

Wales Neonatal Network

Annual Report 2017 / 2018



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FORWARD

I am delighted to present the 2017/18 Wales Neonatal Network Annual Report. This report reflects the highlights, achievements and challenges experienced across the network of 11 neonatal units.

The report includes comprehensive data analysis of activity, outcomes and benchmarking using 2017 data sourced from the Badgernet clinical tool, Vermont Oxford Network (VON) database, and the Child Health Record database. This allows us to understand how we as a service in Wales compare with neonatal services in the UK and across the VON network, and plan our quality improvement initiative.

Within the report, you will see clearly the hard work and contribution by every single unit and transport team in supporting the delivery of the network work programme, and the celebration of successes in building new state of the art facilities across Wales for our babies to receive their care.

I would like to thank all of the medical, nursing, therapy, non-clinical staff and our parent representatives who have participated with dedication to the activities and work of the Wales Neonatal Network.

I would also like to thank Wendy Davies who retired as the Lead Nurse in January 2018. Wendy gave 45 years to the NHS, with the last 5 years dedicated to the network.

Looking forward to 2018 /19, there is a full programme of work. The focus of network business is to work collaboratively with all units and health boards to improve the outcomes of our babies in Wales. I welcome working with you in the coming year.

EXECUTIVE SUMMARY

The 2017/18 annual report has a different format to that of previous years. Previously the report had been based on a calendar year, however in line with NHS Wales Health Collaborative process, this year the main report reflects the activities of the financial year, however the data section remains a calendar year in line with national neonatal audit and benchmarking.

In part one, the network has taken the opportunity to invite units to share best practice and celebrate success within this report. The units at University Hospital of Wales, Royal Gwent and Ysbyty Glan Clwyd shared their new unit developments. These new facilities improve the environment for staff, babies and parents and are a real showcase for successful service planning. The unit at the Royal Glamorgan was nominated for a Bliss excellence award for family centred care, with the unit at Singleton nominated for a BMA award for reducing antibiotic usage.

A number of operational changes were seen within the network team. A new Business Support Officer was recruited along with a Senior Project Manager. This has allowed the network to implement a programme approach to its work, and an increasing focus on delivering change through collaboration. This work programme is structured around the newly approved Wales Neonatal Standards 3rd Edition, written in line with The Quality Improvement Guide: Improving Quality Together (2014) and puts the patient at the centre of all that we do.

The network has continued to work collaboratively with great support from all units in Wales to develop and update a number of clinical guidelines in order to standardise best clinical practice across Wales, they have embedded a process of mortality review to allow shared learning across the network, and delivered a successful Audit Day with a focus on litigation. In December 2017 the first Parent Conference was held in Cardiff, designed to support parents and babies following discharge from the neonatal service. Keeping families at the centre of care, the network has begun the development of an all Wales approach to Family Integrated Care, which will continue into the coming year.

Part 2 provides an in depth analysis of activity, performance against national and international audit and a benchmark against units in the United Kingdom and in the case of the Vermont Oxford Network, worldwide.

Key points to note on network activity are:

- Activity was marginally down on 2016
- 50% of babies admitted were term

- 392 ex-utero transfers were undertaken
- 80% of babies less than 32 weeks were born in a unit aligned to a NICU
- Occupancy for Intensive Care at University Hospital of Wales, High Dependency at Singleton and Special Care at Royal Gwent and Royal Glamorgan units exceeded recommendations
- 97.9% of babies admitted survived to discharge, with 38 recorded deaths in neonatal units

Benchmarking against other services showed:

- Outcomes for death, severe intraventricular haemorrhage, necrotising enterocolitis and cystic PVL are on par with the Vermont Oxford Network and UK
- Chronic lung disease, infection and Retinopathy of prematurity are worse than the Vermont Oxford Network
- National Neonatal Audit Programme data shows considerable variation across Wales, with some areas showing improvement and others not
- A recommendation that Quality Improvement Initiatives are needed to achieve standard and reduce variation.

The network will consider how the data informs the 2018/19 work programme.

It is clear from the limited information in this summary that the network can clearly demonstrate its impact on service improvement and look forward to building on these successes in the coming year.

INTRODUCTION

Across the Wales Neonatal Network, there are six Health Boards and eleven neonatal units in total. These comprise of three Neonatal Intensive Care Units (NICUs), one Sub Regional Neonatal Intensive Care Unit (SuRNICC), two Local Neonatal Units (LNUs) and five Special Care Units (SCU). Surgical, cardiology and other regional services are provided at the NICU in Cardiff, with cardiac surgery provided by Bristol NHS Trust.

THE CORE NETWORK TEAM

In October 2016, the Wales Neonatal Network transferred to NHS Wales Health Collaborative from Welsh Health Specialised Services Committee (WHSSC). The governance, however, continued to be maintained through WHSSC throughout 2017 before the Joint Committee approved the transfer of governance from 1st January 2018.

The work of the neonatal network is guided and overseen by the Wales Neonatal Network Board, chaired, on behalf of NHS Wales, by the designated lead executive for neonatal services, Mrs Nicola Prygodzicz.

The Board is accountable to NHS Wales through the Collaborative Executive Group (chief executives) which in turn reports to the Collaborative Leadership Forum (chairs and chief executives).

A number of changes to the core network team took place during 2016. Mr Alan Hather has taken up his post as Business Support Officer to the Network.

The Network was been successful in increasing its staffing establishment to include a Band 7 Senior Project Manager, and welcomes Jacqueline Davies into this role.

The Network Lead Nurse Wendy Davies made the decision to resign from her post, effective from January 2018. Wendy has given 45 years to the NHS, with the last 5 years to the Neonatal Network. Wendy has a level of expert knowledge that is rarely found and has worked tirelessly to improve nurse staffing, nurse training and education and improve quality of care. We wish her well in her retirement. We look forward to welcoming the next Lead Nurse into the network team.

SERVICE DEVELOPMENTS/ CELEBRATING SUCCESS

It is important that the network celebrates the successes of the units and shares areas of good practice. Units have submitted the following to the network to be included in this report.

Royal Glamorgan – The neonatal unit was nominated for one of *Bliss' Neonatal Excellence Awards'*, which recognises and celebrates outstanding individuals, teams and projects that have made a difference to babies born premature or sick through delivering high quality family-centred care as part of the Bliss Baby Charter.

Although the unit did not win on this occasion, Bliss were incredibly impressed and delighted with the high quality family-centred care the unit is delivering.

University Hospital of Wales (UHW) - the Welsh Regional Neonatal Intensive Care Unit at UHW, Cardiff has progressed during 2017 with the Daisy special care nursery opened in May and Buttercup the first section of the critical care section was occupied in November 2017.

Daisy has one overnight stay room with en-suite facilities which has been very well utilised to date, and makes a big difference to the families preparing for discharge. Each cot space in Buttercup has a pendant and can deliver high dependency or intensive care.



Ysbyty Glan Clwyd - Premature and very poorly infants being cared for at Ysbyty Glan Clwyd are now receiving care in the newly developed Neonatal unit. The SuRNICC (Sub-Regional Neonatal Intensive Care Centre) will care for new-born babies from across North Wales with significant care needs.

Once fully completed, the unit will feature 19 cots, five intensive care, five high-dependency, and nine special care. The new unit also features a dedicated isolation unit, a transitional care service to keep mums and new-born babies together, and on-site parent accommodation.



Royal Gwent - In April 2017 the Neonatal Intensive Care Unit at Royal Gwent Hospital moved back into their refurbished environment. The area between each space has been increased making a more comfortable environment for parents & staff and also increasing infection control compliance. Comfortable chairs were purchased for each space encouraging parents to stay with their baby for longer periods and also aiming to increase breastfeeding rates. The potential number of cots has also been increased.

The Neonatal Team at Royal Gwent Hospital won 'Team of the Year' at Aneurin Bevan's 7th Staff Recognition Awards held on Friday 15th December. The event that celebrated the achievements of staff from across the Health Board was hosted by Ann Lloyd, Chair and Judith Paget, Chief Executive.



Singleton Hospital - neonatal team was nominated for a BMA award for quality improvement work in reducing antibiotic use of the neonatal unit. Although the unit did not win the award in the category, the work was highly commended.

Glangwili Hospital - Glangwili have a number of developments they wish to share including:

- Appointing a practice development nurse
- Rotation of Tier 2 medical staff to Singleton
- Implemented Family Integrated Care
- Included bereavement care as part of their Outreach Service

They have also been extremely successful in developing a closed Facebook page "Little Stars/Sêr Bach". This group provides a support network that is open to all parents that have been on the unit or who receive input from our Neonatal Outreach team. The Facebook page enables parents past and present to share their journeys through Special Care, from birth to present day, with heart-warming comments and photographs.

2017 PROGRESS

The network team have been busy delivering its core business. Dr Roshan Adappa stepped down from his place on the National Neonatal Audit Programme Project Board. He has been replaced by Dr Siddhartha Sen. The network manager is a member of the NNAP Methodology and Data Set Working Group, ensuring Wales is well represented in the development and analysis of NNAP measures.

The Network Manager attended the UK Neonatal Network Managers forum to keep updated and participate in discussions on a national level, including the Neonatal Critical Care Review currently being undertaken, and the national pricing structure for NHS England.

Professional networking amongst the nursing and therapies workforce was driven by the Network Lead Nurse to build relationships with like-minded people, to develop their networking skills and to collectively support their colleagues with innovative ideas, topical issues, and to listen to colleagues' needs and concerns.

The Network has continued to offer support to the work of the South Central Alliance. Most recently, the focus has been on agreeing the future designation of the units in Wales. There are clear national standards to be applied when designating units as Intensive Care, High Dependency or Special Care units. The Neonatal Task and Finish Group, a sub-group of Paediatric, Obstetric and Neonatal Board (PON) made recommendations to the PON Board on the future designation of Units in South Wales. The network has made the recommendation that neonatal service planning should be considered in its entirety and not in smaller regions.

In February 2018 an Implementation Task and Finish Group met to start looking at the alignment of the neonatal and maternity networks from April 2018.

The implementation plan has 2 phases. Phase 1 will be to transfer the Maternity Network to the NHS Wales Health Collaborative on 1 April 2018 and Phase 2 will design and implement the new joint network.

The All Wales Neonatal Standards were updated during 2017 building on the previous standards using the latest evidence and best practice guidelines.

The 3rd edition Standards are based on the premise that the babies and families we care for should be at the heart of everything we do. The Quality Improvement Guide: Improving Quality Together (2014) identifies that patient centred care can lead to improved quality, reduced waste, better experiences and better use of resources. The All Wales Neonatal Standards follow the six domains of quality healthcare as follows:

- Patient Centred
- Safety
- Effective
- Timely
- Efficient
- Equitable

With the revision of the standards it seemed pertinent to ensure that the Network structure was reviewed to ensure it was fit for purpose, and would support Health Boards to deliver the sustainable high quality services required. It was recognised that the 6 domains within the standards could be streamed into themes, supported by the Networks clinical leads and the 2017/2018 work plan actions have been collated under five work streams based on the above quality healthcare domains:

- Safe and effective care
- Person centred care
- Equitable and efficient care
- Timely care
- Professional Networking

The following sections present an overview of key achievements and progress made.

SAFE AND EFFECTIVE CARE

- **Activity** - 2017 was marginally quieter compared to 2016. There were 3395 admissions and readmissions to neonatal units in Wales; this was 3.5% lower than in 2016 when there were 3519 admissions. There were 2747 unique babies admitted to neonatal units in Wales (i.e. first time admissions, excluding readmissions) and which was 3.3% lower than in 2016 when it was 2842.
- **Performance Monitoring** - the Network has been requested to develop a performance framework, and a stakeholder meeting was held in May to review the data set and ensure that reports received are fit for purpose. The outcome of the meeting was to develop an interactive neonatal dashboard that updates performance and activity on a monthly basis. This dashboard was approved in draft by the Network Board and is scheduled for completion by the end of 2018.
- **Mortality review** - In 2017 the network established a programme of mortality review with meetings held on a quarterly basis. These meetings build a platform for sharing lessons learned and ultimately improving quality. The meetings were well attended by multi-disciplinary staff members from all units in Wales, with excellent feedback provided to the network. An annual report is to be generated in line with the Perinatal Review Toolkit recommendations. The Network also sponsored four consultants to attend a conference held on – Learning from Serious Incidents: Implementing the National Guidance on Learning from Deaths. A key learning point from this day was how to give parents and families an opportunity to comment on the care their baby received, and to have any questions answered. Following on from this, the network will be developing guidance for units on involving parents.
- **Clinical guidelines sub group** – the sub group continued to meet during 2017 and a number of existing guidelines were reviewed and updated where appropriate. A number of new guidelines were also produced and published on the network website:
 - Management of Chronic Lung Disease
 - Management of Neonatal Herpes Infection
 - Difficult airway management
 - Vitamins and minerals in preterm infants
 - Management of Bilious vomiting

- **Network audit day** - A successful audit day was held on 11th October. The event was attended by 86 delegates who enjoyed a full agenda on a variety of topics. The morning was dedicated to learning from complaints and litigation with cases presented from all three NICUs. The afternoon saw a variety of presentations from across the network along with a number of free papers. As always, feedback from this event was extremely positive and it remains a key date in the neonatal calendar.
- **National Neonatal Audit Programme (NNAP)** This audit programme, is commissioned by the Healthcare Quality Improvement Commission (HQIP), and funded by Welsh Government. It allows a national comparison against nationally agreed performance measures. In the 2017 report, based on 2016 data Wales showed considerable improvement in 2 of the measures:
 - The rates of babies born at <32 weeks gestation with a temperature recorded within an hour of admission and within the recommended range rose from 56% to 67%
 - The reporting of follow up at 2 years for babies born <30 weeks gestation increased from 31% to 61%. The attached dashboard shows all Wales NNAP data for unit level for 2015 and 2016.
- **Neonatal Sepsis, Antibiotic Resistance and Other Challenges** - The first network conference on was held in the Royal Glamorgan Hospital on November 7th. The event was well attended, with multi-professional representation. The guest speakers were very well received and the clinical discussion on joining forces to take key pieces of work forward on a national basis was exciting.

A number of Welsh neonatal units are now considering a collaborative review of practice to try to safely reduce antibiotic use on the postnatal wards. We are joining with colleagues in the South West network to do this. A retrospective and a prospective study has been agreed, and if these show that antibiotic reduction can be done safely, then units may opt to change practice working in a collaboration and continuing to monitor results for safety.

PERSON CENTRED CARE

- **Parent conference** - The Network hosted a very successful parent conference on 6th December 2017. The event was the first of its kind and was held in the Park Inn Hotel, Cardiff.

The day, aimed at parents with babies aged from birth to 18 months who had received care from neonatal units across South Wales, included keynote talks from clinical psychologists, physiotherapists and Speech and Language therapists and hands on workshops including sensory play, baby massage, nutrition and weaning and encouraging developmental activities at home.

- **Family Integrated Care (FiCare)** - Medical, nursing and therapies colleagues from neonatal units across Wales came together at a workshop in January to discuss implementation of FiCare.

It was encouraging to realise that a number of elements of FiCare were already in place or in the process of being implemented in both NICUs and local/special care units. These included:

- Open ward rounds
- Parent participation in ward rounds
- Open/flexible visiting
- Bedside teaching

A lot of positive actions came from the workshop to be taken forward in the 2018/19 work plan including:

- agreement on a parent checklist
- Design of a Welsh 'steps to home passport' similar to that produced by North West London Perinatal Network
- The parent education curriculum adopted within ABMU would be shared for consideration of adoption as a Network wide curriculum.

- **Bliss**

Our third sector partner Bliss supported the units with a volunteer recruitment programme. This proved to be more successful in South Wales than North Wales, with 12 volunteers in the application process (as at February 2018)

Bliss also co-ordinated a Christmas gift for each of the units, working with Redrow homes. Redrow Homes also visited the Royal Gwent NICU to look at the parent facilities.

- **Workforce review** - The Network monitors the medical and nursing (registered and unregistered) twice a year and information on therapy provision is collected annually.

A Summary of the key points as at September 2017 is shown below:

MEDICAL STAFFING

- In comparison to March 2017:
 - There has been improvement against staff in post at Tiers 2 and 3 in the NICUs
 - Staffing across all units with Deanery trainees has decreased with the most significant change at Tier 1
- There are unfilled posts across all units and whilst there are a number of fixed term locums there continues to be a reliance on support of ad hoc locums
- Singleton had 2 MTI trainees who commenced work in October 2017 and Ysbyty Glan Clwyd are also awaiting 2 MTI trainees to join. 4 speciality doctors have been recruited and will commence by the end of 2017 at Glangwili Hospital.

NURSING & THERAPIES STAFFING

- Nursing establishments have increased by 14.45 wte in the last 6 months;
- Staff in post has increased by 19.81 wte in the last 6 months;
- 6 of the 11 units now have nursing establishments that meet the All Wales Neonatal Standards;
- 2 of the 11 units have staff in post that meet the standards;
- An additional 31.75 wte nurses are required to meet the standards;
- Units report an additional 37.08 wte staff will be joining the service;
- 13% of the workforce were unavailable to work as at 27 September 2017;
- 4 of the 11 units have 70% of their nurses Qualified in Speciality;
- 2 out of 11 units have 100% of their nurses with a NLS qualification;
- 12% of the direct care workforce are non-registered staff
- The Network has seen an improvement in therapy provision from 2.38 wte in 2012 to 3.08 wte as at September 2017;
- The Network can report that units have included dedicated therapy provision within business cases for neonatal unit future development plans;

Medical staffing

At Tiers 1 and 2 units should have a 1:8 staff rota and at Tier 3 a 1:7 staff rota. The exception to this is those local / special care units who have trainees, as the Wales Deanery recommends a 1:11 staff rota at Tiers 1 & 2. Figure 1 illustrates unit compliance against establishment and staff in post.

Fig 1

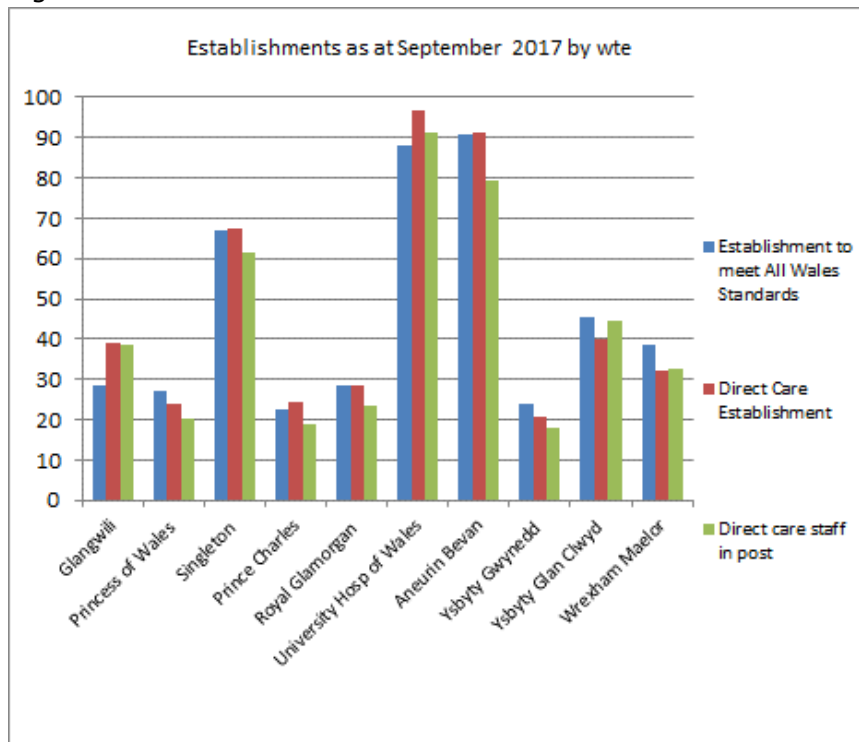
	Tier 1		Tier 2		Tier 3	
	Establishment	In Post	Establishment	In Post	Establishment	In Post
	1:8 staff rota				1:7 staff rota	
Singleton	8.4	5.4	8.8	7.4	8	8
University Hosp. of Wales	19	17.4	8	8	10	10
Royal Gwent	10	7.36	8.66	8.66	12	12
Princess of Wales	11	10	6.4	0.4	8	8
Prince Charles	9	6	7.9	6	7	7
Nevill Hall	7	2	4	5	7.8	6.8
Ysbyty Gwynedd	10	8.5	7	5	7	7
	1:11 staff rota				1:7 staff rota	
Glangwili	13	9	12	8	10	8
Royal Glamorgan	10	10	10.15	14	9	9
Wrexham	13	10	10	9	7	7
Ysbyty Glan Cwyt	12	10	11	10.6	6	5

Nurse staffing

The neonatal nursing workforce is made up of direct and non-direct nursing care. Direct care staff provide care at the cot side and the All Wales Standards for staffing in a ratio of 1:1 nurses for intensive, 1:2 nurses for high dependency and 1:4 for special care. For the purpose of the workforce updates Royal Gwent and Nevill Hall report as single unit 'Aneurin Bevan'.

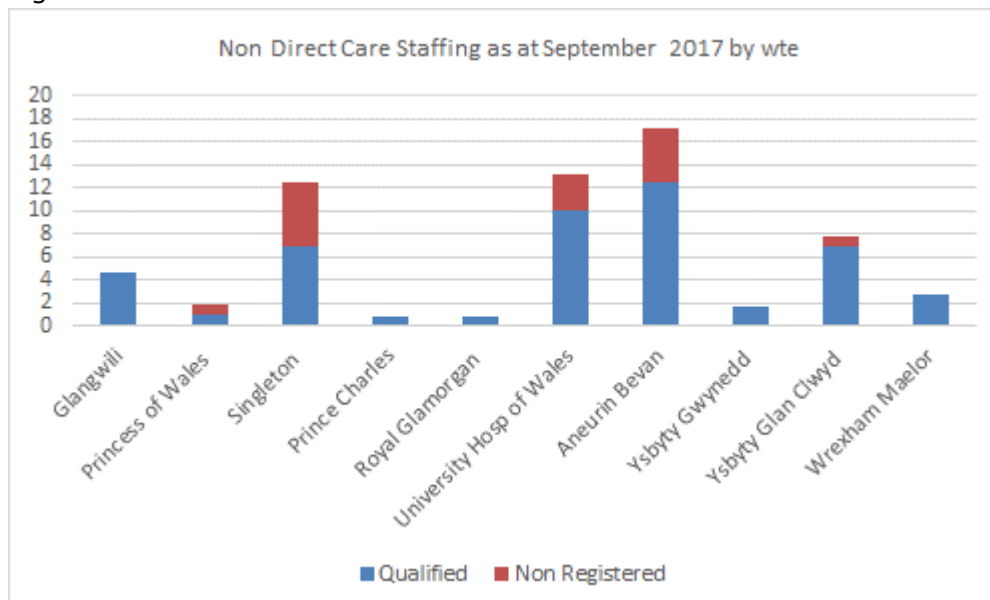
Figure 2 shows 5 of the 10 units now have nursing establishments that meet the Standards and 2 of the 10 units have staff in post that meet the standards.

Fig 2



Supporting those staff providing patient care at the cotside are a number of non-direct staff, who provide other clinical care roles i.e. outreach, education/practice development nurse, ward/office manager, research, receptionists and Health Care Support Workers. Figure 3 shows the non-direct staff in post as at September 2017.

Fig 3



Therapies

Figure 4 shows therapists who are dedicated to provide neonatal services by wte. It is present by Health Boards as therapy provision is sometimes delivered across more than one neonatal unit.

Fig 4:

	Dietician	Occupational Therapists	Physio-therapists	Speech & Language Therapists	Total wte
Abertawe Bro Morganwg		0.5		0.2	0.7
Aneurin Bevan					0
Betsi Cadwaladr					0
Cardiff & Vale			0.5		0.5
Cwm Taf					0
Hywel Dda	0.47	0.47	0.47	0.47	1.88
Wales	0.47	0.97	0.97	0.67	3.08

Paediatric Therapists also provide support to neonatal units from their core therapy hours. Abertawe Bro Morganwg provide 1 wte physiotherapist and Cwm Taf Speech & Language therapists provide 0.01 wte.

- **Education & Training** - the network hosted / supported a number of collaborative **learning events** in 2017. The events include:
 - New neonatal nurse education day. This event, held in March was directed at newly registered or recruited qualified nurses and delivered by the practice educators / educational leads employed by the units. A large volume of nurses entered the service from September 2017, and it was felt that a joint event would provide a uniform introduction to NHS Wales neonatal nurse education. A very cold Monday saw approximately 25 nurses attend or Video Conference in to an exciting introduction to their education pathway
 - Post Mortem and Organ Donation – the excellent Post Mortem session was delivered by Dr Andrew Bamber (pathologist) and included the importance of neonatal post mortem along with guidance on obtaining consent. This is a session the network would be keen to host on an annual basis. The NHS Blood and Transplant team followed

with a presentation and discussion on the process for neonatal organ donation

- Holistic Neonatal Care Conference – North Wales, November 2017 – this conference raised awareness of the importance of therapy provision in a neonatal unit.

TIMELY CARE

- **CHANTS (Cymru inter-Hospital Acute Neonatal Transfer Service)**

The CHANTS service is the neonatal transfer service for Wales and is responsible for arranging and ensuring safe transfer of neonates within Wales, as well as any Welsh babies out of network that need to be transported. It is a 7-day a week provision operating twelve hours a day, (08:00 - 20:00)

In South Wales Dr Sunil Reddy, Network Transport Lead, and Claire Richards, Service Manager oversee the service. It is consultant led and run from each of the three NICUs in rotation.

In North Wales the service is overseen by Dr Sandra Bakker, Lead Neonatologist for Neonatal Transport (This following the departure of Dr Tarek El-Alam who resigned his post), and run from Ysbyty Glan Clwyd. It is a consultant led service comprising of transport consultants, transport ANNPs and transport nurses responsible for the transfer of premature and sick babies > 27 weeks gestation. Babies < 27 weeks gestation as well as British Association of Perinatal Medicine (BAPM) defined time-critical transfers 24hr hours a day are transferred by CONNECT North West.

- *Activity*

During the period 1st January to 31st December 2017, 665 transfers were undertaken by CHANTS, 512 in the South and 153 in the North. This is a slight decrease on the previous year's transfers when 680 were performed.

The general breakdown of activity has remained consistence since the commencement of the service with 1/3rd bring uplifts and 2/3rd a combination of repatriation and capacity transfers. The clinical reason for 85% of the transfers undertaken was medical.

	Medical		Surgical		Cardiac		Neuro		Total	
	South	North	South	North	South	North	South	North	South	North
Uplift	101	18	47	20	6	4	13	4	167	46
Repatriation	239	99	2						241	99
Capacity	101	2							101	2
Out Patients	3	5		1					3	6
Total	444	124	49	21	6	4	13	4	512	153

- *Working with Emergency Medical Retrieval and Transfer Service (EMRTS)*

In 2017, both North and South Wales performed 21 flight transfers. Although this is a growing number, it was felt that the services have so much to learn from each other and in light of this; a joint EMRTS/CHANTS session was held in March 2018. The aim of the session was to share experiences, learn from each other and benefit from the learning points raised. Each CHANTS team, with EMRTS crew input, presented 2 / 3 flight transfers.

- **24 hour service**

Due to the limitations of the current service model in South Wales, the Network continues to work towards achieving a 24hr transport service in line with the All Wales Standards. The out of hour's service in South Wales is not commissioned, with any transport delivered dependent on the availability of Medical/Nurse staffing and WAST availability at the time of referral. The Network clinical lead presented the service risk to the Directors of Planning on 9 February 2018 and to a stakeholder engagement workshop, led by WHSSC, on 27 February 2018. The 24-hour transport service has been identified as a key priority for the network for 2018/19 and is being progressed collaboratively between the network, WHSSC and Health Board teams.

- **New Ambulance** - the Network has been working with WAST to ensure the specification of the new vehicle for South Wales neonatal transport is fit for purpose. The transport sub-group approved the final design for the replacement ambulance, with the clinical leads going to the factory in Ireland to ensure the specification was correct. The newly built ambulance will be put into service in the new financial year and is a real success story for the transport teams and Network.

2018 / 2019 PRIORITIES

Looking forward to 2018/19, the Network has identified the following four key service priorities and look forward to working with its stakeholders to continue to improve neonatal care in Wales:

- Capacity and Current Risks
- Nursing, Medical and therapy current and future Workforce
- 24 Hour Transport Service
- Delivery against the Neonatal Standards

ACTIVITY OUTCOMES AND BENCHMARKING

Summary of activity and outcomes

ACTIVITY

3.5% fewer admissions than in 2016

9 of 10 babies admitted lived within their referral areas

2017 has been a marginally quieter year compared to 2016. In 2017 there were 3395 admissions and readmissions to neonatal units in Wales. This was 3.5% lower than in 2016 when there were 3519 admissions. There were 2747 unique babies admitted to neonatal units in Wales (i.e. first time admissions, excluding readmissions) and which was 3.3% lower than in 2016 when it was 2842. Of these, 2717 babies were inborn in Welsh hospitals (Tables 1 and 2). 91.1% of babies admitted to neonatal units lived within the respective referral areas (Table 5).

Half of all babies admitted were full term babies

1 in 20 of all term babies born in Wales were admitted to neonatal units

Nearly 1 in 4.5 babies admitted were unexpected admissions

Measures to reduce term admissions and unexpected admissions in place

Full term babies accounted for 52.3% of all admissions (Table 10). This is lower than in England, where the figure is close to 60%. 5.3% of all term babies born in neonatal units in Wales were admitted to neonatal units (Table 3). 22.4% of admissions to the neonatal units in Wales were from the post-natal wards (Tables 4 and 7) – in other words unexpected admissions. This figure has marginally reduced from 23.3% in 2016.

More than 9 in 10 mothers whose babies were admitted to neonatal units, delivered in units where they were booked

392 ex-utero transfers were carried out

8 out of 10 babies less than 32 weeks gestation delivered in NICUs as recommended

92.3% (93.5% in 2016, 89.7% in 2015) of mothers whose babies were admitted to neonatal units in Wales delivered in the hospitals where they first booked. A total of 392 ex-utero transfers were carried out in 2017. 86 babies less than 28 weeks gestation were admitted to neonatal units in Wales (Table 10) compared to 75 babies in 2016.

In South Wales, 82.4% of such babies delivered at the NICUs as recommended compared to 76.4% in 2016 and 59.9% in 2015. This is movement in the right direction since the recommendation of the Neonatal Network for babies less than 32 weeks gestation to be delivered in level 3 units.

There were 91 ELBW babies (<1000g) (Table 11) compared to 77 in 2016, 109 in 2015 and 77 in 2014. There were 303 VLBW babies (<1500g) in 2017 compared to 296 in 2016, 300 in 2015 and 271 in 2014. In S Wales, 74.8% VLBW babies were delivered in NICUs in 2017 compared to 73.5% in 2016 and 72.6% 2015.

In 2017, all neonatal units in Wales provided 6474 (6921 in 2016, 6936 in 2015 and 6805 in 2014) days of intensive care, and 11428 (10733 in 2016, 10114 in 2015 and 10024 in 2014) days of high dependency care. There were 26949 (265462 in 2016, 5951 in 2015 and 25861 in 2014) days of special care and normal care provided.

Overall occupancy rate 76.3%

UHW had IC occupancy of 80%, Singleton HD occupancy of 138% and Royal Gwent and Royal Glamorgan over 150% for SC

High occupancy indicated shortage of available capacity

Overall occupancy rate was 76.3% but individual units had unacceptably high levels of occupancy. University Hospital of Wales had an IC occupancy rate of over 80% compared to the recommended occupancy of 70%. *Singleton hospital had a high dependency occupancy rate at an unacceptable 138% against a recommended 70%.* Special care occupancy rates were exceptionally high at Royal Glamorgan hospital (147.7%) and the Royal Gwent hospital (160%).

OUTCOMES

97.9% babies admitted survived to discharge

38 babies died in neonatal units in Wales

94% babies under 1500g survived to discharge

Gestation and weight specific survival to discharge is explored in Tables 28-34 and Figs to 14-19. Overall, of all babies admitted to neonatal units in Wales 97.9% survived to discharge. There were 38 deaths in neonatal units in Wales. There were 4 additional deaths of babies who had been transferred to England for care. 84.4% of ELBW babies (<1000g) admitted to neonatal units in Wales, survived to discharge (compared with 85.3% in 2016, 84.3% in 2015, 75.9% in 2014 and 80.1% in 2013).

For babies under 1500g, the survival was 93.6% (94.5% in 2016, 92.3% in 2015, 90.3% in 2014 and 89.4% in 2013). The 2017 survival figure was within the Vermont Oxford Network 2016 crude survival figures for VLBW babies (89.5%, Q1 86.7 - Q3 95.1).

Table 33, 34 and Fig 18 and 19 compute the cumulative survival by gestation (of babies admitted to the neonatal units) in Welsh Neonatal units over a 6 year period 2012-2017. These figures are based on a substantial numbers of babies and are very likely to be representative. These figures can be used as guidelines to council parents on expected outcomes.

BENCHMARKING

Since 2015, all neonatal units in Wales have joined the Vermont Oxford Network (VON) and have been submitting their very low birth data to the network. Founded in 1988, VON is made up of teams of health professionals representing neonatal intensive care units and level I and II care centers around the world, in support of the mission *to improve the quality and safety of medical care for newborn infants and their families through a coordinated program of research, education, and quality improvement projects.*

Benchmarking against Vermont Oxford Network
Death, Severe intraventricular hemorrhage, Necrotising Enterocolitis and cystic PVL outcomes at par with the VON and UK
Chronic Lung Disease, infection and retinopathy of prematurity
Welsh outcomes worse

Prior to 2015 the 3 NICUS in South Wales submitted data to VON. This is the third year that the Welsh data for outcomes of VLBW babies in the 3 NICUS in South Wales can be compared to the rest of the UK and the larger network. Table 35 and Fig 20-22 makes the comparison of Key Performance Measures of babies looked after in the NICUs in 2016 against similar babies in the rest of the participating units of the UK and the world. These figures show that for major outcome measures like mortality, death or morbidity, chronic lung disease, late bacterial infection, severe intraventricular haemorrhage, necrotising enterocolitis and cystic PVL, the Welsh figures are at par with both the UK and the Vermont Oxford Network figures. For some other outcomes like Coagulase negative staphylococcal sepsis, Nosocomial infection and any late infection the figures for Wales were outside the Q3 of either the UK or the Network figures.

Benchmarking against the National Neonatal Audit Programme

At or above par in 5 of 9 parameters tested

Below par in 4 of 9 parameters

Poor showing in 4 parameters mainly due to poor results from a handful of units

Special measures of quality improvement needed in those units to improve outcomes

Tables 37-50 and Figs 24-37 show indicative results for units in Wales on the NNAP audit questions for 2017. Although there has been improvement in a number of areas, other areas have dropped. There are significant regional variations and though the overall results for the Wales Network compares more favourably with the other networks in the UK.

- Of eligible babies, 92.6% had their temperatures taken within 1 hour of birth against an NNAP standard of 95%.
- 90.1% of eligible mothers received antenatal steroids prior to delivery though there are some regional variations. This figure was higher than the NNAP standard of 85% and higher than the figure from 2016.
- In 2017, 4.2% of eligible babies apparently did not have ROP screening at all. Overall 89.9% babies had ROP screening at the right time. This is short of the UK average of 94%.
- 52.6% eligible babies had *any* breast milk at discharge. There are significant regional variations. This figure has improved year on year, but is still below the UK average of 55%
- 89.9% of eligible babies' parents were spoken to by a senior doctor within 24 hours of admission. The National average is 91%.
- 64.1% of eligible babies had a 2 year assessment against a National average of 59.1%.
- 3.6% of babies over 35 weeks gestation had neonatal encephalopathy.
- There were 3.9 episodes of catheter related sepsis (old definition) per 1000 catheter days in Welsh neonatal units in 2017. This is higher than the National average of 3 per 1000 days.
- 53.1% of eligible babies had *any* BPD compared to a National average of 50%

- 54.4% of eligible Welsh mothers had the recommended Magnesium sulphate against a National average of 59%

Though overall figures have improved over the last 3 years, specific units of Wales are underperforming and these need to be addressed urgently.

METHODS

The data for part two of the Annual report has been drawn from the BadgerNet clinical tool. The cases were babies who were cared for on any neonatal unit in Wales during 2017, including those born in 2016 if their care extended into 2017. For babies that died the data includes only deaths that happened in 2017 (Table 28). Data for Table 3 (total inborn live births) has been derived from the Child Health Records database.

This Annual Report includes every single admission to the neonatal units in Wales. There were 11 neonatal units in 6 Health Boards, divided into 4 Health Communities; South-West (Hywel Dda University Health Board and Abertawe Bro Morgannwg University Health Board), South-Central (Cwm Taf University Health Board and Cardiff & Vale University Health Board) South-East (Aneurin Bevan University Health Board) and North (Betsi Cadwaladr University Health Board). Babies of mothers who normally reside outside Wales, and who had any care in any of our neonatal units are included. Babies of mothers resident in Wales but who had their *entire* neonatal care in England are not included as the Network only has permission to access data from Welsh units. In future we hope to have access to the data on these babies from neighbouring Networks. There are two categories of babies born in England – those planned as part of a normal care pathway, especially cardiac babies, and infants of mothers living on the Welsh borders who deliver in England and unplanned deliveries mainly due to lack of capacity in Wales.

This Annual Report is descriptive. The data is uncorrected for risk or case mix. This and the relatively low numbers from individual units means there is lack of statistical power to draw any valid comparisons between units. However some of the data does lead us to pose certain questions which may be explored at a later date.

The data has been manually cleaned as far as possible. Regular audits across all Health Boards, rigorously undertaken during 2012-2013 and continuing, have shown that the data quality is improving though not yet perfect.

PLANS FOR THE FUTURE

Morbidity data has been included though not fully explored. Morbidity data, from the Vermont Oxford Network and some morbidity data from the National Neonatal Audit Programme (NNAP), show that Wales has performed at par with units both internationally and nationally. This area will be explored in further detail in the next few years.

Siddhartha Sen

Network Lead for Quality and Safety

ACTIVITY

Table 1. Total admissions, babies and percentage of inborn babies admitted (2017)

	Total Admissions	Total Babies†	Inborn	First Episodes**	% Inborn
South West Wales					
Bronglais	8	8	8	8	100.0
Glangwilli General	281	257	214	216	83.3
Princess of Wales	234	219	173	174	79.0
Singleton	455	445	370	377	83.2
	978	929	765	775	82.3
South Central Wales					
Royal Glamorgan	264	242	219	220	90.5
Prince Charles	269	259	227	227	87.6
University Hospital of Wales	497	484	419	421	86.6
	1030	985	865	868	87.8
South East Wales					
Nevill Hall	231	208	157	157	75.5
Royal Gwent	472	451	369	377	81.8
	703	659	526	534	79.8
North Wales					
Ysbyty Gwynedd	228	213	198	198	93.0
Ysbyty Glan Clwyd	242	227	189	198	83.3
Wrexham Maelor	214	197	174	174	88.3
	684	637	561	570	88.1
Total	3395	3210	2717	2747	84.6

** First episode includes babies that were admitted for the 1st time in a neonatal unit in Wales

† Count of total number of babies seen in individual units in Wales (includes babies unique to the unit but not necessarily to the network)

Table 2. Total Admissions 2013-2017 and percentage change in 2017 from 2016

	2013	2014	2015	2016	2017	% change
South West Wales						
Bronglais	19	5	8	9	8	-11.1
Glangwilli General	156	203	288	318	281	-11.6
Princess of Wales	282	276	289	270	234	-13.3
Singleton	372	422	433	444	455	2.5
	829	906	1018	1041	978	-6.1
South Central Wales						
Royal Glamorgan	308	263	257	248	264	6.5
Prince Charles	209	188	212	255	269	5.5
University Hospital of Wales	524	552	464	579	497	-14.2
	1041	1003	933	1082	1030	-4.8
South East Wales						
Nevill Hall	285	256	258	239	231	-3.3
Royal Gwent	475	460	522	482	472	-2.1
	760	716	780	721	703	-2.5
North Wales						
Ysbyty Gwynedd	196	171	190	208	228	9.6
Ysbyty Glan Clwyd	328	278	230	269	242	-10.0
Wrexham Maelor	227	189	212	197	214	8.6
	751	638	632	674	684	1.5
Total	3381	3263	3363	3519	3395	-3.5

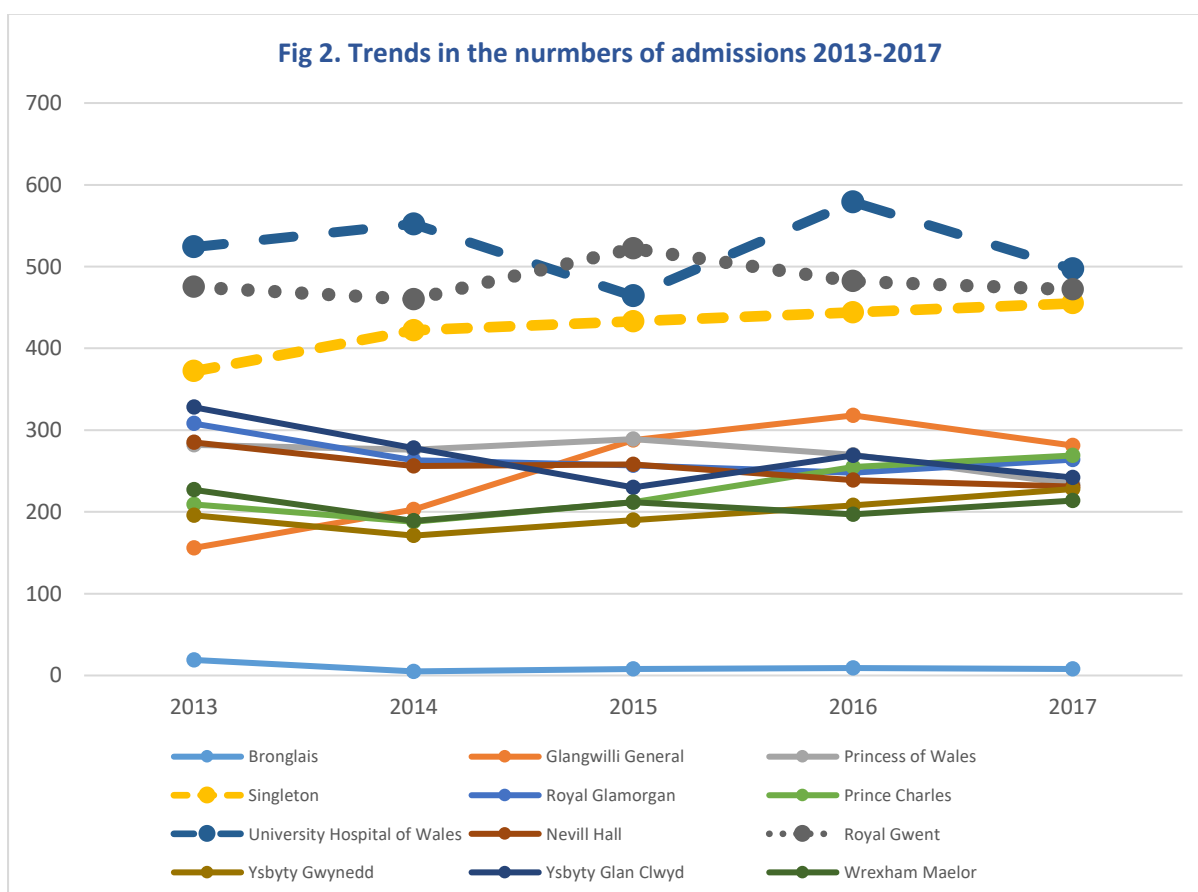
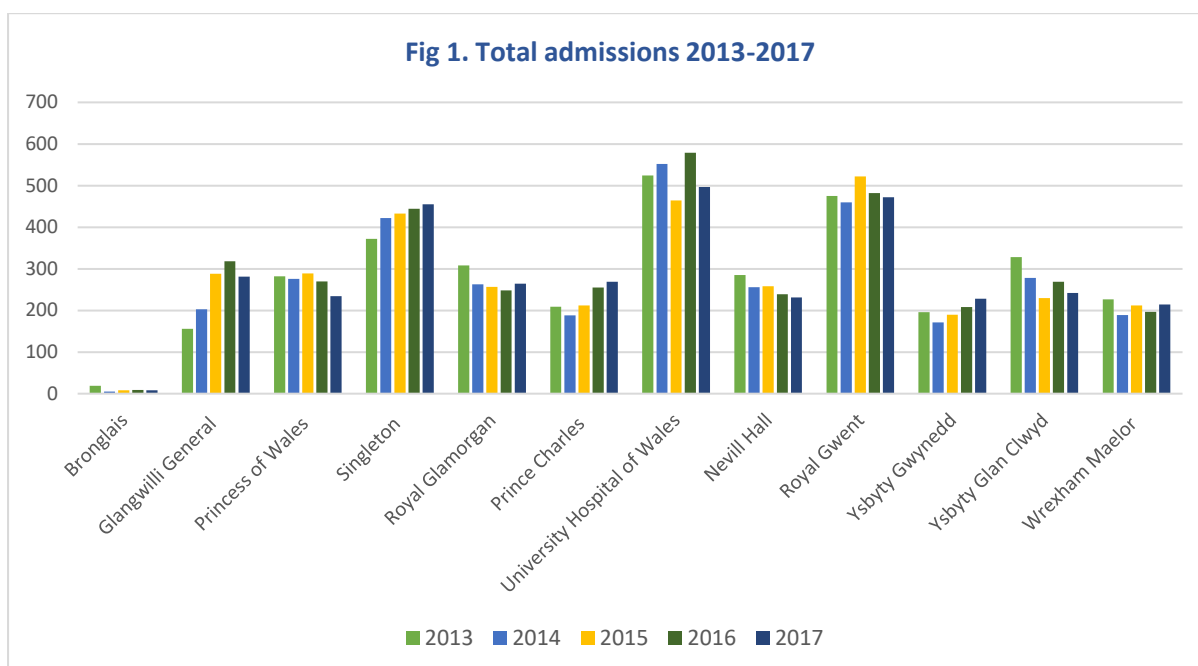


Table 1 shows the numbers of total admissions, total babies, 1st episode of admission and inborn (to the hospital) admissions to neonatal units in Wales in 2017. There were a total of 3381 (down from 3519 in 2016) neonatal admissions in Wales and 84.6% were inborn. A total of 2747 (2842 in 2016) distinct babies were admitted to neonatal units in Wales which

included 2717 (2820 in 2016) inborn babies that were inborn in Welsh hospitals.

Overall North Wales had the highest percentage of inborn admissions, reflecting lower rates of inter-hospital transfers in this region – this has been the pattern over the last few years. Lower rates of inborn admissions in the LNU in South Wales are a reflection of transfer of lower dependency babies into these units from the NICUs. As expected, the highest numbers of admissions were to the NICUs in South Wales. Fig 1 and Table 2 show the comparative figures of total admissions in 2013 -2017 and shows that two of the three NICUs had lower admission rates in 2017; University Hospital of Wales was 14.2% lower and Royal Gwent was 2.1% lower. Singleton was 2.5% higher. The number of admissions to Ysbyty Glan Clwyd dropped by 10% after an increase of 17% in 2016.

Overall, across Wales, there was a 3.5% drop in the number of babies admitted to neonatal units compared to 2016.

Table 3. Proportion of inborn babies and term (≥ 37 weeks) inborn babies admitted

	Inborn live births	Inborn admissions	% inborn babies admitted	inborn term live births	Inborn term admissions	% inborn term babies admitted
South West Wales						
Glangwili General	2540	214	8.4	2363	121	5.1
Princess of Wales	2138	173	8.1	1976	86	4.4
Singleton	3123	370	11.8	2847	187	6.6
	7801	765	9.7	7186	394	5.5
South Central Wales						
Royal Glamorgan	1960	219	11.2	1739	99	5.7
Prince Charles	1779	227	12.8	1633	142	8.7
University Hospital of Wales	5534	419	7.6	5186	250	4.8
	9273	865	9.3	8558	491	5.7
South East Wales						
Nevill Hall	2047	157	7.7	1882	83	4.4
Royal Gwent	3532	369	10.4	3169	173	5.5
	5579	526	9.4	5051	256	5.1
North Wales						
Ysbyty Gwynedd	1888	198	10.5	1744	112	6.4
Ysbyty Glan Clwyd	2009	189	9.4	1812	81	4.5
Wrexham Maelor	2324	174	7.5	2073	61	2.9
	6221	561	9.0	5629	254	4.5
Total	28874	2717	9.4	26424	1395	5.3

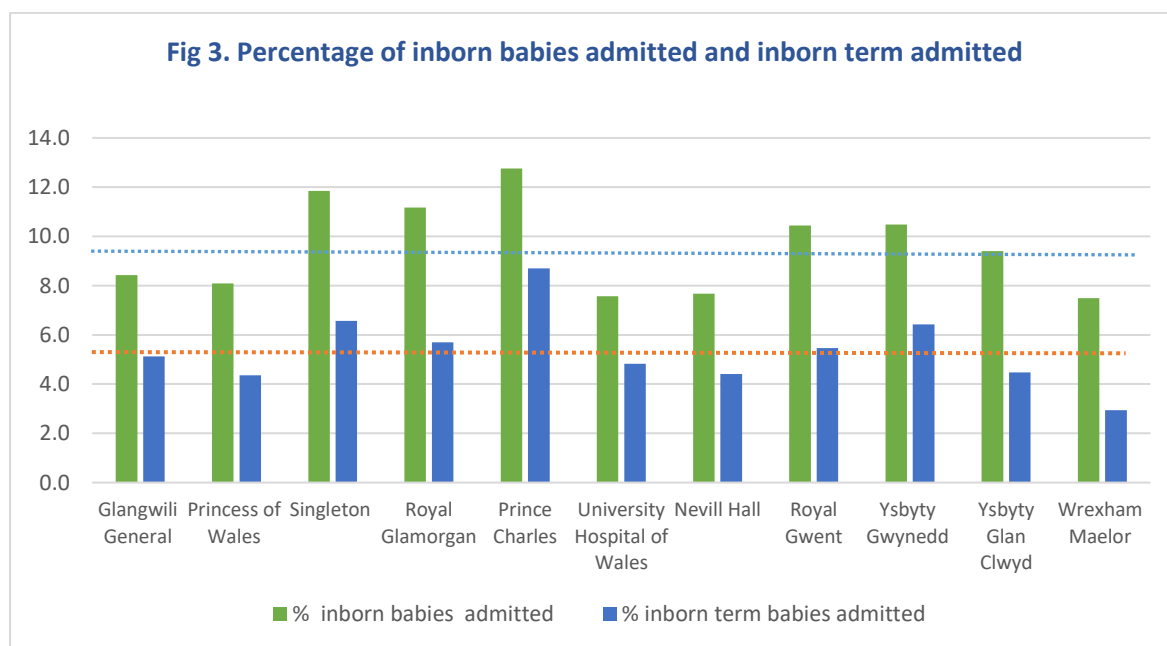


Table 3 and Fig 3 show the numbers of babies that were live born at each of the maternity units of the neonatal units of Wales and the proportion of such babies that were admitted. The Welsh average is shown with the

dotted line. Overall, 9.4% (9.5 in 2016, 9% in 2015) of *inborn babies* and 5.3 (5.1 in 2016 and 4.9% in 2015) of *inborn term live births* were admitted. *These are at par with what is reported in England.* There were regional variations within these figures – Prince Charles had the highest proportion of inborn term live births admitted to the neonatal unit (8.7%); amongst level 3 units, the Singleton had the highest proportion of inborn term admissions at 6.6%. Unfortunately, overall there has been no reduction of inborn term admissions across Wales, compared to earlier years, reflecting the need for proper transitional care facilities in Wales.

Table 4. Percentage of post-natal ward admissions to total inborn admissions 2017

Unit	Inborn admissions	Admissions from PN wards	% admissions from PN wards
South West Wales			
Bronglais	8	1	12.5
Glangwili General	214	43	20.1
Princess of Wales	173	20	11.6
Singleton	370	76	20.5
	765	140	18.3
South Central Wales			
Royal Glamorgan	219	74	33.8
Prince Charles	227	91	40.1
University Hospital of	419	63	15.0
	865	228	26.4
South East Wales			
Nevill Hall	157	23	14.6
Royal Gwent	369	80	21.7
	526	103	19.6
North Wales			
Ysbyty Gwynedd	198	63	31.8
Ysbyty Glan Clwyd	189	45	23.8
Wrexham Maelor	174	29	16.7
	561	137	24.4
Total	2717	608	22.4

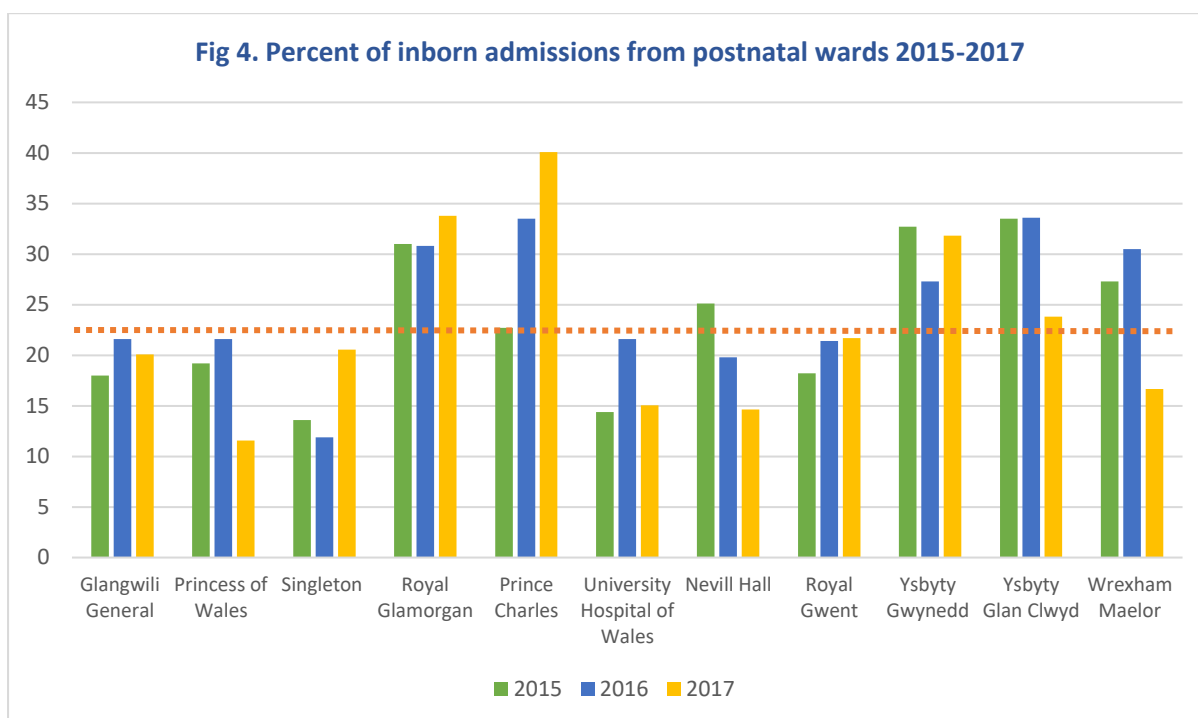


Table 4 and Fig 4 show the percentage of *post-natal ward term babies* who are later admitted to the neonatal unit in each hospital. A count of post-natal ward admissions is important because these are unplanned and unscheduled admissions. In Wales, overall, 22.4% babies were admitted from postnatal wards which is similar to the earlier years (23.4% in 2016 and 21.4% in 2015).

There is considerable regional variation. Prince Charles Hospital, The Royal Glamorgan and Ysbyty Gwynedd stand out, with high rates of admissions from post-natal wards. Amongst the NICUs, the University Hospital of Wales had the lowest rates of post-natal term admissions recorded at only 15% against an overall average of 22.4%.

The reasons for these high figures need greater scrutiny and the individual units will be advised to look at their admission criteria.

Table 5. Health Board of residence of inborn babies admitted to neonatal units in Wales 2017

Health Board of Residence	Betsi Cadwaladr University LHB	Hywel Dda LHB	Abertawe Bro Morgannwg University LHB	Cardiff Vale University LHB	Cwm Taf LHB	Aneurin Bevan LHB	Powys Teaching LHB	England	Unknown	Total
South West Wales										
Bronglais	0	5	0	0	0	0	0	0	3	8
Glangwili General	1	159	2	0	1	0	1	3	47	214
Princess of Wales	0	0	143	8	2	5	1	1	13	173
Singleton	0	49	289	7	12	4	7	1	1	370
	1	213	434	15	15	9	9	5	64	765
South Central										
Royal Glamorgan	0	1	5	6	194	7	0	0	6	219
Prince Charles	0	0	2	0	144	37	5	0	39	227
University Hospital of	1	6	18	342	17	21	1	6	7	419
	1	7	25	348	355	65	6	6	52	865
South East Wales										
Nevill Hall	0	0	0	1	0	113	13	2	28	157
Royal Gwent	0	4	1	2	4	339	2	5	12	369
	0	4	1	3	4	452	15	7	40	526
North Wales										
Ysbyty Gwynedd	151	0	0	0	0	0	0	2	45	198
Ysbyty Glan Clwyd	139	1	0	0	0	1	0	12	36	189
Wrexham Maelor	125	3	0	0	0	0	6	8	32	174
	415	4	0	0	0	1	6	22	113	561
Total	417	228	460	366	374	527	36	40	269	2717

Table 5 shows that excluding the “unknown” babies from the denominator, the majority 2232/2448 (91.1%) of mothers whose babies were admitted to neonatal units delivered in units within the respective referral areas. This figure was higher than in 2016 when 90% mothers delivered within their catchment areas. In South-West Wales, 92.3% babies were residents of Hywel Dda UHB or Abertawe Bro Morgannwg UHB; in South-Central Wales, 86.5% were residents of Cwm Taf UHB or Cardiff and Vale UHB; in South-East Wales, 96% were residents of Aneurin Bevan UHB or Powys Teaching Health Board and in North Wales, 92.6% of babies were Betsi Cadwaladr UHB residents.

Table 6. Place of booking and place of 1st admission of babies admitted to neonatal units

Place of first admission*	Place of Booking	Bronglais	Glan Clwyd	Nevill Hall	Prince Charles	Princess of Wales	Royal Glamorgan	Royal Gwent	Singleton Hospital	UHW	Glangwili General	Withybush General	Wrexham Maelor	Ysbyty Gwynedd, Bangor	Home	Unbooked	English	Total
South West Wales																		
Bronglais		8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
Glangwili General		2	0	1	0	0	1	0	1	0	205	2	0	0	1	0	1	214
Princess of Wales		0	0	1	1	152	0	4	5	3	0	0	0	0	0	1	6	173
Singleton		4	0	1	2	11	6	1	312	12	13	0	0	0	2	1	5	370
South Central Wales																		
Royal Glamorgan		0	0	0	9	0	208	0	0	1	0	0	0	0	0	1	0	219
Prince Charles		0	0	0	220	0	5	0	0	1	0	0	0	0	0	1	0	227
University Hospital of Wales		0	0	1	4	1	1	1	2	398	1	0	0	0	1	2	7	419
South East Wales																		
Nevill Hall		0	0	147	1	0	0	7	0	0	0	0	0	0	0	0	2	157
Royal Gwent		0	0	7	0	1	0	345	0	1	1	0	0	0	1	0	13	369
North Wales																		
Ysbyty Gwynedd		1	0	0	0	0	0	0	0	0	0	0	0	194	1	1	1	198
Ysbyty Glan Clwyd		0	166	0	1	0	0	0	0	0	0	0	7	6	0	0	9	189
Wrexham Maelor		0	2	0	0	0	0	0	0	0	0	0	163	1	1	3	4	174
Total		15	168	158	238	165	221	358	320	416	220	2	170	201	7	10	48	2717

*Inborn admissions only

Place of 1st admission is taken as marker of the place of birth and includes home births and births in transit. Table 6 shows that overall 92.3% (93.5% in 2016) of mothers whose babies were admitted to neonatal units in Wales delivered in the hospitals where they first booked. There were 48 mothers who had booked at hospitals in England, whose babies were first admitted to a Welsh neonatal unit. The Royal Gwent Hospital and Ysbyty Glan Clwyd had the highest number of mothers who had booked in England.

Table 7. Source of admission (inborn admissions)

Admitted from	Labour Ward	Obstetric Theatre	Children's Ward	Postnatal Ward	SCBU/NICU	Home	Other	Unknown	Total
South West Wales									
Bronlais	0	5	0	1	0	0	0	2	8
Glangwili General	88	73	3	43	1	1	0	5	214
Princess of Wales	98	54	0	20	1	0	0	0	173
Singleton	201	83	0	76	0	1	2	7	370
South Central Wales									
Royal Glamorgan	78	62	0	74	0	0	4	1	219
Prince Charles	72	61	0	91	0	0	2	1	227
University Hospital of Wales	178	156	0	63	0	2	11	9	419
South East Wales									
Nevill Hall	70	62	0	23	0	0	1	1	157
Royal Gwent	168	112	0	80	1	0	5	3	369
North Wales									
Ysbyty Gwynedd	71	58	2	63	1	1	2	0	198
Ysbyty Glan Clwyd	57	80	0	45	0	0	0	7	189
Wrexham Maelor	76	64	0	29	0	0	1	4	174
Total	1157	870	5	608	4	5	28	40	2717

Table 7 shows the source of admission to neonatal units. As expected, a majority of the admissions to neonatal units in Wales were from the labour ward or theatre 74.6%. This is slightly higher than that in 2016 when it was 73.4% and in 2015 when it was 72.6%.

Unexpected post-natal ward admissions continues to remain high at 22.4%

Table 8. Mode of delivery babies admitted babies to neonatal units (First Episodes)

	ECS - Not In Labour	Emergency caesarean section - in labour	Elective section - not in labour	Elective section - in labour	Vaginal - forceps assisted	Vaginal-spontaneous	Vaginal - ventouse assisted	Unknown	Total
South West Wales									
Bronglais	4	1	0	1	0	2	0	0	8
Glangwili General	27	47	28	2	8	71	7	26	216
Princess of Wales	23	34	28	4	15	63	3	4	174
Singleton	53	63	56	5	30	154	11	5	377
South Central Wales									
Royal Glamorgan	25	58	38	2	11	81	0	5	220
Prince Charles	25	38	32	8	13	96	7	9	228
University Hospital of	63	74	54	5	57	149	12	7	421
South East Wales									
Nevill Hall	20	41	14	3	9	54	6	10	157
Royal Gwent	58	55	46	4	26	166	7	15	377
North Wales									
Ysbyty Gwynedd	22	42	22	3	12	71	12	14	198
Ysbyty Glan Clwyd	38	40	24	5	13	69	7	2	198
Wrexham Maelor	27	37	20	2	4	69	3	12	174
Total	385	530	362	44	198	1045	75	109	2748

Table 8 shows the mode of delivery of babies admitted to the neonatal units in Wales. Though the average LSCS rate in Wales is around 25% it is noteworthy that 50% (48.6% in 2016, 49.7% in 2015) of babies admitted to neonatal units were delivered by Caesarean section. Only 39.6% (38.7% in 2016) babies admitted to neonatal units were delivered by spontaneous vaginal delivery.

Table 9. Ex-utero transfers carried out 2017

	TO	Bronglais	Glan Clwyd	Nevill Hall	Prince Charles	Princess of Wales	Royal Glamorgan	Royal Gwent	Singleton Hospital	University Hospital of Wales	Glangwili General	Withybush General	Wrexham Maelor	Ysbyty Gwynedd	English Hospital	Total
FROM																
Glan Clwyd		1	0	0	0	0	0	0	0	0	0	0	11	4	20	32
Glangwili General		2	1	0	0	0	1	0	31	1	0	3	2	0	2	43
Nevill Hall		0	0	0	0	0	0	38	1	2	0	0	0	0	7	46
Prince Charles		0	1	0	0	3	6	6	3	8	0	0	0	0	4	23
Princess of Wales		0	0	0	0	0	0	1	24	17	0	0	0	0	2	27
Royal Glamorgan		0	0	0	1	4	0	0	4	8	0	0	0	0	4	13
Royal Gwent		0	0	27	3	2	13	0	3	10	0	0	0	0	17	65
Singleton Hospital		4	0	1	2	21	6	4	0	4	5	0	0	0	7	51
University Hospital		1	0	8	8	4	4	12	14	0	0	0	0	0	4	57
Wrexham Maelor		0	9	0	0	0	0	0	0	0	0	0	0	0	10	19
Ysbyty Gwynedd		0	12	0	0	0	0	0	0	0	0	0	1	0	2	16
Total		8	23	36	14	34	30	61	80	50	5	3	14	4	79	392

Table 9 shows the number of babies transferred ex-utero to different hospitals. A total of 392 transfers were carried out throughout the year. There were 79 transfers to English neonatal. The highest number of transfers was between the Royal Gwent Hospital and the Nevill Hall Hospital which function as a single unit at two sites. As expected, the transfers to and from the level 3 units was high.

Table 10. Babies admitted to neonatal units in Wales by gestation bands (1st episode only)

	< 24		24-25		26-27		28-29		30-31		32-33		34-36		> 36				
Unit	Inborn	Outborn	Inborn	Outborn	Inborn	Outborn	Inborn	Outborn	Inborn	Outborn	Inborn	Outborn	Inborn	Outborn	Inborn	Outborn	Inborn Total	Outborn Total	Total

South West Wales

Bronglais	0	0	0	0	0	0	1	0	0	0	1	0	3	0	3	0	8	0	8
Glangwili General	0	0	0	0	1	0	6	0	6	0	17	0	63	0	121	2	214	2	216
Princess of Wales	0	0	0	0	2	0	0	0	6	0	29	0	50	0	86	1	173	1	174
Singleton	6	0	4	0	14	0	22	0	27	0	41	0	69	0	187	7	370	7	377

South Central Wales

Royal Glamorgan	2	0	0	0	6	0	5	0	16	0	29	0	62	0	99	1	219	1	220
Prince Charles	0	0	0	0	1	0	0	0	5	0	12	0	67	0	142	0	227	0	227
University Hospital	1	0	6	0	11	0	11	1	28	0	38	0	74	0	250	1	419	2	421

South East Wales

Nevill Hall	0	0	0	0	3	0	3	0	7	0	20	0	41	0	83	0	157	0	157
Royal Gwent	0	0	6	0	7	0	21	0	27	1	42	0	93	0	173	7	369	8	377

North Wales

Ysbyty Gwynedd	0	0	2	0	2	0	0	0	5	0	17	0	60	0	112	0	198	0	198
Ysbyty Glan Clwyd	0	0	1	0	7	1	15	0	18	1	25	2	42	1	81	4	189	9	198
Wrexham Maelor	0	0	1	0	3	0	12	0	15	0	29	0	53	0	61	0	174	0	174

Total	9	0	20	0	57	1	96	1	160	2	300	2	677	1	1398	23	2717	30	2747
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Inborn babies are the ones born in the maternity units and admitted to its co-located neonatal unit

Outborn babies are those that are born at home/ambulance/MLU or any other location and admitted to the neonatal unit

Table 10 gives the count of babies admitted by gestation to the various units of Wales. This table counts the 1st episodes only – i.e. the first entry into BadgerNet. It includes all inborn babies, and any babies born outside hospital or in a free-standing MLU and brought in to the neonatal units.

86 babies less than 28 weeks gestation were admitted to neonatal units in Wales. This figure compares to 75 in 2016 and 110 in 2015. As expected, the majority (63/86, 73.3%), were born appropriately at the NICUs/SURNIC. This figure is better than in 2016 when it was 68%.

There were 346 distinct babies less than 32 weeks admitted to neonatal units in Wales in 2017, compared to 339 in 2016 and 337 in 2015. In South Wales, 82.4% of babies delivered at the NICUs as recommended compared to 76.4% in 2016 and 59.9% in 2015. This is movement in the right direction since the recommendation of the Neonatal Network for babies less than 32 weeks gestation to be delivered in NICUs.

1421/2717 (52.3%) babies admitted to neonatal units in Wales were term (≥ 37 weeks). This is much lower than that reported in England which was reported to be close to 60%.

Table 11. Babies by birth weight bands (1st Episode only)

Unit	< 750		750 - 999		1000 - 1499		1500 - 1999		2000 - 2499		> 2500				
	Inborn	Outborn	Inborn	Outborn	Inborn	Outborn	Inborn	Outborn	Inborn	Outborn	Inborn	Outborn	Inborn Total	Outborn Total	Total
South West Wales															
Bronglais	0	0	0	0	1	0	0	0	2	0	5	0	8	0	8
Glangwili General	1	0	0	0	10	0	23	0	43	0	137	2	214	2	216
Princess of Wales	0	0	2	0	7	0	23	0	41	0	100	1	173	1	174
Singleton	16	0	13	0	32	0	45	0	67	0	197	7	370	7	377
	17	0	15	0	50	0	91	0	153	0	439	10	765	10	775
South Central Wales															
Royal Glamorgan	2	0	6	0	16	0	38	0	42	0	115	1	219	1	220
Prince Charles	0	0	0	0	6	0	25	0	48	0	148	0	227	0	227
University Hospital of Wales	7	0	11	0	32	1	48	0	62	0	259	1	419	2	421
	9	0	17	0	54	1	111	0	152	0	522	2	865	3	868
South East Wales															
Nevill Hall	0	0	2	0	7	0	17	0	32	0	99	0	157	0	157
Royal Gwent	6	0	11	0	48	1	44	0	63	1	197	6	369	8	377
	6	0	13	0	55	1	61	0	95	1	296	6	526	8	534
North Wales															
Ysbyty Gwynedd	0	0	2	0	3	0	21	0	40	0	132	0	198	0	198
Ysbyty Glan Clwyd	2	0	3	0	27	2	30	2	26	2	101	3	189	9	198
Wrexham Maelor	1	0	6	0	19	0	44	0	30	0	74	0	174	0	174
	3	0	11	0	49	2	95	2	96	2	307	3	561	9	570
Total	3	0	5	0	208	4	358	2	496	3	1564	21	2717	30	2747

Table 11 gives the numbers of babies born at various bands of birth weight and admitted to the neonatal units in Wales. The numbers are count of babies that were born in the unit, regardless of where they were looked after. Babies who were shown as out born on this table were either born in the community or in MLUs.

There were 91 ELBW babies (<1000g) compared to 77 in 2016 and 109 in 2015. There were 303 VLBW babies (<1500g) in 2017 compared to 296 in 2016, 300 in 2015 and 271 in 2014.

In S Wales, 74.8% (178/238) VLBW babies were delivered in NICUs in 2016 compared to 73.5% in 2016 and 72.6% 2015. This shows that there

has not been an improvement in the proportions of VLBW babies born in NICUs in South Wales. Although some births may have been unavoidable, in utero transfer of these high risk babies to a NICU would have been preferable where possible and over the next few years, this figure must be improved.

Table 12. Total *babies* admitted to the neonatal units in Wales by gestation 2017*

	22 weeks	23 weeks	24 weeks	25 weeks	26 weeks	27 weeks	28 weeks	29 weeks	30 weeks	31 weeks	32 weeks	33 weeks	34 weeks	35 weeks	36 weeks	>36 weeks	Total
South West																	
Bronglais	0	0	0	0	0	0	1	0	0	0	1	0	1	1	1	3	8
Glangwili General	0	1	1	1	1	3	7	4	5	7	10	20	23	29	17	128	257
Princess of Wales	0	2	0	1	3	1	4	4	8	8	21	18	27	15	13	94	219
Singleton	1	5	2	2	10	10	17	14	18	23	28	22	28	16	32	217	445
	1	8	3	4	14	14	29	22	31	38	60	60	79	61	63	442	929
South Central																	
Royal Glamorgan	2	1	0	0	3	5	4	3	10	12	15	18	31	14	20	104	242
Prince Charles	0	0	0	0	2	2	3	0	8	5	12	10	22	26	26	143	259
UHW	0	2	2	6	13	10	5	8	19	14	28	17	21	30	31	278	484
	2	3	2	6	18	17	12	11	37	31	55	45	74	70	77	525	985
South East Wales																	
Nevill Hall	0	0	1	1	5	1	4	3	8	9	21	18	16	10	23	88	208
Royal Gwent	0	0	3	3	8	10	16	13	17	27	31	22	36	28	38	199	451
	0	0	4	4	13	11	20	16	25	36	52	40	52	38	61	287	659
North Wales																	
Ysbyty Gwynedd	0	0	0	4	1	2	3	1	3	6	5	16	21	19	20	112	213
Ysbyty Glan Clwyd	0	2	2	3	3	8	19	6	7	17	14	14	14	21	9	88	227
Wrexham Maelor	0	0	1	2	2	4	13	6	7	12	14	18	24	12	20	62	197
	0	2	3	9	6	14	35	13	17	35	33	48	59	52	49	262	637
Total	3	13	12	23	51	56	96	62	110	140	200	193	264	221	250	1516	3210

*Count of babies unique to the units but not necessarily to the network. Readmissions not counted. A baby may be counted at 2 or more different units at first admission there.

Table 13. Total *babies* admitted to neonatal units in Wales by birth-weight bands 2017*

	<500 grams	500-749 grams	750-999 grams	1000-1249 grams	1250-1499 grams	1500-1749 grams	1750-1999 grams	2000-2499 grams	2500-2999 grams	3000-3499 grams	≥3500 grams	Total
South West Wales												
Bronglais	0	0	0	1	0	0	0	2	3	2	0	8
Glangwili General	0	5	2	8	14	14	20	50	41	46	57	257
Princess of Wales	0	3	4	7	13	16	20	47	31	31	47	219
Singleton	1	17	17	21	31	25	33	71	57	75	97	445
	1	25	23	37	58	55	73	170	132	154	201	929
South Central Wales												
Royal Glamorgan	1	4	8	7	15	17	28	42	44	39	37	242
Prince Charles	0	0	2	5	9	18	20	55	48	53	49	259
University Hospital of Wales	0	12	19	20	21	27	29	70	72	96	118	484
	1	16	29	32	45	62	77	167	164	188	204	985
South East Wales												
Nevill Hall	0	3	6	10	12	10	19	39	33	33	43	208
Royal Gwent	1	6	20	30	35	29	35	70	70	76	79	451
	1	9	26	40	47	39	54	109	103	109	122	659
North Wales												
Ysbyty Gwynedd	0	0	5	6	2	14	12	41	39	37	57	213
Ysbyty Glan Clwyd	0	4	11	26	13	20	16	30	33	38	36	227
Wrexham Maelor	1	1	9	12	17	26	24	32	24	30	21	197
	1	5	25	44	32	60	52	103	96	105	114	637
Total	4	55	103	153	182	216	256	549	495	556	641	3210

*Count of babies unique to the units but not necessarily to the network. Readmissions not counted. A baby may be counted at 2 or more different units at first admission there.

Table 14. Total admissions to neonatal units in Wales by gestation 2017*

	22 weeks	23 weeks	24 weeks	25 weeks	26 weeks	27 weeks	28 weeks	29 weeks	30 weeks	31 weeks	32 weeks	33 weeks	34 weeks	35 weeks	36 weeks	≥37 weeks	Total
South West Wales																	
Bronglais	0	0	0	0	0	0	1	0	0	0	1	0	1	1	1	3	8
Glangwili General	0	2	1	1	1	3	11	6	5	11	10	21	24	31	18	136	281
Princess of Wales	0	2	0	1	7	1	4	4	10	9	21	20	29	15	13	98	234
Singleton	1	6	2	2	11	11	17	14	19	23	28	22	28	17	33	221	455
	1	10	3	4	19	15	33	24	34	43	60	63	82	64	65	458	978
South Central Wales																	
Royal Glamorgan	2	2	0	0	6	8	5	5	11	13	15	19	32	16	21	109	264
Prince Charles	0	0	0	0	2	3	3	0	12	6	12	10	22	26	26	147	269
University Hospital of Wales	0	2	2	6	14	10	5	9	21	16	29	20	21	30	32	280	497
	2	4	2	6	22	21	13	14	44	35	56	49	75	72	79	536	1030
South East Wales																	
Nevill Hall	0	0	1	1	9	2	5	6	10	12	22	19	16	10	24	94	231
Royal Gwent	0	0	3	4	11	11	17	15	17	28	33	22	36	29	38	208	472
	0	0	4	5	20	13	22	21	27	40	55	41	52	39	62	302	703
North Wales																	
Ysbyty Gwynedd	0	0	0	5	2	2	3	1	3	7	5	17	21	19	23	120	228
Ysbyty Glan Clwyd	0	2	5	6	3	12	19	6	7	17	14	15	16	21	10	89	242
Wrexham Maelor	0	0	1	2	4	7	16	6	7	12	14	18	25	14	20	68	214
	0	2	6	13	9	21	38	13	17	36	33	50	62	54	53	277	684
Total	3	16	15	28	70	70	106	72	122	154	204	203	271	229	259	1573	3395

*babies counted multiple times - at each admission

Table 15. Total admissions to the neonatal units in Wales by weight bands 2017

	<500 grams	500-749 grams	750-999 grams	1000-1249 grams	1250-1499 grams	1500-1749 grams	1750-1999 grams	2000-2499 grams	2500-2999 grams	3000-3499 grams	>3500 grams	Total
South West Wales												
Bronglais	0	0	0	1	0	0	0	2	3	2	0	8
Glangwili General	0	6	2	11	18	17	22	52	45	47	61	281
Princess of Wales	0	3	8	8	14	17	22	50	32	32	48	234
Singleton	1	18	18	22	32	25	33	72	57	77	100	455
	1	27	28	42	64	59	77	176	137	158	209	978
South Central Wales												
Royal Glamorgan	1	5	14	10	16	19	28	44	47	43	37	264
Prince Charles	0	0	2	6	11	19	22	55	49	55	50	269
University Hospital of Wales	0	12	21	21	23	30	29	73	73	96	119	497
	1	17	37	37	50	68	79	172	169	194	206	1030
South East Wales												
Nevill Hall	0	3	10	13	18	11	21	40	37	34	44	231
Royal Gwent	1	7	25	33	36	30	35	73	70	80	82	472
	1	10	35	46	54	41	56	113	107	114	126	703
North Wales												
Ysbyty Gwynedd	0	0	6	7	2	15	14	44	41	40	59	228
Ysbyty Glan Clwyd	0	7	14	26	17	20	17	31	35	38	37	242
Wrexham Maelor	1	1	13	16	17	26	26	32	26	33	23	214
	1	8	33	49	36	61	57	107	102	111	119	684
Total	4	62	133	174	204	229	269	568	515	577	660	3395

*babies counted multiple times- at each new admission

Inter-Network activity

Table 16. Number of babies and care days delivered outside Network for babies booked to deliver in Wales

Provider Network	Babies	Intensive care days	High Dependence Care days	Special Care days	Normal care days	Total days
Cheshire & Merseyside	32	389	128	111	2	630
Greater Manchester	3	95	35	3	0	133
Lancashire and South Cumbria	4	42	8	0	0	50
London - South	1	0	0	11	0	11
Midlands - South West	4	37	17	24	0	78
South East Coast ODN	1	1	4	9	0	14
South West ODN	35	137	119	137	0	393
Staffordshire, Shropshire and Black Country New-born Network	1	0	5	39	0	44
Thames Valley	5	9	9	13	0	31
Network Total	86	710	325	347	2	1384

Table 17. Care level days delivered in Wales to babies booked to deliver in another Network

Booked Network	Babies	Intensive care days	High Dependence Care days	Special Care days	Normal care days	Total days
Cheshire & Merseyside	12	27	59	288	0	375
Greater Manchester	2	0	6	39	0	45
London - North East and North Central	1	0	2	0	3	5
London - South	2	1	2	21	0	24
Midlands - South West	1	0	0	25	0	25
South West ODN	10	143	174	30	0	347
Staffordshire, Shropshire and Black Country New born Network	3	5	18	51	0	74
Wessex	1	0	0	19	0	19
Yorkshire and Humber - North	1	0	0	47	0	47
Yorkshire and Humber - South	3	3	9	30	0	42
Network Total	36	179	270	550	3	1003

Table 16 shows that there were 86 babies booked in Wales who had a part or all their care in England accounting for 710 IC days, 325 HD care days and overall 1384 care days. This would include babies that were transferred from NICUs in Wales for specialist care in England. Conversely, (Table 17) there were 36 babies that were booked in England that had their care in Wales accounting for 179 days of IC, 270 days of HD care and 1003 days of care overall. Wales is thus remains a net exporter of babies in relation to England.

In addition, another 2000 days of care were delivered in England to Welsh residents, booked to deliver in England.

Table 18. Reasons for Admission

Reason for admission	Number	Percentage
Respiratory disease	1057	31.1
Preterm	971	28.6
Hypoglycaemia	297	8.7
Re-admission	182	5.4
Infection	137	4.0
Monitoring/Observation	102	3.0
Poor condition at birth	90	2.7
HIE	80	2.4
Surgery	68	2.0
Congenital abnormality	58	1.7
IUGR / SGA	48	1.4
Jaundice	44	1.3
GIT disease	40	1.2
Poor feeding/Weight loss	35	1.0
Unknown	32	0.9
Social issues/foster care	31	0.9
Convulsions	30	0.9
NAS	30	0.9
Cardiovascular disease	28	0.8
Failed oximetry	11	0.3
Birth trauma	8	0.2
Other neurological disease	6	0.2
Investigation	5	0.1
Maternal admission	3	0.1
Other metabolic disease	3	0.1

Table 18 lists the documented reason for admission. Preterm birth and respiratory distress accounted for 59.7% which was similar to that seen in 2015 and 2016. The numbers of babies classified as “unknown” has reduced very significantly to less than 1% since the new classification system was introduced by on BadgerNet.

Table 19 Top reasons for admission (in percent) of babies >36 weeks, admitted to the neonatal units in Wales 2017

	Respiratory Disease	Other	Hypoglycaemia	Infection	Cardiac	Poor condition	Feeding/WL	Congenital abnormality	Neurological	GI pathology	HIE	NAS
Glangwili General	36.6	23.9	8.2	6.7	1.5	8.2	0.7	3.0	0.0	5.2	4.5	1.5
Princess of Wales	41.8	20.4	5.1	9.2	1.0	14.3	0.0	3.1	0.0	1.0	4.1	0.0
Singleton	47.9	9.1	11.9	1.8	1.4	5.9	0.9	0.9	3.7	2.3	9.6	4.6
Royal Glamorgan	37.6	13.8	25.7	6.4	1.8	2.8	1.8	1.8	0.9	0.0	5.5	1.8
Prince Charles	44.9	12.9	29.3	6.1	0.0	0.7	1.4	0.0	0.0	2.7	1.4	0.7
University Hospital of Wales	42.8	17.6	7.6	4.7	3.6	3.6	0.7	7.2	3.6	2.5	4.3	1.8
Nevill Hall	48.9	16.7	11.1	8.9	0.0	4.4	0.0	0.0	1.1	1.1	4.4	3.3
Royal Gwent	43.2	13.1	16.0	3.9	1.5	6.8	1.5	0.5	3.9	1.5	7.3	1.0
Ysbyty Gwynedd	33.0	18.3	17.4	11.3	0.9	2.6	5.2	7.0	1.7	0.9	1.7	0.0
Ysbyty Glan Clwyd	37.2	14.0	9.3	22.1	1.2	4.7	1.2	1.2	1.2	0.0	7.0	1.2
Wrexham Maelor	44.8	9.0	1.5	13.4	0.0	10.4	3.0	10.4	1.5	3.0	3.0	0.0

Top reasons for admission (percent) for babies >36 weeks gestation

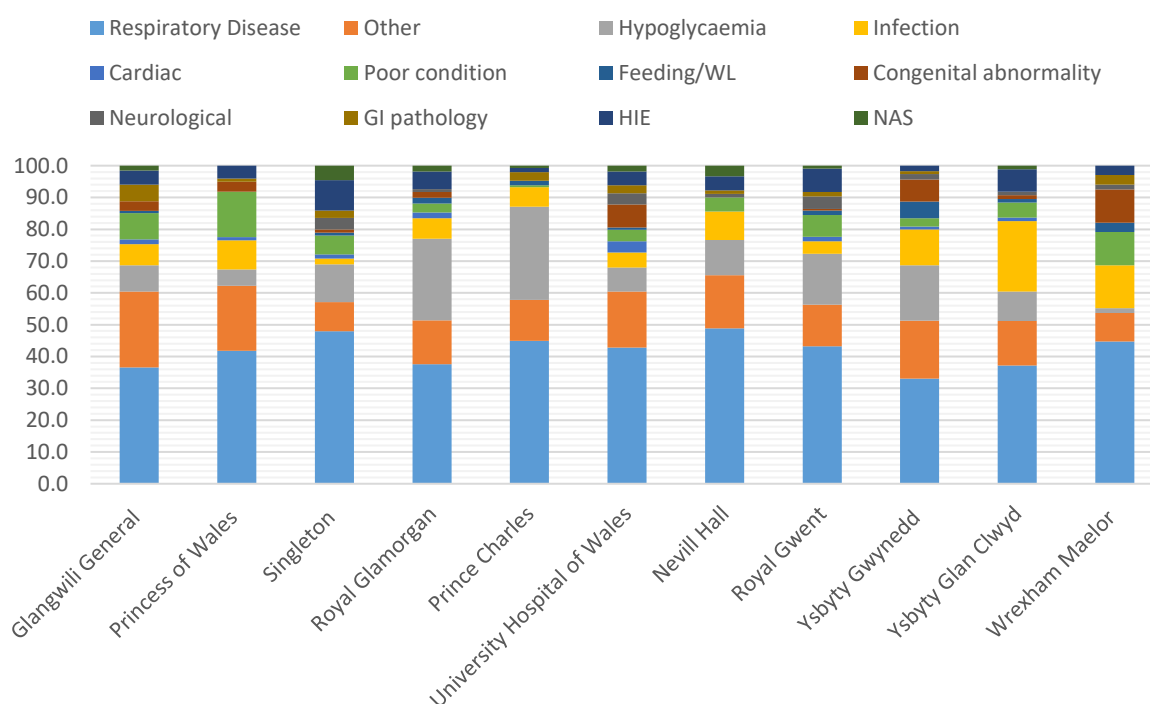


Table 19 and Fig 5 detail the reasons for admissions of term babies to neonatal units in Wales. Overall, "Respiratory Disease" and "Other" reasons were the commonest reasons for admission. Hypoglycaemia was the commonest reason for admission in Prince Charles and the Royal Glamorgan hospitals and accounted for 25.7% and 29.3% respectively of their term admissions. In Ysbyty Glan Clwyd "infection" accounted for a high proportion of their admissions (22.1%). Reducing admissions because of hypoglycaemia should be one of the key targets to reduce term admissions.

Table 20. Cots, Activity and Occupancy in Neonatal Units in 2017

	Stabilisation Cots*	Intensive care cots	Intensive Care days	IC Occupancy†	HD Cots	High Dependency days	HD Occupancy (%)	SC cots	Special Care + Normal Care days	SC Occupancy (%)	Total	Total cots	Total Occupancy (%)
South West Wales													
Bronlais	0	0	1			0			2		3	0	
Glangwili General	1	0	38		4	850	58.2	8	2501	85.7	3389	12	77.4
Princess of Wales	1	0	195		3	592	54.1	9	2067	62.9	2854	12	65.2
Singleton	1	7	1624	63.6	4	2015	138.0	11	3003	74.8	6642	22	82.7
	3	7	1858		11	3457	86.1	28	7573	74.1	12888	46	76.8
South Central													
Royal Glamorgan	1	1	180	49.3	4	725	49.7	4	2157	147.7	3062	9	93.2
Prince Charles	1	0	91		3	367	33.5	6	1896	86.6	2354	9	71.7
UHW	1	6	2058	93.9	10	2872	78.7	8	3187	108.8	8117	24	92.6
	3	8	2329		17	3964	63.9	20	7240	99.2	13533	42	88.3
South East Wales													
Nevill Hall	1	0	165		3	317	28.9	6	1911	87.3	2393	9	72.8
Royal Gwent	1	6	1535	70.1	7	2110	82.6	6	3503	160.0	7148	19	103.1
	2	6	1700		10	2427	66.5	12	5414	123.6	9541	28	93.4
North Wales													
Ysbyty Gwynedd	1	0	25		2	175	24.0	9	1675	51.0	1875	11	46.7
Ysbyty Glan Clwyd	1	3	376	34.3	3	1006	91.9	10	2648	72.5	4030	16	69.0
Wrexham Maelor	1	3	186	17.0	4	399	27.3	8	2399	82.2	2984	15	54.5
	3	6	587		9	1580	48.1	27	6722	68.2	8889	42	58.0
Total	11	27	6474		47	11428	66.6	85	26949	86.9	44851	158	77.8

* Stabilisation cot only – should be unoccupied most of the time

†IC occupancy of units that provide ongoing intensive care

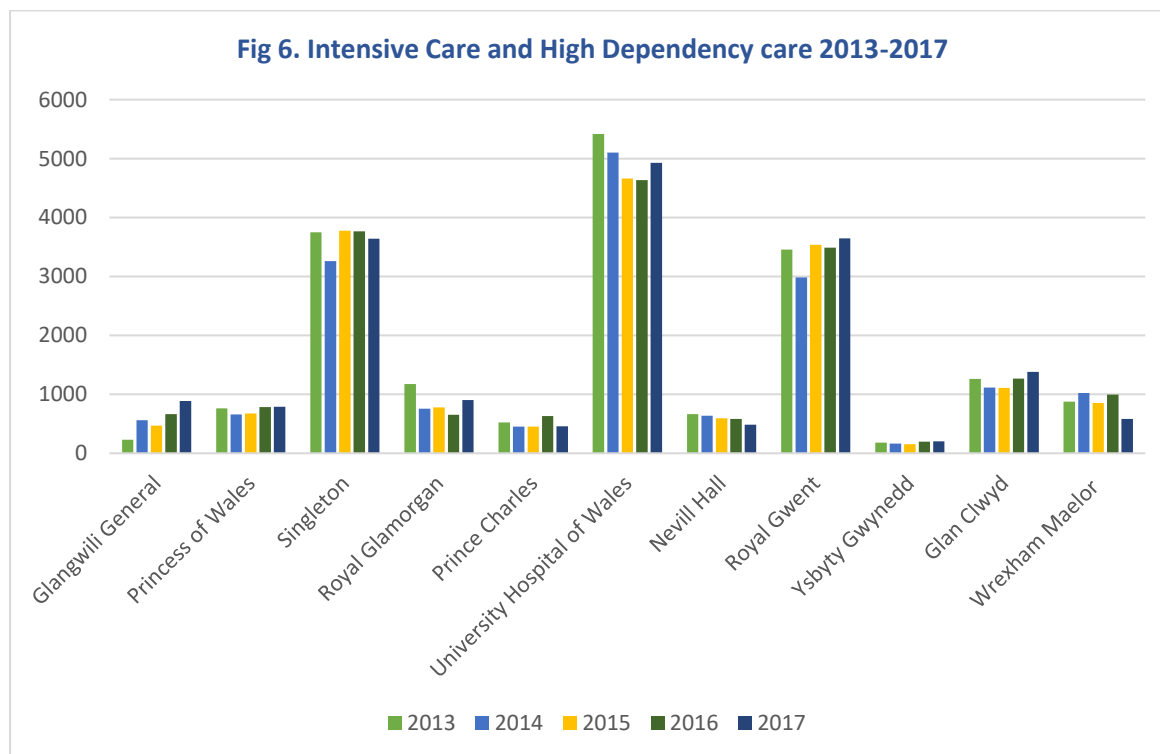


Fig 7. IC+HD Activity in Wales, 2013-2017

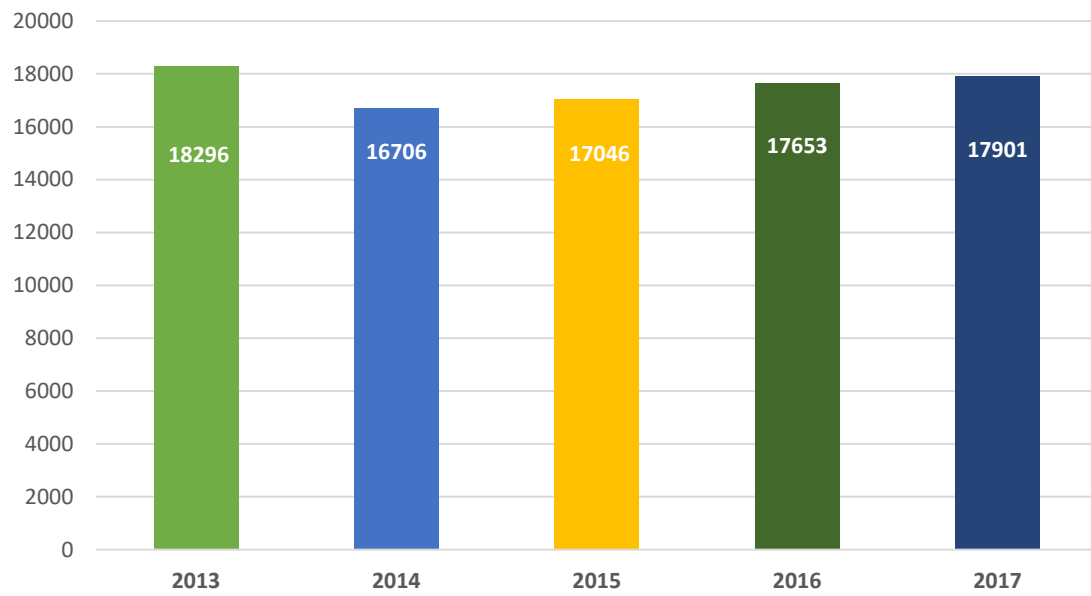
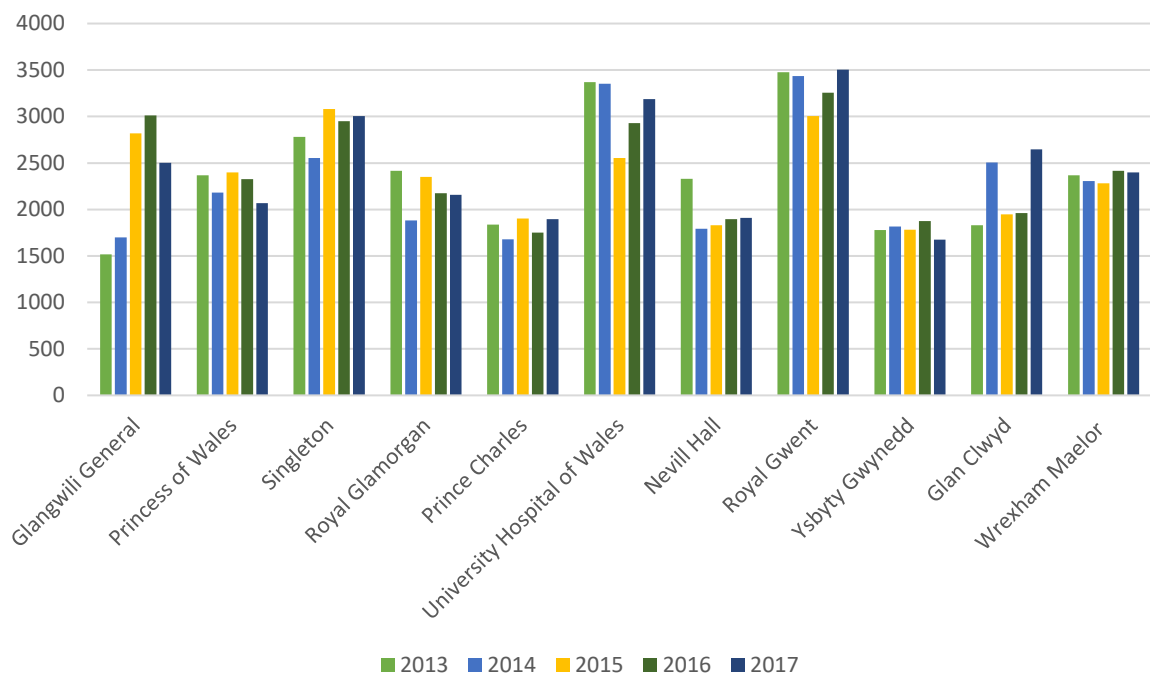


Fig 8. Special Care and Normal Care activity 2013-2017



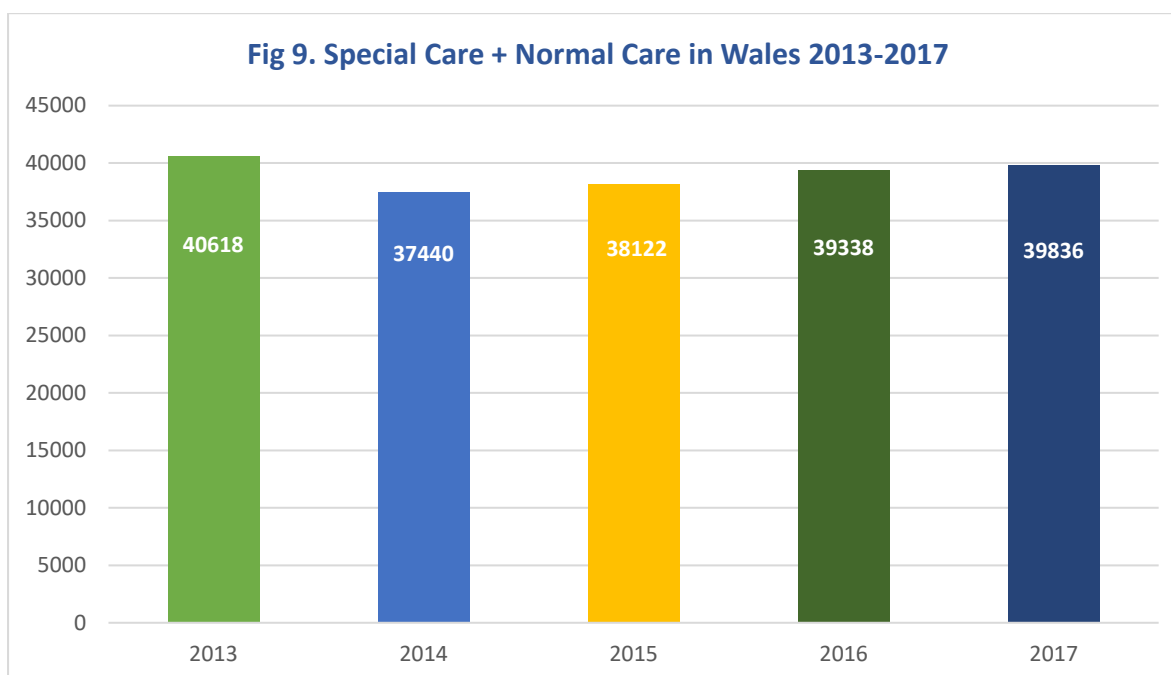


Table 20 and Figs 6-9 detail the levels of activity (by BAPM 2011 criteria) and occupancy at each of the neonatal units in Wales. BadgerNet captures the activity very accurately and these numbers should be taken as the definitive figures.

In 2017, all neonatal units in Wales provided 6474 days of intensive care (6921 in 2016, 6936 in 2015 and 6805 in 2014), 11428 days of high dependency care, (10733 in 2016, 10114 in 2015 and 10024 in 2014). There were 26949 days of Special Care and Normal Care days provided (26546 in 2016, 25951 in 2015 and 25861 in 2014). As expected, high numbers of intensive care activity were provided at the three NICUs in South Wales. Overall, neonatal units in Wales provided a total of 44851 days of care in 2017 which is steadily rising compared to earlier years (44202 in 2016, 43001 in 2015 and 42690 in 2014).

Occupancy is more difficult to define and categorise, and in 2017 it was more so because of the unit in Cardiff being partly closed to admissions for part of the year having a variable number of functional cots through the year. The calculations of occupancy rates do not include stabilisation cots. Stabilisation cots should be available at all times in case of an unexpected delivery that needs intensive care. The BAPM standards for Hospitals providing Neonatal Intensive Care and High Dependency Care 2001 state that the average occupancy of a unit should be 70% to account for fluctuations. These figures starkly show a lack of capacity in the system and a misdistribution of capacity in the region.

Figs 6 and 7 show the combined IC and HD care days over the last 5 years in each of the neonatal units separately and in a combined graphic.

The level of IC plus HD care has been maintained individually for the three Level 3 units of South Wales, and collectively across Wales.

Figs 8 and 9 show the combined SC activity care days over the last 5 years in each of the neonatal units separately and in a combined graphic. Glangwili General Hospital has increased its activity over the last 3 years. In other units, there have been minor fluctuations in activity as expected. Overall (Fig 9) the activity has increased year on year over the last 4 years.

Table 21. Admissions by highest level of care

	I Care	HD Care	Special	Normal	Unknown	Total
South West Wales						
Bronglais	1	0	0	0	7	8
Glangwili General	25	122	133	0	1	281
Princess of Wales	67	92	75	0	0	234
Singleton	220	121	113	0	1	455
South Central Wales						
Royal Glamorgan	81	95	85	3	0	264
Prince Charles	36	93	140	0	0	269
University Hospital of Wales	250	136	111	0	0	497
South East Wales						
Nevill Hall	83	53	93	0	2	231
Royal Gwent	247	107	117	1	0	472
North Wales						
Ysbyty Gwynedd	14	70	142	1	1	228
Ysbyty Glan Clwyd	80	72	89	0	1	242
Wrexham Maelor	66	58	88	0	2	214
Total	1170	1019	1186	5	15	3395

Table 21 details the number of admissions that received IC, HD care and SC in each of the neonatal units in Wales. Overall, 1170 admissions needed IC, 1019 admissions needed HD care and 1186 admissions needed SC. As expected, the largest numbers were in the three NICUs in South Wales. It is noteworthy that 307/1170 (26.2%) admissions received intensive care outside the designated NICUs and the larger units of North Wales (Ysbyty Glan Clwyd & Wrexham Maelor). This figure is constant over the last 4 years.

Table 22. Activity (BAPM 2011) by number of admissions and gestation

Gestation	Admissions*	Intensive Care days	High Dependency care days	Special Care days	Normal Care days	Total care days
23-24	31	402	738	342	8	1490
25-26	110	910	1722	1120	24	3776
27-28	192	1181	2664	2967	70	6882
29-30	208	817	1215	3416	74	5522
31-32	384	997	1397	5728	199	8321
33-36	986	897	1670	6977	348	9892
>36	1586	1266	2022	5404	272	8964
Total	3497	6470	11428	25954	995	44847

*Babies present in the units between 1/1/0217-31/12/2017

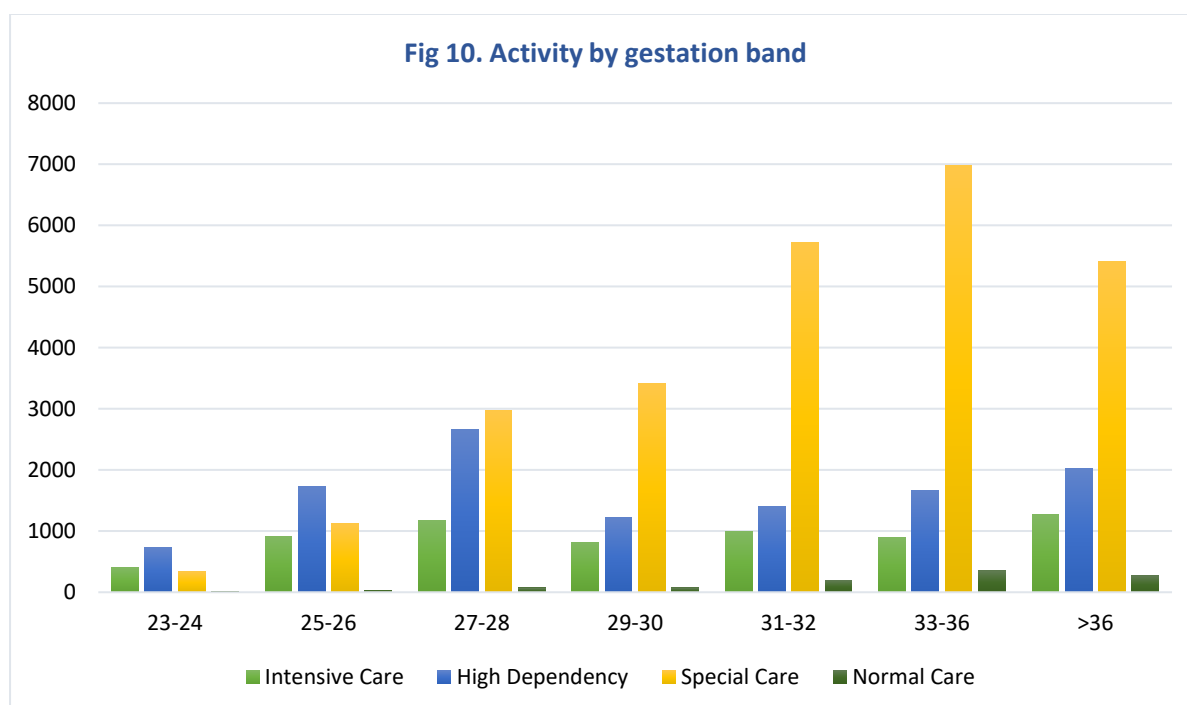


Table 22 and Fig 10 present the overall breakup of figures of levels of care by gestational bands.

Babies of all gestations contributed to intensive care workload. Whereas extremely preterm babies (≤ 28 weeks gestation) contributed 38.4% of the intensive care workload, term babies contributed to 19.6%. From Fig 13 it is quite clear that the moderately premature babies (33 weeks onwards) and term babies cause the highest workload at the lower intensity of care. These relatively mature babies over 32 weeks of gestation contributed 42% of the total care days provided by the neonatal units in Wales.

Normal care, a new category of care defined in the BAPM 2011 criteria accounted for 2.2% of all care days.

Table 23. Activity (BAPM 2011) by number of admissions and birth-weight bands

Birth Weight	Admissions*	Intensive Care	High Dependency	Special Care	Normal Care	Total
501-750	61	831	1449	600	12	2892
751-1000	148	971	2240	1793	44	5048
1001-1250	192	892	1742	3335	84	6053
1251-1500	230	690	1256	3455	106	5507
1501-2500	1108	1735	2449	10789	452	15425
2501-4500	1698	1259	2203	5766	287	9515
>4501	53	41	30	155	8	234
Unknown	10	55	59	61	2	177
Total	3500	6474	11428	25954	995	44851

*Babies present in the unit during the period 1/1/2017-31/12/2017

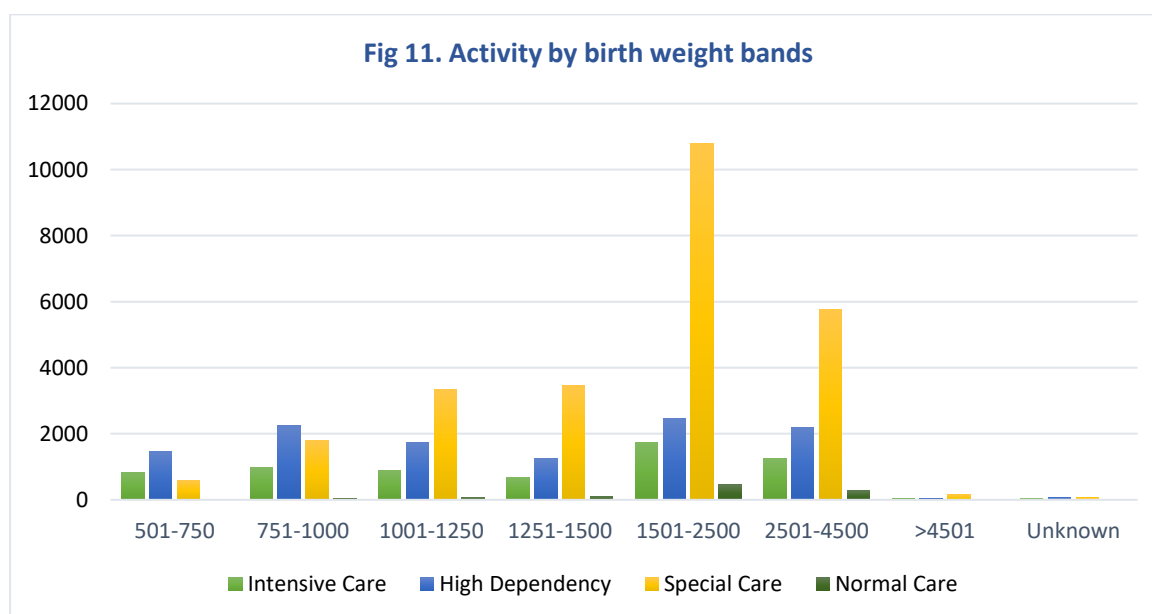


Table 23 and Fig 11 detail the activity by birth weight bands. Babies $\leq 1000\text{g}$ accounted for 27% of IC activity and 32.3% of HD activity. Of note, normal weight babies ($>2500\text{g}$) took up 20.1% of IC days. Overall, this group of babies took up 9749 days of care accounting for 22.1% of overall care. It is clear from Fig 11 that babies over 1500g create the largest number of special care days. The pattern is very similar to that seen in 2014 -2016.

Table 24. Respiratory Therapy given during 2017

Unit	HFOV		Conventional Ventilation		CPAP		High Flow		Oxygen		Total Respiratory days (invasive + non-invasive ventilation)
	Babies*	Days	Babies*	Days	Babies*	Days	Babies*	Days	Babies*	Days	
West Wales											
Bronglais	0	0	1	1	0	0	0	0	0	0	1
Glangwili General	0	0	17	19	73	148	78	613	29	224	780
Princess of Wales	1	1	25	32	57	104	99	457	20	165	594
Singleton	30	114	148	728	145	669	273	1829	49	397	3340
South Central											
Royal Glamorgan	4	4	38	54	84	154	74	347	28	266	559
Prince Charles	2	2	20	21	86	159	35	165	32	275	347
University Hospital	27	77	152	793	177	646	199	1747	20	70	3263
South East Wales											
Nevill Hall	0	0	25	28	54	64	45	188	25	257	280
Royal Gwent	29	62	130	539	154	771	223	1493	43	260	2865
North Wales											
Ysbyty Gwynedd	0	0	10	13	49	79	29	81	30	252	173
Ysbyty Glan Clwyd	2	2	47	119	87	217	96	771	60	771	1109
Wrexham Maelor	1	2	46	80	40	89	72	247	39	713	418
Total	96	264	659	2427	1006	3100	1223	7938	375	3650	13729

*Numbers are not mutually exclusive. The numbers count the numbers that "ever received that level of respiratory support"

Table 24 shows respiratory therapy given to babies admitted to neonatal units in Wales. Overall 96/2747 (3.5%) of all babies needed HFOV and 24% needed conventional ventilation. A total of 13729 days of invasive (via an endotracheal tube) and non-invasive ventilation (CPAP or High Flow) respiratory support was provided across Wales in 2017. All three NICUs in South Wales had over well over 2000 days of respiratory care.

Table 25. Respiratory therapy given by weight bands

	HFO		Conventional Ventilation		CPAP		High Flow		Oxygen		Nitric Oxide	Total Respiratory days (invasive + non-invasive ventilation)
Birth Weight	Babies*	Days	Babies*	Days	Babies	Days	Babies	Days	Babies	Days	Babies	
< 1000	39	145	120	1131	120	1264	137	2806	82	1173	3	5346
1000 - 1499	16	27	141	374	183	686	239	2511	112	1717	6	3598
1500 - 1999	10	16	101	205	172	333	201	1017	50	374	7	1571
2000 - 2499	7	16	76	174	153	273	170	494	22	100	5	957
2500 - 2999	8	16	69	188	131	197	142	323	22	103	3	724
> 2999	16	44	152	355	247	347	334	787	87	183	6	1533
Total days		264		2427		3100		7938		3650		13729
Total babies	96		659		1006		1223		375		30	

*Numbers are not mutually exclusive

Table 25 shows the respiratory therapy given by birth weight bands. 40.6% of babies treated with HFOV were below 1000g at birth.

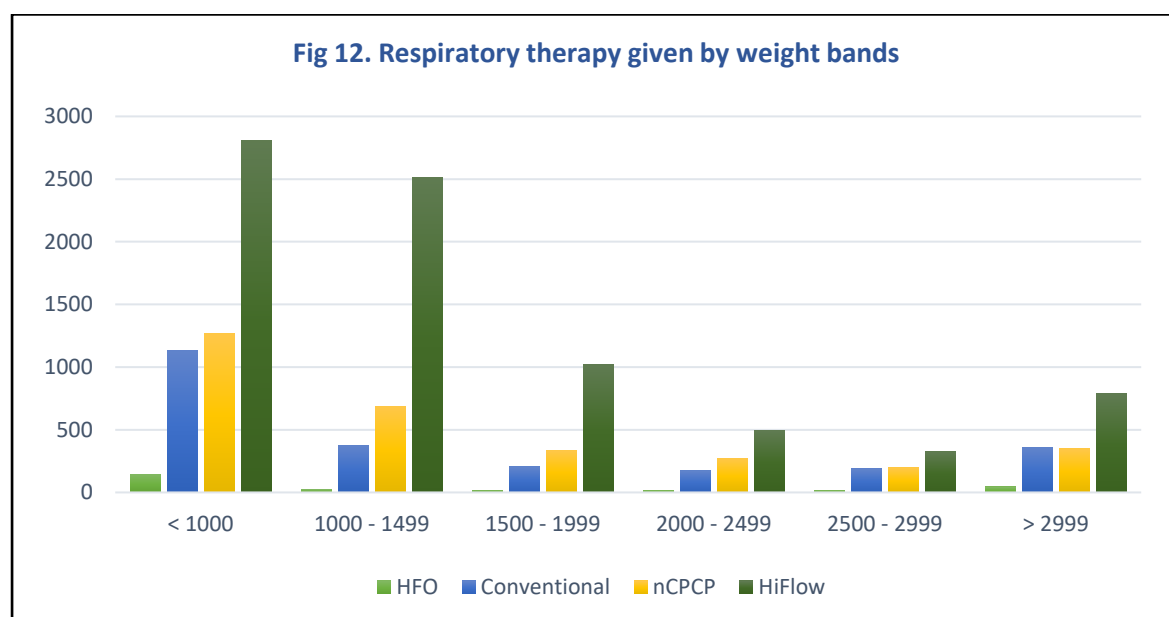


Fig 13 gives the days of respiratory care by birth weight bands. It is clear that the smallest babies needed the largest numbers of days of respiratory therapy.

Table 26. Respiratory therapy given by gestation bands

Gestation	HFOV		Conventional Ventilation		CPAP		High Flow		Oxygen		Nitric Oxide	Total respirator days
	Babies*	Days	Babies*	Days	Babies*	Days	Babies*	Days	Babies*	Days	Babies*	
23-24	8	31	15	345	20	274	21	426	14	280	0	1076
25-26	15	46	58	485	61	623	69	1402	45	629	2	2556
27-28	22	69	101	478	111	783	129	2287	80	1304	3	3617
29-30	13	29	74	172	92	233	126	1194	48	694	4	1628
31-32	7	15	100	180	152	304	205	918	53	360	5	1417
33-36	12	23	109	249	276	471	289	780	35	118	8	1523
>36	19	51	199	514	294	412	384	931	100	265	8	1908
Total Days		264		2423		3100		7938		3650		13725
Total Babies	96		656		1006		1223		375		30	

*Numbers are not mutually exclusive

Table 26 shows gestation bands and the respiratory therapy given. It is noteworthy that term babies were numerically the largest group that received conventional ventilation. HFOV was very commonly used in the most immature babies – 45/96 (46.8%) of babies who received HFOV were 28 weeks or less. This pattern was very similar to that seen in 2013-2016.

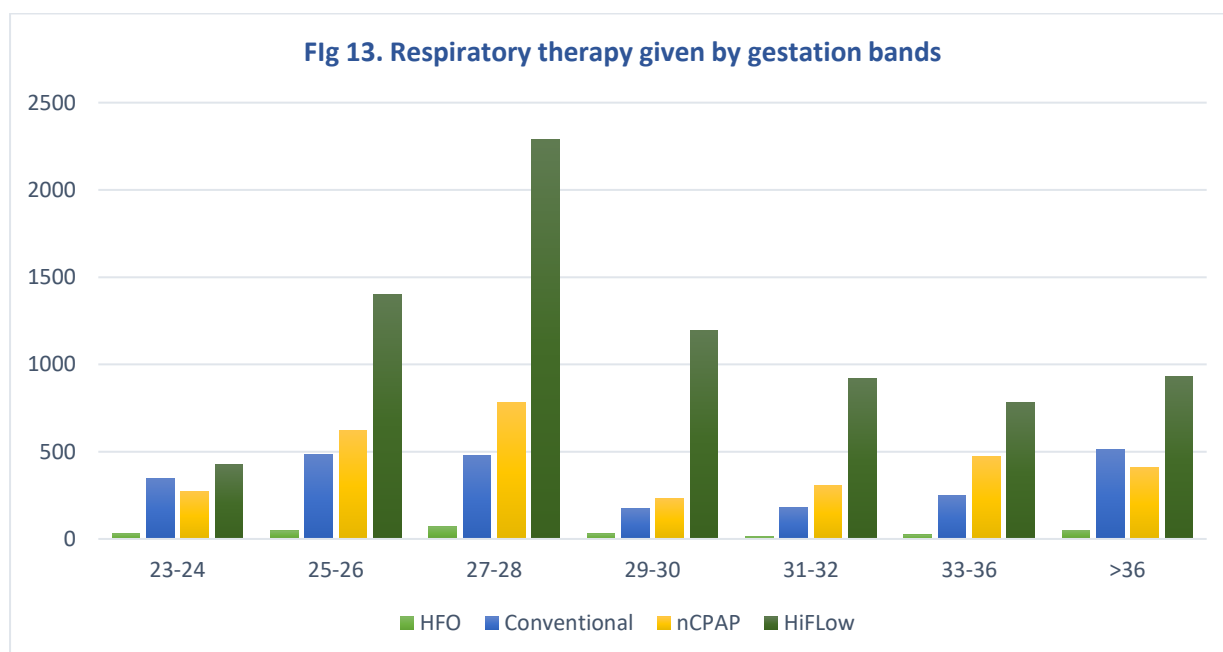


Fig 13 shows the days of respiratory therapy given by different gestation bands. It shows that babies under 30 weeks dominated the need for this support.

Table 27. Top 10 medicines used in neonatal units in Wales 2016

	Babies	Episodes	Days
Gentamicin	2311	2311	7482
Benzylpenicillin	2264	2264	6617
Vitamin K	1059	1059	1624
Total parenteral nutrition	1046	1046	7215
Abidec	773	773	9893
Caffeine	674	674	9288
Folic Acid	524	524	5963
Sodium Chloride for flush	409	409	1348
Sodium chloride	402	402	6261
Dextrose 10%	372	372	843

The top 10 medicines used in the neonatal units in Wales are listed in Table 27. As expected, antibiotics feature as 3 of the top 10 medicines.

Though this table is more accurate than the one presented in 2016, the figures still need to be validated. Greater accuracy of data entry of medicines will be emphasised in the coming years.

OUTCOMES

Table 28. Deaths of babies in neonatal units in Wales in 2017

Serial No	Gestation	Birth Weight	Cause of death 1	Cause of death 2	Cause of death 3	Age at death
1	22	550	Extreme prematurity	RDS	Twin	1
2	22	505	Extreme prematurity	RDS		0
3	22	455	Extreme prematurity	RDS		0
4	24	640	Extreme prematurity	RDS	Severe IVH	25
5	24	650	Extreme prematurity	RDS		2
6	24	720	Extreme prematurity	NEC	Gram -ve sepsis	11
7	25	500	Extreme prematurity	RDS	Severe IVH	8
8	26	660	Extreme prematurity	RDS	TTTS	10
9	26	800	Extreme prematurity	NEC	Sepsis	27
10	26	475	Extreme prematurity	Severe IUGR		3
11	26	850	Extreme prematurity	Severe IVH	Pulmonary interstitial emphysema	17
12	27	960	Prematurity	NEC	Gram -ve sepsis	37
13	28	755	Prematurity	Circulatory failure	Sepsis	2
14	28	855	Prematurity	RDS		2
15	28	1275	Prematurity	RDS		1
16	28	950	Prematurity	RDS	Sepsis	3
17	28	482	Prematurity	Severe IUGR	volvulus	70
18	28	798	Prematurity	Respiratory failure	RSV bronchiolitis	78
19	28	1420	Prematurity	Pulmonary haemorrhage	Severe IVH	4
20	29	1780	Hydrops	Respiratory failure		2
21	29	1370	Asphyxia	Severe IVH		4
22	29	1220	Necrotising enterocolitis	Sepsis		19
23	29	1375	Necrotising enterocolitis	Sepsis		21
24	30	860	IUGR	Congenital abnormality		0
25	30	1610	Respiratory failure			3
26	30	1355	Respiratory failure			0
27	32	2480	Hydrops fetalis	Congenital heart disease		0
28	35	2580	Congenital abnormality	Diaphragmatic hernia	PPHN	1
29	35	2515	Necrotising enterocolitis	Severe IVH		14
30	36	2500	Congenital abnormality	Pulmonary hypoplasia	Obstructive uropathy	0
31	38	3835	HIE 3			0
32	38	2160	Congenital abnormality	Pulmonary haemorrhage	IUGR	13
33	38	3915	HIE 3			1
34	39	3060	HIE 3			0
35	39	3170	Multi-organ failure			2
36	39	3840	Congenital abnormality	Diaphragmatic hernia	Respiratory failure	1
37	40	4000	HIE 3			2
38	41	3800	HIE 3			2

* 4 other babies died after transfer to units in England

For all deaths <26 weeks gestation, "extreme prematurity" has been assigned as the primary cause of death

Deaths between 26 and 27 weeks, "prematurity" has been assigned the primary cause of death

Table 28 and Fig 15 and 16 list the causes of deaths in *neonatal units* in Wales in 2017. The causes of deaths have been derived from the details of the diagnosis recorded on BadgerNet, and if not clear, confirmed from the unit where the baby died.

Overall, there were 38 deaths recorded (30 in South Wales, 8 in North Wales), up from 28 in 2016. There were 43 deaths in 2015, 45 in 2014 and 59 in 2013. There were 4 other babies who was recorded on BadgerNet to have had a part of their care in one of the neonatal units in Wales and died in England. All of these were from N Wales. Of the 38 deaths in Wales, 11 (29%) were babies who were extremely preterm (<26 weeks gestation). Term babies (>36 weeks gestation) accounted for 8/38 (21.1%) of deaths.

In 13% a serious congenital abnormality was the primary cause of death. In 6 babies (15.8%) sepsis was one of the causative factors of death. Necrotising enterocolitis (either confirmed or suspected) was one of the diagnoses in 4 (10.5%) deaths. 5 (13.2%) babies died as a result of severe hypoxic ischaemic encephalopathy. Of the 38 babies who died, 35 (92.1%) were neonatal deaths i.e. within the first 28 days of life. Of these, 25/35 (71.4%) were early neonatal deaths (within 7 days) and 10 (28.6%) were late neonatal deaths (7-28 days). 3 babies died in the post neonatal period (deaths after 28 days of life).

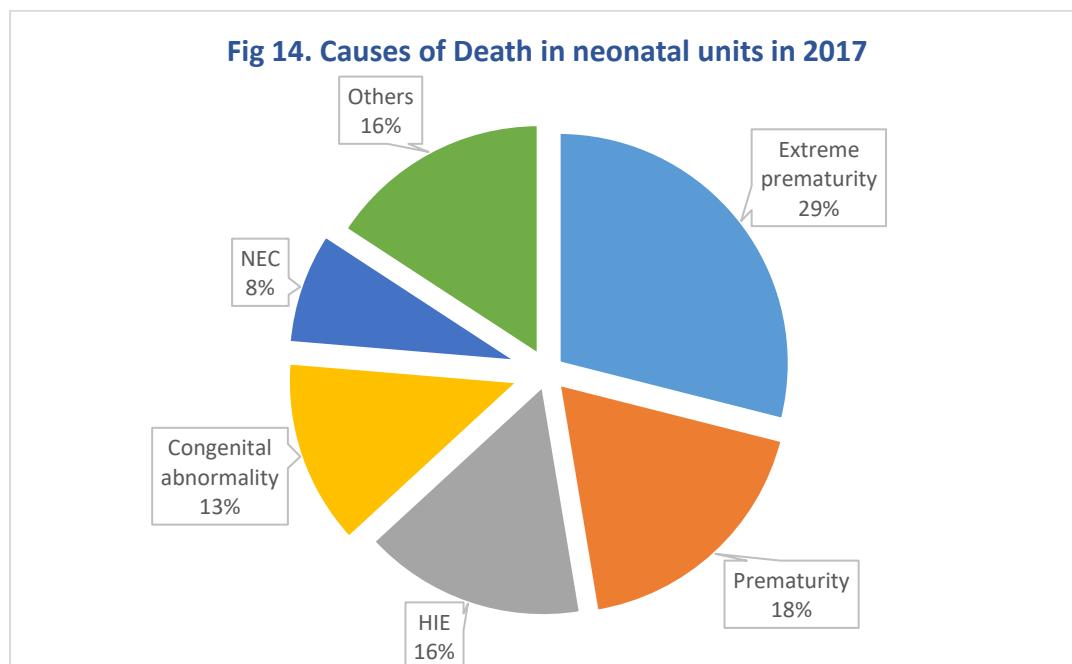


Fig 15. Gestations of babies that died in neonatal units in Wales 2017

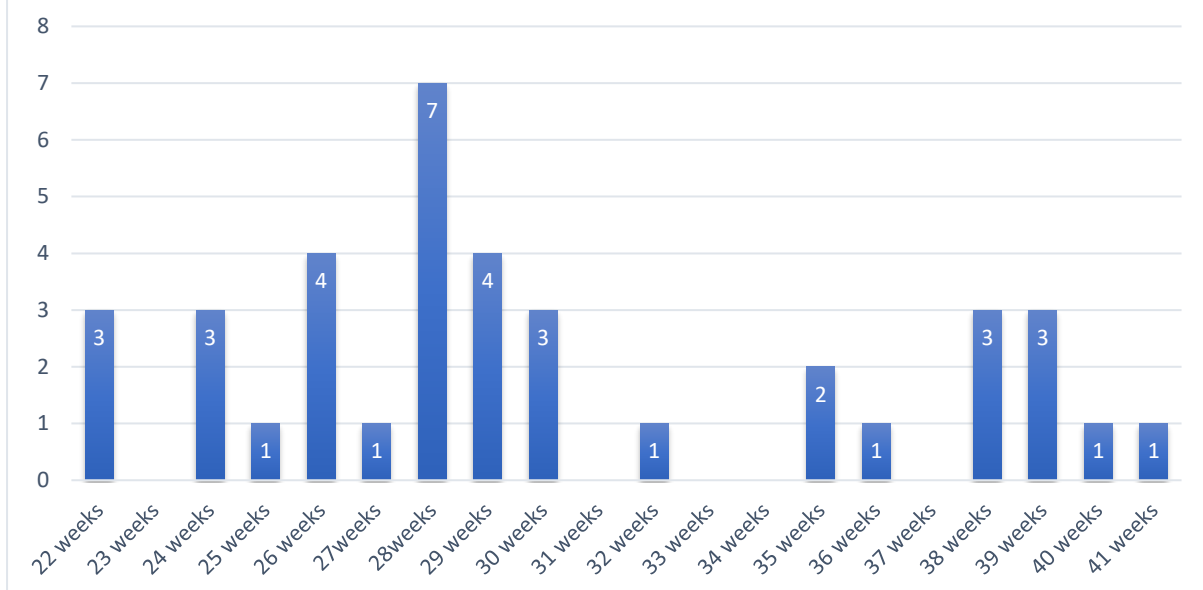


Table 29. Deaths by gestation and location 2017

	22 weeks	23 weeks	24 weeks	25 weeks	26 weeks	27 weeks	28 weeks	29 weeks	30 weeks	31 weeks	32 weeks	33 weeks	34 weeks	35 weeks	36 weeks	>36 wks	Total
South West Wales																	
Bronglais	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glangwili General	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Princess of Wales	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Singleton	1	0	1	0	3	0	0	1	0	0	0	0	0	0	1	1	8
South Central Wales																	
Royal Glamorgan	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	4
Prince Charles	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
University Hospital of Wales	0	0	2	1	1	1	0	2	0	0	0	0	0	2	0	5	14
South East Wales																	
Nevill Hall	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Royal Gwent	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	3
North Wales																	
Ysbyty Gwynedd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ysbyty Glan Clwyd	0	0	0	0	0	0	2	0	1	0	1	0	0	0	0	0	4
Wrexham Maelor	0	0	0	0	0	0	1	1	2	0	0	0	0	0	0	0	4
Total	3	0	3	1	4	1	7	4	3	0	1	0	0	2	1	8	38

Table 30. Deaths by birth weight bands and location

	<500g	500-749g	750-999g	1000-1249g	1250-1499g	1500-1749g	1750-1999g	2000-2499g	2500-2999g	3000-3499g	>3500g	Total
South West Wales												
Bronglais	0	0	0	0	0	0	0	0	0	0	0	0
Glangwili General	0	0	0	0	0	0	0	0	0	0	0	0
Princess of Wales	0	0	0	0	0	0	0	0	0	0	0	0
Singleton	1	3	1	0	1	0	0	0	1	0	1	8
South Central Wales												
Royal Glamorgan	1	1	0	0	1	0	0	0	0	0	1	4
Prince Charles	0	0	0	0	0	0	0	0	0	0	1	1
University Hospital of Wales	0	3	2	1	0	0	1	1	2	2	2	14
South East Wales												
Nevill Hall	0	0	0	0	0	0	0	0	0	0	0	0
Royal Gwent	1	0	1	0	1	0	0	0	0	0	0	3
North Wales												
Ysbyty Gwynedd	0	0	0	0	0	0	0	0	0	0	0	0
Ysbyty Glan Clwyd	0	0	2	0	0	1	0	1	0	0	0	4
Wrexham Maelor	0	0	2	0	2	0	0	0	0	0	0	4
Total	3	7	8	1	5	1	1	2	3	2	5	38

Table 31. Gestation specific survival to discharge or transfer out of Wales

(of babies who were admitted to neonatal units and who were discharged or died in 2017)

Gestation	No of Babies*	Deaths**	Survival 2017	Survival 2016	Survival 2015	Survival 2014	Survival 2013
22 weeks	3	3	0.0	0	0	0	0
23 weeks	8	0	100.0	90.9	28.6	75	50
24 weeks	8	3	62.5	50.0	75.0	50	69.6
25 weeks	18	1	94.4	76.9	82.6	68.4	63.6
26 weeks	34	4	88.2	87.9	80.8	89.5	85.3
27 weeks	42	1	97.6	97.1	86.7	89.5	93.9
28 weeks	60	7	88.3	97.9	96.8	97.4	94.6
29 weeks	47	4	91.5	96.6	100.0	88.6	96.1
30 weeks	71	3	95.8	98.8	98.6	100	98.6
31 weeks	108	0	100.0	99.0	96.7	92.8	98.1
32 weeks	165	1	99.4	97.9	98.2	97.9	97.8
33-36 weeks	842	3	99.6	99.7	99.2	99.7	99.3
37-42 weeks	1424	8	99.4	99.7	99.3	99.1	98.7
Total	2830	38	98.7	99.0	98.3	98.2	97.9

*Total babies include Inborn, Outborn (home, MLUs, ambulance etc.) and Subsequent Admissions (born outside Wales and subsequently admitted to a Welsh neonatal unit). These figures are different "Total Babies" in Table 10 because it counts "subsequent admissions" from outside of Wales.

** excludes 4 babies that died in English neonatal units

Table 31 counts the babies who were *discharged* from the neonatal units and those who *died* in the neonatal units of Wales in 2017. The total numbers of babies is therefore slightly different from the other tables (Table 1) which count the numbers of babies *born* during this period.

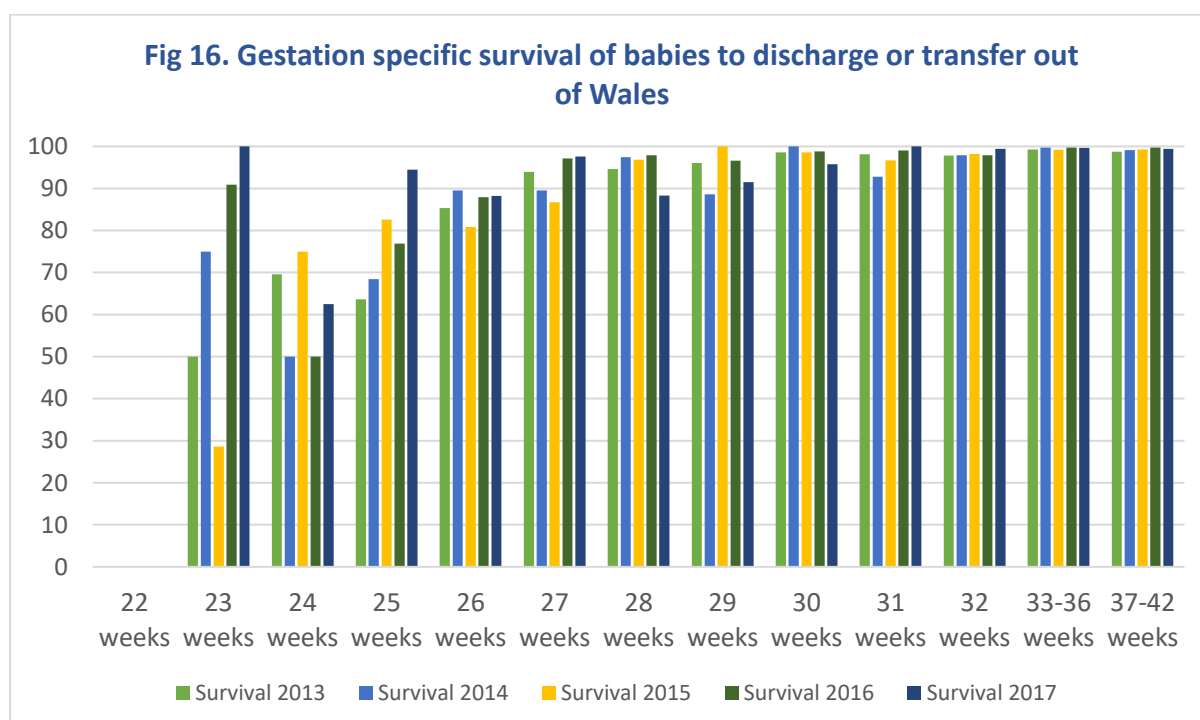


Table 31 and Fig 16 show the overall gestation related survival for babies admitted to neonatal units in Wales during 2013-2017. Deaths in the delivery room have not been included.

Overall, 98.7% of all neonatal admissions in Welsh neonatal units survived to discharge. Though there were minor variations in specific gestation groups, overall the survival was similar to that in 2013-2016. In 2017, 89.4% (101/113) of babies less than 28 weeks admitted to neonatal units in Wales, survived to discharge. The figure in 2013 was 78.8%, 2014 was 80.2%, 2015 was 78.4% and in 2016 was 86.9%.

Table 32: Birth weight specific survival to discharge or transfer out of Wales 2013-2017 (of babies admitted to Neonatal Units in Wales)

Birth Weight	No of babies 2017 *	Deaths 2017	Percent survival 2017	Percent survival 2016	Percent survival 2015	Percent Survival 2014	Percent survival 2013
401-500 g	5	4	20.0	66.7	25	0	0
501-750 g	33	5	84.8	89.3	72.1	63.6	73.9
751-1000 g	71	8	88.7	85.3	91.2	90.9	85.9
1001-1250 g	109	1	99.1	97.8	94.9	95.1	94.4
1251-1500 g	141	5	96.5	98.7	98.3	97.2	95.5
1501-2500 g	897	5	99.4	99.5	98.8	99.1	99.4
2501-4500 g	1528	10	99.3	99.7	99.3	99.1	98.8
>4500 g	49	0	100.0	100	100	100	100
Total	2833	38	98.7	99	98.3	98.2	97.9

*Total babies include Inborn, Outborn (home, MLUs, ambulance etc.) and Subsequent Admissions (born outside Wales and subsequently admitted to a Welsh neonatal unit). These figures are different "Total Babies" in Table 11 because it counts "subsequent admissions" from outside of Wales.

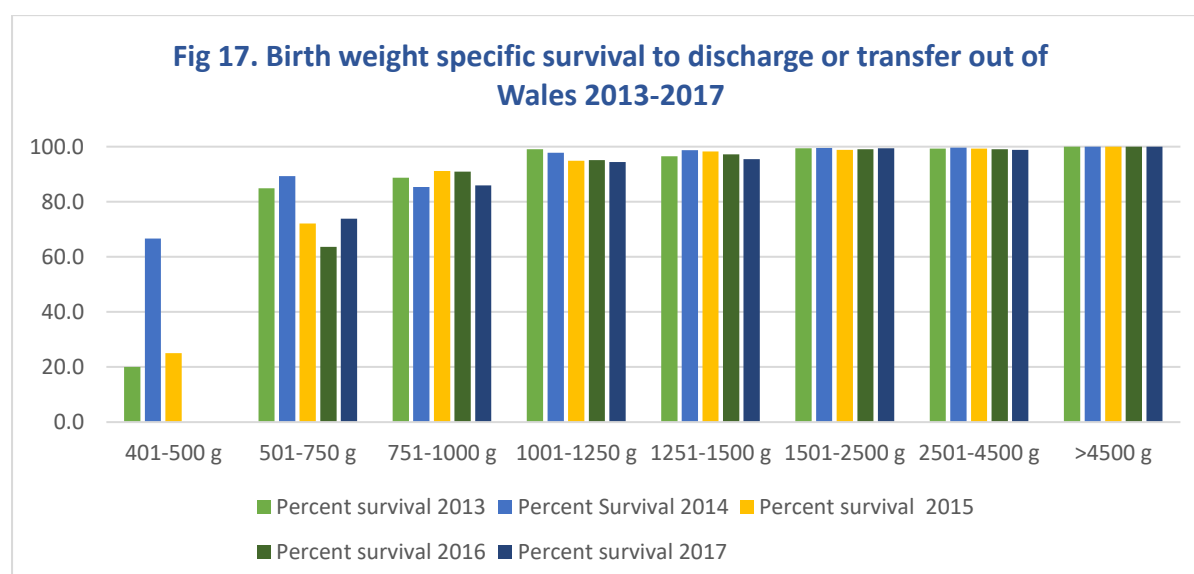


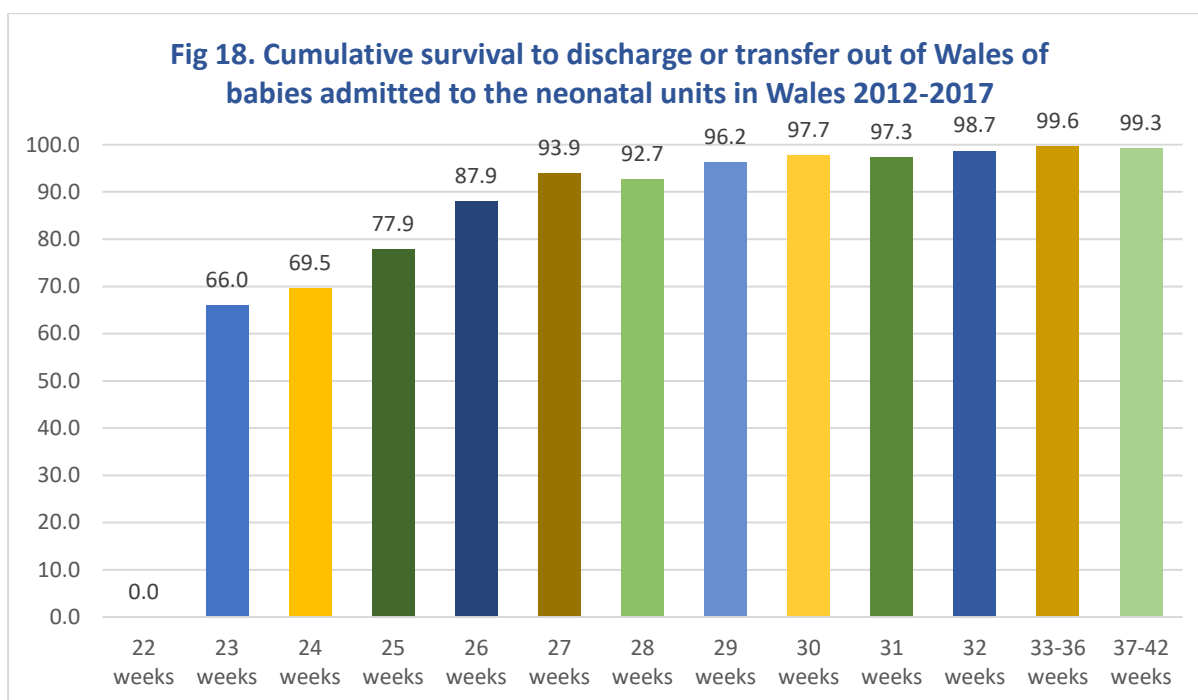
Table 32 counts the babies who were *discharged* or *died* in the neonatal units during the calendar year. The total numbers of babies is therefore slightly different from the other tables (Table 1) which counts the numbers of babies *born* during this period.

Table 32 and Fig 17 show the death and survival rates of babies born at different weight bands and admitted to the neonatal units in Wales. Deaths in delivery rooms, deaths after discharge or transfer out of Wales are not accounted for.

84.4% of extremely low birth weight babies (<1000g) admitted to neonatal units in Wales, survived to discharge (compared with 85.3% in 2016, 84.3% in 2015, 75.9% in 2014 and 80.1% in 2013). For babies under 1500g, the survival was 93.6% (94.5% in 2016, 92.3% in 2015, 90.3% in 2014 and 89.4% in 2013). The 2017 survival figure was within the Vermont Oxford Network 2016 crude survival figures for VLBW babies (89.5%, Q1 86.7 - Q3 95.1).

**Table 33. Cumulative survival by gestation 2012-2017
(Of babies admitted to Neonatal units in Wales)**

Gestation	Total Babies	Total deaths	% survival
22 weeks	3	3	0.0
23 weeks	50	17	66.0
24 weeks	95	29	69.5
25 weeks	140	31	77.9
26 weeks	215	26	87.9
27 weeks	228	14	93.9
28 weeks	288	21	92.7
29 weeks	317	12	96.2
30 weeks	431	10	97.7
31 weeks	622	17	97.3
32 weeks	831	11	98.7
33-36 weeks	5599	24	99.6
37-42 weeks	8541	60	99.3
Total	17360	275	98.4

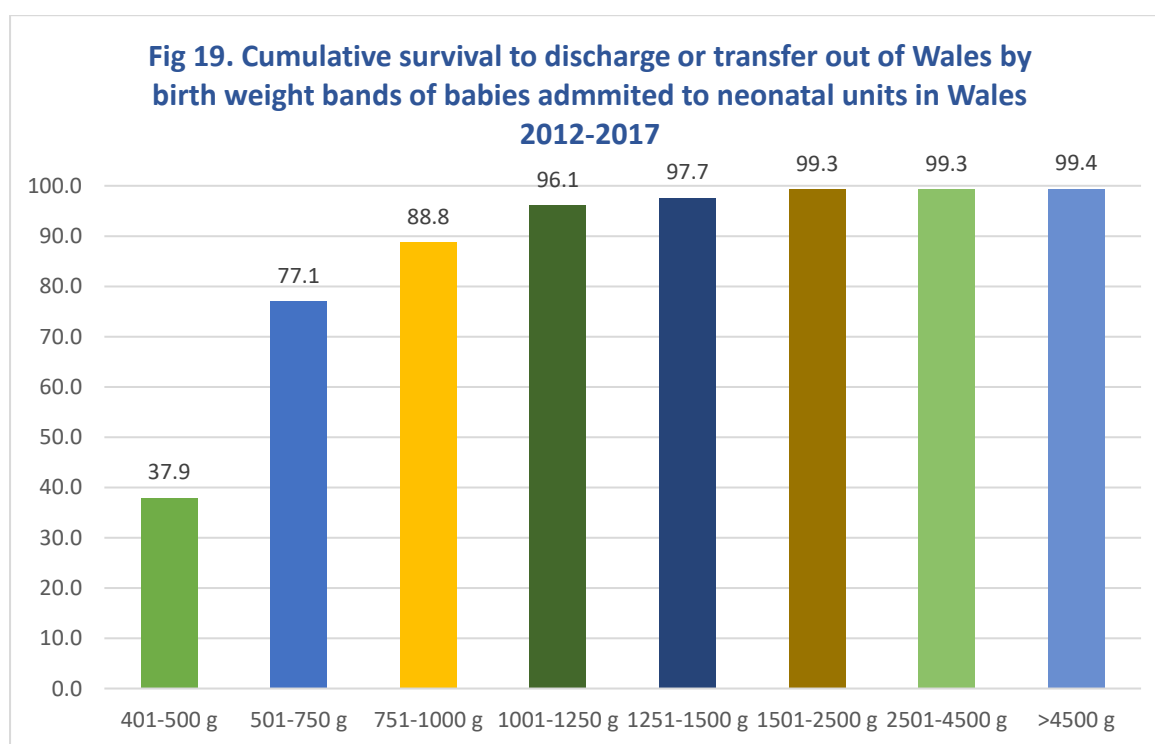


* Babies admitted to the Neonatal Units in Wales

Table 33 and Fig 18 compute the cumulative survival by gestation in Welsh Neonatal units over a 6 year period 2012-2017. These figures are based on substantial numbers of babies and are very likely to be representative. These figures can be used as guidelines to council parents on expected outcomes.

Table 34. Cumulative survival by birth weight bands, 2012-2017

Birth Weight	Total Babies	Total Deaths	% survival
401-500 g	29	18	37.9
501-750 g	262	60	77.1
751-1000 g	445	50	88.8
1001-1250 g	569	22	96.1
1251-1500 g	854	20	97.7
1501-2500 g	5655	41	99.3
2501-4500 g	9211	62	99.3
>4500 g	338	2	99.4
Total	17363	275	98.4



* Babies admitted to the Neonatal Units in Wales

Table 34 and Fig 19 compute the cumulative survival by birth weight bands in Welsh Neonatal units over a 6 year period 2012-2017. These figures are based on substantial numbers of babies and are very likely to be representative. These figures can be used as guidelines to council parents on expected outcomes.

BENCHMARKING

The outcome and the performance of Welsh neonatal units is benchmarked against international (**Vermont Oxford Network, VON**) National standards (**National Neonatal Audit Programme, NNAP**). A summary of the benchmarking data from both standards is presented below.

Vermont Oxford Network

The **Vermont Oxford Network (VON)** is a nonprofit voluntary collaboration of health care professionals working together as an interdisciplinary community to improve neonatal care across the world. Founded in 1988, VON is comprised of teams of health professionals representing neonatal intensive care units and level I and II care centers around the world.

The 3 NICUs in Wales have been submitting data to the VON since 2007 but it is only since 2014 that it was decided that all neonatal units in Wales would be a part of the network. A separate Wales Neonatal Network for VON reporting was enabled in 2014 and this is the second report of the data that has been analyzed. Most of the data is from the 3 NICUs because the non-NICUs have only sporadically submitted their data into the system.

Tables 35 and Fig 21 are the data of VON eligible babies ($\leq 1500\text{g}$ or <30 weeks gestation) who have had the substantial part of their care in Wales in 2016. The Key Performance Measures gives an overview of the outcomes for babies cared for in Wales and compares them to babies looked after in the other centres in the UK and the whole network.

Table 35. Key Performance Measures (Vermont Oxford Network data) of Wales (2016) v the UK (2016) and the Vermont Oxford Network (2016)

	Wales Neonatal Network (2016)					UK 2016				Vermont Oxford Network 2016		
Measure	N	%	Q1	Q3		%	Q1	Q3		%	Q1	Q3
Mortality	266	6	0	5.1		12.	4	13.		14.6	8	17.
Death or Morbidity	266	44.7	26.	41.7		47.	29.	48.		43	29.	48.
Chronic Lung Disease	237	32.1	11.	27.8		32.	17	34.		24.1	11.	29
Pneumothorax	264	4.5	0	3.8		4.6	0	5		4.2	0	5.7
Late Bacterial Infection†	253	7.9	0	10.5		8.8	0	10.		8.9	2.2	11.
Coagulase Negative Staph	253	10.3	0	11.1		11.	3.8	13.		5.1	0	5.9
Nosocomial Infection*	253	15.8	0	18.2		18.	6.8	20		12.3	3.9	14.
Fungal Infection	253	0.4	0	0		0.5	0	0		0.9	0	0.7
Any Late Infection‡	253	16.2	0	18.2		18.	6.9	20		12.7	4.2	15.
Severe IVH	255	4.7	0	7.7		8.4	3.3	9.6		7.9	2.3	10.
Severe ROP	220	5.9	0	6.7		6.4	0	6.7		6.3	0	7.8
Cystic PVL	259	1.2	0	1.3		2.2	0	3.7		2.9	0	4
Necrotizing Enterocolitis	264	2.7	0	5.4		5.7	0	6.8		5	0	6.6
Extreme LOS (survivors)	248	3.6	0	4.1		3.6	0	4.2		5	0	7.1

*Indicates whether the infant has either Late Bacterial Infection and/or Coagulase Negative Staph after Day 3 of life

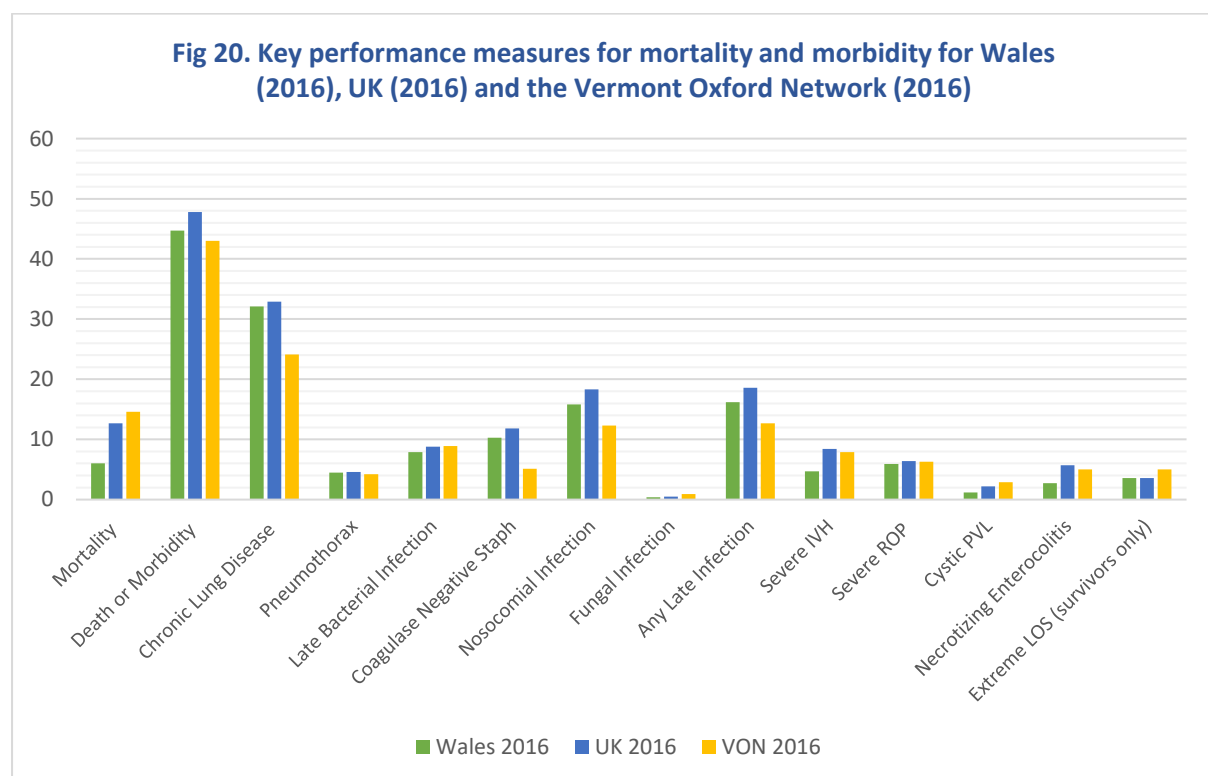
† A bacterial pathogen from the Bacterial Pathogens List is recovered from a blood and/or cerebrospinal fluid culture obtained after Day 3 of life

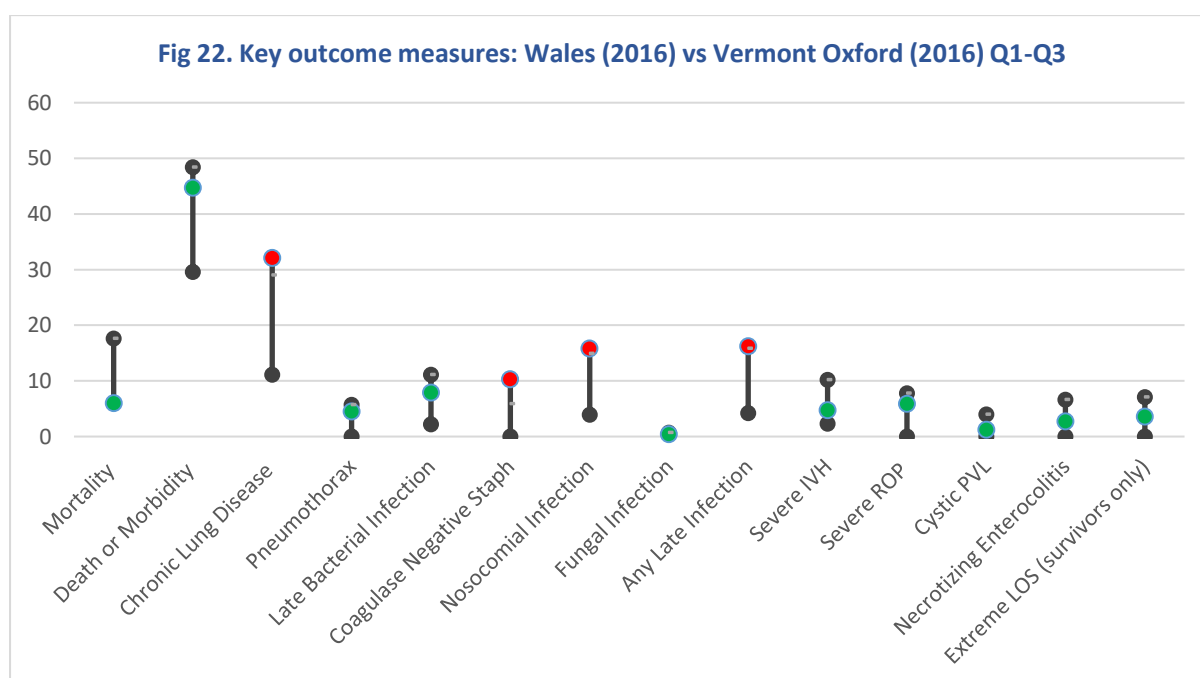
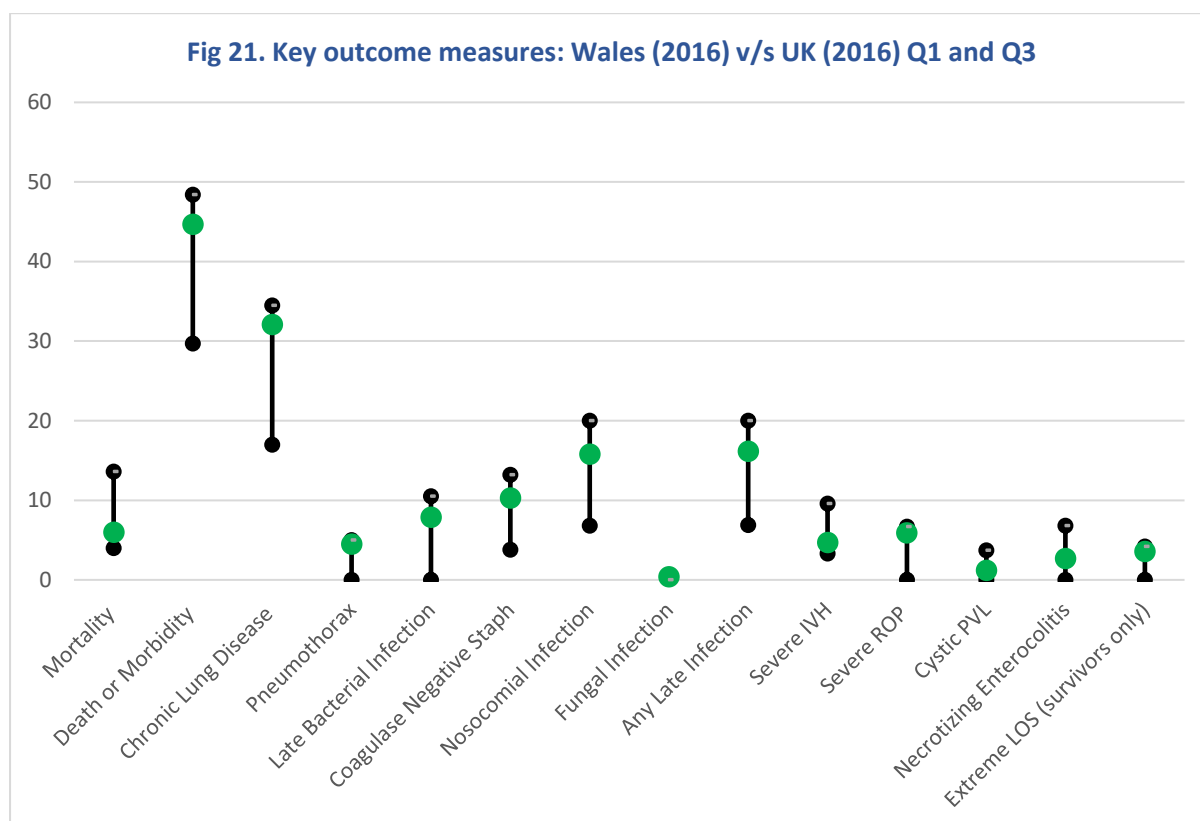
‡ Indicates whether the infant has either Late Bacterial Infection and/or Coagulase Negative Staph and/or Fungal Infection after Day 3 of life

Welsh data is marked green if the Welsh means are within the UK and VON Q1-Q3

Welsh data is marked red if the Welsh means are outside the UK or VON Q1-Q3

Table 35 shows the Key Performance Measures for Wales for 2016 compared to the rest of the UK and to the entire Vermont Oxford Network. Values are coded in green if the mean for Wales was between both the UK and the VON network 1st – 3rd Quartiles. If above the 3rd Quartile of *either*, it is coded red. The results of the VON benchmarking show that for the major outcomes like Mortality, Death or Morbidity, pneumothorax, late bacterial infection, fungal infection, severe IVH, severe ROP, cystic PVL and NEC, the Welsh outcomes are at par with that of the VON Network and the UK i.e. within the Q1-Q3 of *both* the groups. However, the outcomes for Chronic Lung Disease and some of the infection parameters (CoNS sepsis, Nosocomial Infection and *any* Late Infection) both the Welsh and UK performance is short of what the whole network produces. This gap between the UK/Welsh versus the Network is closing over the last few years and it is anticipated that within a couple of years, we should be able to catch up with the best in the Network.





Figs 21 and 22 show a graphic comparison of the Welsh outcome data in comparison to the 1st - 3rd Quartiles of the VON Network data (Fig 21) and to the rest of the UK data (Fig 22). The Welsh figures are coded green if they are within the 1st - 3rd Quartile or in red if outside this range.

Compared to the VON network data, the Welsh figures are outside the range in only 4 categories; Chronic lung disease, Coagulase negative Staphylococcus infection, Nosocomial infection and Any Late Infection. For all other categories, the Welsh figures are within the defined range. Compared to the rest of the UK data, Welsh figures were at par with the rest of the UK.

Analysis of Neonatal mortality data for 2016, Neonatal Data Analysis Unit, Imperial College, London, Published January 2018

The Neonatal Data Analysis Unit (NDAU), Imperial College London, presented an analysis for deaths in babies born in 2016 a gestational age of *less than 32 weeks* and admitted to neonatal units in England, Wales and Scotland (part). The data was acquired from the BadgerNet platform. In the analysis, the standardised mortality ratios (SMR) were estimated for each Operational Divisional Network (ODN). Crude and adjusted estimates of SMR were evaluated. The adjustment is by a logistic regression of the outcome (death/survival) on the following five clinical variables: GA, birth weight, sex, use of antenatal steroids and multiple births, and their transformations and interactions.

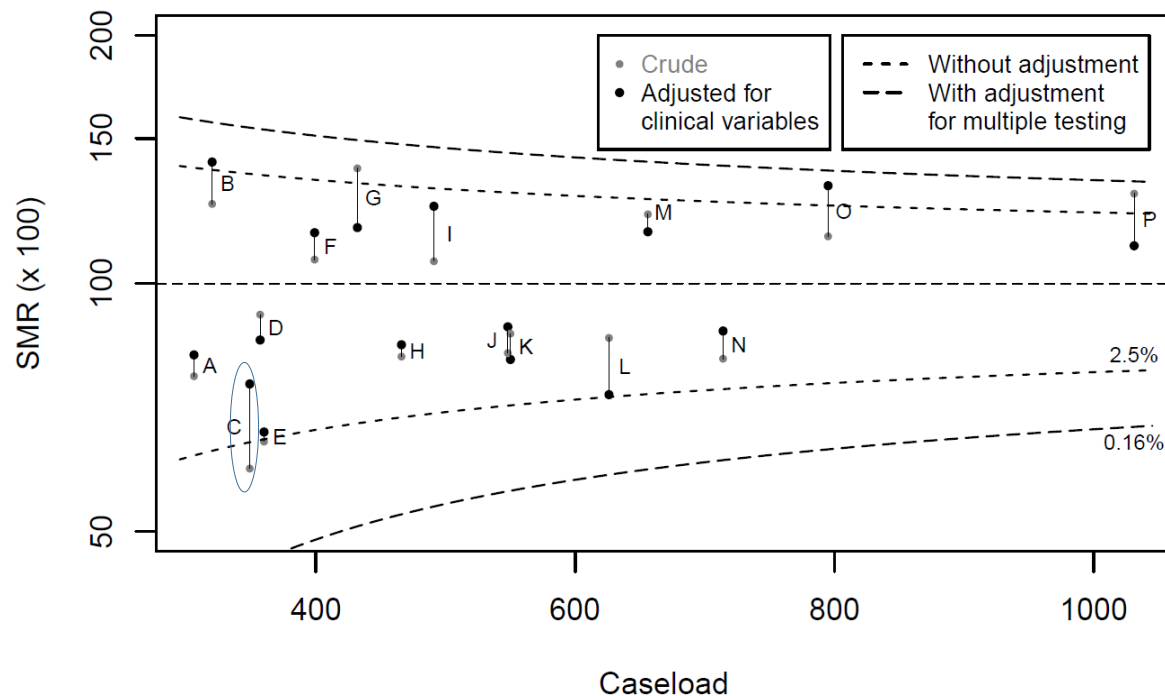
Wales had the lowest crude mortality of all ODNs and the third lowest adjusted SMR.

Table 36. Estimates, standard errors and confidence limits for the ODN-level SMR without and with adjustment for clinical variables

ID	ODN	Infants*				Unadjusted		Adjusted	
		S	D	M	All	SMR	Conf. limits	SMR	Conf. limits
A	Thames Valley	281	20	5	306	77.1	(39.9, 114.4)	81.9	(50.2, 113.6)
B	Staff-Shrop BC	272	32	16	320	124.9	(86.1, 163.7)	140.4	(100.9, 180.0)
C	Wales	328	17	4	349	59.6	(33.7, 85.5)	75.5	(44.0, 107.0)
D	London NW	323	27	7	357	91.7	(53.6, 129.7)	85.4	(54.8, 116.0)
E	Wessex (TV)	332	18	10	360	64.3	(36.1, 92.4)	66.0	(42.0, 90.0)
F	Northern	353	35	11	399	106.9	(71.3, 142.5)	115.2	(82.8, 147.7)
G	Midlands SW	362	48	22	432	138.0	(104.8, 171.1)	116.9	(93.4, 140.4)
H	Penins & West	432	32	2	466	81.5	(53.2, 109.8)	84.3	(57.8, 110.7)
I	Scotland	432	44	15	491	106.4	(78.3, 134.5)	124.1	(96.9, 151.3)
J	South East	498	36	14	548	82.3	(54.7, 110.0)	88.6	(61.3, 115.8)
K	London South	499	40	11	550	86.9	(57.9, 115.9)	80.9	(56.2, 105.5)
L	London N C&E	573	45	8	626	85.9	(63.0, 108.7)	73.3	(55.3, 91.3)
M	Trent	580	67	9	656	121.3	(95.9, 146.8)	115.5	(94.1, 136.9)
N	East of England	650	48	16	714	81.0	(56.4, 105.6)	87.6	(63.8, 111.3)
O	Yorkshire	704	76	15	795	114.1	(91.7, 136.4)	131.4	(110.1, 152.7)
P	North West	883	107	41	1031	128.5	(107.5, 149.6)	111.1	(96.1, 126.1)
	England & Wales	7502	692	206	8400	100.0		100.0	

Notes: * — the counts of infants are for survived (S), died (D), survival status not known (M), and their total (All).

Fig 23. Funnel plot of ODN-level Standardised Mortality Ratio (SMR) with and without adjustment for multiple testing



One sided levels 0.16% (the outer funnel) and 2.5% (inner funnel); SMR estimates with adjustments for clinical variables (black dots) and without (grey dots). Wales Neonatal Network "C"

As can be seen from the above graphic, Wales (C) is a positive outlier with the lowest crude mortality rate of 16 Operational Neonatal Networks in the UK in 2016. When adjusted for gestational age, birth weight, sex, use of antenatal steroids and multiple births, Wales ranks 3rd of 16 Operational Neonatal Networks in the country.

National Neonatal Audit Programme

The National Neonatal Audit Programme (NNAP) is commissioned by the Department of Health through the Healthcare Quality Improvement Partnership (HQIP). It is delivered by the Royal College of Paediatric and Child Health (RCPCH) Clinical Standards Department within the Research and Policy Division. The audit commenced in 2006 and was rolled out throughout England in 2007, and all neonatal units in Wales joined the programme in 2013.

NNAP Audit Measures 2017

1. Were live born and admitted babies born at less than 27 weeks gestation delivered in maternity services on the same site as designated NICUs?
2. For babies with a birth gestation of 34-36 weeks completed inclusive, who did not have any surgery or a transfer during any admission:
How many "Special Care" or "Normal care" days were provided when oxygen was not administered?
3. For babies with a birth gestation of ≥ 37 weeks, who did not have any surgery or a transfer during any admission: How many "Special Care" or "Normal care" days were provided when oxygen was not administered?
4. What proportion of live born babies born at less than 32 weeks gestation who were admitted to a neonatal unit met the NNAP surveillance definition for Necrotising enterocolitis (NEC) on one or more occasion?
5. For all parents of babies with admissions of greater than 24 hours, did at least one parent attend a consultant ward round?
6. Are all mothers who deliver babies between 24 and 34 weeks gestation inclusive given any dose of antenatal steroids?
7. Are mothers who deliver babies below 30 weeks gestation given Magnesium Sulphate in the 24 hours prior to delivery?
8. Do all babies of less than 32 weeks gestation have their temperature taken within an hour after birth?
And
What proportion of these admission temperatures recorded within one hour are within the recommended range of 36.5°C to 37.5°C ?
9. Is there a documented consultation with parents by a senior member of the neonatal team within 24 hours of admission?
10. Do all babies born weighing less than 1501g, or at gestational age of less than 32 weeks, undergo the first Retinopathy of Prematurity (ROP) screening in accordance with the current guideline recommendations?
11. What proportion of babies born at greater than 34 weeks gestation have an encephalopathy within the first three full calendar days after birth?
12. How many babies have a positive blood culture (any growth) with a central line present, after 72 hours of life per 1000 line days?
13. Recording of Blood stream and cerebrospinal fluid (CSF) cultures
What percentage of babies admitted to a neonatal unit have:
 - (a) one or more episodes of a pure growth of a pathogen from blood
 - (b) one or more episode of a pure growth of a pathogen from CSF
 - (c) Either a pure growth of a skin commensal or a mixed growth with ≥ 3 clinical signs at the time of blood sampling?
14. How many blood stream infections are there on a NNU per 1000 days of central line care?
 - a) The growth of a recognised pathogen in pure culture, or in the case of a mixed growth, or growth of skin commensal, the added requirement for 3 or more of 10 predefined clinical signs
 - b) Central line= UAC, UVC, percutaneous long line or surgically inserted longline.
15. What proportion of babies born at less than 32 weeks developed Bronchopulmonary Dysplasia?
16. What proportion of babies born at less than 33 weeks gestation were receiving any of their own mother's milk at discharge to home from a neonatal unit?

17. Are rates of normal survival at two years comparable in similar babies from similar neonatal units?

Some of the results for 2017 are presented below as they are available live from BadgerNet. These figures may be marginally different to the formal NNAP report but are correct on the date of the download, i.e. 18 April 2018.

- Of eligible babies, 92.6% (96.9% in 2016, 92.6% in 2015) had their temperatures taken within 1 hour of birth against an NNAP standard of 95%.
- 90.1% of eligible mothers received antenatal steroids prior to delivery though there are some regional variations. This figure was higher than the NNAP standard and higher than the figure from 2016.
- In 2017, 4.2% of eligible babies apparently did not have ROP screening at all. Overall 89.9% babies had ROP screening at the right time. This is short of the UK average of 94%.
- 52.6% eligible babies had any breast milk at discharge. There are significant regional variations. This figure has improved year on year, but is still below the UK average of 55%
- 89.9% of eligible babies' parents were spoken to by a senior doctor within 24 hours of admission. The National average is 91%.
- 64.1% of eligible babies had a 2 year assessment against a National average of 59.1%
- 3.6% of babies over 35 weeks gestation had neonatal encephalopathy
- There were 3.9 episodes of catheter related sepsis (old definition) per 1000 catheter days in Welsh neonatal units in 2017. This is higher than the National average of 3 per 1000 days.
- 53.1% of eligible babies had *any* BPD compared to a National average of 50%
- 54.4% of eligible Welsh mothers had the recommended Magnesium sulphate against a National average of 59%

The data for Tables 36 to 46 and Figs 24-37 has been extracted from BadgerNet on the 18 April 2018. These results are likely to be marginally different from the final NNAP Annual Report when it is published. The reason for this is that NNAP will give additional warnings and allow additional data entry and checking of the data before finalising the report. This report below is an indication of how the NNAP report for Wales appeared on 18th April 2017.

Table 37. Temperature on admission of eligible babies

	Eligible babies	Temp taken within 1Hr	% Temp taken within 1Hr	Temp taken after 1Hr	Temp not taken	Missing / Unknown data
South West Wales						
Glangwili General	13	11	85	2	0	0
Princess of Wales	8	8	100	0	0	0
Singleton	72	63	88	9	0	0
South Central Wales						
Royal Glamorgan	29	29	100	0	0	0
Prince Charles	6	6	100	0	0	0
University Hospital of Wales	55	51	93	3	0	1
South East Wales						
Nevill Hall	13	10	77	3	0	0
Royal Gwent	59	58	98	1	0	0
North Wales						
Ysbyty Gwynedd	8	7	88	1	0	0
Ysbyty Glan Clwyd	43	41	95	2	0	0
Wrexham Maelor	30	27	90	1	1	1
Total	336	311	92.6	22	1	2

Table 38. Temperature range on admission

	Temp taken within 1Hr	Temp not recordable	Temp <32	Temp 32 - 35.9	Temp 36 - 36.4	Temp 36.5 - 37.5	Temp >37.5
South West Wales							
Glangwili General	11	0	0	0	1	10	0
Princess of Wales	8	0	0	1	3	4	0
Singleton	63	0	0	0	5	52	6
South Central Wales							
Royal Glamorgan	29	3	0	1	4	21	0
Prince Charles	6	0	0	0	1	4	1
University Hospital of Wales	51	0	0	2	6	38	5
South East Wales							
Nevill Hall	10	0	0	0	2	8	0
Royal Gwent	58	1	0	0	8	40	9
North Wales							
Ysbyty Gwynedd	7	0	0	1	1	5	0
Ysbyty Glan Clwyd	41	1	0	0	1	34	5
Wrexham Maelor	27	0	0	1	3	21	2
Total	311	5	0	6	35	237	28

Table 38A. Temperature on admission 2013-2017 in different units in Wales

	2013	2014	2015	2016	2017	Sparklines
Glanwilli General	100	90	100	89	85	
Princess of Wales	91	80	0	100	100	
Singleton	90	96	93	97	88	
Royal Glamorgan	94	94	86	100	100	
Prince Charles	93	93	67	82	100	
University Hospital of Wales	88	93	96	92	93	
Nevill Hall	70	64	50	100	77	
Royal Gwent	91	98	97	100	98	
Ysbyty Gwynedd,	60	90	100	100	88	
Ysbyty Glan Clwyd	91	92	82	98	95	
Wrexham Maelor	93	73	75	100	90	

Fig 24. Percent of babies <32 weeks gestation that had their temperatures taken within 1 hour 2013-2017

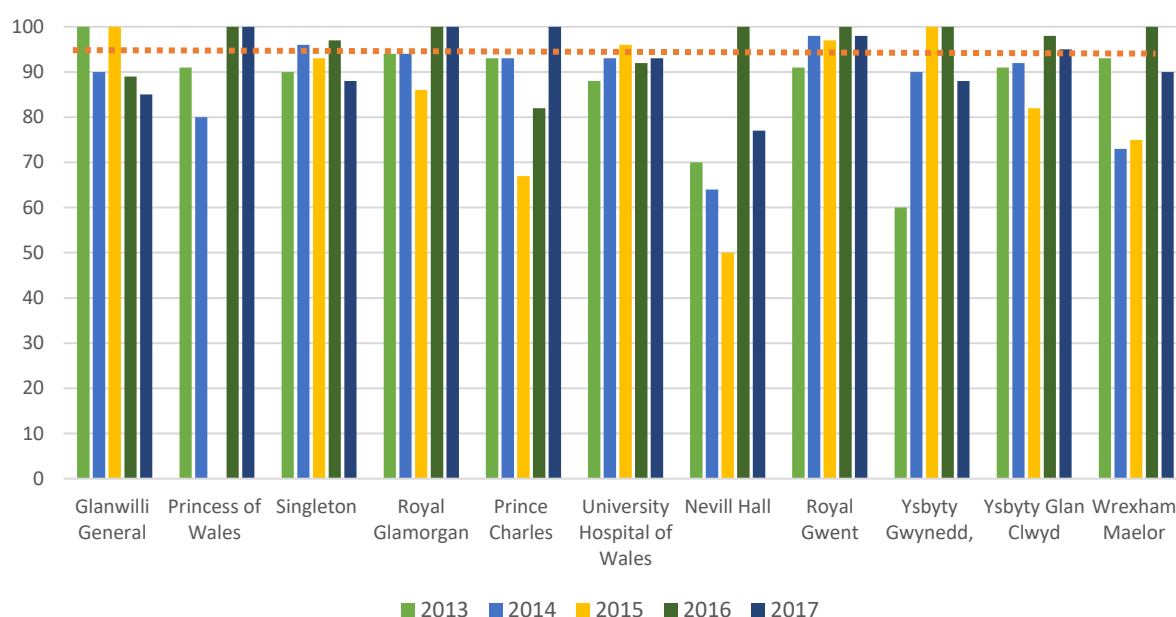


Table 36 and Fig 23 show the numbers and percentages of babies delivered ≤ 32 weeks gestation that had temperatures taken within 1 hour of birth. The figures for 2017 are worse than that of 2016. The overall Welsh figure is lower than the NNAP benchmark.

Fig 25. Benchmarking of percent of babies that had their temperature taken within 1 hour Wales v/s other networks

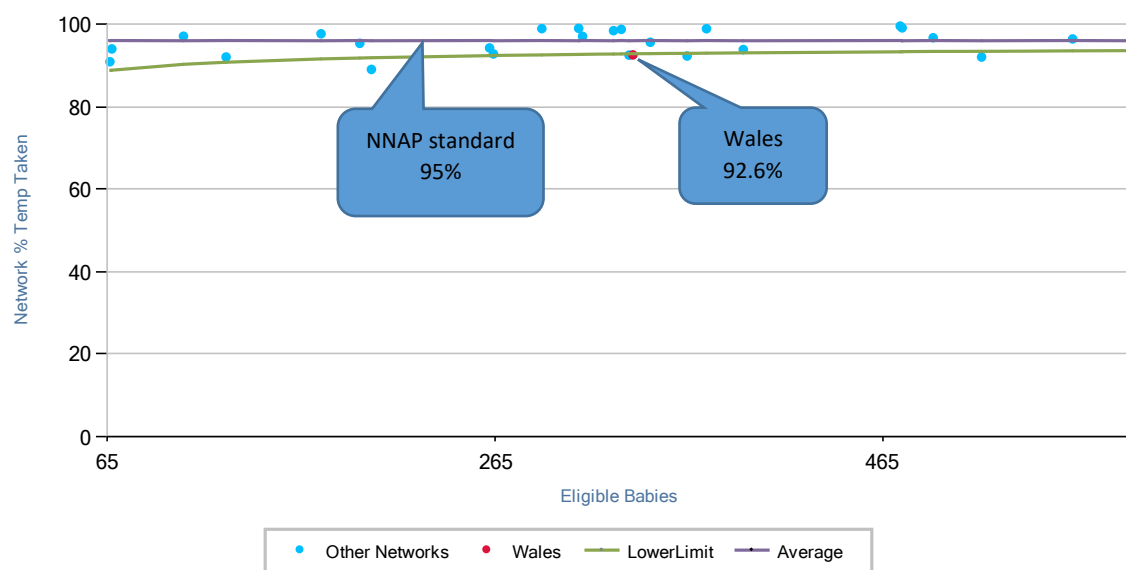


Table 39. Percentage of eligible mothers given antenatal steroids 2017

	Eligible Mothers	Steroids Given	Percentage Given Steroids
South West Wales			
Glangwili General	45	41	91
Princess of Wales	57	49	86
Singleton	118	112	95
South Central Wales			
Royal Glamorgan	72	70	97
Prince Charles	28	26	93
University Hospital of Wales	102	91	89
South East Wales			
Nevill Hall	40	30	75
Royal Gwent	115	102	89
North Wales			
Ysbyty Gwynedd	38	34	89
Ysbyty Glan Clwyd	74	69	93
Wrexham Maelor	70	60	86
Total	759	684	90.1

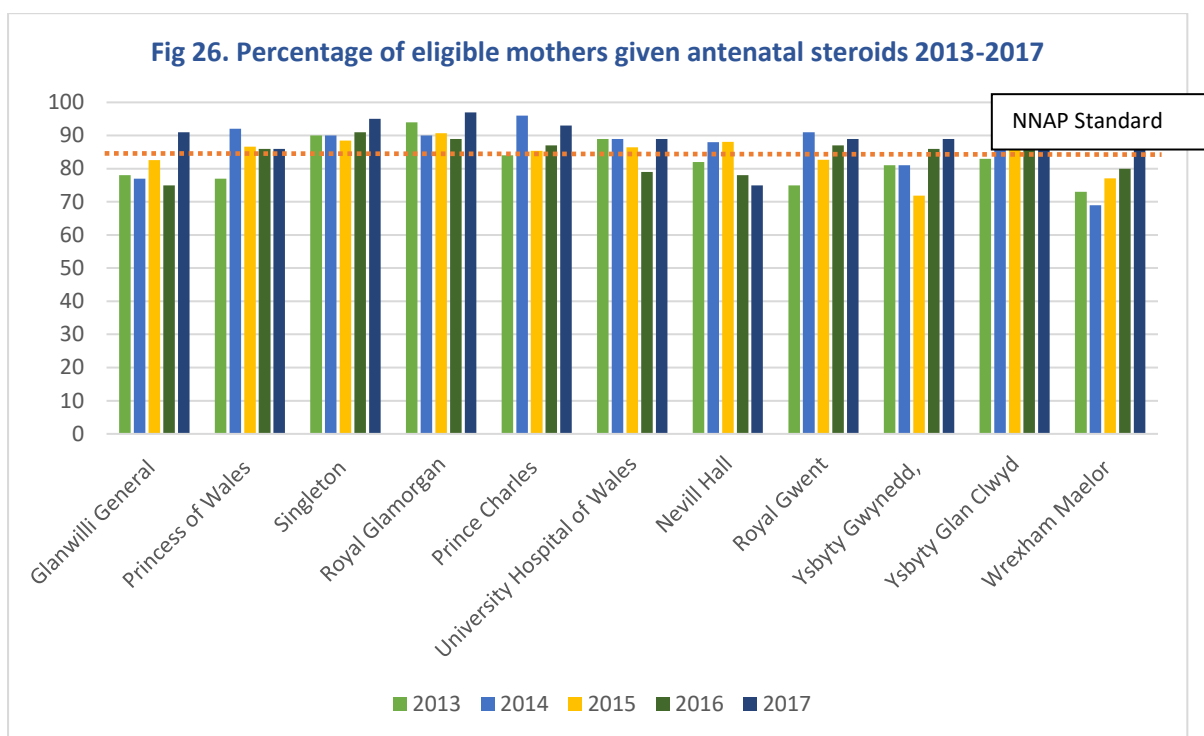


Fig 27. Benchmarking of antenatal steroid use in Wales v/s other networks

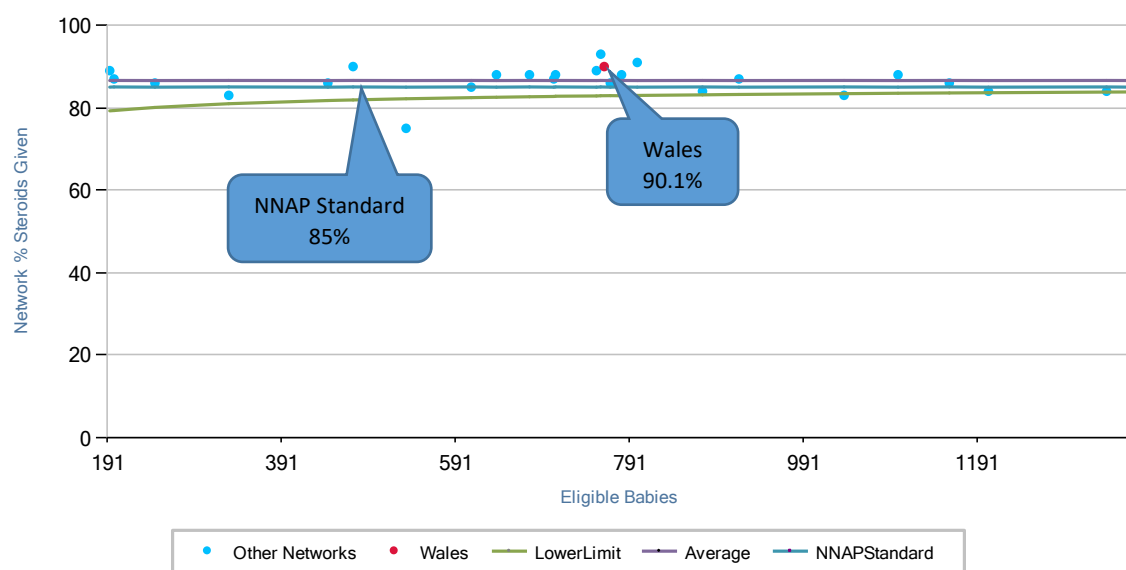


Table 39 and Fig 26, 27 show the rates of antenatal steroids given to eligible mothers prior to delivery. Eligible mothers are those delivering between 24 and 34 weeks' gestation who had at last one dose of steroid antenatally and delivered in the said hospital.

These figures are very likely to be a true reflection of the actual position. The overall figure in 2017 is a satisfactory 90.1%, well above the NNAP standard of 85%. There have been some variations in the individual units over the 4 years as shown in Fig 26.

Table 40. ROP screening in Wales 2017

		ROP on Time		ROP Screen Early		ROP Screen Late		ROP No Screen	
Location Name	Eligible	No	%	No.	%	No.	%	No.	%
South West Wales									
Glangwili General	27	23	85	1	4	2	7	1	4
Princess of Wales	26	24	92	0	0	0	0	2	8
Singleton	58	56	97	0	0	2	3	0	0
South Central Wales									
Royal Glamorgan	33	30	91	1	3	1	3	1	3
Prince Charles	15	12	80	1	7	1	7	1	7
University Hospital of Wales	51	43	84	0	0	6	12	2	4
South East Wales									
Nevill Hall	23	23	100	0	0	0	0	0	0
Royal Gwent	66	63	95	0	0	3	5	0	0
North Wales									
Ysbyty Gwynedd	10	6	60	0	0	1	10	3	30
Ysbyty Glan Clwyd	40	38	95	2	5	0	0	0	0
Wrexham Maelor	36	28	78	0	0	2	6	6	17
Total									
	385	346	89.9	5	1.3	18	4.7	16	4.2

Table 40 and Fig 28 describe the retinopathy screening for eligible babies in Wales. The number of babies who should have had their first screen (based on NNAP criteria) in that unit is shown. For these babies the numbers (%) who had first ROP screen on time/in window/early/late are shown (based on NNAP criteria). In most cases 'on time' means screened appropriately while an inpatient or discharged home before screening period starts but screened prior to discharge. These figures show that 89.9% (87.3% in 2016, 86.4% in 2015, 85.3% in 2014 and 72% in 2013) of eligible babies had the ROP screen on time, though there were some regional variations. Though these figures have shown an improvement over the years, it is still short of the UK average of 94%. Worryingly, 4.2% babies did not have ROP screening at all. These figures are particularly high for Ysbyty Gwynedd and Wrexham Maelor.

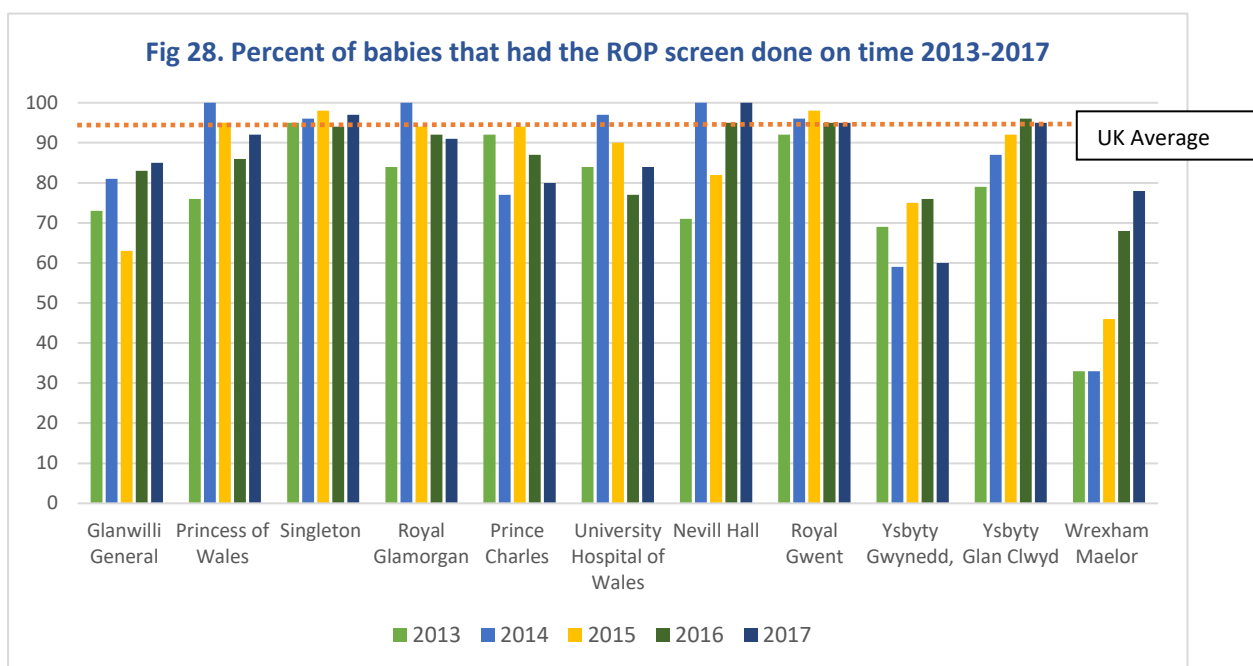
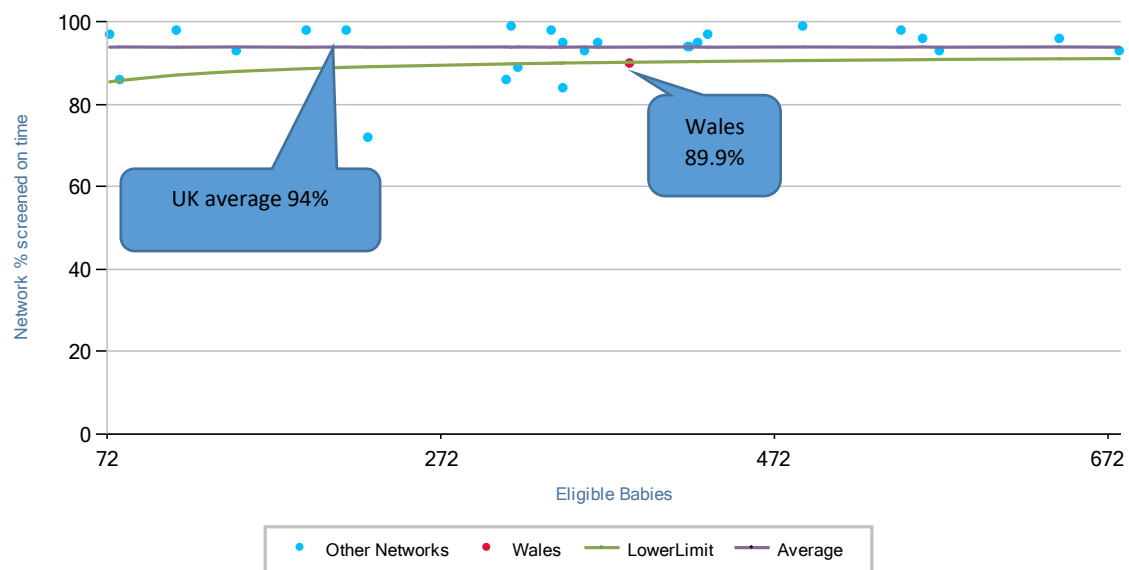


Table 40A. ROP on time in neonatal units in Wales 2013-2017						
	2013	2014	2015	2016	2017	Sparklines
Glanwilli General	73	81	63	83	85	
Princess of Wales	76	100	95	86	92	
Singleton	95	96	98	94	97	
Royal Glamorgan	84	100	94	92	91	
Prince Charles	92	77	94	87	80	
University Hospital of Wales	84	97	90	77	84	
Nevill Hall	71	100	82	95	100	
Royal Gwent	92	96	98	95	95	
Ysbyty Gwynedd,	69	59	75	76	60	
Ysbyty Glan Clwyd	79	87	92	96	95	
Wrexham Maelor	33	33	46	68	78	

Table 40A shows the “ROP on time” rates in the various units in Wales over the last 5 years along with “sparklines”. This shows that the performance of Ysbyty Gwynedd and Wrexham Maelor remain below par.

Fig 29. Benchmarking for ROP done on time – Wales v/s the other networks of the UK 2017



Compared to the UK average (94%), the performance of Wales (89.9%) in respect to ROP screening falls below the expected standard and all units must take particular care to improve on this.

Table 41. Proportion of eligible babies* (<33 weeks) receiving any breast milk at discharge

Unit	Included babies	Number Receiving breast milk	% receiving breast milk at discharge
South West Wales			
Glangwili General	5	4	80
Princess of Wales	11	6	54.5
Singleton	44	34	77.3
South Central Wales			
Royal Glamorgan	22	12	54.5
Prince Charles	4	0	0
University Hospital of Wales	50	28	56
South East Wales			
Nevill Hall	9	4	44.4
Royal Gwent	44	17	38.6
North Wales			
Ysbyty Gwynedd	5	2	40
Ysbyty Glan Clwyd	28	11	39.3
Wrexham Maelor	29	14	48.3
Total	251	132	52.6

*First episodes only

Table 41 and Fig 29 show the numbers of eligible babies (<33 weeks' gestation) who received any breast milk on discharge. In 2017, 52.6% of eligible babies had any breast milk on discharge. There has been a year on year improvement in this figure in Wales: the percentage in 2016 was 50%, 2015 was 45.7%, 41.5% in 2014 and 37.3% in 2013. Overall it shows that there are significant regional variations. It is clear that there is considerable scope for improvement across Wales and the Network is looking at ways to share practice and improve rates overall.

Fig 30. Percentage of eligible babies receiving any breast milk on discharge 2013-2017

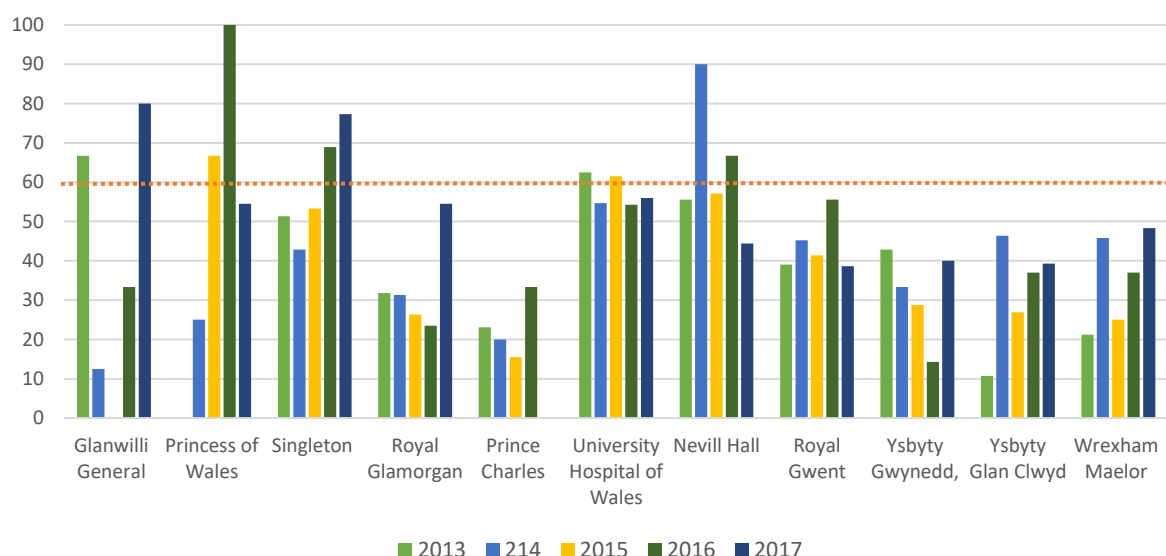


Table 42A. Breast Milk on discharge to eligible babies in Wales 2013-2017

	2013	214	2015	2016	2017	
Glanwilli General	66.7	12.5	0	33.3	80	
Princess of Wales	0	25	66.7	100	54.5	
Singleton	51.3	42.9	53.3	68.9	77.3	
Royal Glamorgan	31.8	31.3	26.3	23.5	54.5	
Prince Charles	23.1	20	15.5	33.3	0	
University Hospital of Wales	62.5	54.7	61.5	54.3	56	
Nevill Hall	55.6	90	57.1	66.7	44.4	
Royal Gwent	39	45.2	41.4	55.6	38.6	
Ysbyty Gwynedd,	42.9	33.3	28.8	14.3	40	
Ysbyty Glan Clwyd	10.7	46.4	26.9	37	39.3	
Wrexham Maelor	21.2	45.8	25	37	48.3	

Table 42A shows the performance of the individual units in Wales in terms of breast milk on discharge over the last 5 years. Royal Glamorgan, Singleton, Glangwilli and Wrexham have improved whereas Prince Charles, Nevill Hall and Royal Gwent have dropped from the year before.

Fig 31. Benchmarking breast feeding on discharge Wales 2016 v/s the other networks 2017

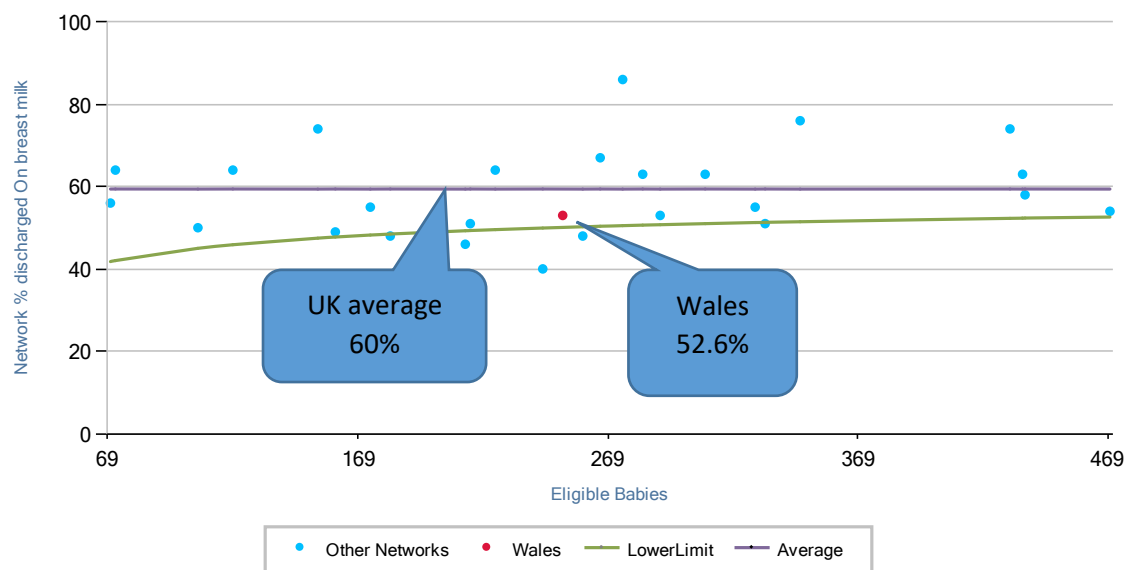


Fig 31 benchmarks the performance of Wales in terms of breastfeeding at discharge to the other networks of the UK. It is seen, that the breastfeeding rates in Wales are 53%, lower than the average for the UK (60%) but above the "lower limit" line. This is one area that there needs to be a concerted effort to improve these rates in the coming years.

Table 42. Percentage of parents seen by senior clinical staff within 24 hours 2017

	Total	Seen within 24 hours		Not seen within 24 hours		Not seen		Unknown	
		No.	%	No.	%	No.	%	No.	%
South West Wales									
Glangwili General	175	161	92.0	10	5.7	4	2.3	0	0.0
Princess of Wales	154	122	79.2	18	11.7	4	2.6	10	6.5
Singleton	362	355	98.1	1	0.3	6	1.7	0	0.0
South Central Wales									
Royal Glamorgan	194	193	99.5	0	0.0	1	0.5	0	0.0
Prince Charles	208	148	71.2	25	12.0	13	6.3	22	10.6
University Hospital of Wales	379	379	100.0	0	0.0	0	0.0	0	0.0
South East Wales									
Nevill Hall	128	76	59.4	28	21.9	5	3.9	19	14.8
Royal Gwent	358	353	98.6	2	0.6	3	0.8	0	0.0
North Wales									
Ysbyty Gwynedd	148	123	83.1	12	8.1	8	5.4	5	3.4
Ysbyty Glan Clwyd	181	169	93.4	3	1.7	6	3.3	3	1.7
Wrexham Maelor	150	113	75.3	12	8.0	4	2.7	21	14.0
Total	2437	2192	89.9	111	4.6	54	2.2	80	3.3

Table 42 and Fig 32 show the percentages of parents seen by senior clinical staff within 24 hours of the first admission. Overall 89.9% (81.2% in 2016, 79.6% in 2015, 80.7% in 2014 and 64.3% in 2013) of parents were spoken to on time; 2.2% were not spoken to at all. Nevill Hall, Prince Charles and Wrexham Maelor were the worst performers.

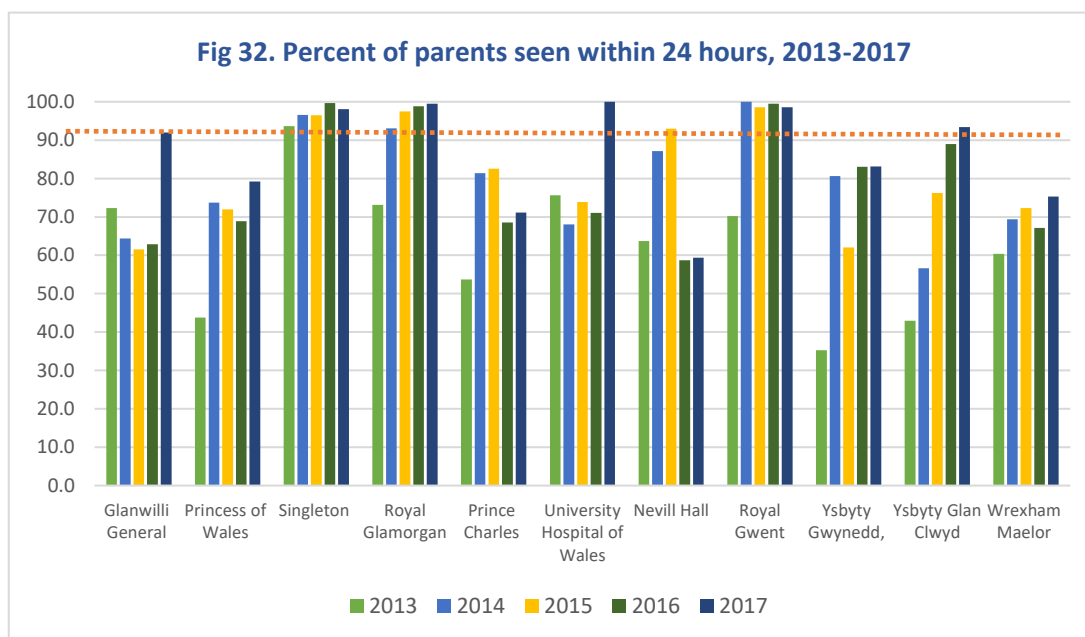
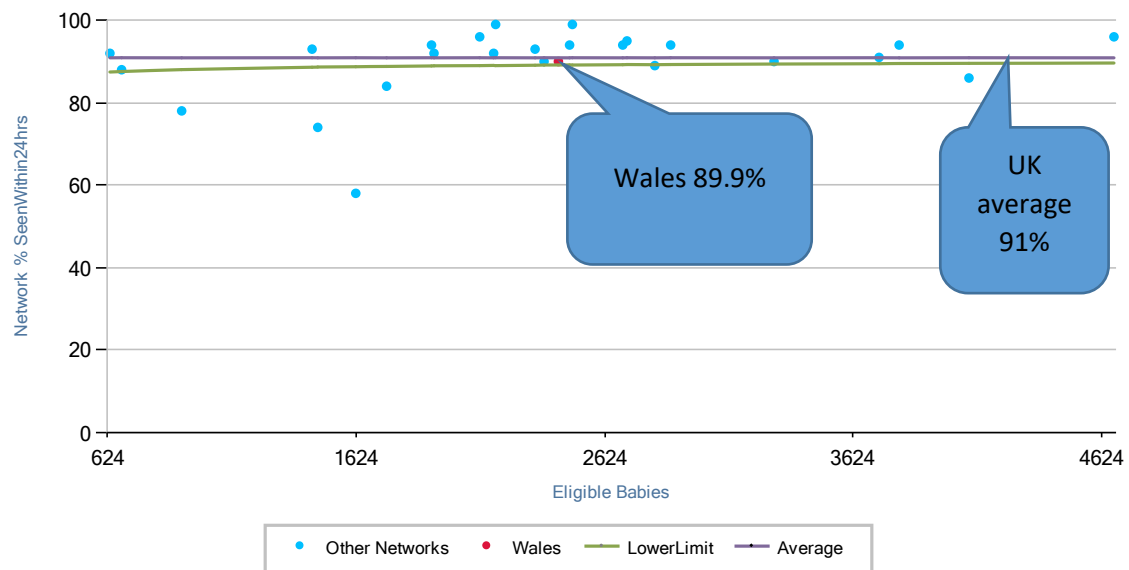


Fig 33. Benchmarking for parents spoken to within 24 hours – Wales v/s other networks 2017



Benchmarking against other networks in the UK shows that Wales at 90% is just below the national average of 91%.

Table 43. 2 year follow-up of babies <30 weeks and outcome of babies born between July 2014-June 2015

	Eligible babies	No data complete	FU not-performed	FU performed	FU performed before 18	FU performed after 30 months corrected	Indeterminable	Missing	None	Mild/Mod	Severe
South West Wales											
Glangwili General	20	12	1	7	0	0	0	3	2	1	1
Princess of Wales	8	6	0	2	0	0	0	1	0	0	1
Singleton	21	2	1	18	0	0	2	3	5	5	3
South Central Wales											
Royal Glamorgan	12	0	1	11	1	0	0	0	5	3	3
Prince Charles	8	3	1	4	0	1	0	0	1	3	0
University Hospital of Wales	22	0	11	11	0	0	0	5	4	0	2
South East Wales											
Nevill Hall	8	1	3	4	0	0	0	0	2	2	0
Royal Gwent	16	0	0	16	1	0	0	0	8	4	4
North Wales											
Ysbyty Gwynedd	14	4	0	10	0	0	0	2	5	0	3
Ysbyty Glan Clwyd	10	4	0	6	0	0	1	1	1	1	2
Wrexham Maelor	13	5	0	8	1	0	1	1	3	0	3
Total	152	37	18	97	3	1	4	16	36	19	22

Fig 34 Benchmarking for 2 year follow up of babies born in 2015 (Wales v/s UK)

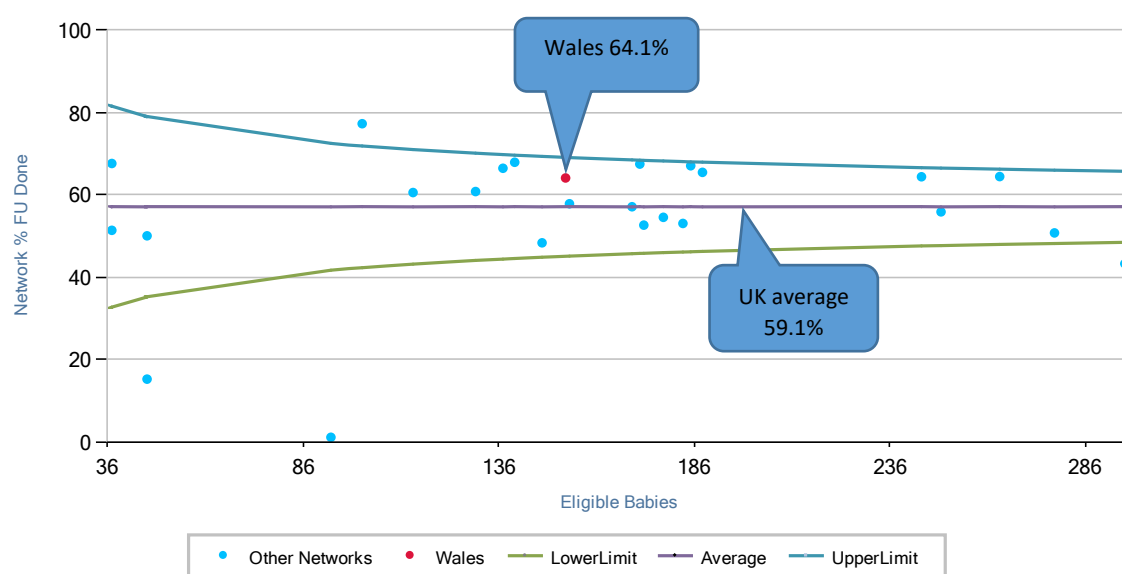


Table 43 and Fig 34 show the proportion of eligible babies that had a recommended 2 year assessment. There has been a significant improvement this year; the figure for Wales in 2017 was 64.1% against a figure of 40% in 2016. The National average of around 59.1%.

**Table 44 Numbers and percentages of babies
= / > 35 weeks that have encephalopathy in the**

	Babies =>35wks	Babies with encephalopathy within first 3 days	%
South West Wales			
Glangwili General	167	6	3.6
Princess of Wales	117	4	3.4
Singleton	258	24	9.3
South Central Wales			
Royal Glamorgan	137	1	0.7
Prince Charles	193	3	1.6
University Hospital of Wales	326	14	4.3
South East Wales			
Nevill Hall	115	1	0.9
Royal Gwent	256	12	4.7
North Wales			
Ysbyty Gwynedd	151	1	0.7
Ysbyty Glan Clwyd	115	3	2.6
Wrexham Maelor	92	1	1.1
Total	1927	70	3.6

There is no defined standard for this measure but of all babies over 34 weeks' gestation, 3.6% had a diagnosis of "encephalopathy" within the first 3 days of life.

Table 45 Catheter related sepsis by old and new definitions in

	Old definition*			New definition**		
	Positive Culture With Line In Situ	Line Days (all)	Infection Per1000 Line Days	Positive Culture With Line In Situ	Line Days (all)	Infection Per1000 Line Days
West Wales						
Glangwili General	0	9	0	0	9	0
Princess of Wales	0	86	0	0	86	0
Singleton	8	714	11.2	8	714	11.2
South Central Wales						
Royal Glamorgan	0	175	0	0	175	0
Prince Charles	0	83	0	0	83	0
University Hospital of Wales	7	1875	1.1	32	1875	17.1
South East Wales						
Nevill Hall	0	44	0	0	44	0
Royal Gwent	3	1248	2.4	7	1248	5.6
North Wales						
Ysbyty Gwynedd	0	30	0	0	30	0
Ysbyty Glan Clwyd	1	395	2.5	0	395	0
Wrexham Maelor	0	247	0	0	247	0
Total	19	4906	3.9	47	4902	9.5

*The growth of a recognised pathogen in pure culture, or in the case of a mixed growth, or growth of skin commensal, the added requirement for 3 or more of 10 predefined clinical signs

**Numerator: Number of babies any positive blood culture taken >72/24

Denominator: Number of central line days (PICC, UVC, UAC, Surgical line)

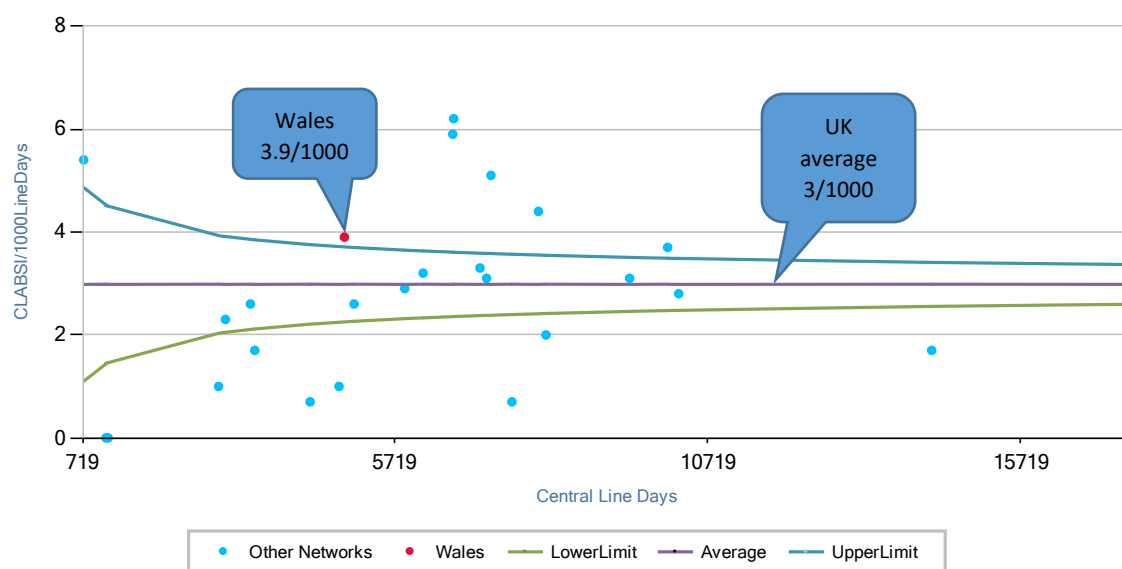
Unit of analysis – NNU

Unit of attribution

Culture to unit where culture taken

Line days to unit where line day care received

Fig 35 Central line associated blood stream infections (CLABSI) in Wales per 1000 line days 2017 (Old definition)



Catheter related sepsis is a new NNAP criterion and there is an old and a new definition for this. According to the old definition, Wales overall had a higher 3.9/1000 line days, against a National average of 3/1000. There is probably significant under reporting across the units in the UK.

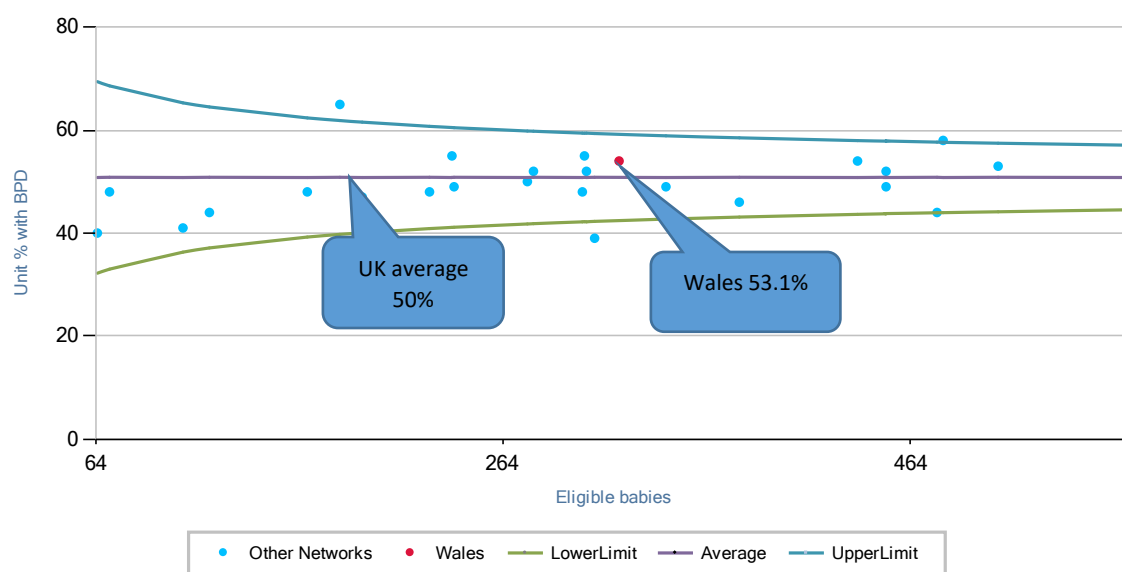
Table 46. Neonatal National Report - BPD Summary
(based on place of birth for babies discharged in 2017)

	Eligible Babies	No BPD	Mild BPD*	Significant BPD†	% with significant BPD
South West Wales					
Glangwili General	13	6	3	4	30.8
Princess of Wales	8	2	2	4	50.0
Singleton	71	26	19	24	33.8
South Central Wales					
Royal Glamorgan	26	14	6	6	23.1
Prince Charles	5	0	0	5	100.0
University Hospital of Wales	50	25	12	12	24.0
South East Wales					
Nevill Hall	12	10	1	1	8.3
Royal Gwent	60	29	13	17	28.3
North Wales					
Ysbyty Gwynedd	9	4	0	5	55.6
Ysbyty Glan Clwyd	41	18	8	15	36.6
Wrexham Maelor	25	12	2	11	44.0
Total	320	146	66	104	32.5

* Mild: respiratory support (Ventilation ,CPAP, BiPAP, HHFNC and or any oxygen) on day 28 + air at 36 weeks corrected gestation or from the time of discharge if discharged earlier

†Significant: respiratory support on day 28 + respiratory support at 36 weeks corrected gestation or from the time of discharge if discharged earlier

Fig 36. Percentage of any BPD in Wales compared to other networks 2017

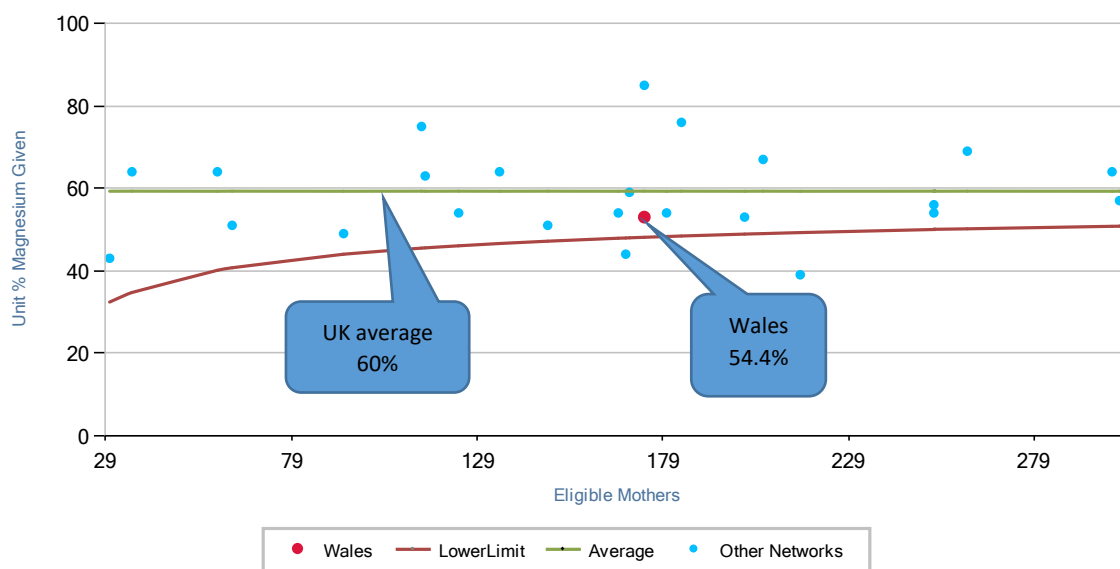


Rates of BPD as defined by the NNAP are shown in Table 44 and Fig 35. Overall, 32.5% of eligible babies had “significant BPD”. The NNAP measures “any BPD” and on these criteria, Wales was 53.1% compared to a National average of 50%.

Table 47. Percent of eligible mothers given Magnesium sulphate during labour

	Eligible mothers	Magnesium sulphate given	% Given
South West Wales			
Glangwili General	5	2	40
Princess of Wales	1	0	0
Singleton	45	27	60
South Central Wales			
Royal Glamorgan	11	1	9.1
Prince Charles	2	0	0
University Hospital of Wales	30	14	46.7
South East Wales			
Nevill Hall	6	2	33.3
Royal Gwent	31	24	77.4
North Wales			
Ysbyty Gwynedd	5	3	60
Ysbyty Glan Clwyd	21	15	71.4
Wrexham Maelor	12	4	33.3
Total	169	92	54.4

Fig 37. Benchmarking of magnesium sulphate given to eligible babies; Wales vs UK 2017



It is recommended that all mothers of babies < 30 weeks gestation receive Magnesium sulphate 24 hours prior to delivery to prevent cerebral palsy in their babies. Table 47 and Fig 37 show the performance of Welsh neonatal units in this regard. It is seen that 54.4% of eligible Welsh mothers had the recommended Magnesium sulphate, which is up from 34.3% in 2016. This figure is lower than the National average which is 59%.

Table 48. Percentage of babies fulfilling criteria for a diagnosis of NEC

(Babies discharged in 2017; attributed to place of care in the first 48 hours of life)

	Number of eligible babies	Total number of babies meeting	% meeting NEC case definition
South West Wales			
Glangwili General	1	0	0.0
Princess of Wales	2	0	0.0
Singleton	36	0	0.0
South Central Wales			
Royal Glamorgan	4	0	0.0
Prince Charles	0	0	0.0
University Hospital of Wales	43	7	16.3
South East Wales			
Nevill Hall	0	0	0.0
Royal Gwent	34	0	0.0
North Wales			
Ysbyty Gwynedd	3	0	0.0
Ysbyty Glan Clwyd	26	1	3.8
Wrexham Maelor	17	0	0.0
Total	166	8	4.8

The above numbers are almost certainly an under representation as it is a new NNAP criteria and units have probably not filled this data in correctly.

Table 49. Minimising inappropriate separation from mother in moderately preterm and term babies 2017

	34-36 weeks				>=37 weeks			
	Number of eligible admissions	Total days of care	Days of HRG 3/ 5 care without oxygen	Rate of HRG 3/ 5 days without oxygen per admission	Number of eligible admissions	Total days of care	Days of HRG 3/ 5 care without oxygen	Rate of HRG 3/ 5 days without oxygen per admission
South West Wales								
Glangwili General	60	633	445	7.42	94	589	377	4.01
Princess of Wales	41	424	297	7.24	69	315	205	2.97
Singleton	57	432	278	4.88	181	962	476	2.63
South Central Wales								
Royal Glamorgan	51	329	237	4.65	81	318	202	2.49
Prince Charles	65	515	407	6.26	130	652	482	3.71
University Hospital of Wales	58	838	478	8.24	196	1171	571	2.91
South East Wales								
Nevill Hall	36	309	220	6.11	68	348	180	2.65
Royal Gwent	81	712	478	5.9	157	913	463	2.95
North Wales								
Ysbyty Gwynedd	56	398	195	3.48	81	361	164	2.02
Ysbyty Glan Clwyd	39	307	186	4.77	75	412	277	3.69
Wrexham Maelor	45	436	330	7.33	44	245	156	3.55
Total	589	5333	3551	6.0	1176	6286	3553	3.0

Table 50. Number of live born <27 weeks gestation delivered in non-NICU units

	Number of deliveries	Delivered in appropriately designated location (NICU)	Delivered in inappropriately designated location (LNU/SCU)	Delivered in location without neonatal facilities
South West Wales				
Glangwili General	4	0	3	1
Princess of Wales	0	0	0	0
Singleton	19	19	0	0
South Central Wales				
Royal Glamorgan	3	0	3	0
Prince Charles	2	0	2	0
University Hospital of Wales	12	12	0	0
South East Wales				
Nevill Hall	1	0	1	0
Royal Gwent	15	15	0	0
North Wales				
Ysbyty Gwynedd	3	0	3	0
Ysbyty Glan Clwyd	1	1	0	0
Wrexham Maelor	4	4	0	0
Total	64	51	12	1

Table 50 shows that 20.3% of babies less than 27 weeks gestation were born in units without a NICU. Most of these were probably unavoidable, but perhaps, lack of capacity in NICUs could have been the cause of some inappropriate deliveries.

APPENDIX

GLOSSARY OF TERMS

Intensive care 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 (1:1 nurses to cot staffing ratio). This includes any day where a baby receives any form of mechanical respiratory support via a tracheal tube, both non-invasive ventilation (e.g. nasal Continuous Positive Airway Pressure (CPAP), SIPAP, Bi-level Positive Airway Pressure (BiPAP), Vapotherm®) and Parenteral Nutrition (PN), day of surgery (including laser therapy for retinopathy of prematurity (ROP) and on day of death or any conditions listed as per BAPM categories of care.

High dependency care is provided for babies who require skilled staff but where the ratio of nurse to patient is less than intensive care (1:2 nursing to cot staff ratio). This care takes place in a neonatal unit where a baby does not fulfil the criteria for intensive care but receives any form of non-invasive respiratory support (e.g. nasal, CPAP, SIPAP (Infant Flow System® with multiple modalities), BiPAP, Humidified High Flow Nasal Cannula (HHFNC), central venous line feeding or continuous treatment of their condition as per BAPM categories of care.

Special care (low dependency) is provided for babies who require additional care delivered by the neonatal service but do not require either intensive or high dependency care. It includes babies receiving oxygen via nasal cannula, feeding by nasogastric, jejunal tube, or gastrostomy, continuous physiological monitoring, care of stoma, presence of an intra-venous (IV) cannula, receiving phototherapy or special observation or physiological variables at least 4 hourly.

Normal care (low dependency) is provided to babies who are on bottle/breast feeds that do not require any oxygen, not in incubators for temperature regulation and not on any monitoring. These babies are in the unit either because of maternal medical/social concerns or very close to discharged.

Neonatal intensive care unit (NICU) these are larger Intensive Care units that provide the whole range of medical (and sometimes surgical) neonatal care for their local population, along with additional care for babies and their families referred from the Neonatal Network in which they are based. Within a Network at least one hospital will have a Neonatal Intensive Care Unit, offering a specialist centre of expertise and experience for the sickest infants. NICUs will work closely with the other Network LNUs and SCUs. Many will be sited alongside specialist obstetric and foetal maternal medicine services and will require close working arrangements with all of the relevant paediatric sub-specialities.

Local neonatal unit (LNU) provide special care and high dependency care and a restricted volume of intensive care (as agreed locally) and would

expect to transfer babies who require complex or longer-term intensive care to a Neonatal Intensive Care unit.

Special care unit (SCU) provide special care for the local population. Depending on arrangements within the Neonatal network, they may provide some high dependency services.

Birth weight

Low birth weight	less than 2500g birth weight
Very low birth weight	less than 1500g birth weight
Extremely low birth weight	less than 1000g birth weight

Gestation (WHO definitions) Preterm is defined as babies born alive before 37 weeks of pregnancy are completed. There are sub-categories of preterm birth, based on gestational age:

extremely preterm	<28 weeks
very preterm	28 to <32 weeks
moderate to late preterm	32 to <37 weeks

Occupancy is calculated as the number of cots days provided per annum divided by the number of funded cots divided by 365.

Stabilisation cot is essentially an additional intensive care cot which should be ideally kept unoccupied, fully equipped and staffed in readiness for an unexpected delivery. This should comply with the All Wales Neonatal Standards 2nd edition and the BAPM Service Standards for Hospitals Providing Neonatal Care 3rd edition 2010.

CPAP is Continuous Positive Airways Pressure, one mode of non invasive ventilation.

HFOV is High Frequency Oscillatory Ventilation- a mode of ventilation which is often used as 'rescue therapy'

High flow is another type of non-invasive ventilation

Conventional ventilation is a variety of different forms of ventilation including SIPPV (synchronised intermittent positive pressure ventilation, SIMV (synchronised intermittent) mandatory ventilation, VG (volume guarantee).