University Hospitals Sussex
NHS Foundation Trust

ANNUAL REPORT 2020

RSCH TREVOR MANN BABY UNIT

PRH SPECIAL CARE BABY UNIT

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ABBREVIATIONS

AABR	Auditory Acoustic Brainstem Responses
ANNP	Advanced Neonatal Nurse Practitioner
ATAIN	Avoiding Term Admissions into Neonatal Units
BAPM	British Association of Perinatal Medicine
BSUH	Brighton and Sussex University Hospitals
CA	Corrected age
CDC	Child Development Centre
MBRRACE	Mothers and Babies - Reducing Risk through Audits and Confidential Enquiries across the UK
CLD	Chronic Lung Disease
CPAP	Continuous Positive Airway Pressure
CVL	Central venous line
EBA	Early Birth Association
ETT	Endotracheal tube
EUT	Ex-utero transfer
GA	Gestational age
HD	High dependency
HHFNC	Humidified High Flow Nasal Cannula
HFOV	High Frequency Oscillatory Ventilation
HIE	Hypoxic Ischaemic Encephalopathy
IC	Intensive care
IUGR	Intrauterine Growth Restriction
IVH	Intraventricular Haemorrhage
LW	Labour Ward
MRSA	Methicillin Resistant Staphlococcus Aureus
MSSA	Methacillin Sensitive Staphlococcus Aureus
NEC	Necrotising Enterocolitis
NIPE	Newborn & Infant Physical Examination Programme
N/K	Not Known
NNU	Neonatal Unit
NTS	Neonatal Transport Service
OAE	Otoacoustic emissions
OOPE	Out of Program Experience
PDA	Patent Ductus Arteriosus
PRH	Princess Royal Hospital
PROM	Premature Rupture of Membranes
RACH	Royal Alexandra Children's Hospital
ROP	Retinopathy of Prematurity
RSCH	Royal Sussex County Hospital
SEC ODN	South East Coast Operational Delivery Network
SLT	Speech and Language Therapy
SC	Special Care
SCBU	Special Care Baby Unit
TOF	Tracheo-Oesophageal Fistula
TMBU	Trevor Mann Baby Unit
WTE	Whole time equivalent

Introduction

The year 2020 will stay in everybody´s memory as the year of the Covid 19 pandemic. This brought lot of challenges to our usual care for healthy and ill infants and their parents. As the pandemic hit the NHS in the first quarter of the year processes for protecting patients, families and staff from infection had to be put in place at short notice and was sometimes changing daily. Everybody worked very hard to implement the guidance about hand washing, social distancing and wearing protective equipment. These rules led to restricted access for parents to be with their infants on the unit. We quickly adopted new technology such as online meetings and Vcreate, an electronic visual communication system which enables parents to view photos of their infants from home.

Improving the standard of care on the baby units is always the department's prime aim.

The team was very keen to start a new initiative called Family Integrated Care. This entails engaging and incorporating parents actively in the care of their babies whilst they are still in hospital. This project had to be slowed down during the lockdown phases of the pandemic, but the team is very keen to take it forward in the upcoming year. Our team is part of an international collaboration MSCA-RISEinFAMILY led by Professor Adelina Pellicer from Madrid, Spain. We were able to a grant for the European Commission´s Horizon 2020 program in 2020 and are looking forward to collaborate with partners and clinical teams in Spain, the Netherlands, Romania, Turkey, Zambia, Canada and USA.

In 2020 we have seen further progress with revision of important clinical guidelines, research and development of human factors' work and education. The educational and training program had to be moved to online sessions to the benefit of colleagues who are not on clinical duties or work at a different site and still can participate if they wish. This has received excellent feedback from medical and nursing students, medical trainees and trainee advanced nurse practitioners and it is likely that some elements of the hybrid teaching program will continue after the pandemic situation has resolved.

Our unit´s mortality rate is captured in the national MBRRACE reports. During 2016-2019 our unit had the lowest mortality rate compared with all neonatal tertiary care units in KSS (2019:1.2/1000 births). The National neonatal statistics reported the lowest mortality rate for our unit out of 28 neonatal surgical units in England for 2017(0.9/1000births). The neonatal dashboard and neurodevelopmental outcomes published in those reports suggest that we are performing well when compared to national statistics. However we also recognize that this same data tells us where we should be improving. In 2019 the department signed up and started entering our data to the Vermont Oxford Neonatal Database. This will help us compare and track our local clinical outcomes for preterm babies with units around the world and focus our quality improvement plans. Hopefully we will be able to share some of this data in the annual report in the years to come.

The Department of Neonatology is based on the Trevor Mann Baby Unit at the Royal Sussex County Hospital and the Special Care Baby Unit at Princess Royal Hospital. In 2020, there were 2482 deliveries at the Royal Sussex County Hospital and 2080 deliveries at the Princess Royal Hospital.

The Trevor Mann Baby Unit, RSCH:

The TMBU is one of the intensive care units in the Kent, Surrey and Sussex Neonatal Network. It provides a tertiary, neonatal medical and surgical service for

Brighton, East and West Sussex and a special care service for Brighton and Mid-Sussex. The Sussex Neonatal Transport Service is based at the TMBU. The units within the South East Coast Operational Delivery Network continue to strive to provide care as close to home as possible, and we work with our colleagues in neighboring transport services to ensure this can happen.
There are 27 cots on the TMBU of which 9 are staffed for intensive care, 8 for high dependency care and 10 for special care. Current cot levels in Brighton are set to provide sufficient medical and surgical intensive care facilities for Sussex babies. Transitional care is provided on the postnatal ward at RSCH. The Neonatal Outreach Service offers the opportunity for earlier and more supported discharge. A co-located midwifery led birthing unit in Brighton is awaited along with improvements to feto-maternal services.

The Special Care Baby Unit, PRH:

The SCBU at Princess Royal Hospital is staffed for 8 special care cots. Transitional care is provided on the postnatal ward. The baby unit is one of two in the UK led by a team of Advanced Neonatal Nurse Practitioners, supported by consultant neonatologists. Women likely to deliver at less than 34 weeks gestation, or whose baby may require intensive or high dependency care, are transferred to the RSCH. There are facilities at PRH for short term ventilation and stabilization of infants prior to transfer. Infants requiring short periods of care on CPAP or HHFNC are routinely managed at PRH. Plans are in place and charity funding has been pledged to improve facilities on the SCBU. It is hoped that delivery of more preterm babies might be possible once these changes are completed.

Further details can be found on the departmental website:
https://www.bsuh.nhs.uk/tmbu/

Maternity Service:

The neonatal and maternity teams work together to provide joint antenatal care for local mothers and in-utero transfers to the maternity department at RSCH. There is a monthly fetal medicine clinic with neonatal and surgical input. Individual counselling is provided for parents on the labour ward expecting preterm babies or babies with other complications.
The neonatal team deliver care and resuscitation to newborn babies on the labour ward as required. The team will routinely attend at-risk deliveries and those expected to need extra support such as preterm infants or those babies with complex antenatal diagnoses.
The neonatal department is responsible for NIPE screening for normal newborn infants and those on Transitional Care.
The maternity and neonatal teams are actively improving newborn pathways within the ATAIN programme. There are joint audit and clinical governance and perinatal meetings across RSCH and PRH sites.

Neonatal Surgery:

There is a high risk pregnancy unit for fetal assessment and referrals are accepted for perinatal care prior to neonatal surgery. All neonatal surgery is performed on site at the Royal Alexandra Children's Hospital with a team of dedicated paediatric surgeons and paediatric anaesthetists. There is sufficient IC and HD capacity

across the TMBU and RACH for neonatal surgery to be referred from around Sussex and a proportion of the Kent, Surrey and Sussex Neonatal Network.

Support Services and Ongoing Care:

We benefit from the developing tertiary services at the RACH, including respiratory medicine, cardiology, gastroenterology and endocrinology. Infants with ongoing medical or surgical needs beyond the neonatal period are transferred to the 'Alex' as soon as possible and we have particularly close links with the paediatric HDU which helps support the smooth transfer of babies with complex respiratory and surgical problems. Our department is supported by a team of paediatric radiologists providing a 24/7 on-call service. MRI, spiral CT and nuclear medicine investigations are all available on site. The neurophysiology department provides a mobile EEG service. We also have access to paediatric dietetics, physiotherapy, pharmacy, speech and language therapy, audiology, ophthalmology, breastfeeding advisor. The Respiratory and Community Paediatric Nursing Team help co-ordinate the discharge and follow-up of infants requiring home oxygen. There is a weekly multidisciplinary Family & Social Meeting. We have access to parent counselling and support from the Chaplaincy Team.

A perinatal pathology service is provided at St Thomas' Hospital, London, with visiting support from other tertiary specialists from the Evelina Children's Hospital including those from genetics, cardiology, nephrology and neurology.
Weekly neonatal follow-up clinics are held on both the RSCH and PRH sites. Monthly neurodevelopmental clinics are used to follow preterm and birth asphyxiated babies. We aim to provide comprehensive follow-up of high risk infants until two years corrected age. The Seaside View and Nightingale Child Development Centres provide multi-disciplinary care for those infants needing ongoing neurodevelopmental support. The weekly One-Stop Clinic cares for mothers and babies with problems of substance misuse.

Staffing

Medical Staff:

Consultant Neonatologists:

Dr Neil Aiton	Interest in perinatal substance misuse (One Stop Clinic)
Dr Philip Amess	Interest in neurology and developmental outcome
Dr Katy Barnes	Lead for Clinical Governance (from 5/2021)
Dr Prashanth Bhat	Interest in neonatal ventilation and IT
Dr Robert Bomont	Lead Clinician, Paediatric College Tutor, Training Programme Director, interest in infectious diseases
Dr Nikolay Drenchev	Consultant Neonatologist, interest in cardiology
Dr Ramon Fernandez	Senior Clinical Lecturer in Paediatrics, Lead for Clinical Governance (ended 5/2021), interest in nutrition,
Dr Cathy Garland	Transport Lead, interest in simulation training
Dr Cassie Lawn	Lead Clinician, Transport Lead, interest in human factors
Professor Dr Heike Rabe	Professor of Perinatal Medicine, Lead for Research
Dr Bettina Reulecke	Consultant Neonatologist, interest in neonatal neurology
Dr Simisola Williams	Locum consultant
Dr Ryan Watkins	Clinical Director, Children and Women's Services and Honorary Senior Clinical Lecturer.

Consultant Obstetricians:

Mr Salah Abdu
Mr Tosin Ajala
Miss Heather Brown
Miss Katherine Fraser (Clinical Lead)
Mr Ani Gayen
Mr Ehab Kelada (Fertility Lead)
Mr Tony Kelly
Miss Rebecca Mallick
Miss Jo Sinclair
Miss Tasneem Singhal
Mr Francis Usifo (Clinical Director_
Mr David Utting
Ms Win Khine (Fetal Medicine)
Mr Vuivun Wong

Consultant Paediatric Surgeons:

Miss Ruth Hallows (Clinical Lead)
Mr Varadarajan Kalidasan (Director of Medical Education)
Mr Costa Healy
Mr Bommaya Narayanaswamy
Mr Saravanakumar Paramalingam
Miss Jigna Sheth

Mr Hesham Elagami (locum)

Orthopaedic Surgeons: Mr Subramanyam Maripuri, Mr Thomas Crompton, Mr Kyle James

ENT Surgeons: Mr Simon Watts, Mr Prodip Das

Consultant Radiologists: Dr Lorraine Moon, Dr Lavanya Vitta, Dr Kyriakos Iliadis (Clincal Lead)

Consultant Ophthalmologists: Mr Dominic Heath, Miss Victoria Barrett

Consultant Audiologist: Mr Rob Low

Consultant Pathologist: Dr Mudher Al-Adnani (St Thomas' Hospital)

HD Paediatric Consultant: Dr Kamal Patel

Cardiology Consultant: Dr P Venugopalan

Consultant Gastroenterologists: Dr Assad Butt, Dr Michael Hii, Dr Haitham Abul-Eis

Respiratory Consultants: Dr Akshat Kapur (Lead)
Professor Paul Seddon
Dr Krishne Chetty
Professor Somnath Mukhopadhya,
Dr Tom Ruffles

Endocrinology Consultants: Dr Shankar Kanumakala, Dr Dunia Ismail (Lead)

Haematology Consultant: Dr Catherine Wynne

Oncology Consultant: Dr Anne Davidson

Neurology and Epilepsy Consultant: Dr Nikil Sudarasan, Dr Sharmila Jeyasingh

Visiting Consultants:

Dr James Wong	Cardiology
Dr Francesca Forzano	Genetics
Dr Chris Reid	Nephrology
Dr Tammy Hedderly	Neurology
Dr Elaine Hughes	Epilepsy
Dr Charles Buchanan	Endocrinology
Dr Mike Champion	Metabolic medicine
Dr Jonathan Hind	Gastroenterology

Junior and Middle Grade Medical Staff:

Tier 1 (8 wte): 6 ST2/3 trainees
1 Trust Clinical Fellow
Additional ANNP contribution

Tier 2 (11 wte): Associate Specialist (Dr Michael Samaan)
Specialist Doctors (Dr Fatou Wadda, Dr Sireesha Battenini)
4 Specialist Registrars
1 Grid Trainee
1 Trust Clinical Fellow
1 Human Factors OOPE (0.7 wte clinical)
ANNP contribution (approximately 1.25 wte)
Consultant contribution (approximately 2 wte)

Neonatal Nurses

Senior Nursing Staff

Lorraine Tinker	Head of Paediatrics and Neonatal Nursing
Claire Hunt	Matron, Neonatology
Dr Susanne Simmons	Senior Lecturer Child Health/Graduate Certificate in Acute Clinical Practice course leader/Neonatal Pathway lead

Band 7
Clare Morfoot (Clinical Practice Educator)
Clare Baker (Senior Sister, PRH)
Louise Watts (Transport)
Chrissie Leach (Transport)
Jacqueline Cherry (Risk management)
Sandra Hobbs (Rota and Leave)
Karen Marchant (Surgery and Patient Information)
Judy Edwards (Neonatal Outreach and Family Care)
Monika Suciu (Human Factors)
Hannah Fraser-James (Senior Sister – Special Care Lead)
Zoe Hall (Senior Sister, TMBU)
Jenny Tsang (Neonatal Child Death Review Sister)

Advanced Neonatal Nurse Practitioners

Jamie Blades	Naomi Decap
Rachel Burton	Caroline McFerran
Simone van Eijck	Sue Robinson
Nicola McCarthy	Alyx Marsh
Elli Hampton	

Trainee ANNP
Ashley Fernandez

There is a large team of Advanced Neonatal Nurse Practitioners who deliver the neonatal service at the SCBU PRH and contribute significantly to the Tier 1 and Tier 2 rota at the TMBU. Each ANNP has a consultant mentor, they are line managed by Lorraine Tinker, Head of Paediatrics and Neonatal Nursing.

Outreach Team:
Judy Edwards
Sara Arief
Sarah Stillwell

The Neonatal Outreach team works to support the discharge of infants from the TMBU and the SCBU at PRH. The team comprises of a sister who works full time and a senior staff nurse and nursery nurse who each work 13 hours per week.

Transport Ambulance Team:
Andy Frame
Graham Bullimore

Support Staff

Directorate Manager:	Jonathan Brooks
Unit Technician:	John Caisley
Pharmacist:	David Annandale
SLT:	Amanda Harvey, Katie James
Physiotherapy:	Emma Pavitt
Dietician:	Carole Davidson
Counsellor:	Julie Carroll
Secretarial support:	Jane Battersby, Emma Morris, Patricia Walker
Ward clerks:	Anthony Jackson-Leonard, Sasha Nye, Benjamin Butler, Lucy Hopkins (PRH)

This report can be found on the BSUH Neonatal website.
Data used to compile this report has been collected from BadgerNet and Metavision.
For enquiries please contact: heike.rabe@nhs.net

Admissions, Activity and Mortality:

TREVOR MANN BABY UNIT

Admissions	Total Admissions per year
2010	525
2011	562
2012	567
2013	528
2014	516
2015	534
2016	524
2017	513
2018	529
2019	451
2020	453

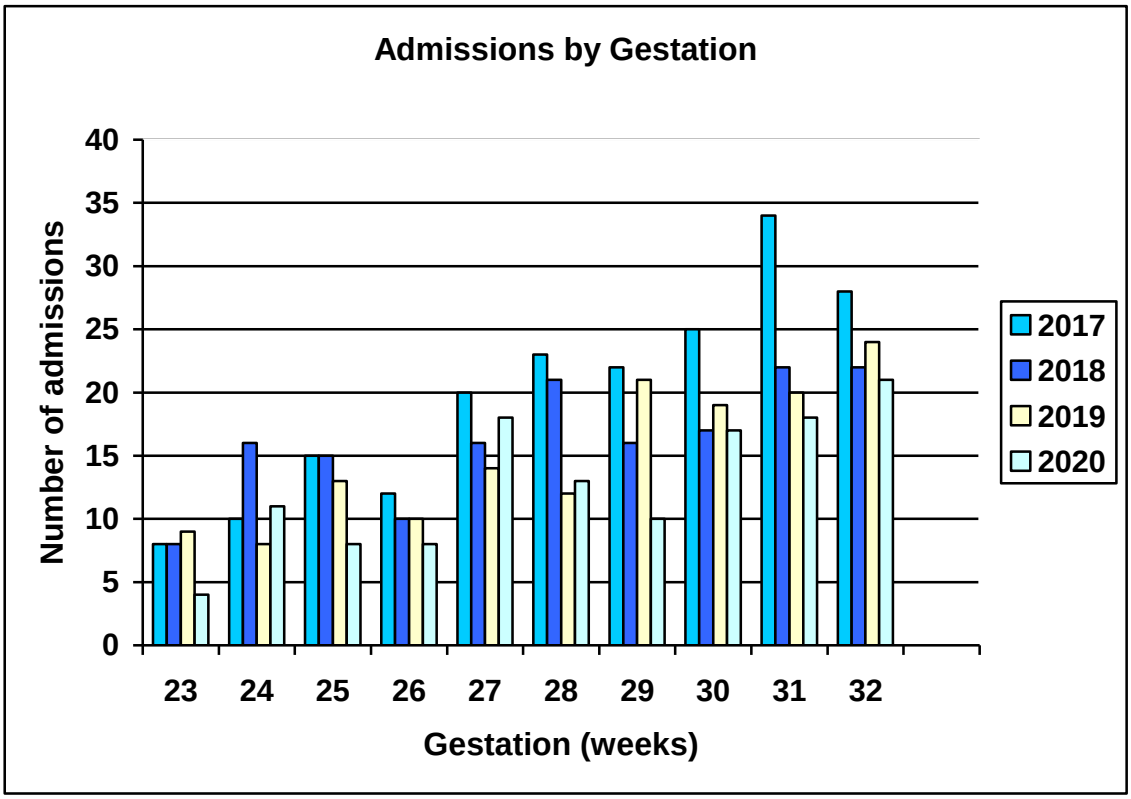
Includes re-admissions

Admissions	2018	2019	2020
Total number of live births (RSCH)	2890	2797	2469
Total admissions (including re-admissions)	529	451	453
Inborn	335	304	319
Inborn booked RSCH	245	209	237
Inborn booked elsewhere	90	95	82
Outborn	151	118	132
Admissions from home	2	2	2
Percentage of inborn births admitted to the TMBU (%)	11	12	12

Admission details	2018		2019		2020	
Gestation (weeks)	**Babies**	%	**Babies**	%	**Babies**	%
23	8	*2*	9	*2*	3	*1*
24	16	*3*	8	*2*	10	*2*
25	15	*3*	13	*3*	7	*1*
26	10	*2*	10	*2*	11	*2*
27	16	*3*	14	*3*	17	*3*
28	21	*4*	12	*3*	12	*2*
29	16	*3*	21	*5*	10	*2*
30	17	*3*	19	*4*	17	*3*
31	22	*4*	20	*5*	19	*4*
32	22	*4*	24	*5*	24	*5*
33-36	130	*27*	109	*25*	97	*20*
37-42	197	*40*	164	*38*	198	*40*
>42	9	*2*	1	*<1*	0	*0*
<500	3	*<1*	3	*7*	2	*<1*

<750	23	*4*	25	*6*	23	*5*
<1000	30	*6*	25	*6*	23	*5*
<1500	57	*12*	66	*15*	56	*11*
Twins	82	*17*	73	*17*	30	*6*
Triplets	4	*<1*	3	*<1*	1	*<1*

Inborn and ex-utero admissions: does not include re-admissions

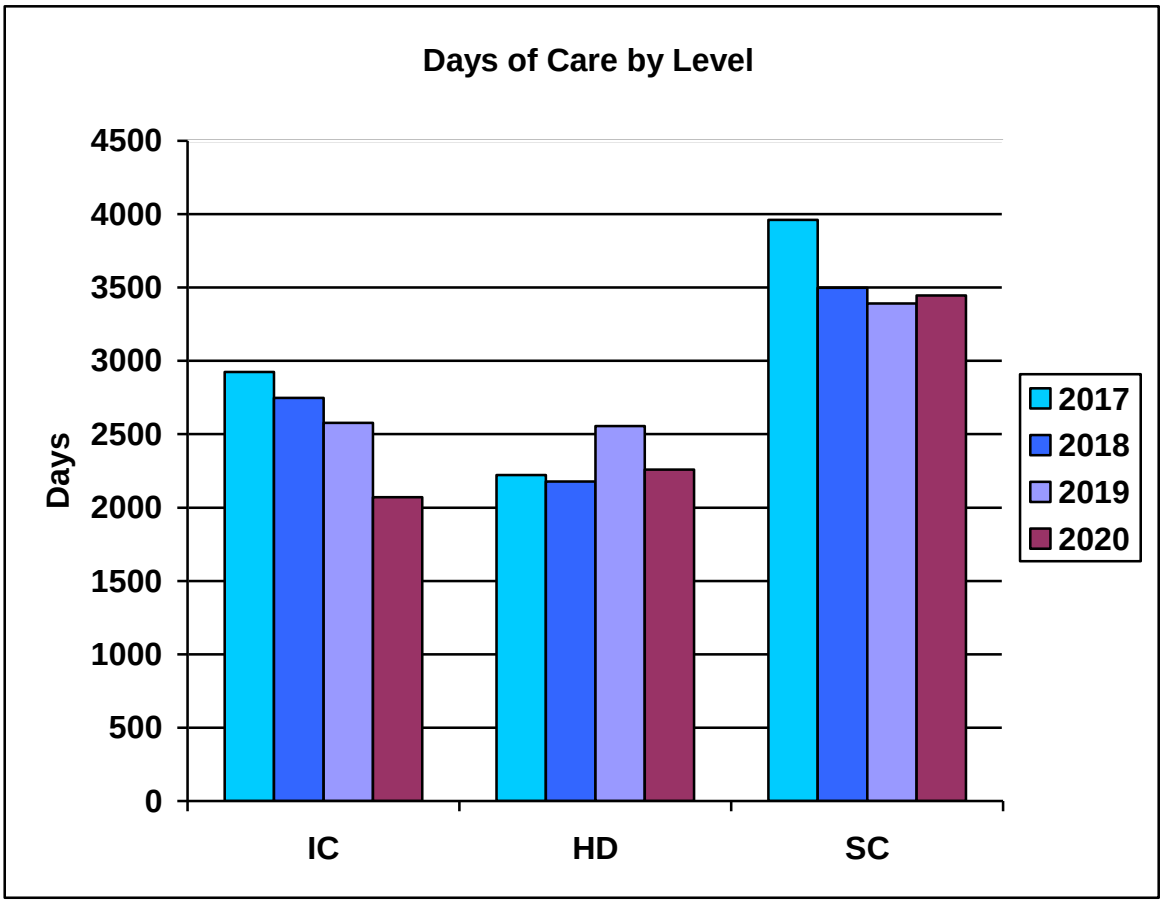


Transfers in	2018	2019	2020
In-Utero			
Babies booked elsewhere and admitted	89	95	82
Refused in-utero transfers Refused by maternity From outside SEC ODN	78 41 12	35 N/A 8	20 9 1
Ex-Utero			
Princess Royal Hospital	37	31	35
East Sussex Hospitals	32	23	20
West Sussex Hospitals	31	20	17
Other Network Hospitals	37	24	25
Outside SEC ODN	26	20	28
Refused ex-utero transfers	33	28	8

Does not include re-admissions or home births

Cot occupancy	2018		2019		2020	
Cots	**Days**	*%*	**Days**	***%***	**Days**	***%***
IC	2747	84	2578	78	2071	63
HD	2178	75	2556	87	2258	77
IC & HD (total)	4925	79	5134	83	4356	70
SC	3499	96	3392	93	3447	94
Total	**8424**	**85**	**8592**	**87**	**7802**	**79**
Transitional Care	1550		1654		1321	

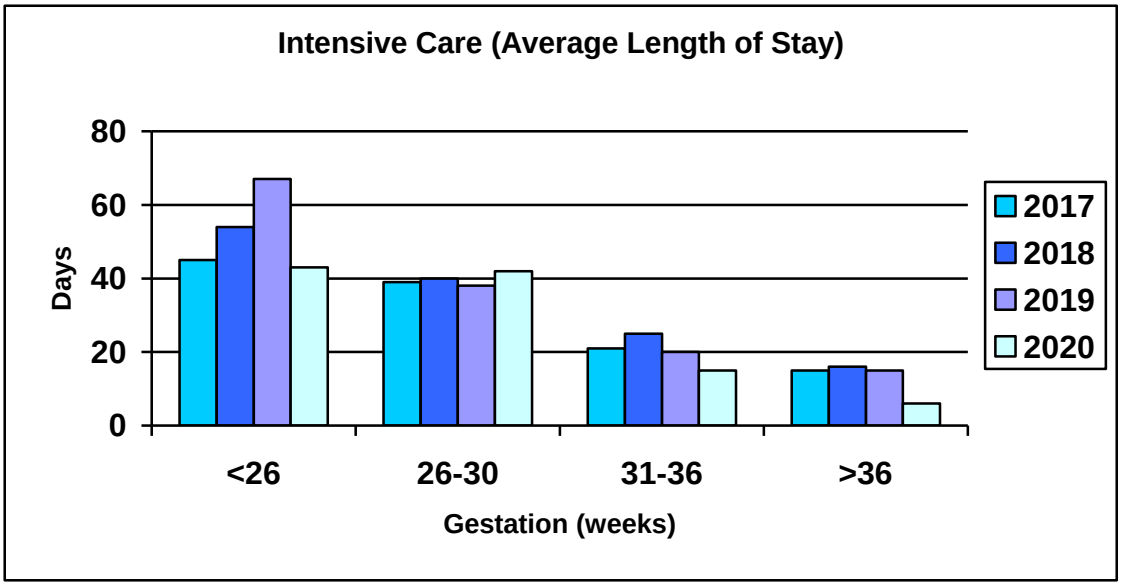
2011 BAPM definition for care levels (all babies receiving care during a 12 month period)



Care Categories for 2020				
Gestation at birth (weeks)	Babies	IC Days	HD Days	SC (only) Days
< 23	1	6	0	0
23	3	75	0	0
24	15	334	291	95
25	8	202	106	58
26	14	244	283	135
27	19	457	440	278
28	12	101	63	126
29	11	56	49	179
30	17	104	113	437
31	19	57	93	358
32	24	49	119	274
33-36	101	115	308	818
37-41	198	216	301	775
>41	11	6	17	42

2011 BAPM definition for care levels
Includes ongoing care for babies born in 2018

Average length of stay in days for all admissions by gestation			
	2018	2019	2020
Gestation			
<26	54	67	43
26-30	40	38	42
31-36	25	20	15
>36	16	15	6
Gestation	**HDU**		
<26	19	-	17
26-30	8	23	13
31-36	18	19	4
>36	9	11	2



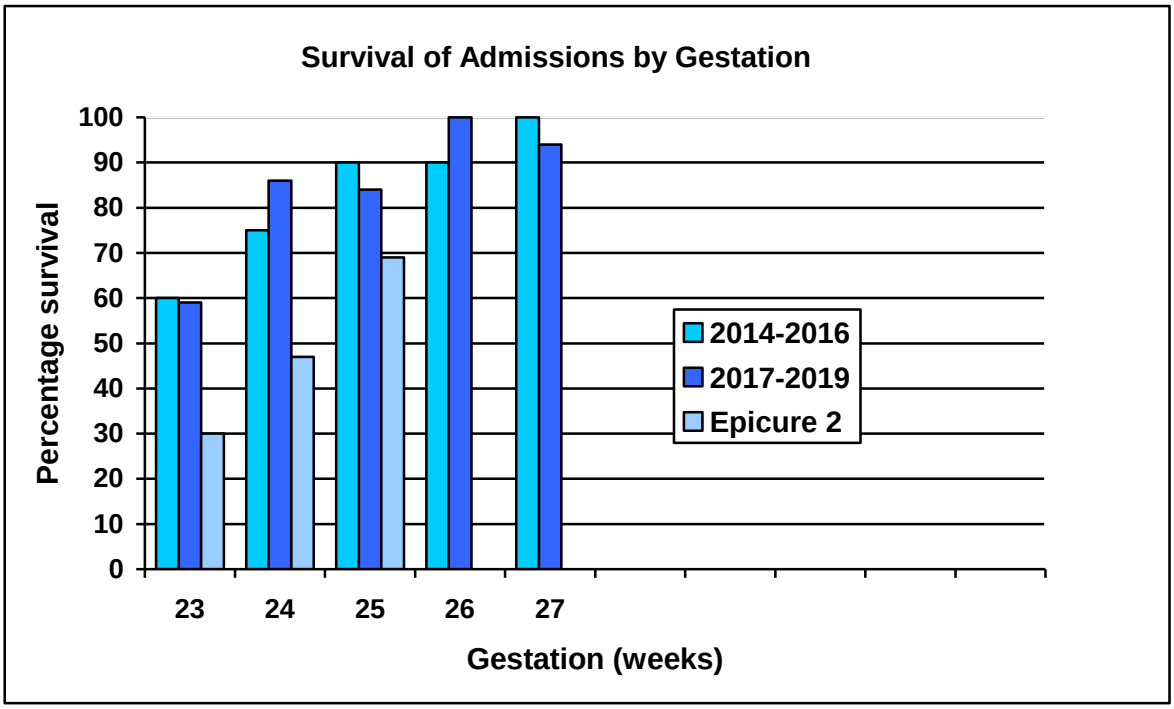
Transfers out	2018	2019	2020
Specialist medical care	23	N/A	5
Cardiac care (ECMO)	6(2)	11(0)	10(2)
Discharges			
Home/Foster care	209	180	164
Postnatal ward	118	93	125
Princess Royal Hospital	42	45	33
RACH	11	8	17
East Sussex Hospitals	31	25	24
West Sussex Hospitals	25	24	19
Other SEC ODN hospitals	26	22	28
Other hospitals outside SEC ODN	21	17	16

Survival of all inborn live births by gestation for 2020								
GA	**Live births**	**Admitted to TMBU***	**Died before admission**	**Died <7d**	**Died 7-28d**	**Died >28d**	**Total deaths**	**Admissions surviving to discharge**
22	1	0		1			1	0
23	2	2			1		1	1
24	5	5			1		1	4
25	6	6		1	1		2	4
26	6	6		2			2	4
27	11	11						11
28	10	10						10
29	7	7						7
30	12	11	1					11
31	13	13		1			1	12
32	20	20						20
33-36	250	83						83
37-42	3798	143		1			1	142
>42	26	0						0
Total				**6**	**3**		**9**	

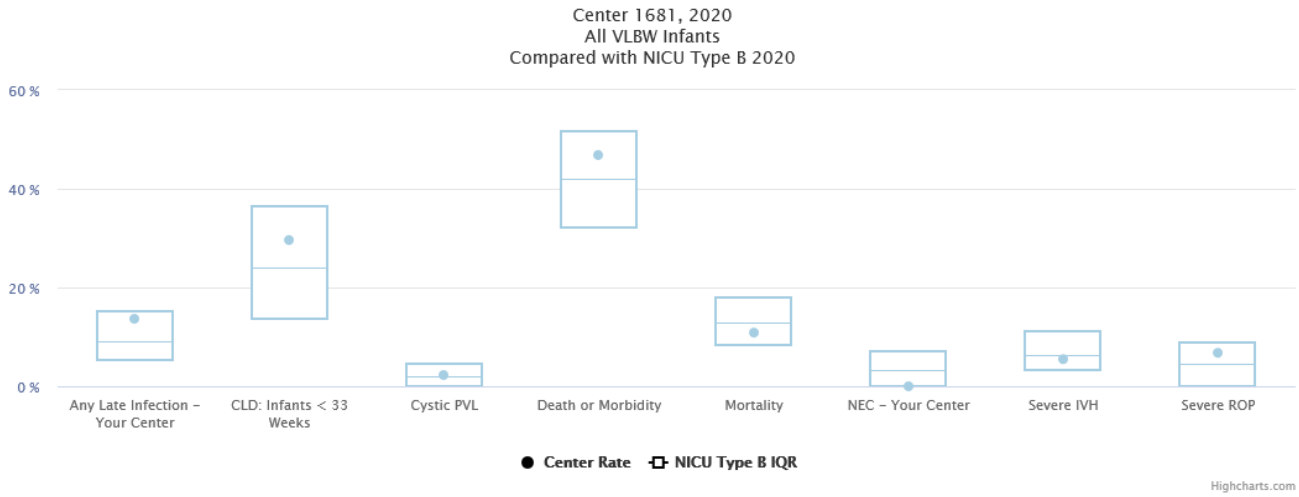
Inborn (booked and unbooked RSCH) excluding lethal congenital abnormalities admitted in 2020
Not including re-admissions

3 year rolling survival to discharge for extreme preterm admissions							
	2018		**2019**		**2020**		
GA	**Admitted**	**Died**	**Admitted**	**Died**	**Admitted**	**Died**	**Survival to discharge %**
22	-	-	-	-	1	1	**0%**
23	7	5	9	2	3	1	**66**
24	11	2	8	0	15	1	**93**
25	11	1	13	4	8	2	**75**
26	9	0	10	0	14	2	**86**
27	15	0	14	0	19	0	**100**

Includes inborn and ex-utero transfers



Incidence of major co-morbidity of prematurity and mortality in our inborn cohort to compared to neonatal surgical units in the Vermont Oxford Network for the year 2020:



Mortality Statistics (RSCH)	2014	2015	2016	2017	2018	2019	2020
Total deliveries	3410	3428	3390	3184	2902	2804	**2482**
Total livebirths	3400	3415	3380	3176	2890	2797	**2469**
Total stillbirths	10	12	10	8	12	7	**13**
Deaths before admission*	2	2	0	1	0	5	**1**
Total neonatal deaths	14	11	9	17	13	8	**13**
Inborn	11	6	4	6	9	4	**9**
Outborn	3	5	5	11	4	4	**4**
Early neonatal deaths**	3	1	1	5	6	3	**9**
Late neonatal deaths**	3	2	0	0	2	0	**0**
Deaths >28 days**	1	3	3	2	0	1	**4**
Still birth rate	2.9	3.5	2.9	2.5	4.1	2.4	**5.2**
Perinatal mortality rate	4.4	4.4	3.2	4.4	6.2	5.7	**9.2**
Neonatal mortality rate**	1.8	0.9	0.3	1.9	2.8	3.2	**3.6**
Mortality Statistics (BSUH = RSCH + PRH)	**2014**	**2015**	**2016**	**2017**	2018	2019	**2020**
Total deliveries	5851	5915	5838	5445	5192	4937	**4563**
Total livebirths	5729	5892	5823	5431	5174	4925	**4546**
Total stillbirths	22	22	15	14	18	12	**17**
Deaths before admission*	1	2	0	1	0	5	**1**
Early neonatal deaths**	5	1	1	6	7	4	**6**
Late neonatal	4	3	0	0	2	1	**3**

deaths**							
Deaths >28 days**	1	3	3	2	0	1	**0**
Still birth rate	3.8	3.7	2.6	2.6	3.5	2.4	**3.7**
Perinatal mortality rate	4.6	3.9	2.7	3.5	4.8	4.6	**5.9**
Neonatal mortality rate**	1.7	0.8	0.2	0.9	1.7	2.2	**2.2**

**** Terminations and deaths <23 weeks gestation not included.***
*****Inborn (booked and unbooked) excluding lethal congenital abnormalities***

TMBU deaths (inborn and ex-utero transfers) 2020					
Delivered	**GA**	**BW (g)**	**Age d**	**PM**	**Cause of death, related factors**
Deaths related to prematurity					
RSCH	23	525	11	Y	Severe pulmonary interstitial emphysema
RSCH	24	520	11	N	Respiratory distress syndrome, pulmonary hypertension, IUGR, antepartum hemorrhage
RSCH	26	491	1	N	IUGR, massive pulmonary hemorrhage
RSCH	30	1499	1	N	PPHN, disseminated intravascular coagulopathy, E coli sepsis
Sepsis					
RSCH	22	428	5	N	Pseudomonas infection, premature rupture of membranes, chorioamnionitis
RSCH	25	748	17	N	Congenital Listeria meningo-encephalitis
RSCH	26	810	4	N	Gramnegative sepsis, IVH IV
Homebirth	42	3100	0	Y	Chorioamnionitis, congenital pneumonia
NEC					
Medway Maritime Hospital	30	1770	5	Y	NEC, sepsis
Tunbridge Wells Hospital	30	1620	4	Y	NEC
Congenital abnormality					
RSCH	25	800	0	N	Pulmonary hypoplasia
RSCH	28	640	61	N	Thoracic spina bifida, hydrocephalus
RSCH	30	1570	0	Y	Lung hypoplasia, Potter Sequence
Frimley Park Hospital	40	3260	2	Y	Malrotation, sepsis, multi-organ failure
Others					
PRH	41	3465	17	N	HIE, seizures
RSCH	39	3600	11	N	HIE after postnatal collapse at home
RSCH	40	2524	3	N	HIE

Post Mortems	2018	2019	2020
Total deaths (inborn only)	13	8	13
Post Mortems performed (% of deaths)	2(15)	2(25)	3(23)

All neonatal deaths within BSUH are routinely reported to the Coroner, logged on the Trust, Datix system and Perinatal Mortality Review Tool (PMRT). Cases are reviewed contemporaneously by the clinical team with further review is undertaken locally within Perinatal and Neonatal Clinical Governance Meetings and when appropriate at joint meetings with other baby units. Deaths are reported to the neonatal MBRRACE-UK database and the KSS Neonatal Network and are individually reviewed at the Sussex, Child Death Overview Panel.

NHS
University

4 year rolling mortality (all admissions)											
	Total Admissions:					Deaths					Survival to discharge
	2017	2018	2019	2020	Total	2017	2018	2019	2020	Total	(%)
Inborn	369	335	310	319	**1333**	7	8	4	9	**29**	**98%**
Outborn	126	151	114	132	**523**	11	4	4	4	**22**	**96**
<26 weeks	33	39	30	20	**122**	6	8	5	5	**24**	**80**
<28 weeks	32	26	24	28	**110**	2	1	1	2	**6**	**95**
<31 weeks	70	54	52	39	**215**	4	3	0	2	**9**	**96**
31+ weeks	361	380	318	364	**1423**	5	1	2	4	**12**	**99**
<500g	3	3	3	2	**11**	3	2	0	2	**7**	**36**
<750g	23	23	25	20	**91**	3	6	5	3	**17**	**81**
<1000g	37	30	25	22	**114**	3	0	1	2	**6**	**95**
<1500g	89	57	66	55	**267**	1	4	0	1	**6**	**98**
>1500g	343	387	305	352	**1387**	7	1	2	5	**15**	**99**

Admissions, Activity and Mortality
Special Care Baby Unit, Princess Royal Hospital

Admissions	2018	2019	2020
Total number of livebirths	2284	2128	**2076**
Total number of stillbirths	6	5	**4**
Total admissions (no of re-admissions)	224(12)	209(18)	**191(17)**
Percentage of live births admitted	10%	9%	**9%**

Admission details	2018		2019		2020	
		% of total admissions		*% of total admissions*		*% of total admissions*
Total admissions (1st admission)	212		191	*9*		**174**
Transitional care babies	-		288	*13*		**266**
Inborn	159	*75*	133	*70*		**143**
Outborn	53	*25*	58	*32*		**31**
Gestation ( ) = born elsewhere and back transferred to PRH						
23	0		1(1)		0	
24	3(2)		0		0	
25	0		4(3)		1(1)	
26	2(2)		3(3)		0	
27	2(2)		2(2)		5(5)	
28	4(3)		1(1)		4(4)	
29	3(3)		5(5)		0	
30	3(3)		4(2)		1(1)	
31	5(4)		3(2)		0	
32	11(9)		9(8)		9(6)	
33-36	66(14)		47(7)		43(9)	
37-42	125(10)		112(6)		108(8)	
>42	0		0		0	
Birthweight (g)						
<500	0		1		1(1)	
<750	4(3)		2(2)		0	
<1000	5(5)		5(5)		2(2)	
<1500	9(8)		12(9)		9(7)	
Twins (babies)	38		18		11	
Triplets	0		0		0	

Does not include re-admissions

Ex-utero Transfers	2018	2019	2020
Transfers out to the TMBU	35	33	32
Transfers out to elsewhere	3	4	5
Transfers in from the TMBU	44	46	34

Transfers in from elsewhere	9	2	3
Transfers in from home*	18	17	13

**** includes babies who were admitted directly to transitional care***

Cot occupancy	2018		2019		2020	
Cots	**Days**	**% occ**	**Days**	**% occ**	**Days**	**% occ**
IC	21		13		10	
HD	227		168		174	
SC	1533	**52**	1514	**51**	1058	**35**
Total	**1781**	**61**	**1695**	**58**	**1242**	**42**

Mortality Statistics (PRH)	2017	2018	2019	2020
Total deliveries	2261	2290	2133	**2081**
Total livebirths	2255	2284	2128	**2077**
Total stillbirths	6	6	5	**4**
Early neonatal deaths*****	1	1	1	**0**
Late neonatal deaths*****	0	0	1	**0**
Post neonatal deaths (>28 days)*****	0	0	0	**0**
Still birth rate	2.7	2.6	2.3	**1.9**
Perinatal mortality rate	3.1	3.1	3.2	**1.9**
Neonatal mortality rate*	0.4	0.4	0.9	**0**

****Inborn (booked) excluding lethal congenital abnormalities***

Transport 2020

The Sussex Neonatal Transport Service, together with similar services in Kent and Surrey, provide 24 hour cover across the KSS Neonatal Network. There is a small team of drivers, a dedicated ambulance and provision of consultant cover for the Sussex service. A doctor and nurse are provided for each shift except for the 'nurse only' second on service week.

The Sussex team undertook 319 transfers in 2020: 108 intensive care transfers, 41 high dependency transfers and 170 low dependency transfers.

A further 10 transfers were not completed as, either diverted to an emergency, handed to another team, or cancelled as no longer required.

The transfers were categorised into:

Medical	Surgical	Neuro	Cardiac
223	53	24	19

Uplift of care	Repatriation	Outpatient Appointments	Resources/ Capacity
157	144	5	12

National Time Critical: 11 transfers were undertaken:

Gastroschisis (0)
Ventilated with Tracheo-oesophageal fistula +/- atresia (1)
Intestinal perforation (3)
Suspected duct-dependent cardiac lesion (not responding to prostin) (1)
Unstable respiratory or cardiovascular failure (not responding to appropriate management) (6)

Local Time Critical: 17 infants received therapeutic hypothermia during transfer.

Summary of Clinical Activity
Trevor Mann Baby Unit

Respiratory Support	2018		2019		2020	
Conventional ventilation	872	144	1071	145	821	126
HFOV	26	18	25	17	26	2
CPAP	573	97	827	105	745	42
HHFNC (Optiflow)	1992	244	1859	230	1915	110
Surfactant (doses)		67 (97)		64 (74)		57 (67)
Nitric Oxide	73	24	53	17	4	1

Respiratory diagnoses	Number of Babies		
	2018	2019	2020
Respiratory Distress Syndrome	146	173	142
Transient Tachypnoea	20	17	15
Signs of respiratory distress of the newborn	165	158	73
Persistent Pulmonary Hypertension	12	13	12
Meconium aspiration	12	5	12
Cystic Fibrosis	0	2	0

Respiratory Complications	2018	2019	2020
Pulmonary haemorrhage	13	10	9
Pulmonary air leak (drained)	24 (10)	19(10)	25
Oxygen at 36 weeks CA	26	29	38
Oxygen at 28 days	59	60	58
Discharged with home oxygen	6	6	14

Management of PDA	2018	2019	2020
Patent Ductus Arteriosus	40	50	34
Indomethacin / Ibuprofen	12 / 4	12/10	9/7
PDA ligated	8	10	9

Infection	Positive Blood Cultures (episodes)		
	2018	2019	2020
Group B streptococcus	0	2	1
Non-haemolytic streptococcus	0	0	0
Alpha haemolytic streptococcus	0	0	0
Haemophilus	0	0	0
Staphylococcus Coagulase negative	43 (39) 3 mixed	17(17)	9(18)

	growth		
MSSA	0	0	0
MRSA	0	0	0
Enterococcus faecalis	5 (2)	8(1 Faecium)	1
Listeria	2 (1)	0	3
Escherichia coli	2 (2)	5	3
Bacillus cereus	0	0	0
Klebsiella species	0	2	2
Serratia species	3 (2)	0	0
Enterobacter species	3 (3)	2	0
Pseudomonas species	2 (1)	0	1
Acinetobacter species	0	0	0
Corynebacterium	1	1	0
Diphtheroid	0	0	0
Micrococcus lutens	0	1	0
Actinomyces	1	0	0
Candida species	0	2	0
Total	**62 (52)**	**40(18)**	**20(18)**

Necrotising Enterocolitis	2018	2019	2020
NEC confirmed cases including perforations (EUT)	7 (4)	8 (6)	7 (6)
NEC suspected cases (EUT)	12 (6)	18 (14)	17 (12)
Confirmed NEC perforated (EUT)	4 (2)	2 (1)	2 (1)
NEC treated surgically (EUT)	5 (2)	5 (3)	6 (6)

Neonatal Surgical Cases (not NEC)	2018 Cases	2019 Cases	2020 Cases
Gastroschisis	4	3	1
Exomphalos	0	3	1
Hirschsprungs	2	1	2
Malrotation confirmed	1	2	2
Meconium ileus (surgery)	4 (0)	3 (3)	2
Gut perforation (not NEC)	1	2	4
Oesophageal Atresia / TOF	3	4	2
Intestinal atresia/obstruction	8	3	4
Imperforate anus/rectal anomaly	5	3	3
Lung cyst/sequestration	1	1	0
Diaphragmatic eventration	0	0	0
Diaphragmatic hernia	1	0	2

Cranial Ultrasound Diagnoses	Number of Babies		
	2018	2019	2020
IVH with parenchymal involvement (EUT)	6 (4)	5 (2)	3 (2)
Post haemorrhagic hydrocephalus (requiring surgical intervention)	5 (1)	4 (0)	3 (0)
Infarction without IVH (EUT)	1 (1)	0	1 (1)
Periventricular ischaemic injury with cyst formation (EUT)	2 (2)	0	1

All babies <32 weeks gestation have routine cranial ultrasound examinations

Hypoxic Ischaemic Encephalopathy	2018	2019	2020
HIE grade 1 (EUT)	17 (12)	10(3)	7(5)
HIE grade 2 (EUT)	13(10)	8(7)	6(3)
HIE grade 3 (EUT)	5(4)	1(1)	4(2)
Hypothermia therapy	28	13	14
- Inborn (BSUH)	8	5	6
- Outborn	21	8	8

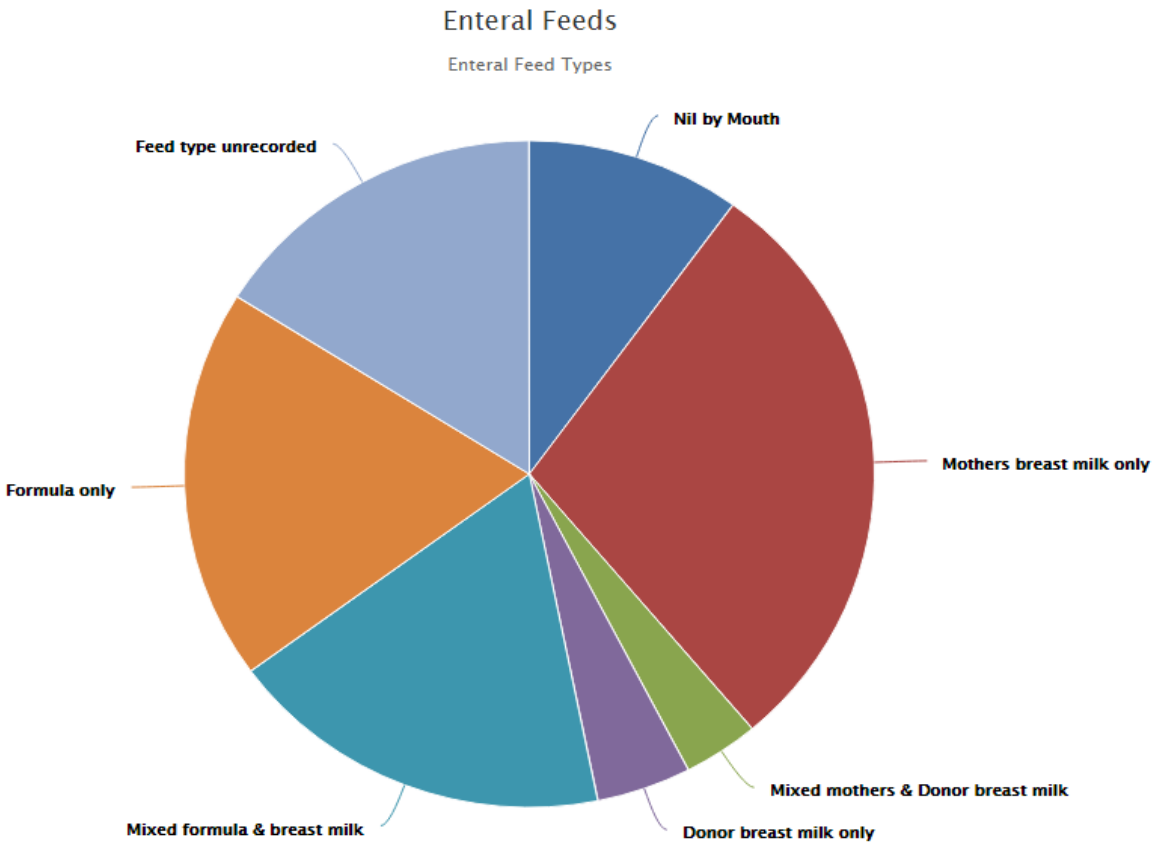
Retinopathy of Prematurity	2018	2019	2020
ROP grades 3/4	5	3	2
ROP treated with laser therapy	5	3	2

Screening as per recommendations from Royal College of Ophthalmologists

Neonatal Dashboard	Eligible babies	Result	%
Antenatal steroids given (24 – 34 weeks gestation at birth)	111	105	95
Magnesium sulphate given	46	44	96
Temperature 36.5 to 37.5 on admission from LW. (<32 weeks gestation at birth)	63	28	44
Parent seen within first 24 hours of admission. (first admission to the TMBU)	428	422	99
Parents present on ward round	381	269	71
ROP screening completed on time (<32 weeks and or <1500g at birth)	58	57	98
Breast milk (all or some) at discharge home. (<33 weeks and first admission)	38	19	50
Catheter related sepsis, per 1000 line days	19	15	79
BPD (<32 weeks gestation at birth)	56	25	4573

Breastmilk Rates 2020	Percentage of Babies (%)
Nil by mouth	10
Breast	29
Mixed (Breast/formula)	18
Mixed (Breast/Donor)	3.5
Donor breastmilk only	4.5
Formula	19
Feed type unrecorded	16

DISCHARGE FEEDING (total discharges) 2020



Summary of Developmental Outcomes

Developmental follow-up takes place in baby clinic.

All babies who are likely to have developmental problems are referred to their local Child Development Centre.

Follow-up schedule for pre-term babies:

Prior to discharge / at term corrected age

- Physiotherapy and / or speech and language therapy assessment
- Audiology screening
- Screening for Retinopathy of Prematurity

At 3 months' corrected age

- Review of development and neurological assessment by consultant in baby clinic.
- Refer to specialist services as appropriate.

At 12 months' corrected age

- Review of development and neurological assessment by consultant in baby clinic.
- Refer to specialist services as appropriate.

At 24 months' corrected age

- Schedule of Growing Skills (2002 until 2006)
- Bayley Scales of Infant Development III (from September 2006 onwards)
- Health Status Questionnaire
- Refer to specialist services as appropriate or discharge if no concerns.

All preterm infants booked and born at RSCH or PRH at <30 weeks gestation (and/or <1000g) are offered a Bayley III assessment as part of their routine neurodevelopmental care. Those booked or born elsewhere are now referred back to local teams for assessment.

For this report neurodevelopmental outcome has been assigned by age equivalent score:

Outcome	Months behind corrected age
Normal	≤ 3 months
Mild impairment	> 3 to <6
Moderate disability	≥ 6 to <9
Severe disability	≥ 9

Of the 516 babies eligible for 2 year assessment since 2002, 380 (85%) infants have had assessments completed. In total 87 babies have been lost to follow-up:

- 51 did not attend
- 15 families had moved out of area
- 3 follow-ups missed
- 10 unable to complete assessment
- 8 Health Visitor or Health Status Questionnaire assessments only.

There have been 17 Health Visitor, PARCA-R or Health Status Questionnaire only assessments during 2020 due to Covid-19 restrictions. These outcome results have been included into the summary data.

49 babies have been referred back to local teams for their 2 year assessment. Their outcomes are not included into the summary data.

Outcome	22	23	24	25	26	27	28	>29	Total (%)
Cognitive									
Normal	2	6	16	32	39	59	84	34	272 (72)
Mild		2	5	9	5	13	15	7	56 (15)
Moderate		1	5	7	5	5	4	3	30 (7)
Severe		1	5	3	4	8	1	0	22 (6)
Communication									
Normal	2	3	13	25	21	38	71	27	200 (53)
Mild		4	5	10	22	19	17	8	85 (22)
Moderate		1	5	11	4	13	8	6	48 (13)
Severe		2	8	5	6	15	8	3	47 (12)
Motor									
Normal	2	4	17	31	28	45	73	30	230 (60)
Mild		3	2	9	15	22	17	7	75 (20)
Moderate		2	6	5	3	8	7	3	34 (9)
Severe		1	6	6	7	10	7	4	41 (11)
Combined outcomes	2	2	13	22	16	32	57	24	168 (44)
Normal		4	4	10	24	19	27	8	96 (25)
Mild		2	7	11	4	18	6	6	54 (14)
Moderate		2	7	8	9	16	14	6	62 (16)
Severe									
Total assessed	**2**	**10**	**31**	**51**	**53**	**85**	**104**	**44**	**380**

Outcomes according to gestation were as follows:

<24 weeks gestation (n=43)

Outcome (%)	Cognitive	Communication	Motor
Normal	24 (56)	18 (42)	23 (53)
Mild impairment	7 (16)	9 (21)	5 (12)
Moderate impairment	6 (14)	6 (14)	8 (19)
Severe disability	6 (14)	10 (23)	7 (16)

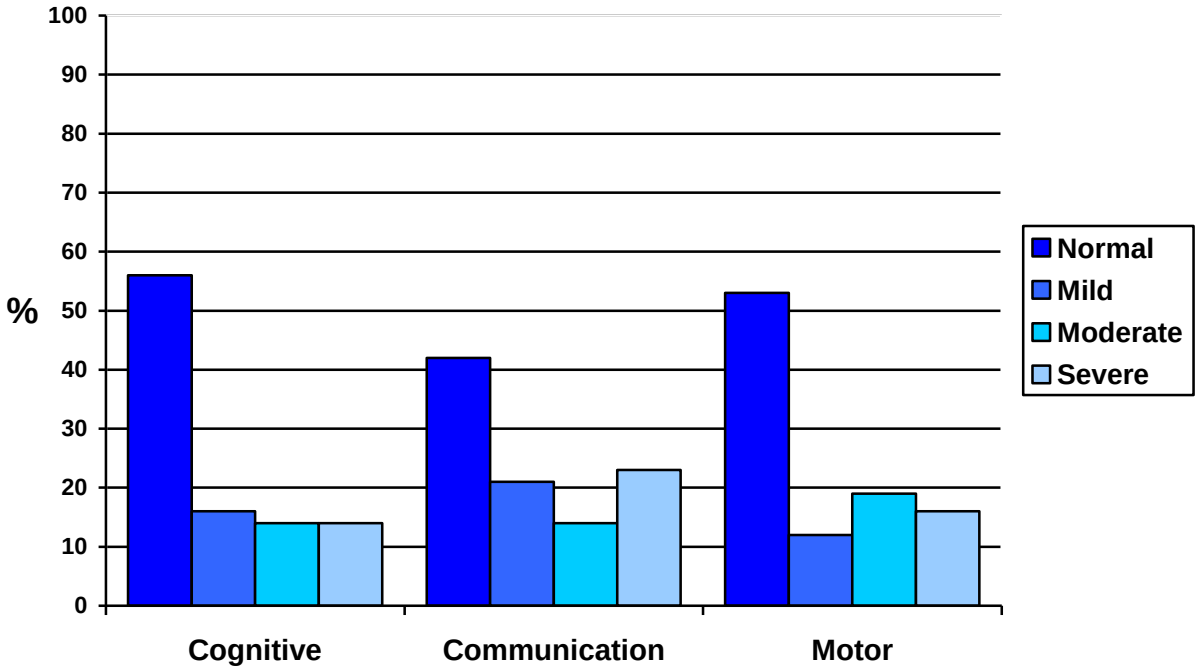
25 and 26 weeks gestation (n=104)

Outcome (%)	Cognitive	Communication	Motor
Normal	71 (68)	46 (44)	59 (57)
Mild impairment	14 (13)	32 (31)	24 (23)
Moderate impairment	12 (12)	15 (14)	8 (8)
Severe disability	7 (7)	11 (11)	13 (12)

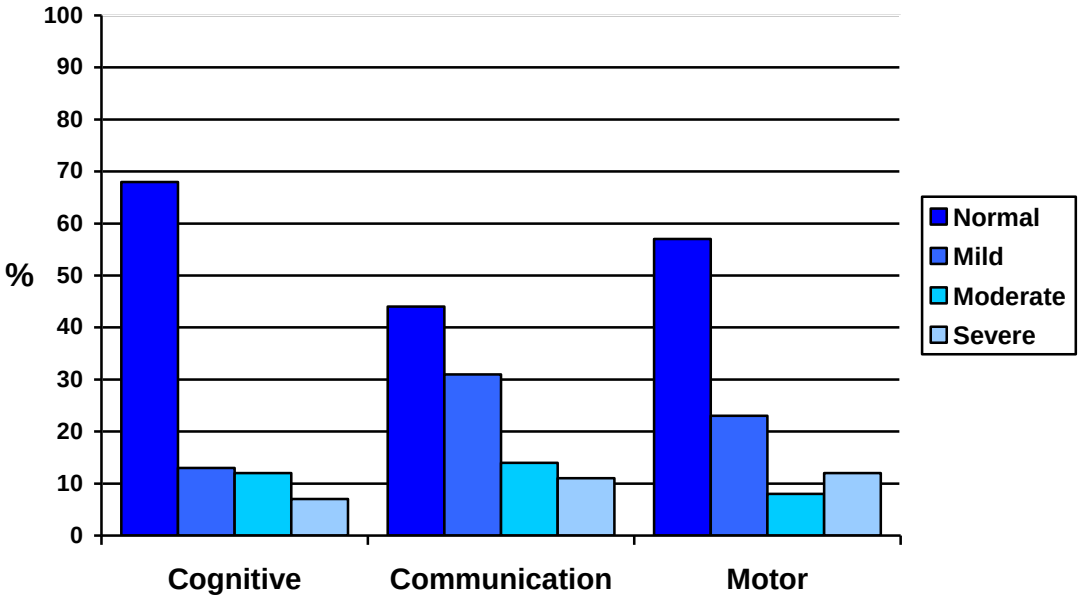
27 weeks gestation and above (n=223)

Outcome (%)	Cognitive	Communication	Motor
Normal	177 (76)	136 (58)	148 (63)
Mild impairment	35 (15)	44 (19)	46 (20)
Moderate impairment	12 (5)	27 (12)	18 (8)
Severe disability	9 (4)	26 (11)	21 (9)

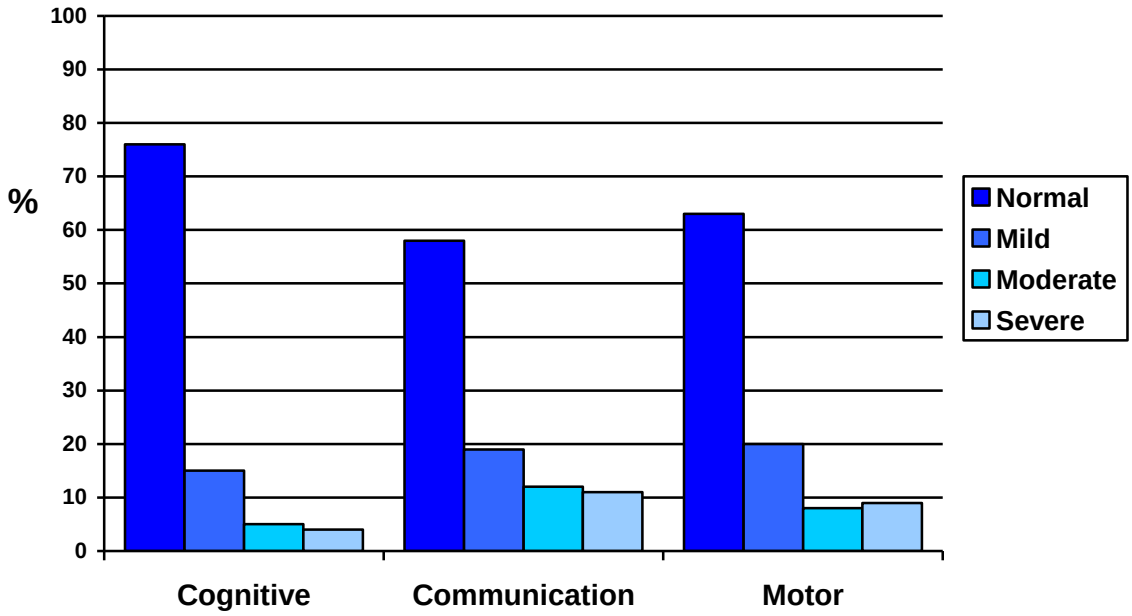
Neurodevelopmental Outcome of Pre-term Infants
<24 weeks at 24 months CA
(n = 43)



Neurodevelopmental Outcome of Pre-term Infants
25 & 26 weeks at 24 months CA
(n = 104)



Neurodevelopmental Outcome of Pre-term Infants
27 weeks and above at 24 months CA
(n = 233)



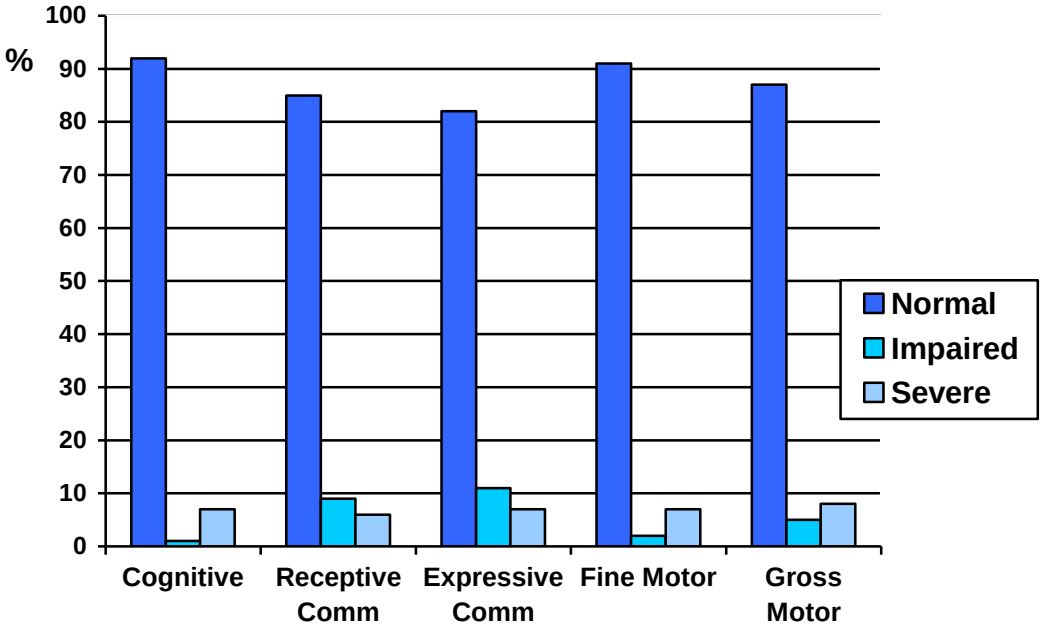
Neurodevelopmental Outcome for Babies with Hypoxic Ischaemic Encephalopathy:

Since 2009 term babies who have received cooling therapy on the TMBU for hypoxic ischaemic encephalopathy have been assessed using Bayley III scales at 24 months. Since 2017 EUTs for cooling therapy have been referred back to local teams for follow-up.

Total cooled babies from 2009	243	
Total assessments performed	130	
Total babies cooled in 2018		30
EUTs referred for local assessment		15
Assessments performed and completed in 2020		11
Attended but unable to complete assessment	1	
Did not attend		1
Died before discharge		2

Neurodevelopmental Outcome of Cooled Babies (n=**130**)

Outcome (%)	Cognitive	Receptive Communication	Expressive Communication	Fine Motor	Gross Motor
Normal	119 (92)	110 (85)	106 (82)	118 (91)	113 (87)
Impaired	2 (1)	12 (9)	15 (11)	3 (2)	7 (5)
Severe disability	9 (7)	8 (6)	9 (7)	9 (7)	10 (8)


%
100
90
80
70
60
50
40
30
20
10
0
Cognitive
Receptive Comm
Expressive Comm
Fine Motor
Gross Motor
Normal
Impaired
Severe

CLINICAL GOVERNANCE:

Risk Management

Staff members are encouraged to report clinical incidents on the Trust, Datix system. There are safety, clinical and transport triggers to guide reporting. The transport team reports incidents to the National Risk Register.
Clinical incidents are reviewed by the Neonatal Risk Panel and at the Children's Patient Safety and Quality Committee meetings with the aim of identifying common themes or trends and addressing issues of clinical risk. Findings are disseminated at clinical governance meetings and via the Baby Watch newsletter.

Safety triggers:
Breach of safe delivery of care (insufficient staffing or other)
Failure or lack of equipment,
Poor communication or consent
Failure in documentation
Breach of confidentiality
Failure of child protection procedure.

Clinical Incident triggers:
Accidental extubation
Extravasation injury
Facial/nasal damage related to CPAP
Failure of infection policy
Cross infection
Medication and prescribing errors

Transport triggers:
Low temperature on arrival (<36 ^{0}C)
Accidental extubation
Delay – no discharge summary ready

Summary of Clinical Incidents (TMBU and SCBU):

Incident Type	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
Access, admission, transfer, discharge					2	4	1			7
Admission	1	1	1		1		1			5
Bloods, Assessments, Diagnoses, Tests	2	4	6	21	26	12	19	20	8	118
Clinical assessment (including diagnosis, scans, tests, assessments)	1	3	2		1	1		3	2	13
Communication									1	1

Confidentiality	6	3	5	1	4	4	5	3	10	41
Consent, communication, confidentiality	2	4	7	9	4	9	5	5	10	55
Discharge Issue		1			2	4	1		5	13
Documentation	5	4	5	16	8	7	11	8	10	74
Documentation (including records, identification)	8	10	15	14	8	6	2	7	5	75
Equipment	5	8	5	10	5	7	6	5	16	67
Falls and other accidents					2		1			3
Implementation of care and ongoing monitoring / review	4	4	5	7	3	1	6	8	10	48
Infection Control Incident	1	1	5	3	2	6	1		2	21
Medical device / equipment	4	3	9	5	4	5	3	6	9	48
Medication	55	59	70	57	49	43	54	26	36	449
Nursing care, Obs, Monitoring, Medical review	1	8	2	4	4	4	6	7	6	42
Other Incident	18	45	17	17	26	28	16	21	22	210
Patient accident			1	1			2	1		5
Patient Self Harming		1								1
Readmission	1	7	2							10
Staffing, Facilities, Environment	12	15	17	16	7	11	9	13	9	109
Transfer									1	1
Transfer Issue		2				1		1		4
Treatment, procedure	24	17	14	27	20	17	16	26	37	198
Grand Total	**150**	**200**	**188**	**208**	**178**	**170**	**165**	**160**	**199**	**1618**

Human Factors

The Human Factors workstream was started in 2017 and is led by Dr Lawn. Two registrars (Out of Program Experience) have been appointed with a remit to 'Human Factors' work. New innovations have been daily, morning safety meetings, after event safety pauses and introduction of a safety prompt for intubation and extubation. There has been an in-depth systematic review and

improvement of resuscitation equipment and postnatal ward work patterns. Obstetric theatre temperature has been targeted as a way of ensuring improved admission temperatures for pre-term babies. A review of medical education is underway and the departmental simulation programme continues to be supported by the human factors team.

Multi-Disciplinary Meetings

- Morning safety meeting (daily)
- Monday clinical handover (weekly)
- Nutrition meeting (weekly)
- Xray review (weekly)
- Tuesday and ThursdayTeaching and Journal Club (weekly)
- Respiratory review and planning (monthly and as needed)
- Wednesday Clinical Grand Round or Mortality Review (weekly)
- Consultant meeting (weekly, Business Meeting monthly)
- Echo peer review (monthly)
- Neonatal Risk Panel (every 2 weeks)
- Perinatal meeting (monthly)
- Neonatal and maternity matrons (monthly)
- Children's Directorate meeting (monthly)
- Children's Patient Safety and Quality Committee (monthly)
- Neonatal Clinical Governance (3 monthly and additional joint meetings with maternity and surgical/anaesthetic teams)
- Consultant outreach visits to Worthing and Hastings neonatal units (3 monthly to each site)
- Sussex Network Meeting (two meetings per year in Brighton)
- KSS Neonatal Network Meetings and Clinical Forum (3 monthly)

Attendance is recorded for meetings and minutes made where appropriate.

Guidelines & Audit:
(Appendix 3)

There is an active programme of clinical governance within the department, including 3 monthly multidisciplinary clinical governance meetings and monthly perinatal mortality and morbidity meetings. There are common medical, nursing and drug protocols for both units with a rolling programme of guideline review. Guidelines are available on the departmental website.
We have a well developed audit programme under the supervision of Dr Fernandez. The department complies with national and neonatal network audit programmes including NNAP, ATAIN, NHSE Dashboards and MBRRACE. The transport team provides data for the UK Neonatal Transport Dataset.

Screening Programmes

The department complies with national neonatal screening programmes including**:**
Newborn examination, NIPE
Newborn Blood Spot
Newborn Hearing
Retinopathy of Prematurity: Ophthalmologists attend weekly to examine babies according to national guidelines. On the TMBU there is a small team of nurses who are training to use RetCam for ROP screening. The theatre at the RACH is fully equipped to undertake laser treatments when necessary.

Information and Technology

Departmental information and all clinical and pharmacy guidelines are accessible on the Trust Intranet. The department has an electronic patient record system (Metavision) which includes facilities for prescribing and automatic collection of data from ventilators, monitors, blood gas machine and from the laboratory. Laboratory results are also available electronically on ICE and imaging on PACS. Badger.net collects data for summary production, the National Neonatal Audit Program, Dashboards and occupancy. Daily data is automatically downloaded from Metavision to Badger.net.
Newborn examinations are recorded electronically on the NIPE system.

RESEARCH
(See appendix 4)

There is an active departmental research program. We have strong links with the Academic Department of Paediatrics, Brighton & Sussex Medical School.

There is an active team which supports the research portfolio:

Rebecca Ramsay	Lead research nurse
Cathy Olden	Research nurse
Vivien Richmond	Research nurse
Sonia Sobowiec Kouman	Research nurse
Christine Laycock	Data Officer
Paul Frattarolli	Data officer

Due to the Covid 19 pandemic recruitment to non-Covid 19 studies had to be paused as per government guidance. The department joined the neonatal arm of the RECOVERY trial.

Prof Rabe continued her collaboration with Dr Rendon Morales from the University of Sussex Institute for Sensor Technology. The NEOSENSE project aims at testing a new non-stick sensor for detecting babies´ heart rate after birth within a few seconds. The clinical research fellow Dr Oana Anton was kindly supported by grants from Rockinghorse Appeal and the Early Birth Association completed her MRes.

Dr Aiton is UK PI for the multi-center study on FAS Fetal Alcohol Syndrome funded by the NIH in USA. He completed recruitment in 2019. The study compared 2D and 3D photography with computerised analysis for earlier detection of craniofacial changes of Fetal Alcohol Spectrum Disorder in newborn infants with and without Prenatal Alcohol Exposure. The results will contribute to novel ways of diagnosing FAS more accurately.

Dr Fernandez and Dr Bhat were local PIs for the CURONEB study which was a trial of nebulized surfactant for preterm infants and is now closed and AZTEC, a randomized controlled trial on the role of prophylactic antibiotics in the development of BPD, which was paused in 2020.

The Department has been involved in several other studies which have completed recruitment. The CMV registry is open for recruitment again in 2021. We are continuing care site for SIFT and BabyOSCAR.
Recruitment for neurodevelopmental follow-up studies of pre-term infants and those who were treated with total body cooling is led by Dr Phil Amess.

Joint multidisciplinary research meetings are held and links continued with various groups such as the Paediatric Respiratory Research Group at the RACH, the Obstetric team, the Department of Clinical Pathology, Department of Psychology (University of Brighton) and with the School of Pharmacy & Biomolecular Sciences (University of Brighton). We are undertaking studies with Dr Bhavik Patel on the safety of medicines.

The research team has a track record in studying the benefits of enhanced placental transfusion at the birth of babies. With funding support from the University of Brighton Dr Alexandra Sawyer, Dr Suzanne Simmonds and Prof Rabe travelled to Lusaka, Zambia in February and opened a pilot study with Prof Mary Ngoma, Prof Anitha Menon and Prof Bellington Vwalika at the University of Zambia Medical School to study barriers of implementing optimal cord management in maternity services.
BSMS year 4 students were involved in our studies as part of the Independent Research Project module in BSMS 404 and supervision was mostly done online.

All studies are performed in close collaboration with the BSUH Research and Development department and we express our thanks to Scott Harfield, Dr David Crook and the R&D team for their ongoing support.

The department is an active member of the Surrey & Sussex Paediatric and Neonatal Research Network and hosted last the Annual KSS Paediatric and Neonatal Research Day 2019. The research days for 2020 and 2021 could not be held due to the current Covid-19 Pandemic situation.

EDUCATION

Neonatal Nurse Pathway

The Neonatal Pathway was designed to acknowledge the recommendations from key documents relating to neonatal care, by offering nursing staff a qualification in the specialty. The aim is to address the significant shortfall in staff holding a neonatal qualification. The pathway promotes the opportunity for local neonatal units to develop highly skilled neonatal staff from among their current workforce.

The pathway is held at the University of Brighton and led by Senior Lecturer Susanne Simmons. It comprises two modules: a 20 credit work based learning module: Foundations in Neonatal Practice and a 30 credit taught module: Neonatal High Dependency and Intensive care. Mentors (approved by the unit manager and pathway leader) support, supervise and assess students in practice. They meet with the student at the beginning of each module; supervise the student's completion of skills; meet with the student mid-way through the module to discuss progress; liaise with the pathway leader on the student's progress; and meet with the student at the end of the module to check completion of clinical skills.

Practice is assessed using clinical skills inventories. Students from level 1 and 2 units have a practice placement in a level 3 unit to gain experience in neonatal high dependency and intensive care. Students on completion of the two neonatal modules receive a neonatal pathway certificate. They then have the opportunity to continue their studies to gain a degree in Acute Clinical Practice awarded by the University of Brighton.

Undergraduate Medical Education

The Department has continued its involvement in the delivery of module BSMS 402 Paediatrics and Child Health. Dr Ramon Fernandez, Senior Clinical Lecturer, leads on the provision of online learning tools to complement their training in newborn physical examination. Consultants and registrars are involved in the student assessments at the end of the year OSCE's.

A number of students chose to undertake the independent research project in BSMS 404 in year 4 in Neonatology. During this module they learn research related skills e.g. how to complete a structured literature search and an appraisal on a focused topic or join in one of the ongoing research projects. Individual consultants have been supporting the Medical School in other tasks such as admission interviews, designing exam questions and online learning modules, organizing and supervising elective placements and tutoring small groups. Professor Rabe continues as module leader for the module BSMS 404.

Postgraduate Education

The department continues its commitment to providing a high quality, structured training, assessment and appraisal programme for Neonatal Medical and Nursing Staff. In addition staff organize, host and deliver many additional educational sessions including Deanery simulation and PLEAT days. We host

and direct the ALSG Neonatal Life Support and PaNSTAR courses, as well as the newer ARNI course. Some of the courses could not run in 2020 due to the Covid 19 pandemic.

We have an established Local Faculty Group which overseas educational governance. Dr Bomont is Paediatric Tutor.

The TMBU offers fellow posts in Human Factors which are proving very popular with doctors in training.

SUPPORT SERVICES

Speech & Language Therapy (SLT)

There are 2 speech and language therapists (1.2 wte).

The service is provided on a needs basis, with priority given to inpatients both on the Trevor Mann Baby Unit and at the Royal Alexandra Children's Hospital. Cover is also provided to various inpatient and outpatient clinics, including joint dietetics/SLT clinics and the Chronic Lung Disease Clinic. Support for neonatal follow up clinics can be arranged as required by contacting the department. Referrals are made to the team by phoning (ext 2527), emailing or writing to Amanda Harvey (Level 5 RACH).

The service provides assessment and management of feeding difficulties for all babies admitted to the TMBU. Feeding difficulties may occur for the following reasons and may be transient or life-long.

Other services provided include:

- videofluoroscopy swallow studies
- teaching for new staff
- liaison and advice for dysphagia therapists across Sussex.

Babies discharged home with feeding difficulties who live in Brighton and Hove or attend the Chronic Lung Disease Clinic will have ongoing input. Babies from outside of Brighton and Hove who continue to have significant feeding difficulties are referred on to local services or may be seen as an outpatient in Brighton if no appropriate local service is available.

Physiotherapy

TMBU has input from Emma Pavitt a band 7 physiotherapist for 8 hours per week.

She has provided support for the team for children with a variety of conditions from chest infections to orthopaedic issues and neurodevelopmental problems. The service has improved patient care by increasing the clinical decision making in regards to chest physiotherapy. There are opportunities for doctors and nurses to request training as they feel necessary, and she is about to start a project alongside doctors and nurses for helping develop a neurodevelopmental pathway. Study days are regularly attended with other neonatal physiotherapists ensuring that the team is kept up-to-date with the latest evidence.

Dietetic Service

The dietitian is funded to provide 0.2 wte to the neonatal service. This includes providing input to the weekly multidisciplinary Nutrition Meeting on the TMBU where nutritional management of more complex infants is discussed. There are weekly outpatient clinics for follow up of babies discharged from the TMBU and SCBU at PRH. This clinic runs alongside the neonatal clinic at RACH to allow joint consultations. dietetic assessment and input is provided for infants attending the chronic lung disease clinic and those supported by the outreach neonatal nursing team. The service continues to provide input to infants who are transferred to the gastroenterology team at RACH. The dietitian attends regular meetings of the National Neonatal Nutrition Network and is involved in teaching on the neonatal unit and around the KSS neonatal network.

Donor Breast Milk

Support is given to mothers so they are able to provide their own breast milk to feed their baby as soon as possible. There are however some circumstances where use of donor breast milk may be useful in promoting good infant health. As supply is limited and cost is significant use of donor milk is restricted according to unit guidelines.

Outreach

The neonatal outreach team supports infants and parents at home when they are discharged from TMBU or SCBU at PRH. The team is comprised of a team leader who works full time, a senior staff nurse and a nursery nurse who both work part time. Visits are made in the community to advise on the continued care of babies that may have been, premature, sick or have additional needs. The team is a link for families between themselves and the neonatal unit or neonatal follow up clinic. The care and support each family requires is tailored to them as individuals, the length of time the outreach team visit for can vary from a few days to many weeks.

Maternal Substance Misuse Clinic (One-Stop Clinic)

The One-Stop clinic is a multidisciplinary, multi-agency clinic which operates across both sites. No appointment is necessary and referrals can come from any source: health or social care professionals in the community, or clients themselves. The clinic was set up in January 2002 by Dr Aiton and representatives from other services to meet the increasing local need. The following staff contribute regularly to the clinic:

- 2 specialist midwives with responsibility for substance misuse
- A representative of the Substance Misuse service
- A representative of Brighton Oasis Project
- Liaison Health Visitor
- Social Worker from Dept, Social Care & Health
- Neonatal Nurse Practitioner
- Consultant Neonatologist

The aims of the clinic are:

- to offer an open-access service for advice on the wide variety of issues surrounding substance misuse in pregnancy
- to provide the level and degree of care and support appropriate to the client during their pregnancy and to the newborn baby

The clinic includes postnatal infants and their mothers with particular emphasis on babies prescribed medication to deal with symptoms of withdrawal.
Some mothers receive nearly all their antenatal and healthcare through the clinic, whereas others may only need to come for one appointment and continue to access routine services. A multi-disciplinary meeting takes place one hour before the RSCH clinic.
Clinics run on Thursday afternoons, week 1 at PRH and weeks 2, 3 and 4 at RSCH.
In 2020 nine babies were admitted to the TMBU and SCBU with Neonatal Abstinence Syndrome.

A total of 30 babies were seen for follow-up in the One Stop Clinic (including antenatal referrals not requiring treatment on TMBU).

Counselling

Counselling is currently available from the Trust Chaplaincy Service at both the TMBU and SCBU at PRH. Julie Carroll is a qualified psychotherapist providing 10 hours per week to the department. In addition the chaplaincy team provide support to staff on an ad hoc basis as needed. The Early Birth Association has kindly funded The Mind Clinic since 2015. The Mind Clinic is a non-NHS organization that comes into the work place to help staff.

Two members of nursing staff have recently completed counselling courses.

Parent Information

A wide range of information for parents is available. Around the time of admission, parents are given a booklet about the TMBU or SCBU and a Parent Passport. In addition all parents receive a copy of the BLISS Parent Information Guide. Unfortunately both of these publications are only printed in English. However, we freely access the Trust funded Sussex Interpreting Service to facilitate communications with parents whose first language is not English.

A parent information area provides health promotion information leaflets on a variety of baby, maternal and family health issues. There is also Social Security benefits' information, and travel information for parents whose baby is transferred to London. Information on consent and how to access the hospital Patients Advocacy and Liaison Service (PALS) is displayed in the information area alongside parent support group information. Planned future developments for the information area include internet access to enable parents to do supported literature searches and the installation of a TV and video/DVD for health promotion information.

Main stream diagnostic specific information is available on the TMBU but more unusual diagnosis information is obtained as required ensuring that it is up to date and accurate. The Contact-A-Family Directory is used regularly to access accurate contact details for parent support organisations.

Information packs are available for Down Syndrome and other information packs are compiled as required.

The Trust supports the hiring of registered sign language interpreters and two members of staff have a basic knowledge of British Sign Language.

Where parent information is available in languages other than English these are downloaded from the Internet as required e.g. Reducing the Risks of Cot Death leaflet.

A small but growing Parents Library contains a selection of books on premature babies and neonatal units. There are also some books specifically for children of Special Care Babies.

Training sessions for parents on infant resuscitation techniques are held regularly.

When a baby dies parents are given an 'Annabel Harwood' pack which contains books, leaflets and contact details of support organisations to help and support parents following the death of their baby. This pack is complemented by a 'Memories Folder'.

Parent Forum

The Parent Forum has now been established for over 10 years and meets quarterly. The group represents parents of babies who have been on the TMBU and Special Care Baby Unit at Princess Royal Hospital. During 2020 the forum

adapted to online meetings via Zoom and this has proved very successful and makes the meeting more accessible.

The group contributes to the design of regular parent feedback exercises. The results of these questionnaires are shared with the group which assists with the identification and prioritisation of actions to respond to feedback received.

The group assists with the development of parent information leaflets used in the service. This includes those written to support a range of local and international research studies in which we participate. Members of the group also kindly provide input into the design of parent information for new research studies.

The forum has helped with the development and review of our unit guidelines and protocols, including proposed changes to the uniform policy and visiting policy.

We also share the BabyWatch publication with the forum, seeking their views on how we can improve safety and quality in the service to further improve the experience of babies and their families and long term outcomes.

Early Birth Association

The Early Birth Association is a registered charity formed of a group of parents that have all experienced having a premature or a very sick baby treated at the Trevor Mann Baby Unit in Brighton or the Special Care Baby Unit in Haywards Heath.

The charity works in partnership with the units to help make a difference and support the outstanding neonatal care for babies and their families

In the last year, through donations raised from supporters, committee members and their own fundraising events, the EBA have funded the purchase of various vital pieces of equipment including a laryngoscope, a CFM and a cooling system for PRH. Other items include bottle warmers and thermometers for all cots, arm splits, LED sky panels for the parent area as well as the interactive vCreate system for families, ongoing funding of the 'Mind Clinic' staff counselling service and the 'Wishing Well' music programme for babies.

The EBA is run solely by volunteers with 100% of all money raised going directly to these units. More information about the EBA is available on their website: www.earlybirth.co.uk

Rockinghorse Children's Charity

The Rockinghorse Charity celebrated its 50th anniversary in 2017. Established in 1967 by Dr Trevor Mann, the charity continues to support the TMBU and SCBU at PRH generously. Members of staff have bravely supported fundraising through the i360 abseil and other events. Staff have also been invited to bid for funds in regular 'Dragon's Den' style events held by the Trustees.

APPENDIX 1

BAPM Categories of Care 2011

INTENSIVE CARE

General principle
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
- Presence of an umbilical venous line
- Presence of a peripheral arterial line
- Insulin infusion
- Presence of a chest drain
- Exchange transfusion
- Therapeutic hypothermia
- Prostaglandin infusion
- Presence of replogle tube
- Presence of epidural catheter
- Presence of silo for gastroschisis
- Presence of external ventricular drain
- Dialysis (any type)

HIGH DEPENDENCY CARE

General principle
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 fulfill 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
- BAPM - Categories of Care August 2011
- presence of trans-anastomotic tube following oesophageal atresia
- repair

- presence of NP airway/nasal stent
- observation of seizures / CF monitoring
- barrier nursing
- ventricular tap

SPECIAL CARE

General principle

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 fulfill the criteria for intensive or high dependency care and requires any of the following:

- oxygen by nasal cannula
- 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

TRANSITIONAL CARE

General principle

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, babies who are on a stable reducing programme of opiate 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.

APPENDIX 2

Definitions according to MBRRACE	
Stillbirth	A baby delivered at or after 24+0 weeks gestational age showing no signs of life, irrespective of when the death occurred.
Early neonatal death	A liveborn baby (born at 20+0 weeks gestational age or later, or with a birthweight of 400g or more where an accurate estimate of gestation is not available) who died before 7 completed days after birth.
Late neonatal death	A liveborn baby (born at 20+0 weeks gestational age or later, or with a birthweight of 400g or more where an accurate estimate of gestation is not available) who died after 7 completed days but before 28 completed days after birth.
Stillbirth rate	Number of stillbirths per 1000 livebirths and stillbirths.
Perinatal mortality rate	Number of stillbirths and early neonatal deaths per 1000 livebirths and stillbirths.
Neonatal mortality rate	Number of neonatal deaths per 1000 livebirths.

APPENDIX 3
CLINICAL GOVERNANCE PERFORMANCE FOR NEONATOLOGY 2020

CLINICAL GOVERNANCE ELEMENT	IMPLEMENTED	PRESENTED	DATE	COMMENTS & ACTIONS	ACTIONS
International & National Guidance					
NICE Neonatal Parenteral Nutrition NG 154	Yes	No		• Practice already in keeping with guidance based on existing evidence and guidance from BAPM guidance (below)	Completed
NICE Guidance Postnatal Care CG 37	Yes	No new presentation last year.		• Site for NIPE • Guidelines revised to meet BFI and NICE standards • Saturation screening implemented as standard • All requirements according to NIPE fulfilled; DDH screening (KP2) markedly improved since last year • University course to train MW developed – continue plan to increase number of trained MW	Completed In progress
NICE Guidance Intrapartum Care CG 55/Antibiotics for Early-onset Neonatal Infection CG 149	Yes	No new presentation last year.		• All requirements fulfilled • Local guideline updated in line with the Obstetrics Department • Audit of Gentamicin dosing schedule	Required

Hypoglycaemia Guideline/NICE Guidance Diabetes in Pregnancy CG 63	Yes	No new presentation last year.		• Guideline amended for new WHO-UK growth charts • Guideline revised to meet BFI standards • Update of guideline in view of conflicting recommendations from BAPM and AAP guidance	Required
Identification and Management of Neonatal Hypoglycaemia in the Full Term Infant – A Framework for Practice (2017)	No	No new presentation last year.		• Publicly documented concerns regarding new BAPM guidance • New TMBU guideline to be based on international best practice recommendations providing the safest approach that is possible without compromising mother-child bonding • Update guideline (see above)	Required
NICE Guidance Neonatal Jaundice CG 98	Yes	No new presentation last year.		• All requirements fulfilled • Compliance with guideline generally good • Audit of updated guideline	Required
Therapeutic Hypothermia IPG 347	Yes	No, report awaited from Badgernet		• All requirements fulfilled • TOBY register data entry now included in NNAP database (Badgernet) • Audit of Network Guidance Time=Brain • Local audit of practice	Completed Completed

NCEPOD – “A Mixed Bag”	Yes	No new presentation last year.		• Local standard to give TPN all babies < 1500 g • Local audit of TPN practice • Adjustment of inclusion criteria required based on local audit	 Completed Completed

The Provision of Parenteral Nutrition within Neonatal Services - A Framework for Practice (2016)	Yes	No new presentation last year.		• Guidance suggests cut-off for TPN at 1250 g birthweight • Update guideline	 Completed
NICE Guidance Developmental Follow-Up Of Children And Young People Born Preterm NG72	Yes	Yes, circulated via e-mail + discussed at senior staff meeting		• Current local guidance in line with recommendations	Completed
Specialist Neonatal Respiratory Care For Babies Born Preterm NG124	Yes	No		• Current local guidance in line with recommendations	Completed
International Audits					
Vermont-Oxford Network	Continuous	Presentation due as this is first year of participation		• NEC rate outstanding as well below international average • BPD rate above international average • Late-onset sepsis rate above international average • Review current respiratory practice • Explore factors affecting sepsis rate	 Required Required
National Audits					
Maternal, Newborn and Infant Clinical Outcome Review Programme	Continuous	No new presentation last year.		• There are 26 surgical neonatal units and 54 level 3 neonatal units altogether • Lowest neonatal mortality and 3rd lowest perinatal mortality out of all	

				(26) neonatal surgical units (incl. cong. anomalies) • 10th lowest neonatal mortality and 5th lowest perinatal mortality out of all (54) level-3 neonatal units (incl. cong. anomalies) • Excl. cong. anomalies: 9th amongst surgical neonatal units and remain 10th amongst all neonatal units • Continue work on improving survival at limit of viability and focus more on BPD and other long-term morbidities	In progress

National Neonatal Audit Programme	Continuous	Yes, circulated via e-mail + discussed at senior staff meeting 		• Overall good performance and reporting quality	
ATAIN - Avoiding Term Admissions Into Neonatal Units	Continuous	Yes, circulated via e-mail + discussed at senior staff meeting		Conditions to be audited: • Respiratory conditions • Hypoglycaemia • Jaundice • Asphyxia (perinatal hypoxia–ischaemia) • Low rate of admissions at moment, most	

				common one respiratory • Work towards reduction of respiratory distress admissions	In progress
NIPE Pilot Saturation Screening for Congenital Heart Diseases	Yes	Yes, circulated via e-mail + discussed at senior staff meeting		• In response to evolving research evidence in support of this tool • Pilot site for NIPE screening for congenital heart diseases • Implement screening as standard locally	Completed
National Training Survey	Continuous	No new presentation last year. 		• Overall satisfaction high – above national average • Continue efforts to improve in all areas of trainee education	In progress

BLISS Survey of Parental Experiences 2010 - 2011	Yes	No new presentation last year.		• TMBU scored in most areas above national average and in 5/7 areas above national average for similar units. • TMBU was never lower than national average in any area • Facilitate unit visits before delivery • Provide written/visual information about TMBU before birth • Provide written/visual network information about preterm birth	Completed Completed Completed
National Programmes & Projects					
Neonatal Hearing Screening	Continuous	No, reported		• Compliant with national requirements	

		separately by Audiology			
Neurodevelopmental Outcome	Continuous	No, reported separately in departmental annual report		• Follow-up continued for preterm infants < 29 weeks gestation: ▪ Schedule of Growing Skills at 12 months CGA ▪ Bayley III Developmental Assessment at 24 moths CGA • Term newborns after cooling treatment: ▪ Bayley III Developmental Assessment at 24 moths CGA	
Neonatal Transport Service	Continuous	No, reported separately in departmental annual report		• Since September 2009 a 24/7 regional neonatal transport service in place, shared between the teams from Surrey, Kent and Sussex • Develop standard electronic activity database • Develop standard risk reporting system for KSS • Develop standard national incident reporting system	Completed Completed Completed
National HIV and Syphilis Surveillance	Continuous	No, reported separately by GUM		• Top antenatal screening centre in the UK	
Trust Identified Projects					
Perinatal Mortality & Morbidity Meeting	Ongoing	Yes, Circulated via e-mail + discussed at senior staff meeting	Monthly	• Joint mortality and morbidity meeting with Obstetrics & Gynaecology • Format under review	In progress
Neonatal Mortality & Morbidity Review	Ongoing	Yes, circulated via e-mail + discussed at senior staff meeting	Quarterly	• Presentation at Neonatal Clinical Governance Meeting • Summary report available in departmental annual report	
Audit of Blood Cultures (Microbiology)	Ongoing	No, circulated via e-		• 6 monthly review not continued due to	

		mail + discussed at senior staff meeting		Microbiology staffing issues • Resume regular reviews • More detailed audit of available data • Audit of new infection prevention measures	 In progress In progress In progress
Audit: Infection Control	Ongoing	No, circulated via intranet infection control dashboard		• Very good compliance generally including hand hygiene and care bundles • Documentation needs improvement	 In progress
The Safety Thermometer	Ongoing	No, awaiting report		• National audit on nursing safety metrics, e.g. catheter care and pressure sores	
Review of Risks, Incidents, Complaints & Claims	Ongoing	Yes, circulated via e-mail + discussed at senior staff meeting		• Medication errors still featuring high, but static • No major incidents otherwise • Review risk panel structure and risk review process • Explore new ways of improving medication errors and communication	 Completed In progress

Survey: Parent Satisfaction	Ongoing	Yes, circulated via e-mail + discussed at senior staff meeting		• Bespoke wireless real-time feedback system discontinued in 2018	
Specialty Identified Projects					
Audits					
No particular audits due to COVID-19 pandemic					
Guidelines/Policies					
Non Invasive Respiratory Support	Yes	Yes, circulated via e-mail + discussed at senior staff meeting		• Update • In response to varying practices affecting overall management	Completed

Invasive Respiratory Support	Yes	Yes, circulated via e-mail + discussed at senior staff meeting		• Update • In response to varying practices affecting overall management	Completed
HBV	Yes	Yes, circulated via e-mail + discussed at senior staff meeting		• Update • In response to varying practices affecting overall management	Completed
Enteral And Parenteral Care	Yes	Yes, circulated via e-mail + discussed at senior staff meeting		• Update • In response to varying practices affecting overall management	Completed
Postnatal Ward Practice Guide	Yes	Yes, circulated via e-mail + discussed at senior staff meeting		• Update • In response to varying practices affecting overall management	Completed
Postnatal Ward Guideline	Yes	Yes, circulated via e-mail + discussed at senior staff meeting		• Update • In response to varying practices affecting overall management	Completed
Attending Deliveries And Admissions	Yes	Yes, circulated via e-mail + discussed at senior staff meeting		• Update • In response to varying practices affecting overall management	Completed
Other					
Management of Preterm Infants at the Edge of Viability	Ongoing	Yes, circulated via e-mail + discussed at senior joint staff meeting with O&G Department		• Plans to improve management through joint efforts with O&G Department – guideline development, parent information and documentation	In progress

APPENDIX 4

List of Publications 2020

Dionne JM, Bremner SA, Baygani SK, Batton B, Ergenekon E, Bhatt-Mehta V, Dempsey E, Kluckow M, Pesco Koplowitz L, Apele-Freimane D, Iwami H, Klein A, Turner M, Rabe H on behalf of the International Neonatal Consortium. Method of Blood Pressure Measurement in Neonates and Infants: A Systematic Review and Analysis. *J Pediatr* 2020;221:23-31

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Anton O, Fernandez R, Rendon-Morales E, Aviles-Espinosa R, Jones CJ, Rabe H. Functionality and acceptability of a novel non-invasive neonatal heart rate monitoring device: a qualitative study of healthcare professionals. *BMJ Innov* 2020;**0**:1–8. doi:10.1136/bmjinnov-2019-000378

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Fernandez Alvarez JR, Mahoney L, Gandhi R, Rabe H. Optiflow™ vs.Vapotherm®

as extended weaning mode of ventilation from Nasal Continuous Airway

Pressure in preterm infants aged less than 28 weeks gestational age

Paediatric Pulmonology 2020; 01 July 2020

https://doi.org/10.1002/ppul.24936

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