day where a baby does not fulfil the criteria for intensive or high dependency care and requires any of the following:

- Oxygen by nasal cannula (low flow)
- Feeding by nasogastric, jejunal tube or gastrostomy
- Continuous physiological monitoring (excluding apnoea monitors only)
- Care of a stoma
- Presence of IV cannula
- Baby receiving phototherapy
- Special observation of physiological variables at least 4 hourly

4. **Transitional Care:** Transitional care can be delivered in two service models, within a dedicated transitional care ward or within a postnatal ward. In either case the mother

- **Must be resident with her baby and providing care.** Care above that needed normally is provided by the mother with support from a midwife/healthcare professional who needs no specialist neonatal training.

Examples include

- Low birth-weight babies
- Withdrawal for Neonatal Abstinence Syndrome and babies requiring a specific treatment that can be administered on a post-natal ward, such as antibiotics or phototherapy.
- Is provided for babies with no medical indication to be admitted to NICU.

INTRODUCTION

As highlighted in the annual report of 2015 about our plans to implement the findings of the RCPCH review of the neonatal services in the south of the region, this year has seen some very important decisions being drawn at the unit, trust as well as wider network and specialist commissioners level. The main result of this is going to be a phased transfer of all neonatal intensive care activities to a single unit in the Teesside area which will be based at the JCUH site. This will achieve our aim of consolidating neonatal services in the Teesside region and provide the best possible care for our newborn babies and their families by next year. Several working groups have been established to ensure that strategic planning of this magnitude is delivered without any patient safety issues.

The proposed changes will increase our nursing and medical establishments to manage the anticipated increase in activity. We plan to create another neonatal consultant post to ensure we have a robust medical consultant rota to deliver the best care to our patients. Prior to any pathway change our expectation is that we will also be fully recruited to our nursing workforce.

Our general bed day activity has increased from the previous year. This is reflected in a number of in-utero and ex-utero transfers from other hospitals. Along with our colleagues in other neonatal units, we try to keep our babies within the region to provide care as close to home as possible. The annual delivery rate remains at around 5000 and we anticipate this figure may rise next year with the reconfiguration of services in line with the RCPCH Review and further work as part of the Sustainability and Transformation Plans (STP) under the NHS Better Health Programme.

We have seen the partial implementation of a new dedicated neonatal transport service however still continue to provide some transport service in the region but eventually this will be taken over by the new dedicated service once full implementation which is based in the grounds of the RVI in Newcastle. Dr Rob Tinnion has taken up the post as Lead Consultant for Neonatal Transport. Dr Tinnion's responsibilities in updating neonatal policy and risk has been taken on by Dr Prashant Mallya.

Our educational and training programme for medical students, paediatric trainees and nursing staff continues to receive positive feedback in various surveys. The research activities in the department reflect our ongoing commitment to deliver high quality research for better care of our patients.

UNIT STAFFING

Dr. Jonathan Wyllie	Clinical Director of Neonatal Services Special Interest: Cardiology and Resuscitation
Yasmin Scott	Service Manager
Cathy Brammer	Clinical Matron
Jane Hall	Unit Manager
Dr Lynne Paterson	Nurse Consultant
Prof Sunil Sinha	Conference Director Special Interest: Neonatal Ventilation, Research
Prof Win Tin	Lead for Clinical Research Special Interest: Neurodevelopment, Education
Dr Mithilesh Lal	Lead for BadgerNet Special Interest: Neonatal Transport, Epidemiology
Dr Shalabh Garg	Lead for CDOP, Neonatal Follow-up, Teaching Special Interest: Neuro-development, Renal Diseases
Dr Rob Tinnion	Lead for Clinical Governance Special Interest: Neonatal Transport, Simulation, Palliative Care
Dr Prashant Mallya	Lead for Obstetric Risk Management; Trainees Rota Special Interest: Cardiology

Specialist Nurses:

Irene Redpath Community Nurse
Advanced Neonatal Nurse Practitioners (ANNP):
Sue Walker (Middle Grade), Kath Noble, Caroline Buckley, Sian Oldham, Caroline Cleaver, Danielle Morley

Neonatal Sisters with additional roles

Amanda Forster & Helena Smith	Research Nurses
Jackie Cooke	Practise Development Nurse
Emma Williams & Sallie Southall	Breast Feeding Co-Ordinators
Susan Morgan	Neonatal Transport
Mary Rose Lees	Bereavement
Vicky Ford	Nursing Rota
Deborah Firth	Clinical Risk

Junior Doctors (Tier 1 and Tier 2):

Tier 1: 5 WTE as part of their paediatric training and 2 WTE from ANNPs

Tier 2: 6 WTE (ST3-ST5), 1 neonatal grid trainee (ST7-8), one research fellow

Neonatal Nurses:

Band 7- 2, Band 6- 22, Band 5- 48, Band 4- 2, Health Care Assistants 3, Auxiliaries- 4, Ward Clerks- 4

Pharmacist: Julie Pagan

Radiologist: Dr Henk Jongschaap

Ophthalmologists: Mr Qasim Mansoor

Obstetric Lead: Dr Helen Simpson

Fetal Medicine Lead: Dr Kumar Kumarendran

ENT: Mr Derek Bosman

MATERNITY STATISTICS-2016

Total number of deliveries: 4793 (↓5%)

Total number of babies born: 4900

Total Number of live Births: 4883

Total number of stillbirths: 17

Singleton: 4793

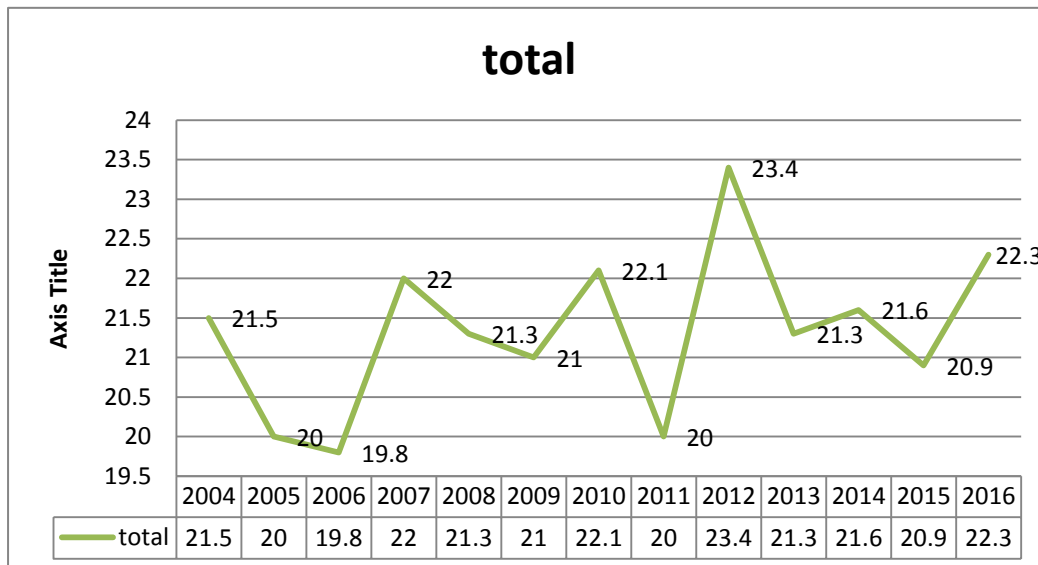
Twin Pregnancies: 101

Triplet Pregnancies: 6

Mode of Delivery:

Delivery Mode	% Rate (2014)	% Rate (2015)	% Rate (2016)
Emergency LSCS	13.8	11.9	13.2%
Elective LSCS	7.8	9	10.1%
Total LSCS	21.6	20.9	22.3%
Operative vaginal	12.6	10.1	11.5%
SVD/ Breech	65.8	69	65.1%

Total LSCS Rate:



Antenatal Steroid Rate in women delivered between 23 to 34 weeks gestation is 91%. This continues to improve from previous years rates of 87% (2015) and 83% (2014).

NEONATAL UNIT ADMISSIONS AND ACTIVITY

Cot Occupancy

Cots	Days 2016 (2015)	% Occupancy 2016 (2015)
IC	1152 (1466)	
HD	1747 (1580)	
IC & HD (total)	2899 (3046)	80(84)
SC	4755 (3903)	64 (54)
Total for JCUH	7654 (6940)	72 (69)

Activity

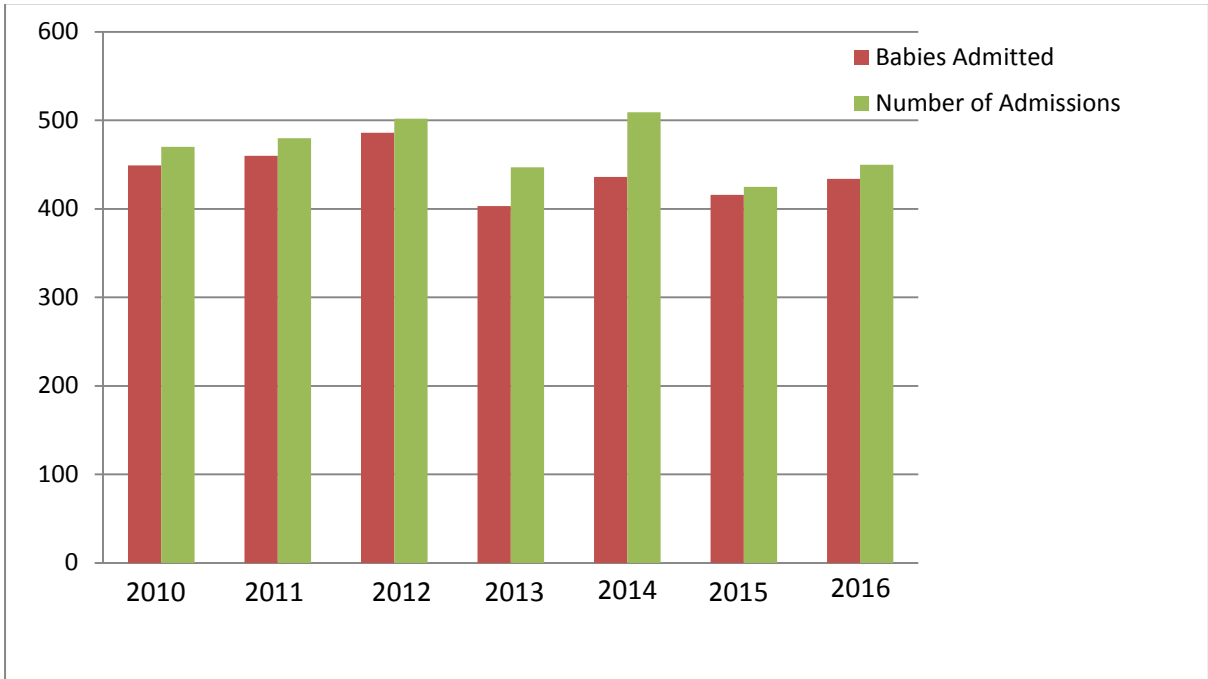
Neonatal Unit Admissions	2016 (2015)
Total Live Births	4883 (5093)
Total Admissions	434 (416)
Total In-born	352 (336)
Total Ex-utero	92 (80)
Total Booked in JCUH	317/73% (286/69%)
Booked Elsewhere (In-utero + Ex-utero Transfers)	35+90= 125/29% (50+80=130/31%)
Percentage of Live Births Admitted to NNU (In-borns)	7.2% (6.5%)

Total Annual Admissions (Last 5 Years)

2012 - 2016	Total Annual Admissions	
	Babies	Admissions
2012	486	502
2013	403	447
2014	436	509
2015	416	425
2016	434	450

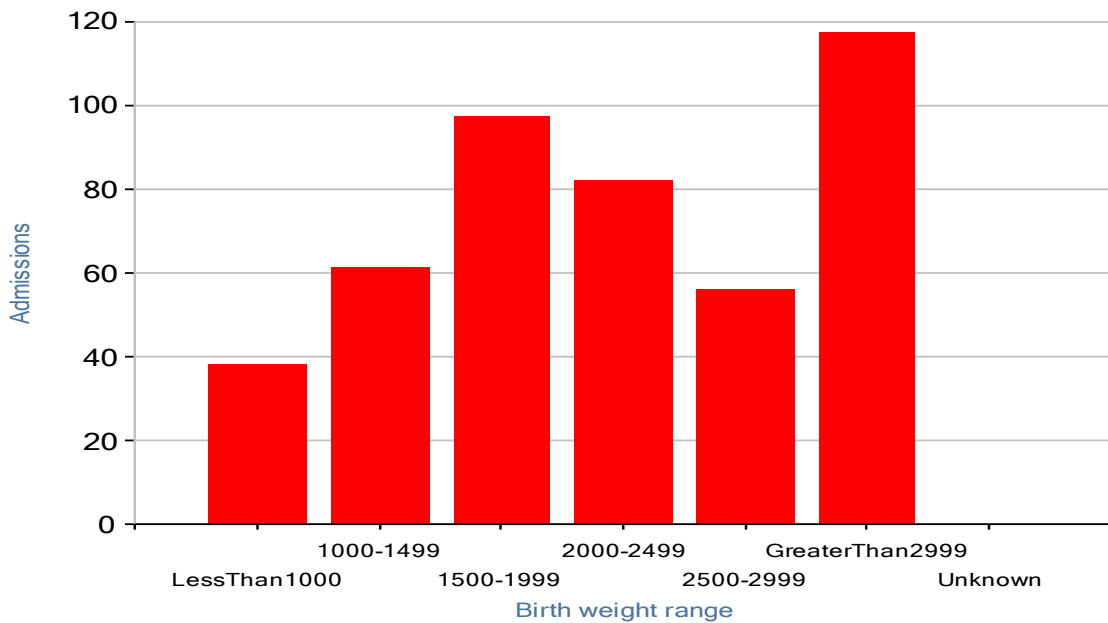
Multiple Births

Plurality	Number	% of Total Admissions	% of Total Live Births
< 37 weeks		2016 (2015)	2016 (2015)
Twins	78 (39 sets)	18% (15.3%)	1.5% (1.2%)
Triplets	24 (8 sets)	5.5% (2.1%)	0.5% (0.1%)
<30 weeks			
Twins	6 (3 sets)	1.3% (7.6 %)	0.1 % (0.6%)
Triplets	9 (3 sets)	2 % (1.4%)	0.1 % (0.1%)

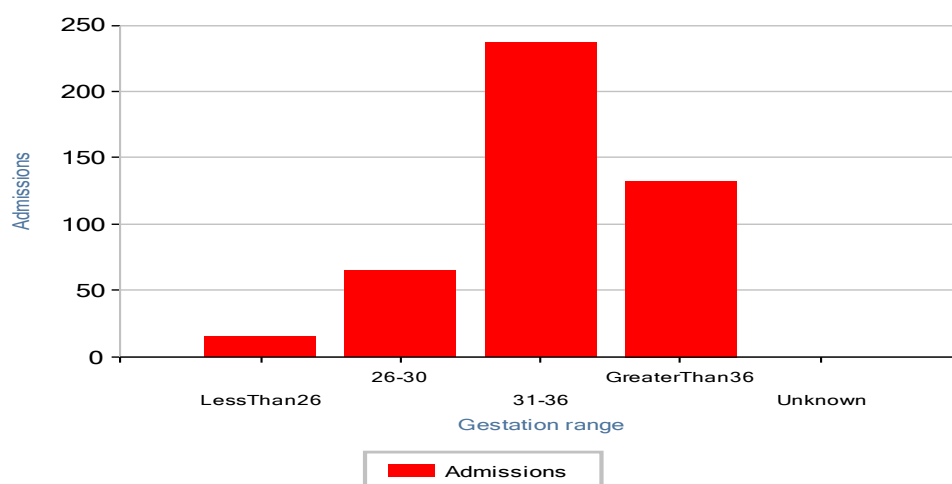


The 5% increase in the number of admissions is also reflected in the number of deliveries. Some of the reconfiguration plans that are being discussed for 2017 may have some impact on women booking in our maternity services from the adjacent areas. We anticipate that and are continuously assessing our staffing levels aiming for a BAPM compliant establishment.

NNU Admissions by birth weight



NNU Admissions by gestational age



Number of babies admitted as by gestational age:

Gestational Age	22	23	24	25	26	27	28-30	31-34	35-36	37-40	41-42	Total
Total Number	0	1	3	7	7	8	46	170	61	113	18	434
Stratified Gestation Groups	18 (4%) (23-26 weeks)					54 (12.5%) (27-30 weeks)		231 (53%) (31-36 weeks)		131 (30%) (37-42 weeks)		

Number of admissions where mothers were booked elsewhere

Booking Hospital	In-Utero Transfers 2016 (2015)	Ex-utero Transfers 2016 (2015)	Total 2016 (2015)
			North of Region
Cumbria (Carlisle/Whitehaven)	5	4	9 (18)
Royal Victoria Infirmary	7	26	33 (32)
Northumbria Emergency Care	1	5	6 (6)
Sunderland	0	2	2 (4)
Gateshead	1	5	6 (6)
South Tyneside	0	1	1 (2)
Durham	5	6	11 (16)
			South of Region
Darlington	8	28	36 (26)
North Tees	3	3	6 (6)
Friarage	3	1	4 (2)
Others (Out of Network)	2	9	11 (9)
Total	35 (48)	90 (79)	125 (127)

Babies transferred out of JCUH due to unavailability of cots in JUCH: North Tees- 6 (3 in 2015)

Monthly Activity (in days) according to Care Level as per BAPM 2011 standards:

According to the data, although the unit has been busier with cot days overall, the ITU days have decreased and the HDU days have increased. With the first phase of the reconfiguration of services this trend is likely to reverse with ITU days increasing.

Month	Intensive Care	High Dependency Care	Special Care	Total
January	97	200	307	604
February	108	164	334	606
March	124	98	500	722
April	90	150	432	672
May	80	132	459	671
June	132	111	413	656
July	75	136	281	492
August	110	109	353	572
September	86	102	493	681
October	133	168	266	567
November	82	216	369	667
December	35	161	548	744
Total	1152	1747	4755	7654

Transitional Care at JCUH

As highlighted in the BAPM categories in the start of the report (page 5), Transitional Care (TC) is a concept of care provided at JCUH by midwifery staff, within the post-natal ward. The mothers are active participants in taking care of the baby with support from healthcare professionals. The ultimate goal is to provide neonatal care while keeping the mother and baby together to promote mutual bonding.

At birth all babies are assessed against a 'traffic light' system of care categories which highlights if Transitional Care is indicated (for example birth weight <2.5kg, babies requiring IV antibiotics). Specific pathways of care have been designed for babies requiring Transitional Care. These babies also have a daily review by the neonatal team. Overall responsibility for the care of these Transitional Care babies lies with the named neonatal consultant on call for the week.

Additional training for Midwives and Assistant Maternity Practitioners (AMP's) to work with these babies and their mothers is provided by the ANNP team. Training covers aspects of thermal management, risk factors for sepsis, observations, fluid and feeding management, jaundice, Neonatal Abstinence and management of newborns at risk of hypoglycaemia. The appropriately trained midwifery staff members provide various aspects of neonatal care on the postnatal ward including intravenous antibiotics, blood sampling for blood glucose levels/serum bilirubin, administration of oral morphine for neonatal abstinence syndrome (NAS), observations of vital signs, provision of phototherapy, thermal management and feeding support.

The current staffing levels for Transitional Care are 1 midwife and 1 Assistant Maternity Practitioner: 6 women and their babies. Our current capacity for Transitional Care provision on the post-natal ward is 12 babies.

NEONATAL TRANSPORT ACTIVITY:

Month	Neonatal Transfers (2014)	Neonatal Transfers (2015)	Neonatal Transfers (2016)
January	27	25	12
February	27	8	12
March	9	12	17
April	24	24	15
May	26	21	11
June	22	17	11
July	22	14	16
August	12	14	5
September	15	12	10
October	10	15	5
November	10	10	7
December	20	5	7
Total	224	177	128

The neonatal transport services are being centralised and as part of wider planning of neonatal services in the North East. The transport service which will be known as NNeTS (Northern Neonatal Transport Service) is provided for the Northern Neonatal Network by a team based at Newcastle. As a result, the James Cook Team will be phasing out their transport services to a minimum as the transport team is further developed (recruitment and training of staff) over the next 12 months. This will see transfers being performed seamlessly in the future by a consistent team in a timely and safe manner.

Breast Feeding Rate (%) at the time of Discharge in babies <33 weeks gestation:

Unit	2013	2014	2015	2016
James Cook Hospital	22	35	50	43
North Tees Hospital	31	39	44	10
Sunderland Royal Hospital	40	60	42	52
Royal Victoria Infirmary	49	50	42	36

We have two nurses in the roles of breast feeding co-ordinators (1wte) within the NICU who have supported lactation and breastfeeding over the last 2 years. The funding for this role was for a limited period only but given the clear, positive difference this service had made to the babies and mother in improving their breast feeding experience, we have fed the results back to the CCG and are awaiting a decision to progress this as a fully funded service development in 2017/18.

Parenteral Nutrition (PN): In babies <29 weeks gestation and/or <1000 grams birth weight; 89% of the babies received parenteral nutrition by day 2. The total number of days that PN was used was 560 days which is a reduction of 35% from last year (886 days in 2015). This could be a reflection of our Intensive care activity which is reduced by about 21% in last 12 months.

Central line days: In 2016, there were a total of 986 days where there was an indwelling central catheter (UAC, UVC, PICC) used for inotropes, invasive monitoring, fluids, antibiotics or parenteral nutrition. This is a decrease of 18% from the central line days in 2015 (1200). There were 119 (149 in 2015) babies who had these central lines put in and the reduction in number of central line days is very much reflective of level 1 days in 2015. The median duration to keep UAC, UVC and long lines in situ was 4, 6 and 7 days respectively. The longest duration for keeping these lines was 10 days for UAC (1 baby), 13 days for UVC (1 baby) and 18 days for long line (1 baby). There were 3 positive blood cultures with a central line in situ during this time (**Central Line Infection Rate: 3 per 1000 line days**).

NEONATAL FOLLOW-UP

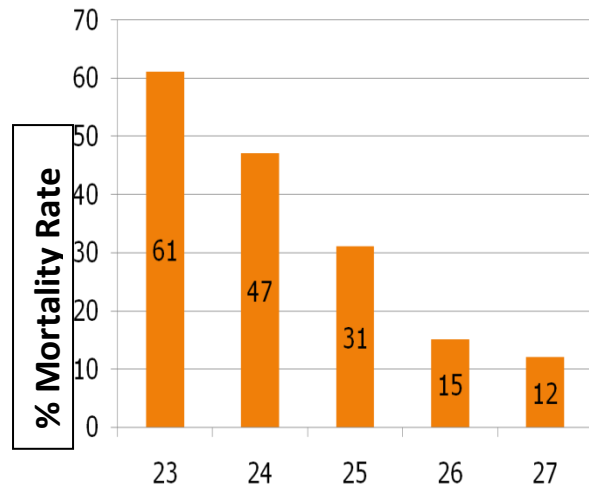
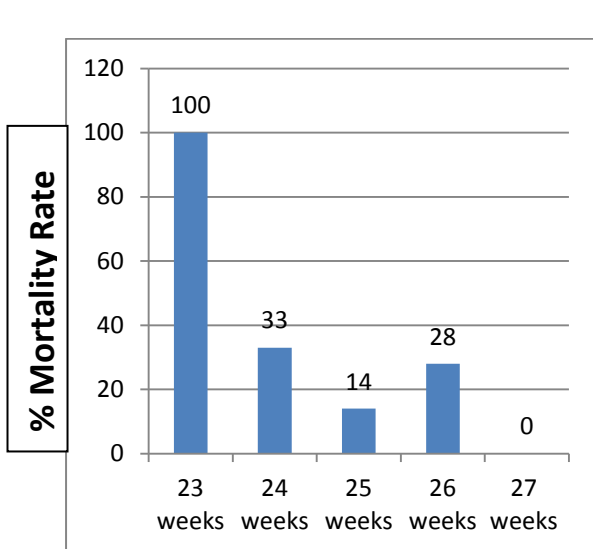
All neonates who are born prematurely (<32 weeks gestation) or have a complicated clinical course, are followed up in the high risk neonatal follow up clinic. This clinic is run once a week and is a multi-disciplinary clinic with involvement of neonatal consultants, registrars, physiotherapists, dieticians and health care assistants. Additionally a similar clinic is run monthly by Dr Mallya in the Friarage Hospital. There is also a nurse led clinic (run by our neonatal community sister) alongside for her particular caseload which includes babies who are discharged on special milk formulas, babies where growth is being monitored and those being monitored for hydrocephalus.

For all the babies who are from the Tees catchment area, there is a detailed neuro-developmental clinic (Bayley Scales of Infant and Toddler Development, 3rd Ed) in which all babies who were born less than 30 weeks gestation or suffered from perinatal asphyxia are offered follow up. This appointment is at 2 years of corrected age. Furthermore we occasionally follow babies from other areas who were cared for in our unit at this clinic. We continue to make progress in ensuring better follow up rates for these babies from this high risk group. For all the babies from our catchment area who were born less than 30 weeks gestation or term babies who had therapeutic hypothermia for hypoxic ischaemic encephalopathy, the current documented year follow up rate for these infants is 70%.

MORTALITY AND SURVIVAL STATISTICS

Survival rate in extreme premature babies (after admission to NICU):

Gestation (weeks)	Total Number	Died	Mortality Rate (%)	Survival Rate to Discharge (%)
23-24	4	2	50	50
25-26	14	3	21	79
27-28	22	1	5	95
Total (23-28)	40	6	15	85



Network Mortality Rate 2006-2011

The aggregated mortality by gestation for northern neonatal network (2006 to 2011) is shown in the figure on the right. There is a general trend in improvement of mortality over the years. It emphasises the impact of gestational age on mortality. Also at 23 to 24 weeks gestation, the overall numbers of deaths are small so producing a three year rolling mortality rates are more informative than yearly numbers.

Admission and Survival by Gestational Age in 2016:

Gestation*	Total Admissions	Total Deaths	<7d	7-28 d	>28 d	Mortality (%)	Survival to Discharge (%)
23	1	1			1	100	0
24	3	1	1			33	67
25	7	1	1			14	86
26	7	2	1	1		28	72
27	8	0				0	100
28	14	1	1			7	93
29	16						100
30	16						100
31	39	1		1		2.5	97.5
32	34						100
33-42	286	3	2		1	1	99

*Completed gestation weeks

Three Year Rolling Mortality:

Gestation ↓ Year →	Total Admissions				Total Deaths				Survival
	2014	2015	2016	Total	2014	2015	2016	Total	%
23-25 weeks	22	29	11	62	7	7	3	17	73
<28 weeks	42	62	40	144	8	8	5	21	85.5
<32 weeks	94	137	111	342	8	9	7	24	93
32-42 weeks	391	279	320	990	3	3	3	9	99
	436	416	434	1286	11	12	10	33	97.5

Perinatal Statistics: 2016

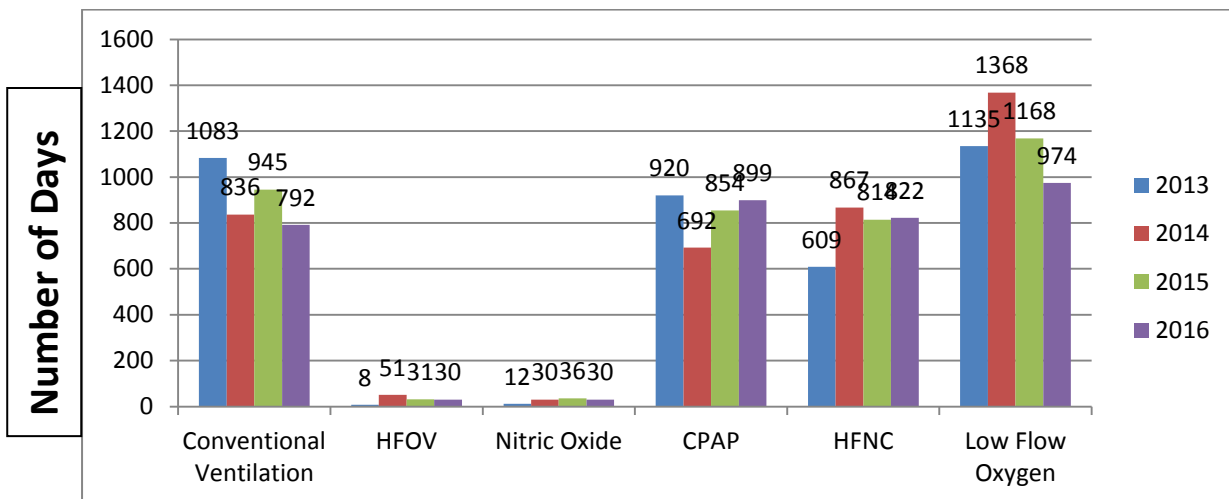
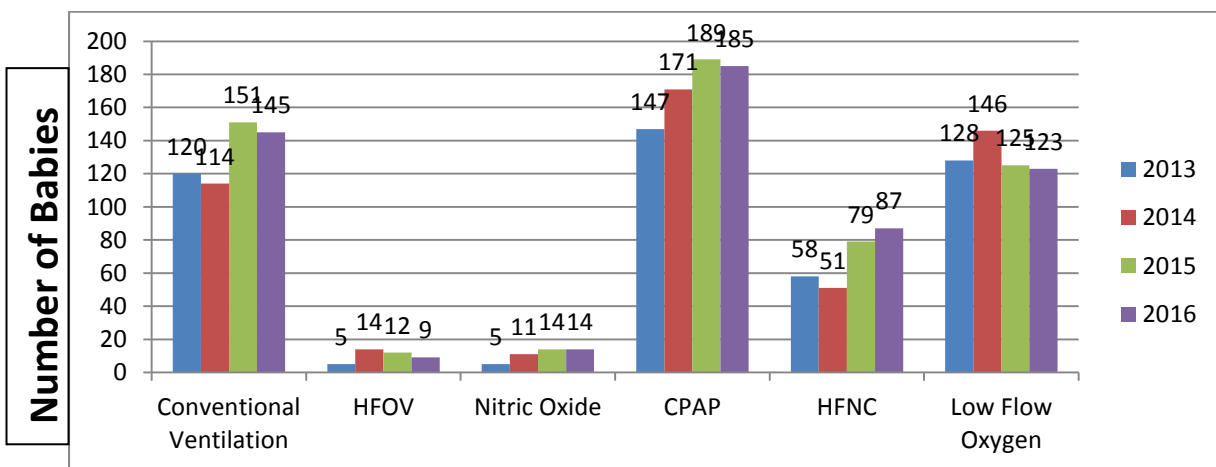
Perinatal Indicators	Total Number 2013	Total Number 2014	Total Numbers 2015	Total Number 2016	ONS England 2015
Total Live Births	4120	4330	5093	4883	664,399
Total Still Births	20	19	25	17	2952
Early Neonatal Deaths*	7	7	6	3	1373
Late Neonatal Deaths*	6	3	2	2	1745
Rates					
Still Birth Rate	4.8	4.3	4.9	3.5	4.4
Early Neonatal Mortality Rate		1.6	1.2	0.6	2.1
Perinatal Mortality Rate	6.5	5.9	6	4	6.5
Neonatal Mortality Rate	3.1	2.3	1.5	1	2.6
NICU Mortality	3.7%	2.5%	2.8%	1.6%	

*Excluded ex-utero transfers (not included in denominator data of local live births)

KEY MORBIDITIES

Respiratory Support Days during 2016:

Intervention (No of days)	Conventional Ventilation	HFOV	Nitric Oxide	CPAP	HFNC	Nasal Cannula O ₂
No of Babies						
	145	792				
	9	30				
	14		30			
	185			899		
	87				822	
	123					974



There continues to be an increasing trend for CPAP and high flow oxygen shows a marginal increase. The total number of babies needing mechanical ventilation (conventional and HFOV) remained fairly similar (163 in 2015 vs 154 in 2016) but the total number of ventilated days were reduced by almost 16% during the same years. Whether this reflects in a reduction of rate of BPD over next 1-2 years will need to be measured.

The use of nitric oxide (NO) is similar as to the last year. There were 14 babies who received NO out of which 9 babies were preterm babies (<37 weeks). 7 babies out of these were less than 30 weeks gestation.

BPD/CLD (oxygen requirement at ≥36 weeks) in babies born at <32 weeks gestation (Babies who had their major intensive care stay in JUCH) :

Gestation at Birth (weeks)	Total Number of Babies	Death (Rate)	Rate of BPD (amongst survivors)	Home Oxygen	Death + BPD (Rate)
23	1	1 (100%)	0	0	1 (100%)
24	3	1 (33%)	1/3 (33%)	1	2 (66%)
25	7	1 (14%)	6/6 (100)	3	7 (100%)
26	7	2 (28%)	4/5 (80%)	3	6 (85%)
27	8	0	5/8 (62%)	5	5 (62%)
28	14	1 (7%)	7/13 (54%)	3	8 (57%)
29	16	0	2/16 (12.5%)	2	2 (12.5%)
30	16	0	1/16 (6%)	0	1 (6%)
31	39	1 (2.5%)	0	0	1 (2.5%)
Total	111	7(6.3%)	26/67 (38%)	17	33 (30%)

Home Oxygen Rate in babies born less than 32 weeks gestation: These are the group of babies most vulnerable to develop BPD and some have an oxygen requirement when discharged home. In 2016, 17 babies (15% of the total number) were sent on home oxygen. Almost one third of the babies who developed chronic lung disease needed to go home on oxygen. The overall rate of chronic lung disease has remained the same as in 2015.

Patent Ductus Arteriosus (PDA) in babies less than 30 weeks gestation (n=56):

	2013	2014	2015	2016
Infants Diagnosed with PDA	35 (total babies <30 weeks=88)- 40%	23 (total number 56)- 41%	31 (Total babies 81)- 38%	29 (Total babies 56)- 51%
PDA requiring medical treatment (Ibuprofen only)	14 (40% of babies with PDA; 16% of total babies)	5 (22% of babies with PDA; 9% of total babies)	13 (42% of the babies with PDA; 16% of the total babies)	13 (45% of the babies with PDA; 23% of the total babies)
PDA closed with Ibuprofen	8 (Success Rate- 57%)	1 (Success Rate- 20%)	6 (Success Rate- 46%)	9 (Success Rate- 69%)
PDA Ligation	6 (14% of babies with PDA; 7% of all babies less than 30 weeks)	8 (35% of babies with PDA; 14% of all babies less than 30 weeks)	4 (13% of babies with PDA; 5% of all babies <30 weeks)	1 (3.5% of babies with PDA; 1.7% of all babies <30 weeks)

The use of Ibuprofen and ligation rate has more or less remained same over last 2 years. The success rate of Ibuprofen is quite reassuring in 2016 and this resulted in only 1 baby needing duct ligation in 2016. We are now actively recruiting for Baby-OSCAR trial which is a national trial to look into role of targeted PDA management in babies less than 28+6 weeks gestation.

Necrotising Enterocolitis (NEC):

Total number of live births between 23 to 30 weeks gestation: 72 (2015 = 108)

3 babies have died in 2016 where there was confirmed diagnosis of NEC (1 was confirmed at surgery; 2 were too unwell to be transferred to surgical centre)

NEC diagnosis and management	Number of Babies (%)	Gestation (n)
Clinically Suspected	7 (10%)	23 (1), 24 (2), 25 (1), 26(2), 28 (1)
Clinical and Radiological	3 (4%)	1 had confirmed NEC at Surgery
Transfer to Surgical Centre	3 (4%)	Outcome of Babies transferred to surgical centre:
Surgery Required	3 (4%)	<ul style="list-style-type: none"> ▪ Transferred back in 2 days- no NEC ▪ PAN NEC, died (28 week) ▪ Milk Inspissation, no NEC- Leeds

Retinopathy of Prematurity (ROP):

<p>Number of babies eligible to have ROP screening: 81</p> <p>Number of babies with screening within the desired time window: 65 (80%)</p> <p>Number of babies admitted at ≤28 weeks: 26 (≤30 weeks: 56)</p> <p>Number of babies that developed any degree of ROP: 15</p> <p>Number of babies needing Laser therapy: 6 (24 weeks-1; 25 weeks-4; 26 weeks-1)</p> <p>Rate of Laser Therapy in babies ≤/ 28 weeks: 23% (≤/ 30 weeks: 10.7%)</p>
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Hypoxic Ischaemic Encephalopathy and Therapeutic Hypothermia:

Gestational Age (Weeks)	Inborn	Out-born	Outcome
37		1	Discharged to local hospital and then home
38	2		Both Discharged Home (1 died later at 6 months)
39	2		One Discharged Home, one died
40		2	One Discharged Home, other to local hospital
41	1	1	Discharged Home
Total	5	4	Survival- 8 (89%)

CLINICAL GOVERNANCE

Clinical Audits

As a department, we continue to conduct annual quality improvement cycles each year to highlight clinical issues as well as implement any changes required for ongoing improvement. A clinical audit group has been established which includes neonatal medical and nurse consultants as well as a clinical audit co-ordinator. The group meets bimonthly to ensure progress of ongoing audits and their timely completion, their presentation at monthly paediatric audit meetings as well as the implementation of their recommendations. A forward plan for the audits is published every 3 to 6 months that forms the basis for future audits and these are given to new trainees and other staff on the NICU to undertake thus aiding in their training and development. We continue to make progress in the national neonatal audit programme (NNAP) and provide essential data for national benchmarking. The drug/prescription audit has been ongoing now for almost 2 years and as a result of this, a number of changes have been made that have objectively improved our prescribing practices as well as helped reduce serious drug errors.

Mortality Review and Risk Management

We conduct monthly death review meetings to critically evaluate the medical care of the babies who die in the neonatal unit. This is a multi-disciplinary meeting involving neonatal and obstetric consultants, junior doctors, ANNP's, midwives, pathologists, and nursing staff as well as colleagues from other hospitals. Any positive and negative points about the overall medical care of the babies are highlighted and issues identified. Recommendations are made from these and action plans are implemented. The learning points are then discussed at the Teesside Child Death Overview Panel. We aim to complete the whole process within 6 months of the death of the each baby. We have made the process more robust as compared to previous years by securing an external independent neonatal consultant from another hospital, who chairs the meetings.

Any other areas of clinical risk are highlighted by the Datix system and reviewed monthly at the Directorate Paediatric and Neonatal Clinical Risk meeting, attended by medical and nursing representatives from both teams. All incidents are reviewed and a monthly tracking and trending of incidents are monitored and actioned. This includes formal and informal complaints. Any serious risk generates a root cause analysis or a serious incident investigation and appropriate escalation.

In addition, staffs from the NICU attend the Northern Neonatal Network governance meetings. These are held quarterly and include death reviews as well as complex cases where learning is shared.

Guidelines and Protocols:

There are medical, nursing and drug protocols in the department which cover many clinical areas. Guidelines are readily accessible within the neonatal unit by all clinical staff and are made available to the trainees during their induction period. There is a programme in place to continually extend and update these and post them onto the Trust's internal website, ensuring they are current.

EDUCATIONAL AND RESEARCH ACTIVITIES

Education and Training:

The department has developed a comprehensive induction programme for the new doctors and nursing staff.

Ours is an academically active department where various other teaching programmes are delivered to fulfil the educational needs of junior doctors and nursing staff. The medical teaching programme has been further extended from last year and morning teaching occurs every day now (Mon-Fri). The teaching sessions include journal clubs, case presentations, X-ray meetings, grand rounds as well as expert lectures from guest speakers.

A chest drain workshop using animal models is conducted every 6 months with the change-over of junior doctors and is well appreciated amongst trainees medical staff as well as ANNP trainees and provides a useful update for all others.

Neonatal Simulation Training is being used more within neonatal skills training over the last few years. In our department, we have established a multi-disciplinary simulation training programme and under leadership of Dr R Tinnion and Dr S Garg, there are regular simulation sessions delivered for nurses and doctors. We have also started to introduce more joint sessions with both the obstetrics and paediatric departments.

Nurses Education and Training:

There are monthly educational training days for our nursing staff where mandatory training and other more specific training is delivered and regular staff meetings take place. Our nurses have well established links with Teesside University where specialist post registration courses in special and intensive care of the newborn are delivered. We have introduced a teaching session for student nurses from Teesside University who have placements the NICU where they spend a morning being initiated to working on the Unit. We are a centre for pre-registration education and regularly have student nurses and midwives rotating into the unit both as junior and senior students in order to gain valuable neonatal experience and we regularly get excellent feedback from our students.

We contribute to the Trust 'widening participation' agenda so that local students can gain valuable work experience in anticipation of a career in the associated caring professions and we have recently had three former 'students' accepted onto a programme of pre-registration nursing training. A weekly teaching session is conducted for neonatal nurses led by Advanced Neonatal Nurse Practitioners which includes varied aspects of neonatal care and practice and involves all members of the multidisciplinary team.

There is now a well-established induction programme for all the new starters in the nursing role. They are provided with a Preceptorship pack which is competency based and covers Intensive care, High dependency and special care areas of the Unit. All new starters are assigned a mentor to work alongside. The practice development Sisters ensure that the nurses are supported, attend essential training and complete their preceptorship programme within the first year working on the Unit.

We have successfully trained several ANNP trainees over the years and currently with the support from Health Education North East (HENE) have been able to support two trainees to attend Sheffield University for their master's level education.

NURSE STAFFING & ACTIVITY

Staffing has increased in line with our current cot configuration and we have achieved safe staffing levels. We are working towards achieving staffing numbers in line with BAPM Standards as the RCPCH review recommendations come to fruition in 2017/2018.

Family Centred Care

Work on family centred care has been on-going for some time on the NICU. There is a small group of nursing staff who are developing information leaflets as well as processes for parents and staff in order that families feel they can contribute to the care of their babies whilst on the unit. The Bliss Baby Charter Audit is being worked on and staff are looking at different ways of working to ensure that these standards are being adopted and that the necessary alterations to our environment is being addressed.

Changes include: the use of quiet times for babies and parents, increasing the amount of kangaroo care and the use of stickers, use of a Family Guide for parents, more information for siblings of babies on the NICU, greater encouragement of mothers and fathers to read and sing to their babies and the use of diaries for parents and staff to write comments about their babies which can then be kept as a keepsake on discharge.

FINE (Family & Infant Neurodevelopmental Education Programme) Training

Several members of the nursing team and two of our consultants have undertaken the FINE level 1 foundation training, and a couple of staff have undertaken the FINE level 2, practical skills training. This has been supported by the Northern Neonatal Network and rolled out by Bliss. Staff therefore, ensure that noise, light and touch is better supported and are looking at ways to improve this within the unit so that the care of the infant is not compromised.

Sibling Bags & Activities

Bags have been developed on the NICU following some work done with one of our staff and a charitable team in Scotland. These bags have colouring books and toys inside and they are used to ensure that siblings have something to do whilst visiting with their parents.

DVD Players

In addition to the sibling bags DVD players as well as DVDs have been donated which can be used to entertain siblings when they visit the unit. The DVD players can also be used for informational use by the parents when demonstrating resuscitation and manual breast expression.

Stoma Care Pathway

Several members of the nursing team developed a specific stoma pathway for babies who had surgery performed at Newcastle at our surgical site. This includes a box which ensures that babies have the correct stoma fixations and that they are managed in accordance with the surgeon's wishes when they are transferred back to the NICU. Staff are also in no doubt as to which fixations and bags are being used and this is consistently applied. This was developed in direct response to parents' feedback on the NICU.

Advanced Neonatal Nurse Practitioners (ANNPs):

Whilst the role of the ANNPs is not a new one on our NICU, we continue to develop the team. We now have 6 fully trained nurse practitioners working in the department. One of the senior ANNPs has now been promoted to function at middle grade level. We are also looking into the development of a specific portfolio for appraisal and competencies for all our ANNPs. There is now an allocated consultant supervisor for ANNPs and in liaison with Dr Lynne Paterson (Nurse Consultant), the consultants provide the clinical supervision similar to that for neonatal trainees.

Practice Development:

In 2016, Jackie Cooke in this role has helped to support students, new starters and also existing staff to maintain practice and to develop the skills that we require into the future. She also arranges and runs the monthly training days for nursing staff and coordinates mandatory training as well as maintaining staff training records. Jackie then left this role to join the ANNP programme and her post was taken up by two Neonatal Sisters Helena Smith and Elizabeth Schonewald.

Breast feeding facilitators

The NICU continues to benefit from a continued secondment of two breast feeding facilitators. They continually manage to achieve increased rates of expressing on the unit as well as an increase in the number of mothers who continued to breast feed when they were either discharged home or transferred to other units. This role is now been recognised by the trust and we are very hopeful to achieve permanent funding for this role in the near future.

ADDITIONAL INPUT

Volunteers on the NICU:

The role of the volunteer on the NICU has been developed over the last two years. The volunteers act as a resource for parents when they need someone to talk to and can support them in different ways from the neonatal team. A team of volunteers are involved in making a drinks trolley each day and hold a weekly 'coffee morning' for our parents. This is a weekly slot where tea, coffee and cake is available in our waiting room and is attended by our volunteers and often by our chaplaincy team. Parents are invited to drop in for a chat and this in turn helps establish links with other parents on the unit. The volunteers are also involved in promoting our parents feedback information.

Middlesbrough BLISS Family Group:

This group was jointly set up by our BLISS Family Care Sister and one of our Community Sisters. It was developed to provide peer group support for families once they leave the neonatal unit. It runs twice a month and there are between five and ten families accessing this group each time it runs. There are many more families who access the Facebook page associated with this group and as such it also provides support from a distance.

NEONATAL RESEARCH ACTIVITY 2016

Research Team

Prof W Tin, Dr M Lal, Prof J Wyllie, Dr S Garg, Dr H Chitty

Research nurses: Amanda Forster, Suzanne Bell and Helena Smith.

2016 saw our neonatal activity flourish with a total of nine studies underway and one other imminent. What had started as a mainly consultant led venture had now become a full team effort.

One whole time equivalent research post was equally shared between Registered Nurses Amanda Forster and Suzanne Bell. This is latterly filled by Helena Smith.

The research team have vastly improved the communication and teamwork related to research in the NICU.

During this year the studies recruited at an excellent rate often surpassing the targets set.

Our longest running study Planet-2 began back in 2013. We are part of one of the largest randomised neonatal trials investigating when is best to administer platelet transfusions to pre term babies.

SIFT is an infant feeding study which finished in May 2016 to which recruited and randomised 114 babies becoming one of the top recruiting sites in the country.

The Royal Victoria Infirmary invited us to be part of THE REDEXAM STUDY looking at indicators of Retinopathy of Prematurity in pre term infants. We contributed to the cross site target of 300 babies recruiting and consenting 65 babies in total.

The ELFIN study has becoming our largest recruiting study and we have become one of the highest recruiting sites surpassing our target of 70 babies by May of 2016.

We were fortunate to be chosen for the pilot phase of The BABY- OSCAR study, a large randomised trial looking at early treatment of Persistent Ductus Arteriosus in babies less than 29 weeks gestation. The larger randomised controlled trial is to follow.

On a smaller scale we contributed to The PARENT study looking at parents' views about neonatal research. We met our target of ten sets of parents.

We contribute to the E-tips pilot study implementing early intervention family led therapies for babies who have suffered a stroke.

Locally we saw completion of two independent studies on the neonatal unit;

Dr Helen Chitty implemented The VoluVent study comparing differing types of ventilation and successfully completed the recruitment in Dec 2015. We eagerly wait for the results to be presented in 2017.

Dr Shalabh Garg's NIDOP study recruited successfully, comparing different methods of measuring blood pressure in pre term infants.

Both studies involved a huge contribution on the part of the nursing staff and because of their enthusiasm we were able to implement the studies successfully. We were very fortunate to have Dr Helen Chitty as research fellow. Dr Chitty worked incredibly hard not only to implement her own study but she continually supported and advised the research nurses throughout. She was hugely instrumental in recruitment for all of the neonatal studies during this time. She also organised and chaired The Teesside Perinatal and Neonatal Research Group cross site meetings allowing us to discuss and share ideas across the network.

Research on the neonatal unit has become a full team effort. Amanda and Helena hold regular training sessions and updates for medical and nursing staff. They ensure that the studies are run safely by well-informed staff and that the trusts Research and Development regulations are always followed. We are proud of our team and excited to see the results of such hard work and dedication to improving care for the babies and their families.

PEER REVIEWED PUBLICATIONS (2016, in alphabetical order)

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Tin W, Lal M. Discharge Planning and Follow Up of the NICU Graduate. In: Manual of Neonatal Respiratory Care (Ed. Donn SM & Sinha SK) Elsevier, Philadelphia 2016.

Wyllie J. Reply to: 'What initial oxygen is best for preterm infants in the delivery room?-A response to the 2015 neonatal resuscitation guidelines.'. Resuscitation. 2016;101:e9.

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Wyllie J. Managing Obstetric Emergencies and Trauma. The MOET course manual 3rd edition. Paterson-Brown S, Howell C eds. Cambridge June 2016.

OTHER RESPONSIBILITIES AND CONTRIBUTIONS

Jonathan Wyllie:

- Organising Faculty:
- Annual International Neonatal Conference, Middlesbrough, UK
- Teesside Neonatal Cardiology and Haemodynamic Conference, Stockton, UK
- Chair, NLS Course Subcommittee
- Chair, Advanced Resuscitation of the Newborn Infant (ARNI) Working Group
- Chair, European Resuscitation Council NLS International Courses Committee
- Co-chair, ILCOR neonatal task force for the evidence evaluation process
- NLS Course Director, Middlesbrough
- Member of Northern Neonatal Network Executive Board

Win Tin:

- Principal Overseas Examiner, RCPCH
- Vice Chair, MRCPCH Written Examination Board
- Member, MRCPCH Examination Board
- Senior and Overseas Examiner, MRCPCH and DCH Examination

- Member, PRE and Specialist Question Writing Group
- Course Director, Annual International Neonatal Conference, Middlesbrough , UK

Mithilesh Lal:

- Vice Chair, MRCPCH Written Examination Board
- Principal Regional Examiner, Northern Deanery, RCPCH
- Member, MRCPCH Examination Board
- Senior and Overseas Examiner, MCRPCH and DCH Examination
- Lead Examiner, PRE and Specialist Question Writing Group
- Organising Faculty, Annual International Neonatal Conference, Middlesbrough, UK

Sunil Sinha:

- Conference Director, Annual International Neonatal Conference, Middlesbrough, UK
- Organising Faculty, Teesside Neonatal Cardiology and Haemodynamic Conference, UK
- Chairman, International Academy of Neonatology (IAM), Kuala Lumpur, Malasia.

Rob Tinnion:

- Member, NLS Subcommittee of Resuscitation Council
- Neonatal Representative, North East Paediatric Palliative Care Network
- NLS Course Director, Sunderland
- Faculty, Neonatal Stabilisation Courses in Northern Neonatal Network (NNN)

Shalabh Garg:

- Member, Question Writing Group, RCPCH
- Member, Teesside Child Death Overview Panel
- Faculty, Neonatal Stabilisation Courses in Northern Neonatal Network (NNN)
- Member of the Guideline Group of Northern Neonatal Network (NNN)
- Lead Reporter, Each Baby Counts and MBRRACE-UK Projects, RCOG

2016: The Highlights:

- *Expansion plan for the NICU being implemented to deliver the recommendations of the RCPCH review of neonatal services in the North East*
- *Recruitment of medical and nursing staff to ensure safe staffing levels and to further consolidate our plans of achieving BAPM staffing standards*
- *Only 6 babies were transferred to another hospital (within our region only) due to unavailability of beds and we continue to provide space for babies from other hospitals*

- *Increased capacity: Unit capacity has increased to 32 cots (12.5 HDU/ITU and 20 SCBU beds)*
- *Dr Jonathan Wyllie was awarded with the Professorship from the Durham University*
- *Assistant Practitioner Ann-Marie Pryde, won the Trust 2016 Nightingale Award for her work on the development of a Family Guide for parents and also a book for siblings who have a brother or sister on the NICU*
- *Dr Shalabh Garg completed a postgraduate certificate in clinical research from Newcastle University as part of the Greenshoots Scheme from NIHR CRN North East*
- *Participation and above target recruitment in a number of NIHR Portfolio Clinical Trials*
- *This year was the 24th year that our annual international neonatal conference was held*