BAPM/NNS: Service Organisation

PA.01 WITHDRAWN

PA.02 WITHDRAWN

PA.03 EFFECT OF A NEONATAL OUTREACH TEAM ON DISCHARGE OF PREMATURE BABIES FROM A SPECIAL CARE BABY UNIT

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Background: Length of stay is used as a performance measure in healthcare. Length of stay for preterm babies is determined by physiological maturity; however, the ultimate discharge day may be affected by availability of community support.
Aims: To audit the impact of a nurse-led 7-day neonatal outreach team (ORT) on discharge weight and discharge delay in babies on the special care baby unit (SCBU) at St Thomas' Hospital.
Methods: We prospectively audited all SCBU admissions <36 weeks' gestation between 1 January and 31 March 2005 and in 2007 after the establishment of the ORT. Birthweight, gestational age, discharge weight and discharge delay were documented. Delay was defined as a 24-hour period when the baby no longer required either SCBU medical or nursing input.
Results: We identified 50 babies in 2005 and 60 in 2007 who were discharged home from the SCBU. There were no differences in gestational age or birthweight between the two groups. In 2007 median (interquartile range) discharge weight was significantly lower at 1920 g (1786–2150) versus 2055 g (1910–2265), $p = 0.014$ and fewer babies (21.7 versus 48%) experienced any discharge delay, $p<0.01$.

Unnecessary bed days decreased (157 versus 79) with an average delay of 2.1 days in 2005 compared with 0.74 in 2007 ($p<0.001$), with no re-admissions within 48 h due to discharge failure.
Conclusions: The development of the neonatal ORT significantly reduced discharge weight and discharge delay in premature babies in the SCBU. This team plays a central role in promoting early discharge and improving the efficiency of SCBU cot utilisation.

PA.04 A WORKFORCE FOR THE 21ST CENTURY: AN EVALUATION OF ADVANCED NEONATAL NURSE PRACTITIONERS

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Introduction: The importance of advanced neonatal nurse practitioners (ANNP) in the provision of neonatal care has been highlighted in recent reports. This study explored current and future workforce issues concerning ANNP.
Methodology: A postal survey of graduates from a single ANNP training programme who qualified between 1992 and 2004 (n = 166) was undertaken. 14 were known no longer to be ANNP and for another 28 no contact address was available. The remaining 124 were sent a structured questionnaire incorporating open and closed questions.
Results: 116 (93%) responded. 102 (88%) were employed as ANNP; the median age was 46 years (range 31–59). Of these, 75% were employed in their original seconding unit. 49% were working in district general hospitals, 44% in tertiary centres, 4% solely in transport and 3% overseas. 21% were working for at least some of the time at "specialist registrar level" and at least 68% were working at "senior house office level"; 24% had independent ANNP rotas; only 19% were working on nursing rotas. For 80% of all respondents part of their role included transport.
Conclusions: ANNP are playing a key role in the provision of neonatal care and many are undertaking "middle-grade" functions. The good retention rates within both the workforce and individual units confirm that investment in this role is justified. However, given their age distribution and the intensity of the neonatal workload, the potential for ANNP to provide full night-time cover is probably limited. In order to provide high-quality care round the clock additional workforce strategies need to be explored.

PA.05 AN EVALUATION OF THE FINANCIAL AND EMOTIONAL IMPACT OF IN-UTERO TRANSFERS UPON FAMILIES

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Introduction: The transfer of pregnant women to and between tertiary obstetric centres for subspecialist care is likely to cause financial and emotional stress to families. The socioeconomic and psychological impact of in-utero transfers (IUT) has not previously been evaluated within Scotland.
Methods: A postal questionnaire was sent to each woman who experienced an IUT in Scotland between August 2006 and February 2007. Contact was initiated 6 months after the IUT if deemed appropriate by the woman's GP. Quantitative and qualitative data were recorded and analyzed using Microsoft Excel and simple descriptive statistics.
Results: Of the 559 women experiencing an IUT during the study period, 530 (95%) were sent questionnaires. The response rate was 45%. Respondents described both domestic and personal difficulties consequent upon IUT: 78 women (33%) had older children at the time of transfer and 37 (47%) reported insufficient time to arrange alternative childcare; 42 (21%) had partners who experienced difficulty securing time off work and 66 (28%) reported financial problems. 113 (47%) had partners who were unable to travel with them and only 31 (13%) received help from hospital staff in locating family accommodation, with 126 families (53%) expressing a desire for hospital accommodation to have been made available for them.
Conclusions: Centralisation of specialised obstetric and neonatal services creates the requirement for IUT. The impact upon the immediate family is often overlooked and our findings illustrate the need for better support systems, resource planning and local accommodation for families displaced by an IUT.

PA.06 CLINICAL IMPACT OF POINT-OF-CARE TESTING WITH OMNI-S BLOOD GAS ANALYZER IN A NEONATAL INTENSIVE CARE UNIT

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Background: Point-of-care (POC) testing is widely used in neonatal intensive care units (NICU) and allows an increasing number of assays to be performed on smaller volumes of blood. The use of these systems simplifies staff training, reduces maintenance costs and blood sampling. The OMNI-S analyzer (Roche Diagnostics, UK) was introduced into this NICU in 2003 and its performance is compared with existing POC equipment and laboratory assays.[1] The aim of this study was to assess the clinical impact of the POC analyzer in terms of the number of laboratory tests and blood transfusions performed.
Methods: The study covers the period January 2003 to December 2005 reviewing activity in the 12 months before and 24 months after the introduction of the OMNI-S. Information on NICU and laboratory workload was obtained from the neonatal, hospital

clinical information systems and pathology databases. Ethical approval was not sought as it was deemed an audit of current practice.

Results: NICU activity increased over this period: number of admissions (16%); days of care intensive therapy unit plus high-dependency unit plus SCBU (22%); ventilation (39%); continuous positive-airways pressure (83%) and total parenteral nutrition (37%). The number of laboratory assays and transfusions performed decreased: biochemistry (49%); haematology (32%). The number of octpack units transfused fell by 3%. Laboratory costs were reduced by £17 250 (41%) following the change in practice.

Conclusions: Despite increased activity in the NICU there were substantial reductions in the number of laboratory tests performed. The introduction of the OMNI-S POC analyzer has resulted in changing clinical practice yielding cost savings for the service and reduced transfusion requirements for neonates.

1. **Arthurs O,** Dey P, Pattnayak S, *et al*. Point of care measurements in neonatal intensive care unit using an Omni-S blood gas analyzer. *Point of Care* 2007;**6**: 112–17.

PA.07 WITHDRAWN

PA.08 UNDERSTANDING PARENTAL INVOLVEMENT IN NEONATAL NETWORKS

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Public involvement has now become a cornerstone of the NHS. Recently this has moved beyond the individual level to include greater involvement of both patients and the public in governance. However, there is relatively little literature that explores the nature and outcomes of long-term patient involvement initiatives, particularly at the level of corporate decision making. This paper reports on findings from a national study of parental involvement in neonatal network boards.

A survey of all neonatal network managers in England was carried out. This was designed to elicit information about the current status of parent representation on neonatal network boards. Five networks have also been selected for more in-depth study. This involves interviews with ''key'' members of each network board, interviews with parent representatives, observation of meetings and access to board minutes.

The data collected show that a wide range of approaches to involving parents has been adopted. These range from decisions not to involve parents at this level at all, to relatively well-developed systems designed to link parent representatives on network boards to parents in neonatal units. However, the data collected suggest that these differing approaches carry with them underlying and often divergent understandings of the purposes of parental involvement, leading to potential misunderstandings and confusion. We suggest that addressing these issues can maximise the benefits of participation for both professionals and parents, ultimately contributing to improved services outcomes.

PA.09 NEONATAL PHLEBOTOMY EDUCATION: A QUALITY INITIATIVE

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Background and Aims: In neonatal intensive care, phlebotomy losses are a primary factor leading to anaemia and transfusion in critically ill infants. Blood sampling in excess of laboratory requirements may be a key factor. Junior doctors with no specific training usually undertake neonatal phlebotomy. We aimed to determine whether education on laboratory requirements reduces phlebotomy overdraw.[1]

Abstract PA.09

	Mean weight (kg)	Mean % (SD) sample volume	% Insufficient	% Overdrawn (>120%)
Pre (n = 206)	1.525	86.6 (27.4)	1.4	11.8
Post (n = 211)	1.719	90.0 (23.1)	1.5	7.8
				(χ^2) p = 0.162

Methods: Early morning blood sampling in a regional neonatal unit was assessed before and after education of junior medical staff. The education comprised teaching slides, written information, unit poster and increasing awareness of the unit guidelines on phlebotomy volumes. The source of the sample was recorded (venous, arterial or heel stab). The phlebotomist was blinded to the audit process. Samples were weighed at laboratory level and classified as sufficient, insufficient, clotted or overdrawn. The volume was calculated using the specific gravity of blood and converted to the percentage of requested laboratory volume.

Results: The findings are summarised in the table.

Conclusions: The data demonstrate that the ward and laboratory staff are achieving high standards, with only 1–2% of samples being repeated because of insufficiency. The educational intervention did not achieve a statistically significant change and we are currently modifying the educational package for staff.

1. **Mayes C,** Jenkins J, McCall E, for NICORE Ireland. Evidence-based quality improvement. Reduction in neonatal transfusion requirement toolkit. NICORE Ireland, 2006. ISBN 085389 8898.

PA.10 GENERATING TEXTUAL SUMMARIES OF CLINICAL TEMPORAL DATA

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Introduction: Staff of a neonatal intensive care unit are presented with many forms of complex data. Interpretation of the data may be problematical, leading to erroneous decisions. In this study we consider whether computing technology can aid in decision support, by automatically generating textual summaries of time series physiological and free text data.

Methods: Software was developed to extract and summarise data collected in an electronic patient record. Using an experimental design with 24 scenarios, we tested decision making in four groups of medical and nursing staff. Data were presented using three formats: computer-generated summaries; human-generated summaries and graphical displays of physiological data.

Results: Overall, the difference in scores between the three formats approached significance (p = 0.06), with human summaries showing an advantage over the other two formats (both p = 0.03). In subgroup analysis, this difference was driven only by the junior nurse group (p = 0.01) (see table).

Abstract PA.10 Mean scores (SD) of the four staff groups across the three conditions

	Graphical displays	Human-generated summaries	Computer-generated summaries
	Mean (SD)	Mean (SD)	Mean (SD)
Junior nurses (n = 8)	0.31 (0.16)	0.43 (0.10)	0.28 (0.09)
Senior nurses (n = 9)	0.38 (0.09)	0.42 (0.12)	0.41 (0.15)
Junior doctors (n = 9)	0.29 (0.14)	0.33 (0.11)	0.35 (0.14)
Senior doctors (n = 9)	0.36 (0.17)	0.39 (0.11)	0.33 (0.13)

Conclusions: Overall, textual summaries were more helpful than graphical displays in decision making. In particular, our computer software provided summaries that were equally helpful as human summaries for most participants.

PA.11 CONSISTENCY IN APPROACH TO MANAGEMENT OF NEONATAL ABSTINENCE SYNDROME ACROSS A NEONATAL NETWORK

K Johnson, AB Gill. *Leeds Teaching Hospitals NHS Trust, Leeds, UK*

Aims: Neonatal abstinence syndrome (NAS) babies can have a significant impact on neonatal service capacity. We wished to examine if there was any consistency in the approach to management of infants with NAS across the Yorkshire neonatal network (YNN).
Methods: A questionnaire to all neonatal units within the YNN and retrospective case note review of all infants receiving treatment over a 5-month period across the YNN.
Results: YNN is largest network in the United Kingdom, covering 43 000 births. 11 of the 12 units had a guideline for the management of neonatal drug withdrawal. There was very little standardisation of scoring systems for treatment and weaning of NAS babies. The most commonly used first-line treatment was oral morphine. A second-line agent was administered to over 25% of affected infants. The median duration of treatment was 13.5 days and the median total length of stay was 22 days. Sample size precluded any meaningful assessment of management strategy and length of stay.
Conclusions: This study highlights major variations in practice across a single network. This may partly reflect the lack of evidence, in particular, for example, the use and choice of scoring charts to assess severity of symptoms. A standardised guideline is proposed to improve consistency in approach and hopefully minimise length of stay thereby improving neonatal service capacity.

PA.12 PREMEDICATION PACKS BEFORE EMERGENCY INTUBATION OF NEONATES

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Objective: Do pharmacy-prepared premedication drugs reduce the time taken to successful endotracheal intubation in neonates?
Methods: An initial audit of emergency intubation practice on a tertiary neonatal unit found a significant delay between the decision to intubate and administration of premedication due to delays in the preparation of drugs. The audit was repeated following the introduction of pre-prepared syringes of both fentanyl and suxamethonium provided by the regional sterile pharmacy unit allowing a simple calculation of 0.5 ml/kg for each drug.
Results: 15 intubations were included in group 1 with 22 in group 2. All were emergency procedures requiring premedication. Both groups were comparable for gestation (median 28 versus 28.5 week, $p = 0.975$) and birth weight (median 1.090 versus 1240 g, $p = 0.496$). The number of intubation attempts was the same in each group (mean two). There was a significant difference in time taken to administration of premedication (20 minutes versus 10 minutes, $p = 0.015$, 95% CI 1.00 to 11.00) and in time taken from decision to intubate to successful intubation (23 minutes versus 18 minutes, $p = 0.023$, 95% CI 1.00 to 11.00). There was no difference in lowest recorded oxygen saturation (mean 57 versus 51%, $p = 0.495$), but the second group did have a significantly lower heart rate reported during intubation (mean 119 versus 85 bpm, $p = 0.016$, 95% CI 7 to 61). None of these infants required atropine. No adverse effects were reported.
Conclusions: Pre-prepared premedication drugs reduce the time to successful emergency endotracheal intubation in neonates. This development may improve compliance with premedication drugs and limit periods of non-optimal ventilation.

PA.13 WITHDRAWN

PA.14 PAIN MANAGEMENT IN NEONATAL INTENSIVE CARE UNITS AND NURSERIES IN SOUTH WALES: A SURVEY OF DOCTORS AND NURSES

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Objective: To obtain information regarding the management of pain among neonates in neonatal units in South Wales.
Methods: Questionnaires were distributed to doctors and nurses in seven neonatal units in South Wales between January and August 2007. Respondents were asked to rank the painfulness of seven common procedures, how often pharmacological and comfort measures are used and what the optimal treatment for different neonatal age groups should be. There were also questions on the assessment of pain, use of sucrose, existence of unit pain policy and audit, staff training and respondent's perception of the level of use of pharmacological agents in their unit. Suggestions on how to improve neonatal pain management were also elicited. The survey was approved by the Multi-Centre Research Ethics Committee Wales.
Results: The survey response rate was 40% and included 62 doctors and 137 nurses. There was almost universal agreement that neonates feel pain and therefore needed pain relief. On a Likert scale of 0–10 for procedure painfulness, chest drain insertion scored highest at 9.20. Using an interval scale of 0–4, clinicians believed analgesia and comfort measures were not usually used for procedures and optimal care would require more use of both measures. The ratings of respondents were examined for internal consistency and demonstrated good reliability—overall Cronbach's alpha of 0.975. A pain tool was rarely used to assess pain and training on neonatal pain was an exception.
Conclusions: More staff training on neonatal pain management and the development of unit pain guidelines is urgently needed in our neonatal units.

PA.15 IMPROVING COMPLIANCE WITH CLINICAL PROTOCOLS: CLINICAL DECISION SUPPORT WITHIN ELECTRONIC PATIENT RECORDS

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Background: The introduction of oral nystatin prophylaxis to all babies $\leqslant 32$ weeks on our neonatal unit has been associated with a reduction in fungaemia from 4.1% in 1998–2000 to 1.8% in 2001–3 ($p = 0.008$). A previous audit showed a compliance of 81% with the policy. We have changed from using written medical notes to an electronic patient record on our unit. This computer system was modified to incorporate a prompt to administer nystatin prophylaxis to eligible babies following the audit.
Aims: The aims of this audit were to determine whether this computer-based prompt within had led to any change in the compliance and to monitor any impact on the rate of fungaemia.
Methods: The computerised records of all eligible babies admitted since the introduction of the computer-based prompt (1 March 2006 and 31 August 2007) were examined. To validate the computerised information, prescription charts of 50 random babies were also examined.
Results: 317 babies with a gestation $\leqslant 32$ weeks were admitted during the study period. 297 were eligible for prophylaxis. Of these,

282 received prophylaxis. Compliance therefore increased from 81% to 95% ($p = 0.0001$). Examination of the prescription charts confirmed that the information within the computerised notes was completely accurate. Six babies (1.9%) developed fungaemia. This is no different to the rate of 1.8% seen during the first 3 years of prophylaxis ($p = 0.79$).

Conclusions: Clinical decision support within electronic patient records can be used successfully to improve compliance with clinical protocols.

PA.16 AUDIT ON "COMMUNICATION TO EXPECTANT MOTHERS <28 WEEKS"

A Mishra, P Yap, J Moise. *Neonatal Unit, Hope Hospital, Manchester, UK*

Background: British Association of Perinatal Medicine guidelines 2000 and Nuffield Bioethics Committee November 2006 advise that comprehensive accessible information on the risks and benefits of what is proposed should be given to expectant parents of babies born at the threshold of viability. Decisions on management should be made in partnership with parents. There are few published data on the quality of communication from obstetric and neonatal teams to expectant parents before 28 weeks.

Aims: To audit the quality of communication and documentation between obstetric staff, neonatal staff and expectant mothers at <28 weeks.

Methods: Retrospective review of 25 case notes of mothers whose babies were born at less than 28 weeks in 2006.

Results: Out of 25 patients, 10 were booked locally and 15 were transferred from other hospitals. All patients were seen by the obstetric staff but there was no documentation of the discussion with expectant mothers. Documentation of neonatal staff's discussion with expectant mothers was recorded in 70% of case notes. Of the documented cases, only 33% of the notes had documentation about survival chances. Management at delivery was discussed in 90% and management on the neonatal unit in 75% of patients. 40% of patients were offered a visit to the neonatal unit.

Conclusions: <10% of neonatal documentation had all the main points discussed with expectant mothers.

Recommendation: To ensure all important points are discussed and documented we have designed a standard proforma and guidelines addressing the suggested areas of discussion. We plan to carry out a prospective audit after its implementation this year.

PA.17 PATTERNS OF DRUG ERRORS IN A LEVEL 3 NEONATAL UNIT

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Introduction: Drug errors are unfortunately common in the neonatal care unit environment. There is very little published literature available on the causes and effects of such errors. This study looks at the patterns and causes of drug errors in a level 3 neonatal unit over a 2-year period (1 January 2006 to 31 December 2007).

Methods: Drug errors were identified through a critical incident reporting system database and the patterns and causes identified.

Results: A total of 105 drug errors were reported, which constituted 8.7 per 1000 neonatal activity days. Two were potentially serious—overdoses of gentamicin and hepatitis B vaccination. 63.8% were nursing errors, 25.7% prescribing errors, 5.8% protocol non-compliance and 4.7% pharmacy errors. Of the nursing errors, missed doses/incorrect doses/incorrect timing accounted for 60.8% of errors and infusion errors accounted for 36.2%. Common infusion errors involved constituents of total parenteral nutrition, morphine and sodium bicarbonate. Prescribing errors included incorrect calculation/dosing (67%) and transcription errors (33%). Calculation errors were seen most commonly in calculating the doses of calcium gluconate, hydrocortisone, sodium bicarbonate and morphine. Neither nursing errors nor prescription errors correlated with the level of activity or junior doctor changeover times or time of day as might have been expected. Correlation with staffing levels could not be made.

Conclusions: Complex environments and systems and human fallibility contribute to errors. Fortunately, actual harm to an infant is rare. Periodic evaluations of this kind in the context of quality improvement including systemisation and automation for prescribing, dispensing and administration of drugs can potentially minimise errors.

PA.18 USING NEONATAL NETWORKS TO FACILITATE RESEARCH INTO HIGH-RISK GROUPS: THE SUCCESSFUL ESTABLISHMENT OF A POPULATION-BASED COHORT OF CHILDREN WITH DOWN'S SYNDROME

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Background: In order to provide a current evidence base for management, the Children with Down's Syndrome Study (CDSS; www.cdss.org.uk) has been set up as a collaboration between the Down's Syndrome Association, the Down's Syndrome Medical Interest Group, clinicians and researchers. The CDSS aims to follow children with Down's syndrome (DS) from birth onwards collecting information and sequential biological samples. It is dependent on the support of neonatologists and paediatricians who invite the family of a newborn with DS to take part.

Methods: The target area is defined by six adjacent neonatal networks, corresponding to 63 hospitals where DS newborns might be cared for. After establishing contact with clinicians in each hospital and a presentation of the study, a local lead would be agreed and research and development approval sought (Multicentre Research Ethics Committee approval with site-specific assessment exemption already given: 06/MRE09/016).

Results: Presentations about the CDSS have been made in 60 hospitals and to four neonatal network meetings. The CDSS is fully open in 55 hospitals. Research and development approval is awaited in three hospitals. Two hospitals are considering participation. A talk is awaited in three hospitals. To date 142 cases have been recorded and figures for 2006 indicate completeness of ascertainment of ~67%.

Conclusions: The existing neonatal network structure enabled immediate identification of relevant hospitals. In addition, the four invitations to speak to neonatal network meetings allowed rapid dissemination of information and consensus about participation across networks. Current recruitment rates indicate ~500 families will be participating by the end of 2009, making this a very significant dataset.

PA.19 NEONATAL NETWORKS: AN EFFECTIVE VEHICLE FOR IMPROVING CLINICAL PRACTICE

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Background: Haematological abnormalities are common in neonates with Down's syndrome (DS). Benign changes including neutrophilia, polycythaemia and thrombocytopenia are present in the majority. Up to 10% may have transient myeloproliferative disorder. This group remain at particularly high risk of developing acute megakaryoblastic leukaemia. Consequently, it is now considered good practice by paediatric haematologists to check a full blood count (FBC) in all neonates with DS.

Methods: Meetings with general paediatricians and neonatologists were arranged in the 12 hospitals within the Yorkshire neonatal network (YNN) to discuss the management of neonates with DS in each centre. A presentation was then given at a YNN Forum meeting, followed by discussion.
Results: All babies with suspected DS have blood taken for cytogenetic confirmation. Clinicians agreed on the clinical features of a sick neonate that would prompt checking a FBC. However, consultation revealed a wide variation in practice in checking FBC in relatively well neonates with known or suspected DS. The most common reasons cited for not checking a count were: lack of awareness of the relationship between transient myeloproliferative disorder and acute megakaryoblastic leukaemia and a lack of confidence in interpreting abnormalities.
Discussion: There was a clear discrepancy between current practice and what was believed to be good practice. In order to address this and as a direct result of discussion at the YNN Forum a new regional service has been set up. The YNN structure enabled this to be agreed, set up and efficiently rolled out in a manner that directly involved clinicians.

PA.20 FAMILIES' PERCEPTIONS OF CARE EXPERIENCED ACROSS THE YORKSHIRE NEONATAL NETWORK

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Aim: The need to engage families in the planning of neonatal services is a key measure of the performance of neonatal networks.
Methods: A study-specific parental questionnaire was developed and offered to all families with infants admitted to one of the 12 neonatal units across the Yorkshire neonatal network (YNN) over a 3-month period. Nine major aspects of care were studied through the questionnaire.
Results: 286 questionnaires were returned out of 395, which offered 72%. There was an appropriate spread of returns across the YNN. The majority of families focussed on issues and problems within their home unit. Families perceived good care and understanding of their baby's needs was provided by health professionals; many families felt there was not full understanding of their own needs. Communication and engagement in decision making was perceived as lower than that which many parents and families desired. Inflexibility of visiting in some units caused concern among family members and discharge planning opportunities appeared to have been missed at crucial times during the parents' stay. There was a general paucity of understanding of the role of neonatal networks.
Conclusions: This major study of families' views of neonatal care highlights variations in parental experiences of care across a large neonatal network. Families were very supportive of care delivered to their baby(ies). Networks can only be considered all inclusive if they engage with users of their service. This study suggests the YNN has some way to go to achieve this. We suspect many networks are in a similar position.

PA.21 THE IMPACT OF "SMART" INFUSION PUMPS ON THE FREQUENCY AND NATURE OF MEDICATION-RELATED INCIDENTS ON THE NEONATAL UNIT

CJ Dewhurst, H Parry, NV Subhedar. *Liverpool Women's Hospital, Liverpool, UK*

Background: Approximately 20% of all adverse clinical events that occur in neonates are related to medicines. To reduce the incidence and severity of medication-related incidents, we introduced "smart" intravenous infusion pumps with built-in medication safety software (Guardrails, Cardinal Health).
Aim: To determine the impact of the introduction of "smart" infusion pumps on the nature and frequency of medication errors.
Methods: Medication-related adverse clinical events and near misses were identified by the critical incident reporting system for 12 months before and after the introduction of "smart" infusion pumps. Incidents were categorised according to the stage in the medication process in which they occurred and their overall risk rating.
Results: The frequency of medication-related adverse clinical events before and after the introduction of "smart" pumps was 108/year (6.18 per 1000 patient-days) and 104/year (6.14 per 1000 patient-days), respectively. The majority occurred during the prescribing and administration stages of the medication process and this pattern was similar in both periods. However, there was a significant decrease in the overall risk severity of medication-related incidents following the introduction of the pumps: very low risk 17 versus 64; low risk 70 versus 25 and moderate risk 9 versus 0 ($p<0.05$); no high-risk events occurred in either period.
Conclusions: Although the introduction of "smart" infusion pumps had no discernible effect on the frequency of reported medication incidents, there was a reduction in their overall risk severity. We speculate that critical incident reporting systems may be an insensitive tool for measuring the frequency of medication-related incidents.

PA.22 WITHDRAWN

PA.23 A REVIEW OF LOCAL PRACTICE AND OUTCOMES IN THE MANAGEMENT OF PRETERM INFANTS AT THE ROYAL DEVON AND EXETER HOSPITAL, EXETER, BETWEEN 2001 AND 2005

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In order to inform local practice, and counsel parents it is important to review local outcomes and compare with published data. We undertook a retrospective review of all infants born at <30 completed weeks' of gestation between January 2001 and December 2005 at the Royal Devon and Exeter Hospital (RD&E), a large district general hospital.

135 preterm (<30 weeks' gestation) infants were born at the RD&E during this period. A further 17 preterm infants were transferred to the RD&E on day 1 for further intensive care. We have reviewed the outcomes for all these infants according to their gestational age and other confounding factors and shown comparable survival outcomes with the EPICure and CESDI 27/28 published data.

We have looked in detail at the mode of delivery and resuscitation requirements on the labour ward. All infants of less than 26 weeks' gestation required resuscitation and intubation on the labour ward, with declining requirements recorded for infants of greater gestational age. No infant of less than 26 weeks' gestation who required cardiac massage or adrenaline administration survived to discharge.

33 deaths were recorded and the causes were reviewed. Below 26 weeks, most deaths occurred within 48 h of birth, whereas deaths tended to occur later in infants of ⩾26 weeks. Sepsis was a frequent cause of death in all gestational groups.

Morbidity outcomes including laser therapy for retinopathy of prematurity (9%) and oxygen dependence at estimated date of discharge (29%) compared favourably with EPICure outcomes (14% and 51%, respectively).

PA.24 PRESSURE TOLERANCE AND RISK OF RUPTURE OF NEONATAL PERCUTANEOUS CENTRAL LINES

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Aim: To determine the pressures generated and risks of rupture of 27G polyurethane (Premicath, Vygon) and 24G silicone (ECC, Vygon) percutaneous central venous catheters (CVC).

Abstract PA.24

	Silicone	Polyurethane
Pressure at 30 ml/h	8.3 (6.9 to 9.7)	42.1 (37.2 to 46.9)*
Pressure at 499 ml/h	189.6 (172.4 to 206.8)	823.9 (753.6 to 894.3)*
Rupture pressure	285.4 (254.4 to 316.5)	1738.2 (1635.4 to 1897.4)*
Flush pressure (patent CVC)	48.3 (33.1 to 63.4)	171.0 (144.1 to 196.5)*
Flush pressure (occluded CVC)	245.5 (146.9 to 343.4)	348.9 (295.1 to 403.3)
Rupture frequency (flushing occluded CVC)	5/9 flush attempts	0/40 flush attempts*

CVC, central venous catheter. *p<0.001.

Methods: Three in-vitro experiments were performed. Flow–pressure relationships in CVC were determined using an infusion of water, with increases in flow rate between 5 and 499 ml/h (16 polyurethane and 14 silicone CVC). These catheters were then occluded distally and low flow rates applied until rupture. Finally, neonatal staff were instructed to flush saline into both patent and obstructed catheters in two clinical scenarios, using three different syringe sizes (14 polyurethane catheters with 14 staff, six silicone catheters with six staff). Catheters and the manometer were hidden to ''blind'' staff.
Results: See table; pressure is in kPa; data presented as mean (95% CI).
Conclusions: Polyurethane catheters have greater pressure tolerance and lower rupture frequency compared with silicone catheters. Flushing of obstructed silicone CVC will probably result in rupture.

PA.25 PARENTAL PERCEPTION OF CONFLICTING ADVICE AND CONFIDENTIALITY IN THE NEONATAL UNIT

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Aim: To study the parental perception of conflicting advice and confidentiality during staff communication on the neonatal intensive care unit (NICU) and to relate this to baby and parent characteristics.
Methods: This is a prospective questionnaire study. Parents of babies admitted to the NICU were approached at the time of or soon after baby's discharge/transfer/death. Baby characteristics collected: demographic data, severity of complication and length of stay. Parental characteristics collected: ethnicity, social class, religion, family support and maternal age. Data collected on staff communication: frequency and place of update, parental perception of confidentiality and conflicting advice.
Results: A total of 397 parents were approached and 210 (52.9%) responded. 39.7% of parents reported that they were given conflicting advice. Parents of babies with complex clinical problems (49%) reported that they were given conflicting advice ($p = 0.027$). 41.4% of parents reported that the confidentiality was breached; more common in parents from social classes I–IV ($p = 0.013$). 19.2% of discussion was conducted in private. Significantly higher numbers (26.2%) of parents who received conflicting advice also reported that confidentiality was not maintained ($p = 0.0001$). Discussion in the ward or presence of other parents was the most common reason for breach of confidentiality. Significantly higher numbers of parents who reported breach in confidentiality (88.8%, $p<0.001$) and received conflicting advice (71.4%, $p = 0.005$) were also not satisfied with the overall care provided.
Conclusions: One third of parents reported breach in confidentiality and received conflicting advice during staff communication. Providing proper parent communication may help in improving parental satisfaction with overall care provided.

PA.26 POSTNATAL ULTRASOUND OF HIPS FOR BABIES WITH BREECH PRESENTATION AT TERM

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Background: Breech presentation in late pregnancy has been identified as a risk factor for developmental dysplasia of the hip, a spectrum of disorders including congenital dislocation. Developmental dysplasia of the hip is associated with significant impact on quality of life as well as implications for healthcare resources. The American Academy of Paediatrics published a guideline in 2000, which recommended that all babies who had presented as breech should have an ultrasound scan within the first 6 weeks of life.
Objectives: All babies delivered with a history of breech presentation at 6 weeks should have a postnatal ultrasound scan of the hips requested before discharge from hospital. These scans should occur within the first 6 weeks of life. Results should be filed in the baby chart. Abnormal results should be acted upon.
Methods: Babies born with breech presentation were identified via the Northern Ireland Maternity Statistics Database. Maternal charts were requested for calendar months February to June 2007. 34 charts were reviewed. If the information contained within the charts was incomplete, enquiries were made to Radiology and to the infant's general practitioner in order to exclude filing errors and lost reports as false negative results.
Results: Evidence of requests for ultrasound scans before discharge was found in 77% of cases. The report was in baby notes in 77% of cases. No abnormal results were noted. 26% of the ultrasound examinations were completed within 6 weeks.
Conclusions: As a unit, we can easily improve on the figures mentioned above. Strategies in progress to achieve this include re-education of all health professionals involved in postnatal care and liaison with Radiology colleagues with a suggestion to reserve dedicated ultrasound slots for these infants.

PA.27 BASIC LIFE SUPPORT FOR NEONATES: A STUDY OF COMPETENCE IN A CROSS-SECTION OF HEALTHCARE PROFESSIONALS

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Background: Reduced junior doctor working hours and decreased study leave budgets for all professionals were felt to affect the resuscitation skills of personnel entrusted with the responsibility of providing initial life support measures.
Aims: To assess basic life support skills in health professionals involved in neonatal care.
Methods: This was a prospective cross-sectional study using neonatal resuscitation guidelines 2005. All professional groups involved in the care of neonates in our trust were assessed using a common scenario with a mannequin. The maximum score that could be achieved was 19.

Abstract PA.27

Skills	NP (%)	Skills	NP (%)
Airway assessment	10 (40)	Landmarks	12 (48)
Airway positioning	8 (32)	Chest compressions (CPR)	20 (80)
Choosing appro mask	4 (16)	Rate 3 : 1	13 (52)
Assess of breathing	3 (12)	Depth of compression	8 (32)
Pressure relief valve	22 (88)	2-Finger technique	8 (32)
Ventilation breaths	5 (20)	CPR after requesting help	16 (64)
Circulation assessment	16 (64)		

CPR, cardiopulmonary resuscitation; NP, number of participants who did not perform skills appropriately.

Results: Participants n = 25; paediatric senior house officers 7, midwives 6, paediatric nurses 5, neonatal nurses 5, paediatric registrar 1, paediatric consultant 1. Source of most recent learning: NLS 15, weekly neonatal resus teaching 2, departmental study day 2, midwife 2 h study day 2, local trust NLS 3, emergency obstetric study day 1. Time since last training: <1 year (40%), <2 years (24%), <3 years (16%), ⩾3 years (20%) (see table).
Conclusions: There are gaps in knowledge and the practice of basic life support across all professional groups.
Recommendations: Regular resuscitation training sessions involving all team members may reinforce and refresh the knowledge and skills gained from attending life support courses. Resources need to be made available for continued training.

PA.28 PRIORITIES IN NEONATAL MEDICINES RESEARCH: A SCOPING EXERCISE

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The inadequate evidence base for neonatal therapeutics and the limited number of clinical trials that can be performed at one time indicate a need for prioritisation. The aim of this scoping study was to examine how prioritisation can be informed by data relating to medicines use and therapeutic gaps provided by clinicians.

A survey was sent to 80 units in the extended neonatal network (ENN) of the Medicines for Children Research Network. 25 units reported which medications were used over a 2-week period: 15 reported how many babies received each medication, 16 suggested therapeutic gaps.

Reports covered 119 medications and 1767 prescriptions. Medications most frequently used related to infection (20 medications, 34% of prescriptions), vitamins (11, 22%), chronic lung disease (8, 9%), skin (21, 9%), pain (7, 7%) and upper gastrointestinal tract problems (7, 6%). A dose for preterm infants was unavailable for 13 of the 21 most commonly used medications. Therapeutic gaps related to infection (8 units), chronic lung disease (6), hypotension (6), patent ductus arteriosus (6), vitamins (4) and neuroprotection (4). All units used caffeine, which is unlicensed in neonates.

This study demonstrates the feasibility of using the ENN to gather data about medicines use and the opinions of clinicians during prioritisation. Prioritisation will need to reconcile the need for research on high impact, low volume medicines (inotropes/patent ductus arteriosus), high impact, high volume medicines (chronic lung disease) and low impact, high volume medicines (vitamins). The large number of medications used in some therapeutic areas suggests that priorities could include therapeutic rationalisation.

BAPM/NNS: Epidemiology, Outcomes and Brain

PB.01 EPIDEMIOLOGY OF CONGENITAL DIAPHRAGMATIC HERNIA IN THE FORMER TRENT REGION, UK

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Aims: The management of congenital diaphragmatic hernia (CDH) remains a major challenge to all clinicians with no definitive trials to identify even elements of an optimal management approach. The aims of this study were to report the incidence and short-term outcome of CDH in a large geographically defined population with routine access to antenatal scanning and termination and to estimate the feasibility of performing a randomised control trial (RCT) in this patient population.

Methods: Data were collected on all cases of CDH reported to the East Midlands and South Yorkshire Congenital Anomaly Register between 1997 and 2005.
Results: 194 cases of CDH were identified from 547 025 births, a birth prevalence of 3.5 per 10 000. 73% were diagnosed antenatally and 22% postnatally. 69% of cases resulted in a live birth, with 61% one year survival. 25% of cases were terminated. 54% were isolated cases and 46% were associated with another anomaly; livebirths were significantly higher in the isolated group (80% versus 56%, $p \leqslant 0.01$). The overall one year survival with an isolated CDH was 62% compared with 19% with an associated anomaly ($p \leqslant 0.01$). Overall, only 133 babies were born alive and only 83 were cases of an isolated CDH; these being the only group suitable for inclusion in a RCT.
Conclusions: Given the above, it is impossible that any unit alone would be able to recruit sufficient patients to perform a valid RCT of management strategies for CDH. This highlights the importance of planning collaborative international trials to address this complex clinical problem.

PB.02 TRENDS IN NEONATAL MORTALITY OVER A 30-YEAR PERIOD: WHAT ARE THE REMAINING CHALLENGES?

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Aims: A report on neonatal mortality in Northern Ireland during 1974/5 showed it was higher than the rest of the United Kingdom. It also highlighted significant deficiencies in perinatal services at that time. Our aim was to review neonatal mortality and the organisation of services in 2004/5 compared with the earlier review.
Methods: All babies who died before 28 days of age between 1 January 2004 and 31 December 2005 were included. Data were collected on neonatal mortality rates, causes of death, place of birth and maternity services. Cause of death was classified using mortality tabulation based on the International Classification of Diseases, version 10.
Results: In the 1970s there were 44 maternity units and only one neonatal intensive care cot with one part-time neonatologist. There are now 10 obstetric units and 19 intensive care cots, all appropriately staffed. The neonatal mortality rate during 1974/5 and 2004/5 fell from 13.3 to 4.1 per 1000 live births. Immaturity is now the main cause of death with significantly more being less than 24 weeks (31.2% versus 2.8%). There are notably fewer deaths primarily from respiratory distress syndrome. Congenital malformation remains a major cause of death but with a marked reduction in some groups such as congenital heart disease (6% versus 26.5%) and the virtual disappearance of deaths from neural tube defects.
Conclusions: Neonatal death has fallen rapidly in 30 years as a result of major advances in prenatal diagnosis and neonatal therapy. The problems that remain are with very immature babies and those with sporadic lethal syndromes or other major malformations.

PB.03 MANAGING SEIZURES IN THE NEONATAL PERIOD: IS THERE A UK CONSENSUS?

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Background: Neonatal seizures are a relatively common occurrence associated with an adverse outcome. Their recognition is difficult. The clinical signs are often subtle and a substantial proportion are non-clinical. The introduction of cerebral function monitoring (CFM) has led to an increased recognition of seizures. Creating a guideline is difficult due to a lack of evidence for the drugs used and lack of international consensus.
Aim: To benchmark the management of neonatal seizures.