

**WELSH PAEDIATRIC
CRITICAL CARE
SERVICE**

**ANNUAL REPORT
2008**

SUMMARY

- 309 children were admitted to the unit during the year 2008, 84.7% of whom were ventilated.
- In the year 2008, the retrieval team agreed to 120 requests for retrieval.
- 5 retrievals were refused due to the lack of an available staffed bed during the winter period of peak demand.
- 12 patients had their surgery postponed due to lack of a PICU bed.
- The development of the Paediatric Critical Care Network has continued with multidisciplinary audit and feedback sessions held in all Trusts.
- The partnership between the Lead Centre PICU and the Welsh Burns Centre in Morriston Hospital continues.
- The UK Paediatric Intensive Care Audit Network Database (PICANet) has published its 6th report (www.picanet.org.uk).
- The Cardiff PIC team hosted the 2008 Paediatric Intensive Care Society Meeting.

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CHAPTER 1

THE LEAD CENTRE PAEDIATRIC INTENSIVE CARE TEAM

Dr Helen Fardy	Lead Clinician	Paediatric Critical Care Service
Mrs Paula Davies	Lead Nurse	Paediatric Critical Care Service
Dr Rim Al-Samsam	Consultant in Paediatric Intensive Care	- responsible for Audit and Research
Dr Malcolm Gajraj	Consultant in Paediatric Intensive Care	- responsible for Education and Training
Dr Damian Pryor	Consultant in Paediatric Intensive Care	- responsible for Clinical Risk
Dr Mark Price	Consultant in Paediatric Intensive Care/Anaesthesia	- responsible for Anaesthetic Training
Dr Allan Wardhaugh	Consultant in Paediatric Intensive Care	- responsible for Unit and Retrieval Audit
Dr Michelle Jardine	Consultant in Paediatric Intensive Care	
Dr Fieke Slee-Wijffels	Consultant in Paediatric Intensive Care	
Ms Alison Oliver	Regional Training & Development Co-Ordinator for Paediatric Critical Care Services in Wales	
Mrs Catherine Wood	Directorate Manager	Critical Care Services
Miss Kath Ronchetti	Senior Physiotherapist	
Mrs Julie Armstrong	Practice Educator	
Mrs Kath Singleton	Dietician	
Zoë Taylor	Pharmacist	
Mrs Pat Davies	Personal Assistant to Lead Clinician	
Sue Tullett	Secretary/Audit Clerk	

CONTACT NUMBERS:

Dedicated Retrieval Line	Tel:	029 20745413
Consultant via long range bleep	Tel:	029 20747747 (via switchboard)
Pat Davies PA to Dr Helen Fardy	Tel:	029 20746423
Email:		Pat.Davies@Cardiffandvale.wales.nhs.uk

CHAPTER 2

THE SERVICE

Our service has been developed based on multidisciplinary teamwork both within the Lead Centre and with our Paediatric, Anaesthetic and Emergency Medicine colleagues in the District General Hospitals throughout Wales.

Consultant Staff

The Paediatric Intensive Care Unit and Retrieval Service is covered by a team of 7 consultants. In combination, with designated general paediatricians, the team also contributes to the cover of the Paediatric High Dependency Unit.

Specialist Registrars

The Paediatric Intensive Care Unit has a dedicated rota of resident specialist registrars – four from the Welsh Paediatric Rotation and one from the Welsh Anaesthetic Rotation. This provides an important part of the training of paediatricians and anaesthetists of the future.

Training is provided in the recognition and care of the critically ill child, as well as safe transport of the critically ill child (the principles of which are transferable to adult and neonatal practice).

A key component of a centralised service is the requirement for resuscitation and stabilisation locally, prior to retrieval by PICU. It is therefore essential that junior staff, the consultants of the future, learn about critically ill children during their time in PICU. Much of this knowledge will be gained from direct experience managing patients, but given the limited time, shift working and variable patient numbers, this experience must be backed up by a rigorous educational programme.

Our junior staff are provided with guidelines and a self-directed programme, still in development, but which has been well received by the specialist registrars. This encourages independent study and strengthens understanding. Teaching ward rounds and a formal grand round once a week provide practical and specific knowledge, backed up by weekly tutorials on a wide curriculum pertinent to PICU.

We have recently moved to a more formal appraisal process for our registrars which take into account opinions of all of the consultants and senior nurses. This will enable us to quickly identify registrars who are having problems and therefore target their needs. This will also form the basis of any references or RITA paperwork that will need to be completed.

Advanced airway skills are essential to medical staff working in intensive care. Without a patent and secure airway, all other medical interventions become irrelevant.

At the start of their attachment trainees attend a lecture and practical tutorial utilizing training mannequins. This helps emphasize the difference in anatomy, technique and equipment between infants, children and adults.

Paediatric trainees then spend time with a consultant anaesthetist, in the operating theatre. Here a range of airway management techniques, including endotracheal intubation, can be taught under close senior supervision and monitoring.

Theatre attachments used are those with exposure to multiple cases that require more involved airway management. A good example is day case Ear, Nose and Throat surgery. To maximize training both adult and paediatric lists, without any other trainees, are utilized.

The feedback from our trainees has been positive.

However, due to the changes in the anaesthetic training programme, it is becoming increasingly difficult to organise these attachments as it will interfere with the training of the anaesthetic trainees.

We would like to thank all the anaesthetic consultants involved for their time and interest.

Recruitment of specialist registrars from both paediatric and anaesthesia has proven difficult over the past year and we are working with the Regional Advisors and Medical Director to try and address this. As part of this process and with view to our rota being compliant with the EWTD, we have submitted a proposal to employ an Advanced Nurse Practitioner and 2 Clinical Lecturers in Anaesthesia and Paediatric Intensive Care Medicine.

INHOUSE TEACHING AND TRAINING INITIATIVES

Resus scenarios

We provide acute illness scenario teaching to the paediatric wards twice a month with the resuscitation officer. We base our scenarios on recent cases. This has been well received on the wards and members of staff often suggest topics for future scenarios. We have recently started using a Simbaby and giving no advance warning which makes the situation more true to life and gives us the opportunity to check the correct equipment and procedures are in place.

Senior Clinical Project

We maintain our commitment to teaching at all levels and this year supervised a final year medical student Nicola Ball through her in depth senior clinical project. She spent two months with us and produced a seven

thousand word project entitled "A retrospective review of admissions to Paediatric intensive care (PICU) with meningococcal septicaemia over a six month period in 2008 compared to the same period in 2004." This received an "A" grade and a copy is included in the appendix.

Nursing Staff

Lead Nurse for PICU – Paula Davies

We have continued to work towards an integrated nursing team which will provide care for both Paediatric Intensive Care and Paediatric High Dependency patients, eventually based on a combined 15 bedded Paediatric Critical Care Unit which will be built in Phase 2 of the Children's Hospital for Wales. Nursing representatives from both units have been involved in the planning for the new unit, and it has been an exciting time for us, realising that the service will be relocated and based in a hospital focused on children in a few years time.

With regards to recruitment we are able to recruit junior nurses without difficulty but still have problems recruiting to senior nursing posts as a result of the specialist skills we require at this level. Therefore education is very much a priority in terms of developing the nursing workforce. We have appointed a Practice Educator, Julie Armstrong to work across PICU and PHDU this year. The Practice Educator works with both PICU and PHDU nurses, ensuring that we offer support and supervision in providing excellent quality nursing care and also to facilitate a joint critical care training strategy.

The Paediatric Intensive Care Course has been successfully provided in partnership with Birmingham City University for the second consecutive year. This has enabled 5 nurses to achieve a specialist award and for us to continue providing a service compliant with the Standards for Critically Ill Children in Wales. It has also helped us to develop close professional links with the PICU team in Birmingham.

The nursing team have experienced a busy year with patient activity. We have shared a busy winter with many colleagues at our regional hospitals. In addition the team have been working on evidence based nursing protocols and safer patient initiatives.

Finally we are developing a pathway for Advanced Nurse Practice in order to retain senior members of the nursing team who wish to remain in a clinical role. A proposal has been submitted to the Senior Management team and the outcome awaited.

All of these developments will contribute to enhancing the quality of our care and assist us in the delivery of a seamless transition through critical care.

Pharmacy Report

Postholder – Ms Zoë Taylor

Clinical pharmacy role on PICU

A specialist clinical pharmacist visits PICU every day Monday to Friday. Their role is to promote the safe and effective use of medicines. All medications for every child are reviewed daily to check that they are appropriate for the age, weight and clinical condition of the child. The pre admission drug history will be checked with the parent/carer, GP or referring hospital.

Throughout the child's stay on PICU the pharmacist will advise on:

- Therapeutic drug monitoring,
- Drug dose adjustments in renal and hepatic failure
- Drug interactions
- Suspected adverse reactions to drugs
- Formulations of medicines
- IV compatibility issues
- Advise on parenteral nutrition

The pharmacist will also provide advice in the preparation of guidelines and protocols, help with drug related audits, review any medication incidents, promote safe prescribing and help with education and training.

To ensure as seamless care as possible, the pharmacist will contact the paediatric pharmacist from the ward or referring hospital that the child returns to once they leave PICU to hand over any pharmaceutical issues and answer any questions.

The pharmacist's role is to work as part of the multidisciplinary PICU team to ensure the best care possible for our patients.

The Physiotherapy Service

Postholders –

Miss Kath Ronchetti (Band 7 Paediatric Respiratory/PICU)

Kate Laats (Band 7 Paediatric Trauma and Orthopaedics/PICU)

The physiotherapy service to the paediatric intensive care unit at UHW, is led and delivered by advanced paediatric physiotherapy practitioners Katherine Ronchetti and Kate Laats (nee Williams), with support from other specialist physiotherapists when indicated.

Services are provided Mon to Fri 8 am to 4.30pm, with on call, evening and weekend respiratory only services delivered by emergency duty staff.

The induction programme for emergency duty staff has been modified and is now more comprehensive, in order to provide better clinical experience, teaching opportunities and specific learning outcomes. This was implemented to increase emergency duty's staff confidence and competence and to therefore improve the standard of care to PICU patients.

The service is currently undertaking an audit to review paediatric emergency duty provision.

Training has continued to the rotational registrars re: role of physiotherapy and non bronchoscopic broncho-alveolar lavages (NBBAL). The teaching of the NBBAL procedure has also continued to the senior staff nurses. This however has also become more comprehensive and structured ensuring adequate competencies when performing this procedure. This training is underpinned by appropriate documentation which has been developed for CPD and KSF programmes. A poster is also currently being produced looking at the research related to NBBAL and to outline the procedure for the unit. Teaching also includes the physiotherapy management of the unstable spine, collars and the positioning /handling of the acute neuro patient.

Cough assist machines have also been introduced onto the unit as an effective adjunct to the physiotherapy management of patients. Training for the use of this machine has been introduced in the staff inductions to the unit.

We have also been working very closely with Julie Armstrong (clinical practice educator) in improving the teaching to nursing staff on the unit especially with new starters. There is now a structured induction programme which we are involved in where physiotherapy related assessments and treatments are discussed. From this the issue of bagging techniques on the unit has been raised and there are now manometers placed at every bed side in order to increase the safety and efficacy of this technique during physiotherapy.

A practical session has also been developed to teach management of the unstable spine. As physiotherapists we are continuing to implement the use of the unstable spinal checklist with relevant patients. We are liaising closely with the spinal link nurses on PICU and HDU to develop a checklist for the nursing staff to use. Nurses on PICU and PHDU have also been booked onto the spinal study days over the summer which will enable link nurses to cascade spinal care more efficiency through the unit.

Dietitian's Report

Postholder – Mrs Kath Singleton

Nutrition and dietetic advice is provided 5 days a week with every child on the PICU and PHDU receiving a review. There is an on-call service available on Bank Holidays and weekends. An analytical software programme has been in operation for several years which has benefited the unit by streamlining the provision of enteral feeds, allowing a profile of macro and micro nutrients of all enteral feeds to be given on request. This ensures that the child's nutritional requirements are being met within the limitations of a PICU setting. On PHDU encouragement is given to work towards and achieve the child's usual feeding regimen or move onto a normal oral intake. The rolling educational programme continues which highlights the importance of nutrition. The dietitian continues to liaise with colleagues both within and outside the Trust to guarantee a seamless service.

Family Bereavement Support

Laura Thomas, Sister - PICU

Family support continues to be a priority within PICU. We work closely with the nurse counsellors and Trust Bereavement Officer to help our families through some very difficult times.

The annual memorial service continues to go from strength to strength. This year we decided to focus more heavily on the bereaved siblings with renditions of Jingle Bells and plenty of chocolate.

We have also purchased a book of remembrance and glass cabinet with money which was kindly donated to us. This will enable families to make an entry along with a photograph which they can come and see in the chapel whenever they wish.

CHAPTER 3

THE REGIONAL PAEDIATRIC CRITICAL CARE SERVICE

Regional Education and Training Report 2008 - Alison Oliver
Regional Training and Development Nurse for PIC Services in Wales

Ongoing changes in Health Service Provision in Wales continue. Reconfiguration of services brings both challenges and optimism for future developments. It also creates challenges for the maintenance of competence for staff groups who may well have reduced exposure to critically ill children. Therefore training for the future will need to be fit for purpose and regional visits and training days are still available for secondment if individuals wish to maintain competence in caring for critically ill children. Some staff did attend these in 2008. For groups in trusts who wish to practice scenarios, the development of simulation days have replaced the previously provided stabilisation days. This helps the team approach to the critically ill child function so that when such events occur, team members are prepared for their role.

Visits continued across Wales providing training and education concentrating on pre retrieval care training this year using more scenario based training. Abertawe Bro Morgannwg provided two full study days for their own staff, provided by their own staff with contributions from the lead centre. One was provided on the Morriston site and one on the Princess of Wales site. These were well attended and are good progress in hospitals meeting the recommendations of the Tanner Report.

The APLS course has now been redeveloped and is available as one VLE day and two scenario filled days. The cost remains the same which makes it difficult for managers to prioritise with financial constraints and the introduction of additional mandatory training in blood administration training etc. For these reasons the regional team have devised a newly developed one day study day in simulation training scenarios delivered locally. This will not replace APLS but it is free of charge and will help trusts in achieving their aim of compliance with the recommendations of the Tanner Report. It will not help staff that are aiming to comply with the Standards for Care of the Critically Ill Child. EPALS is still available at Merthyr NHS trust and Carmarthen NHS Trust. Foundation in Caring for the acutely ill child course ran in Cardiff in 2008.

Feedback regarding retrieval and regional services at all trusts has been ongoing. The link consultants have changed hospitals this year as some have been links for some time. Teaching sessions by them can be arranged by contacting the service through the internet site or the unit administration service through 0292074 ext 6423. Local involvement in these feedback meetings is crucial in making them beneficial to all and this has been encouraged through a revision of the feedback plan this year.

The network group (previously the paediatric intensive care advisory group) for critically ill children continues to meet for South Wales to progress and

audit the work in care of the critically ill child. In 2008 a network study day took place to increase awareness across the network of the work of this group. This was well attended and created much discussion amongst professional groups involved in caring for the critically ill child. The care bundles for Head Injured and Septic children have been launched and are currently being audited. Early results appear to show that they are being complied with. They are available through the internet site. Further bundles will be launched soon. Ongoing work continues regarding plans for pandemic flu and reviewing the newly devised standards for the network groups as part of the CYPSS project.

Ongoing discussions regarding the care for critically ill children with Burns continue.

The following contact numbers may be of use to staff that need access to courses outlined in the Standards:

Course co-ordinator for Resuscitation Service – Aneurin Bevan LHB APLS/PLS	Joanne Powell Royal Gwent Hospital Newport Tel: 01633 234234
Course Co-ordinator for Resuscitation Service. Cardiff & Vale ULHB APLS/PLS	Jacqui Scott University Hospital of Wales Cardiff Tel: 029 20748297
Resuscitation Officer APLS/PALS	Cheryl Thomas Ysbyty Gwynedd Bangor Tel: 01248 384384
Resuscitation Officer- PALS	Harry Stephens Prince Charles Hospital Merthyr Tel: 01685 721721
Resuscitation Officer	David Edwards Wrexham Maelor Hospital Wrexham Tel: 01978 727409
Child Health Education	Jane Davies Eastgate House Newport Road Cardiff Tel: 029 20927732
Child Health Education	Jo John University of Swansea Sketty Road Swansea Tel: 01792 295789

REGIONAL NETWORK MEETINGS

The following table shows the details of all the Study Days, Multidisciplinary and Nursing Meetings held:

HOSPITAL	Multi-Disciplinary Visit	Full Study Days
Singleton Hospital	7 Feb 2008	5 Aug 2008 Provided by local staff
Morrison Hospital		5 Aug 2008 Provided by local staff
Royal Glamorgan Hospital	28 Feb 2008 28 Aug 2008	24 July 2008 31 July 2008
Princess of Wales Hospital	29 Sept 2008	25 June 2008 Provided by local staff
West Wales General Hospital	28 Nov 2008	
Withybush General Hospital		17 July 2008
Prince Phillip Hospital		
Neath/Port Talbot Hospital		
Prince Charles Hospital	16 Sept 2008	7 August 2008
Nevill Hall Hospital	2 May 2008	21 July 2008
Bronglais Hospital	28 Nov 2008	14 August 2008
Brecon Memorial Hospital		
Royal Gwent Hospital	9 July 2008	
Glan Clwyd Hospital	N/A	
Ysbyty Gwynedd Hospital	N/A	
Wrexham Maelor Hospital	N/A	
Alder Hey Hospital	N/A	

As can be seen from the table, multidisciplinary meetings have been held with all our referring hospitals. These have enabled clinicians to clarify issues in relation to the service and make suggestions on future developments as well as providing the opportunity to discuss referred/retrieved patients. These meetings will continue on a yearly/twice yearly basis depending on the number of referrals from each hospital.

Future Plans for the Network

Each PICU Consultant is linked to a group of hospitals. He/She is responsible for arranging the joint audit and feedback session at that hospital.

HOSPITAL	DGH LINK	PICU LINK FROM APRIL 07
Singleton Hospital	Ingo Scholler	Malcolm Gajraj
Morrison Hospital	Rachel Evans/ Wynne Rogers	Malcolm Gajraj
Royal Glamorgan Hospital	Lynne Millar-Jones	Allan Wardhaugh
Prince Charles Hospital	David Deekollu	Allan Wardhaugh
Princess of Wales Hospital	Nirupa d'Souza	Malcolm Gajraj
Bronglais Hospital	John Williams	Mark Price
West Wales Hospital	Vinay Saxena	Mark Price
Withybush Hospital	Gustav Vas Falcao	Mark Price
Prince Phillip Hospital	via West Wales	Mark Price
Neath/Port Talbot Hospital	via Singleton	Malcolm Gajraj
Nevill Hall Hospital	Marcus Pierrepoint	Michelle Jardine
Royal Gwent Hospital	Marion Schmidt	Michelle Jardine

Drs Rim Al-Samsam, Damian Pryor and Fieke Slee-Wijffels work with Alison Oliver running of the 'Stabilisation Study Day'. We have been fortunate as a service to receive significant amounts of money due to the generosity of the families and friends of our patients. We have therefore purchased a simulator which aids enormously with our training days and inhouse scenarios

Children & Young People's Specialised Services Project (CYPSS)

We, in line with paediatric colleagues across Wales await further developments with the CYPSS. Our aim is for the "informal" network we have set up over the past 6 years from the lead centre, to be developed into a formal Managed Clinical Network.

The existing All Wales Paediatric Critical Care Group has been revamped and now has North Wales and South Wales sub groups.

The South Wales Group met on the 13th March 2008, 2nd June 2008 and 25th September 2008.

The table below outlines representation of the group :

Helen Fardy	Lead Clinician	PICU
Paula Davies	Lead Nurse	PICU
Alison Oliver	Regional Training & Development Nurse	PICS in Wales
Marcus Pierrepoint	DGH Link Paediatrician	South East (nominated by WPS)
Eryl Owen	DGH Link Nurse	South East (nominated by Senior Nurse Forum)
Vishwa Narayan	DGH Link Paediatrician	South West (nominated by WPS)
Eirlys Thomas	DGH Link Nurse	South West (nominated by Senior Nurse Forum)
Lloyd Harding	Adult ITU Consultant	WICS Representative
Grant McFadyen	Consultant Paediatric Anaesthetist	PAGW Representative
Vicky Goodwin	Consultant A & E	Prince Charles Hospital
TBA	Ambulance Representative	Nomination awaited via HCW
TBA	Contact a Family parent representative	Nomination awaited via HCW
TBA	MCN Co-ordinator	HCW/WAG
Pat Davies	PA to Dr H Fardy	Admin Support

Network Study Day
Miskin Manor - 8th May 2008

The Lead Centre hosted a network study day at Miskin Manor in 2008. A wide variety of topics were covered with very positive feedback. The registration costs were kept to a minimum, thanks to the generosity of friends and families of our patients donating to our endowment fund.

PAEDIATRIC INTENSIVE CARE SOCIETY ANNUAL CONFERENCE 2008

The Cardiff PIC team hosted the 2008 Paediatric Intensive Care Society/Association of Paediatric Anaesthetists Meeting.

It was a 2 day meeting held in November 2008 at the Mercure Holland House Hotel attended by 300 delegates. The feedback on the multidisciplinary programme was excellent.

A Masterclass was held on the previous day at the All Nations Centre which also evaluated well.

CHAPTER 4

UTILISATION OF THE LEAD CENTRE PAEDIATRIC INTENSIVE CARE UNIT

PICU activity

PICANET have collated and published our admission and retrieval data, and this can be accessed at www.cardiffpicu.com.

What follows is an abridged account of the PICANET data for our unit, with some added information regarding historical trends.

Admissions

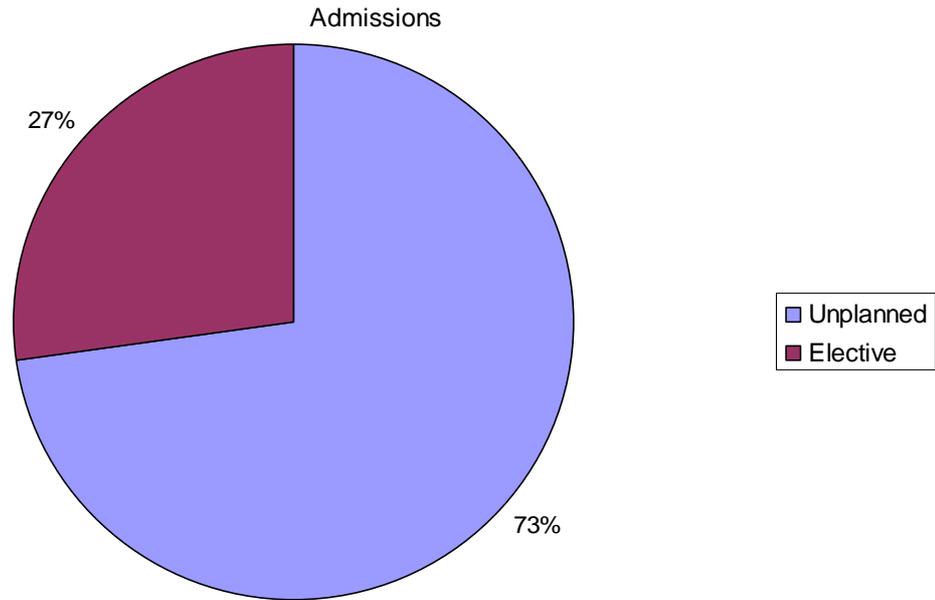
Total

There were a total of 309 admissions.

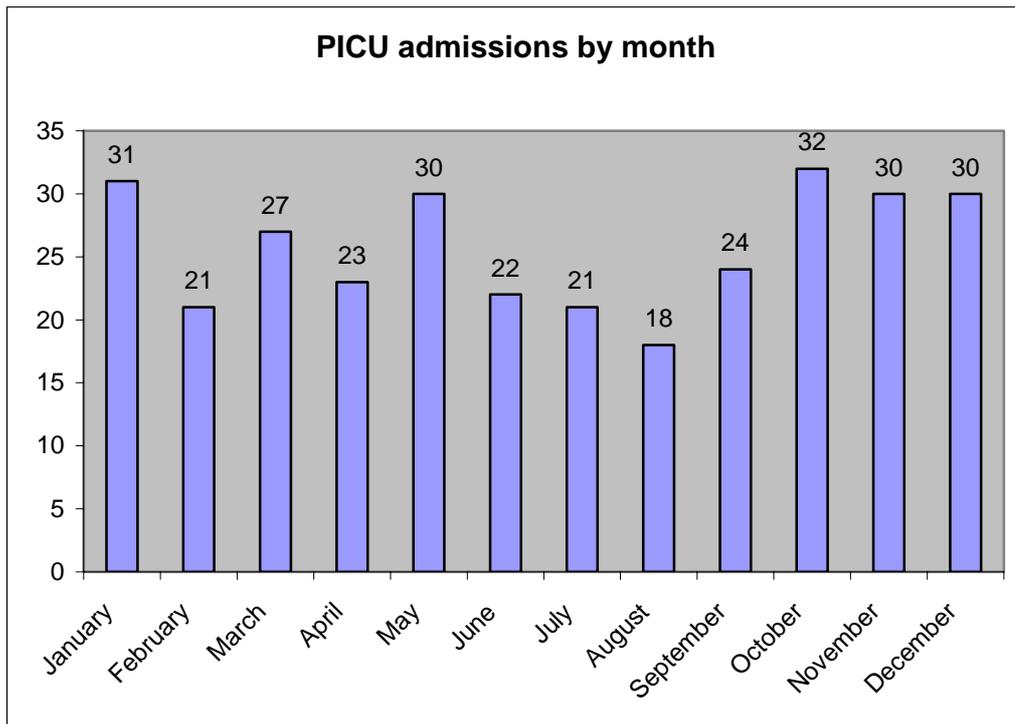
85% of all admissions received invasive ventilation during their stay. This is an interesting topic, commented upon in the PICANET report this year. There is a marked variation in the proportion of patients invasively ventilated across the PICUs participating in PICANET, with 8 trusts reporting less than 50% of admissions receiving invasive ventilation. These are mainly small units, or larger ones who are providing level 1 (or HDU) care on their PICU. University Hospital of Wales has a separate HDU, so we are able to keep our PICU beds specifically for those patients requiring level 2 or 3 critical care, and our rates are more in keeping with larger units and other trusts who have a separate HDU facility.

Unplanned vs Elective

Of our admissions, 84 were elective and 225 were unplanned, in keeping with our figures for previous years. This figure emphasizes the difficulty in planning staff levels to cope with variation in workload, as the high proportion of unplanned admissions are by their nature unpredictable.



By month



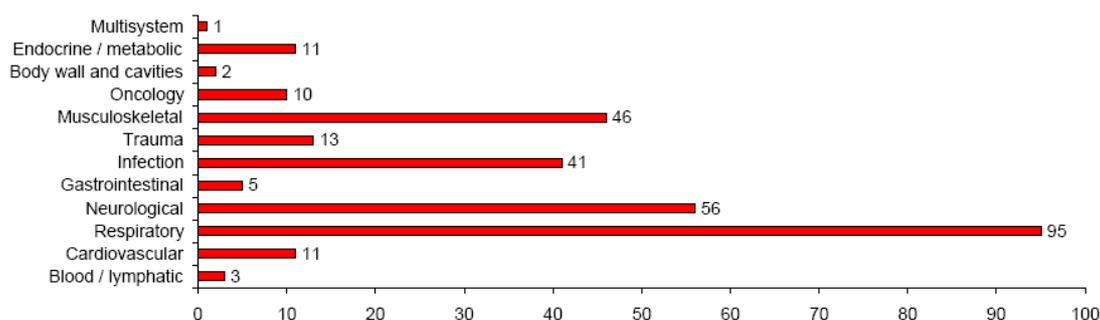
Source of admission

As always, just under half of all our admissions (44%) come from other hospitals.

UHW	172
Other hospital	137

By diagnostic group

The chart below illustrates the most common primary diagnostic group for admissions to the unit. Respiratory comprise almost a third of the total, with neurological conditions and infections the next most common diagnoses for unplanned admissions. The elective admission of patients following scoliosis repair accounts for the high number of admissions with a musculoskeletal label.



Looking in more detail at diagnosis shows the most common specific diagnoses for our patients. Because of variation in the way diagnoses are coded, it is difficult to draw too many conclusions from these data – what one clinician codes as bronchiolitis, another may code as respiratory failure, and another may code as obstructive respiratory disease. Likewise, any variation over time in this more granular data may reflect changing coding practices rather than true changes in disease patterns.

Admissions by primary diagnostic / age group (top 10 diagnoses)

Primary diagnosis	Age group (years)										Total			
	<1		1-4		5-10		11-15		16+		Unknown		n	%
Acquired scoliosis (X70D3)	0	(0)	1	(2)	5	(12)	34	(83)	1	(2)	0	(0)	41	-
Bronchiolitis (XSDOK)	28	(97)	1	(3)	0	(0)	0	(0)	0	(0)	0	(0)	29	-
Meningococcal septicaemia (A362)	7	(41)	7	(41)	0	(0)	3	(18)	0	(0)	0	(0)	17	-
Status epilepticus (X007B)	2	(18)	8	(73)	1	(9)	0	(0)	0	(0)	0	(0)	11	-
Injury of head region (XA003)	0	(0)	5	(45)	3	(27)	3	(27)	0	(0)	0	(0)	11	-
Sepsis (X70VZ)	5	(50)	2	(20)	2	(20)	1	(10)	0	(0)	0	(0)	10	-
Situation-related seizures (X006g)	3	(33)	5	(56)	0	(0)	1	(11)	0	(0)	0	(0)	9	-
Respiratory failure (XM09V)	6	(67)	0	(0)	3	(33)	0	(0)	0	(0)	0	(0)	9	-
Laryngomalacia (H1y7B)	5	(71)	0	(0)	2	(29)	0	(0)	0	(0)	0	(0)	7	-
Adult respiratory distress syndrome (XE0Ve)	6	(86)	0	(0)	1	(14)	0	(0)	0	(0)	0	(0)	7	-

Bed usage

The table below from PICANET shows bed days by month and age group:

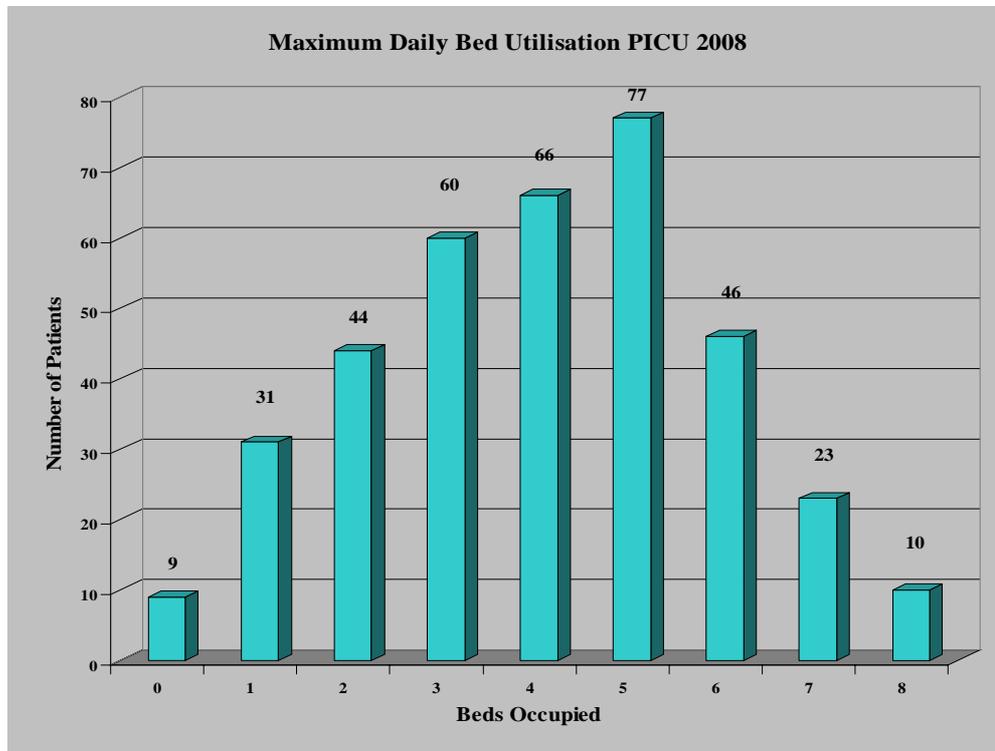
Year	Month	Age group (years)										Total			
		<1		1-4		5-10		11-15		16+		Unknown		n	%
2008	1	103	(62)	24	(14)	3	(2)	36	(22)	0	(0)	0	(0)	166	(11.4)
	2	95	(81)	8	(7)	4	(3)	11	(9)	0	(0)	0	(0)	118	(8.1)
	3	52	(43)	22	(18)	35	(29)	11	(9)	0	(0)	0	(0)	120	(8.2)
	4	33	(26)	55	(44)	23	(18)	15	(12)	0	(0)	0	(0)	126	(8.6)
	5	32	(31)	42	(40)	19	(18)	11	(11)	0	(0)	0	(0)	104	(7.1)
	6	34	(31)	14	(13)	36	(32)	27	(24)	0	(0)	0	(0)	111	(7.6)
	7	60	(43)	41	(29)	10	(7)	28	(20)	0	(0)	0	(0)	139	(9.5)
	8	36	(51)	12	(17)	1	(1)	21	(30)	0	(0)	0	(0)	70	(4.8)
	9	23	(32)	16	(22)	6	(8)	25	(35)	2	(3)	0	(0)	72	(4.9)
	10	23	(22)	15	(14)	21	(20)	47	(44)	0	(0)	0	(0)	106	(7.3)
	11	86	(51)	68	(41)	9	(5)	4	(2)	0	(0)	0	(0)	167	(11.4)
	12	72	(44)	43	(27)	25	(15)	19	(12)	3	(2)	0	(0)	162	(11.1)
Total		649	(44.4)	360	(24.6)	192	(13.1)	255	(17.5)	5	(0.3)	0	(0.0)	1461	

There are 7 funded beds, so the crude figures for monthly percentage occupancy are as below:

January	76%
February	58%
March	55%
April	60%
May	48%
June	53%
July	64%
August	32%
September	34%
October	49%
November	80%
December	75%

These figures are crude, as they reflect bed occupancy as measured once per day. It is likely that PICANET will start to collate data entered into database a live bed status in the future, and this will allow the finer detail of occupancy to be seen. What the data in the table above does not reflect is that particularly (but by no means exclusively) in the winter months, there are many individual days where occupancy is 100% or higher. As an example, in January 2008, although occupancy for the month was 76%, there were 10 days when the occupancy was 100% or more, in other words where the unit was unable to accept any new admissions. Thus, in a unit with a small number of beds and with a day to day workload that is largely unplanned and unpredictable, bed occupancy is not a particularly useful measure of 'efficiency' – the nature of the specialty is that in order to cope with times of peak demand, there will be many periods where we have apparent over-capacity. The terms of commissioning of the unit remain that we are able to accommodate admissions for 95% of the time, which condition we still satisfy, although not as comfortably as in the past.

BED UTILISATION



The above graph shows the number of patients on the unit in any one day and the number of days in the year this occurred. On 10 days there were more than 7 patients and on 23 days there were exactly 7 patients. Without flexibility the unit would have been closed on 33 days. Five emergency patients were refused during this year due to lack of an available staffed bed. Twelve patients also had their surgery postponed due to the lack of an available staffed bed.

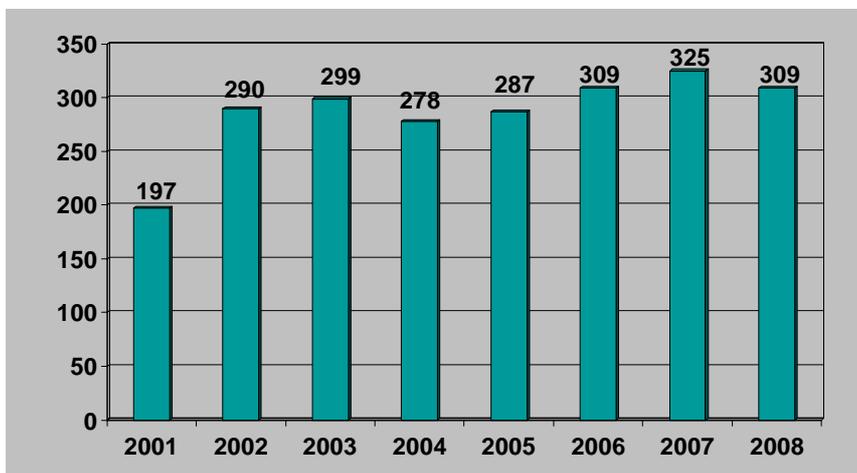
Length of stay

The table below, again courtesy of PICANET demonstrates that one third of admissions are for 1 day or less, although if we exclude elective surgical admissions from analysis, it would be seen that more typically, unplanned admissions stay for between 1 – 7 days most commonly. The overall median admission time remains 2 days.

Year	Month	LOS group (days)												Total			
		<1		1 to <3		3 to <7		7 to <14		14 to <28		28+		Unknown		n	%
2008	1	6	(19)	8	(26)	12	(39)	2	(6)	3	(10)	0	(0)	0	(0)	31	(10.0)
	2	4	(19)	3	(14)	10	(48)	3	(14)	1	(5)	0	(0)	0	(0)	21	(6.8)
	3	9	(33)	10	(37)	7	(26)	1	(4)	0	(0)	0	(0)	0	(0)	27	(8.7)
	4	7	(30)	5	(22)	4	(17)	5	(22)	2	(9)	0	(0)	0	(0)	23	(7.4)
	5	16	(53)	9	(30)	3	(10)	2	(7)	0	(0)	0	(0)	0	(0)	30	(9.7)
	6	4	(18)	7	(32)	4	(18)	4	(18)	2	(9)	1	(5)	0	(0)	22	(7.1)
	7	4	(19)	11	(52)	2	(10)	4	(19)	0	(0)	0	(0)	0	(0)	21	(6.8)
	8	8	(44)	5	(28)	5	(28)	0	(0)	0	(0)	0	(0)	0	(0)	18	(5.8)
	9	11	(46)	8	(33)	2	(8)	2	(8)	1	(4)	0	(0)	0	(0)	24	(7.8)
	10	21	(66)	6	(19)	3	(9)	1	(3)	1	(3)	0	(0)	0	(0)	32	(10.4)
	11	5	(17)	11	(37)	8	(27)	4	(13)	2	(7)	0	(0)	0	(0)	30	(9.7)
	12	8	(27)	6	(20)	11	(37)	4	(13)	0	(0)	1	(3)	0	(0)	30	(9.7)
Total		103	(33.3)	89	(28.8)	71	(23.0)	32	(10.4)	12	(3.9)	2	(0.6)	0	(0.0)	309	

Historical trend

PICU Admission Trend

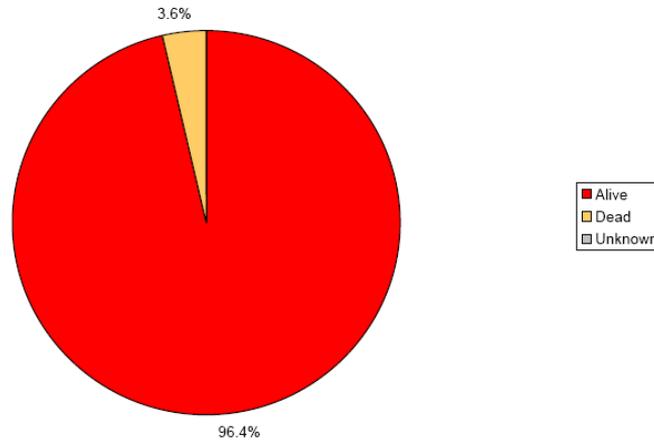


We reported last year an apparent upward trend in admissions, but this year's figures seem to buck that trend. A caveat should be borne in mind that although the numbers have decreased, there were a number of refused admissions and cancelled operations, so although the number of patients has decreased this year, there were more 'knocking on the door', but not getting in.

Outcomes

Crude mortality

The UK figure for crude mortality is 4.9% for the period 2006 – 8. The crude mortality for this unit in 2008 was 3.6%.



Risk-adjusted mortality

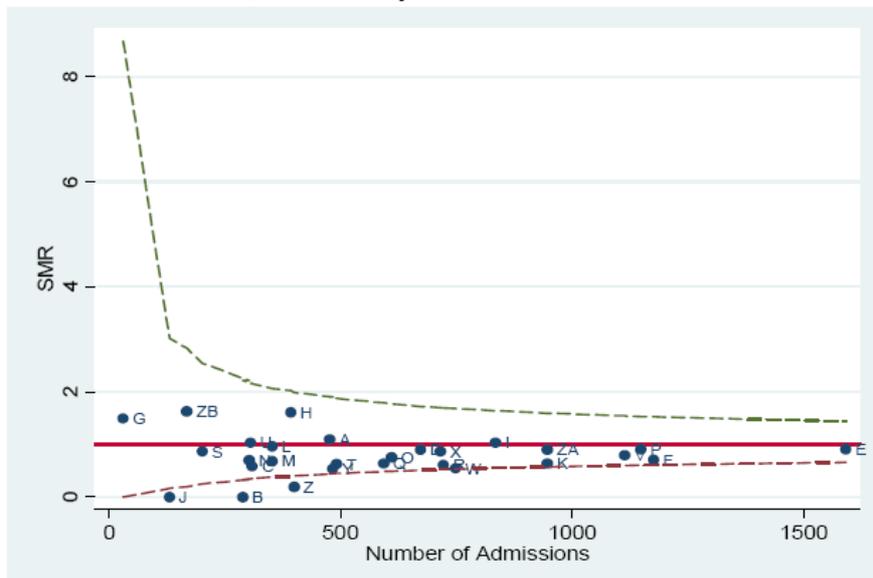
Of much more importance than crude mortality, is the risk-adjusted figure using the PIM-2 model. Details of this model have been given in previous reports, and are available through www.picanet.org.uk

The standardized mortality ratio for our unit in 2008 is 0.58 (95% confidence intervals 0.29 – 1.01).

The chart below shows a funnel plot of risk-adjusted mortality for all trusts in PICANET – Cardiff and Vale NHS Trust is the letter C on the chart – the full key to the trusts is available in the PICANET annual report.

The unit's SMR has not changed significantly since PICANET started collating data.

Figure 49b PICU Standardised mortality ratios by NHS trust with 99.9% control limits, 2008: PIM2 adjusted



CHAPTER 5

PAEDIATRIC HIGH DEPENDENCY CARE AT THE LEAD CENTRE

The PHDU continues to develop its service with ongoing planning to combine with the PICU in the second phase of the Children's Hospital for Wales.

During the last 12 months, the nursing team have worked flexibly across both PICU and PHDU to meet peak demands on the service. The PHDU has regularly needed to open additional beds to accommodate emergency referrals, urgent and elective surgery throughout the winter months.

The nursing team have developed further critical care skills and this has enabled service development to take place. An example of this is the introduction of non invasive ventilation to PHDU. Due to this some children [there are guidelines for criteria of use] have been cared for on CPAP and BIPAP on the PHDU.

The PICU and PHDU have a joint nursing education and training strategy and both teams now benefit from the Paediatric Intensive Care course being delivered flexibly at Cardiff [see PIC nursing chapter]. Several of the senior nursing staff will have undertaken PIC training by the end of this year which more than meets the standards for critically ill children in Wales in regard to PHDU provision.

The amalgamation of PICU and PHDU provides a high quality and efficient paediatric critical care service which will be operationally improved when the units are based in one area in the future.

Planning for Phase II of the Children's Hospital for Wales

The Paediatric Critical Care subgroup chaired by Dr Helen Fardy contributed to the Clinical Services Planning Group for Phase II of the Children's Hospital. This work has involved developing a service model for a combined paediatric critical care service and working with the architects in ensuring that the design is fit for purpose. Work will shortly begin on building a decant building which HDU, along with other areas will need to move into temporarily.

CHAPTER 6

THE RETRIEVAL SERVICE

Retrieval Activity

Retrieval totals

There were 120 retrievals in 2008. 6 patients were transferred in by another PICU team (this occurs when a patient is transferred back from Bristol, or from an ECMO centre), and 11 patients were transferred in by referring teams, usually for clinical reasons – e.g. an acute neurosurgical emergency where the imperative is rapid transfer of a patient to expedite surgery.

Year	Month	Own team		Other specialist team (PICU)		Retrieval team Other specialist team (non-PICU)		Non-specialist team		Unknown		Total	
		n	%	n	%	n	%	n	%	n	%	n	%
2008	1	15	(83)	0	(0)	1	(6)	2	(11)	0	(0)	18	(13.1)
	2	6	(75)	2	(25)	0	(0)	0	(0)	0	(0)	8	(5.8)
	3	10	(91)	0	(0)	1	(9)	0	(0)	0	(0)	11	(8.0)
	4	13	(100)	0	(0)	0	(0)	0	(0)	0	(0)	13	(9.5)
	5	7	(78)	1	(11)	1	(11)	0	(0)	0	(0)	9	(6.6)
	6	14	(100)	0	(0)	0	(0)	0	(0)	0	(0)	14	(10.2)
	7	7	(78)	1	(11)	0	(0)	1	(11)	0	(0)	9	(6.6)
	8	6	(100)	0	(0)	0	(0)	0	(0)	0	(0)	6	(4.4)
	9	5	(100)	0	(0)	0	(0)	0	(0)	0	(0)	5	(3.6)
	10	10	(83)	1	(8)	1	(8)	0	(0)	0	(0)	12	(8.8)
	11	14	(93)	0	(0)	0	(0)	1	(7)	0	(0)	15	(10.9)
	12	13	(76)	1	(6)	1	(6)	2	(12)	0	(0)	17	(12.4)
Total		120	(87.6)	6	(4.4)	5	(3.6)	6	(4.4)	0	(0.0)	137	

Refused retrievals

There were 4 cases where the patient died before retrieval could be completed, either before arrival of the retrieval team, or while the retrieval team were present but before the patient could be transported back. There were 5 cases in 2008 where a retrieval had to be refused because there was no bed available, but in all cases a bed was obtained in another PICU.

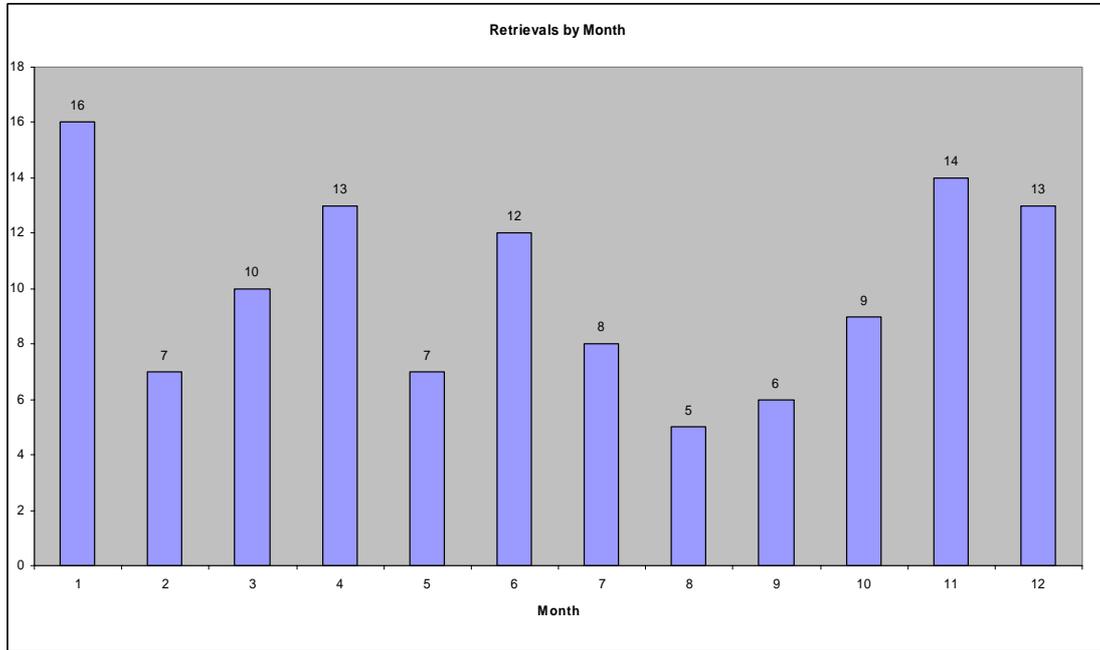
Retrievals by referring hospital

The data below are for Welsh Hospitals only – there were a small number of patients retrieved from hospitals in the West of England when there were no beds available in Bristol and/or Birmingham.

	Retrieved	Transferred by own team
Royal Gwent	34	2
Royal Glamorgan	19	
Singleton, Swansea	19	1
Morrison, Swansea	12	
Princess of Wales	9	1
Merthyr	7	3
Nevill Hall	6	2
Withybush	4	
West Wales	8	1
Bronglais	1	
Llanelli	1	

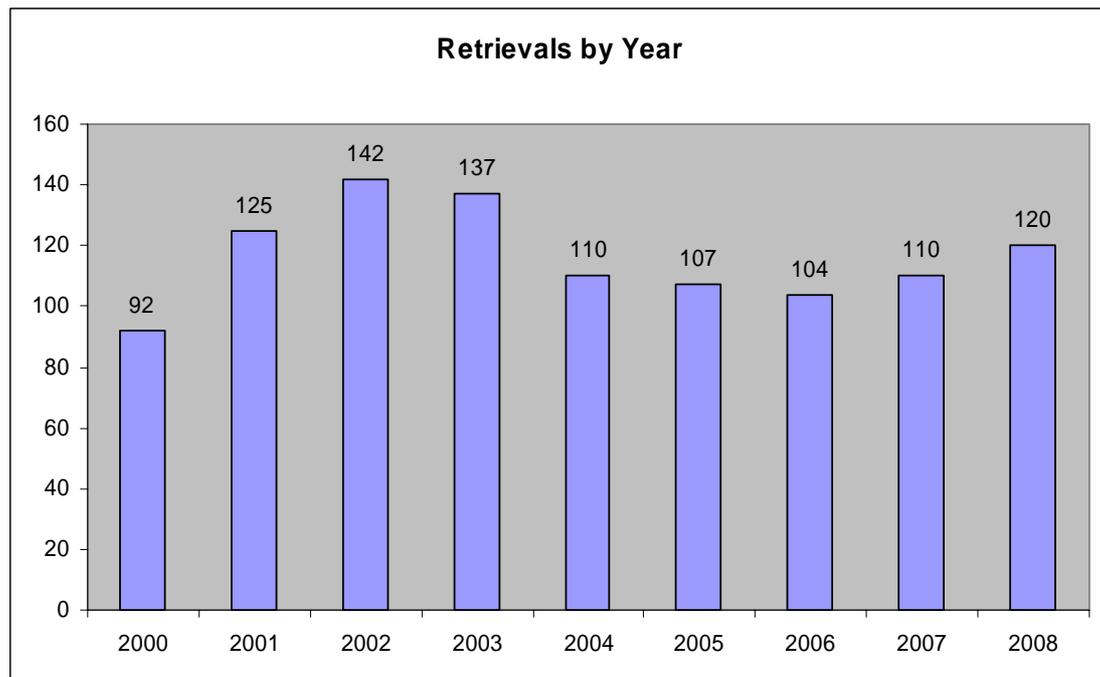
Retrievals by month

As would be expected, the peak months for retrieval reflect overall activity in that November, December and January are the months with greatest demand, and the Summer months quiet by comparison.



Trends

With the notable exceptions of 2002 and 2003, the numbers of retrievals remain relatively stable. (The closure of the inpatient unit at Llandough Hospital accounts for a reduction in 10-15 patients between 2003 and 2004).



CHAPTER 7

CLINICAL GOVERNANCE/AUDIT/RESEARCH

Clinical Risk

The main aim of clinical governance activities is to continuously improve the quality of care delivered, the most important aspect being to minimize risk and improve safety in the complex environment of patient care.

To this end all paediatric critical incidents are reviewed and discussed in two separate monthly multi-disciplinary meetings. The first being the pan directorate meeting where both adult and paediatric incidents are discussed to allow Cross the floor learning from incidents. The second is the paediatric senior staff meeting so that any issues arising can be addressed quickly throughout the unit.

In Summary there were 91 incidents reported for the year Jan –Dec 2008. 48% were category E (No Harm) 49% Category D (Minor) and 1% Category C (Moderate)

The three largest categories of incidents were due to

- Implementation of care and ongoing monitoring review 28% (64 % were pressure area related incidents and 20% accidental removal of devices)
- Medical devices 22%
- Medication. 20%

This has led to increased awareness and a training programme for pressure area care.

New initiatives in the year have been the introduction of the central line care bundle and using PDSA cycles as part of the Safer Patient Initiative.

As part of the lead centre audit we continue to collect data for PICANet which is reported earlier in the document. Our retrieval service is continually audited and we have monthly clinical governance sessions as well as quarterly morbidity and mortality meetings in association with the paediatric department.

Research & Audit

Completed Non-Core Audit Project:

- *An Audit of Adrenal Function and the use of Steroids in Children with Sepsis on a Paediatric Intensive Care Unit or "Steroids for Sick kids with Stress and Spots"*

Bidder C, Roberts Z, Al-Samsam R.

Poster presentation: Paediatric Intensive Care Society 2008, Cardiff

Oral presentation: Welsh & Irish Paediatric Society 2009, Cork

Limited evidence exists regarding the investigation of adrenal function in septic children and whether treatment with Corticosteroids is beneficial. Guidelines for Corticosteroid use in adults with severe sepsis are published¹. There is variability in Paediatric practice. Pragmatically, a protocol for investigation of adrenal function and steroid treatment in children with severe sepsis was introduced on our unit in 2003. This retrospective audit includes the 4 years afterwards.

Methods: The protocol states that Corticosteroids should be considered in septic patients with continuous fluid requirements and increased inotropic support. A Low Dose Short Synacthen Test (LDSST) should be performed and Hydrocortisone started (30mg/m²/day) pending results. Adrenal function is 'impaired' if a random Cortisol is <500nmol/L or the increment following Synacthen is <200nmol/L, (unless baseline >950nmol/L). Treatment should be stopped if results are normal. If abnormal, a repeat LDSST is suggested at 6 weeks. Patients were identified from discharge summaries and data compiled from case notes.

Results: 74 cases were identified and 57 records were available to audit (77%). There was 1 death in those audited. The diagnosis was Meningococcal disease in 93%. One child started Dexamethasone pre-referral, (meningitis dose).

2 patients started Hydrocortisone without any Cortisol assay. 37 patients (66%) had a random Cortisol. 5 patients started treatment after random Cortisol only: all 5 had normal Cortisol >500nmol/L, but treatment was continued in 2, (for 5 and 7.75 days).

Of those who had a random Cortisol, 23 (62%) had LDSST and started Steroids. 10 of these 23 children (43%) had normal adrenal function and treatment was stopped in all 10. In the 13 children (57%) with impaired adrenal function, treatment continued for between 1.5 and 11 days, (mean 5.6, median 4 days).

21 patients who received Hydrocortisone had LDSST (75% of those treated). LDSST provided information which was helpful in decision making in 25%. No relationship was found between the volume of fluid resuscitation or intensity of inotropes and baseline Cortisol levels or response to Synacthen. There was no relationship between baseline Cortisol levels and the increment following Synacthen.

Conclusions: Pending further evidence, there is no reason to change the current unit practice. Good compliance is noted regarding cessation of Hydrocortisone in those with normal Cortisol results. We should amend our recommendations for follow-up LDSST testing.

- ***Emergency Management of Children with Severe Sepsis in the United Kingdom –The Results of the Paediatric Intensive Care Society Sepsis Audit*** David P Inwald, Robert C Tasker, Mark J Peters and Simon Nadel, on behalf of the Paediatric Intensive Care Society Study Group (PICS-SG).

Published: (2009) Arch Dis Child adc.2008.153064.

Objective: To audit current UK practice of the management of severe sepsis in children against the 2002 American College of Critical Care Medicine / Pediatric Advanced Life Support (ACCM-PALS) guidelines.

Design: Prospective observational study.

Setting: 17 UK Paediatric Intensive Care Units (PICUs) and 2 UK PICU transport services.

Participants: 200 children accepted for PICU admission within 12 hours of arrival in hospital, whether or not successfully transported to PICU, with a discharge diagnosis of sepsis or suspected sepsis.

Main outcome measures: Medical interventions, physiological and laboratory data to determine the presence or absence of shock, inter-hospital transfer times, predicted mortality (using the Paediatric Index of Mortality, version 2 (PIM2) scoring system) and observed mortality.

Results: 34/200 (17%) children died following referral. Although children defined as being in shock received significantly more fluid ($p < 0.0001$) than those who were not in shock, overall fluid and inotrope management suggested by the 2002 ACCM-PALS guideline was not followed in 62% of shocked children. Binary logistic regression analysis demonstrated that the odds ratio for death, if shock was present at PICU admission, was 3.8 (95% CI 1.4-10.2, $p = 0.008$).

Conclusions: Presence of shock at PICU admission is associated with an increased risk of death. Despite clear consensus guidelines for the emergency management of children with severe sepsis and septic shock, most children received inadequate fluid resuscitation and inotropic support in the crucial few hours following presentation.

Ongoing Non-Core Audit Projects:

- ***Survey of the Incidence, Aetiology, Treatment and Outcome of Children Admitted to Paediatric Intensive Care in Refractory Convulsive Status Epilepticus***

National Multi-centre Project run by the Paediatric Intensive Care Society.

A two-year prospective and national survey of all children admitted to paediatric intensive care units with refractory convulsive status epilepticus (RCSE). Inclusion criteria for the study will be all children aged from one month to 16 years with refractory convulsive status epilepticus defined as: 'Children in whom, prior to admission to PICU, the presenting tonic-clonic seizure did not completely stop with benzodiazepine boluses + phenytoin or phenobarbitone or where there is clinical or electrical evidence of a further tonic-clonic seizure within 48 hours of admission to PICU'

All children admitted to a PICU with 'seizure', 'convulsion', 'status epilepticus', 'febrile seizure/convulsion' or 'fit' will be identified or 'flagged up' using the existing PICANet Data Collection form that is in common usage in all intensive

care units registered with the PICU Network. Once identified using this form, these children will be then reviewed to see if they meet the defining criteria for RCSE in the above box. Those children that do meet these criteria will then have their data recorded on the questionnaire. The data will be collected centrally by PICANet and will then be forwarded to Dr Appleton at the research centre (Alder Hey). The study is supported by the Paediatric Intensive Care Study Group (PICSG) and the Paediatric Intensive Care Audit Network (PICANet). PICANet are submitting an amendment to their current MREC approval to allow for this additional data collection required for this study. There will be no personal or unit identifiers on the questionnaire, the child will only be identifiable by the PICANet admission number.

1. *Retrospective Audit of Children Admitted to PICU with Status Epilepticus.*

N. Syed, D. Pryor, R. Al-Samsam.

Objective:

1. To document the duration of intubation in Paediatric Intensive Care Unit for children with status epilepticus.
2. To establish if the APLS guidelines are followed in the management of status epilepticus prior to PICU admission.

Design: Cross sectional retrospective study of all children admitted to PICU with the diagnosis of status epilepticus between March 04 and March 09.

Setting: A PICU setting

Population: PICANET database and discharge summaries of each admission with status epilepticus

Standard: APLS logarithm for management of status epilepticus

2. *Audit of the Use of Antibiotics in Children Admitted with Bronchiolitis to PICU*

E. Smit, R. AL-Samsam

Introduction: Bronchiolitis is a common problem during the winter months. Infants and those with underlying conditions like prematurity, chronic lung disease, cyanotic heart disease and immunodeficiency are usually more severely affected and may need intensive care. Hospitalised children with bronchiolitis are often given antibiotics, although two RCTs have shown no added benefit in uncomplicated RSV bronchiolitis (1, 2). The risk for associated bacteraemia in bronchiolitis is small (0.3%). In children admitted to PICU with RSV positive bronchiolitis this risk is slightly higher (2.9%). (3) On our paediatric intensive care unit there seems to be a wide variation in which children with bronchiolitis are prescribed antibiotics and for how long.

Aims: To establish our current practice with regards to treating children with bronchiolitis that require intensive care during their illness. With help from the microbiology department we hope to set a standard and compare our practice with this standard.

Standard: No UK standards or guidelines are available. The American Academy of Pediatrics has published a clinical practice guideline regarding the diagnosis and management of bronchiolitis (4). Their recommendation is to only use antibiotics in children with bronchiolitis and specific indications of the coexistence of a bacterial infection.

Methods: All children admitted to PICU in 2008 with a diagnosis of 'bronchiolitis' were included. Retrospectively the notes were reviewed to identify which children were treated with antibiotics and for how long. Reasons for discontinuation of antibiotics were identified and CXR changes, CRP, white cell count and microbiology results noted.

3. *Retrospective Audit to Establish the incidence of Ventilator Associated Pneumonia on our PICU Prior to the Induction of Ventilator Bundle.*

K. Poon, R. AL-Samsam

Many thanks to Pat Davies, Sue Tullett and staff from PICANet for their help in compiling this report and to all the clinical staff who have supported and worked with us over the years.