Abstracts

Plenary sessions

P1 IMPLEMENTATION OF A GUIDELINE FOR CHILDREN PRESENTING WITH ACUTE BREATHING DIFFICULTY: A BEFORE AND AFTER STUDY

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Introduction: Health professionals often spend a great deal of time developing new guidelines but little attention is given to the process of implementation.

Aim: To evaluate the implementation of an evidence-based guideline on the management of the child presenting with an acute breathing difficulty.

Method: An evidence based guideline was developed and a variety of strategies were employed to help implement the guideline such as small teaching sessions, workshops and dissemination of written material. In addition, the resulting guideline was implemented as an algorithm in the emergency department. Data on investigation, treatment, and cost of care were collected during four month periods before and after implementation.

Results: Data was analysed on 979 children before and 442 children after the implementation. There was a significant increase in the number of children having oxygen saturations and respiratory rate observed (p less than 0.001 and p=0.001). A significant decrease in the number of urea and electrolytes, c-reactive protein, blood culture and chest *x* ray (p=0.002, p=0.002, p=0.001, p less than 0.001 respectively) was found. There was a significant increase in the number of children with croup treated with oral steroids (p<0.001). Significantly less nebulisers (p=0.013) and significantly more spacers (p=0.001 exact) were used in the treatment of children with asthma. More children were admitted to hospital post implementation (p=0.04) but there was significantly less children re-attending the department within 24 hours (p=0.001). The total cost of attending to a child fell significantly from £78.33 to £74.73 (p is less than 0.05).

Conclusions: The implementation of the guideline produced a reduction in the number of investigations, standardised treatment, and reduced the cost of managing the child in the acute department. It also encouraged clinicians to be more precise and pay more attention to the appraisal of clinical signs and symptoms.

P2 THE INNOVO TRIAL: PRELIMINARY RESULTS FOR NO USE IN PRETERM INFANTS

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Background: Existing data from randomised trials provide no clear evidence of benefit from the use of inhaled nitric oxide (NO) in preterm infants with severe respiratory failure.

Method: Ventilated preterm infants (<34 weeks gestation) not responding to conventional care were eligible for the trial. Telephone randomisation was used with minimisation by hospital of care, principal diagnosis, severity of respiratory disease, and postnatal age at trial entry. Allocation was either to have nitric oxide added to the ventilator gases or not to use nitric oxide. No blinding was attempted. In most babies nitric oxide was started at a dose of 5 parts per million (ppm) and doubled and redoubled to a maximum of 40ppm if no satisfactory response (an increase in post ductal PaO2 of more than 3kPa) was achieved. It was estimated that 200 babies would have 80% power to detect whether NO reduces death or severe disability as assessed by the child's local paediatrician at one year (corrected) from 60% to 40% with α of 0.05 (2-sided).

Results: 108 babies were recruited (55 in the NO arm and 53 controls) from 21 neonatal units in 4 countries. See table.

Conclusion: NO clearly produces short term benefits in the preterm infant with severe respiratory failure but does not seem to influence longer term measures of outcome. Development will be reviewed again around 4 years.

P3 CLUSTERING OF HEALTH RISK BEHAVIOURS (HRB) (TOBACCO, ALCOHOL AND DRUG USE) IN A MULTI-ETHNIC SAMPLE OF EARLY ADOLESCENTS

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Aims: Common risk and protective factors may underlie HRB in adolescence. Clustering of HRB places young people at greatest risk of adverse outcomes. Little is known about such clustering in UK adolescents, particularly in minority ethnicities. This report describes risk and protective factors for HRB in the RELACHS cohort.

Methods: RELACHS wave 1 was a school-based epidemiological study of a representative sample of 2790 11–14yr adolescents from 28 schools in East London in 2001. HRB assessed : smoking 1 or more cigarettes per week; drinking alcohol more than once a fortnight; having ever used drugs.

Results: N=2790; 49% M. 74% non-"White". 1% reported 3 HRB, 2% two and 7% one HRB. Table shows conditional multivariate logistic regression for ⩾2 HRB, with forced entry of socioeconomic variables.

Conclusions: Black and Indian ethnicity and non-English home language were associated with a lower risk of clustering of HRB. Poor mental health, higher age and overweight were associated with higher risk. Socioeconomic variables did not explain associations found. Work is needed to examine mental health and acculturation as determinants of HRB in adolescents.

P4 GENETIC POLYMORPHISMS OF GROWTH FACTORS AND RETINOPATHY OF PREMATURITY

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Background: Retinopathy of prematurity (ROP) is a major problem amongst very preterm survivors of neonatal intensive care. Threshold ROP (tROP) occurs in about 5% of infants <1250gm, and despite treatment 20-30% of these children will become blind. Neovascularisation of the retina is important in the proliferative stages of ROP, and is under the control of a number of growth factors such as vascular

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	NO	No NO	RR (95%CI)
BWT (Kg) (mean,SD)	1.06 (0.40)	890 (0.34)	
GA (wk) (mean,SD)	27.4 (2.6)	26.3 (2.4)	
OI at recruitment (mean,SD)	39.3 (22.7)	41.1 (39.6)	
OI 1h after establishing dosage (mean,SD)	24.6 (16.4)	n/a	
Death up to 1 year corrected	30/55	34/53	1.27 (0.80,2.01)
Death or severe disability at 1 year corrected	37/55	36/52	0.97 (0.75,1.26)

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Variable	OR	p	95% C.I.	
Age (continuous)	3.30	0.00	2.13	5.09
Ethnicity (compared White)	0.62	0.39	0.20	1.87
Bangladeshi				
Black	0.34	0.01	0.15	0.78
Indian	0.19	0.03	0.04	0.88
Pakistani	0.00	0.61	0.00	56
Home language not English (comp. with English)	0.30	0.01	0.12	0.75
Abnormal Strengths & Difficulties Questionnaire (SDQ) score (compared with Normal score)	2.89	0.01	1.37	6.13
Overweight (BMI>85%) (compared <85%)	1.75	0.05	1.00	3.07
Eligible for free school meals (Yes compared No)	1.03	0.92	0.58	1.83
Home overcrowding (>1.5 per room compared <1.5)	1.21	0.61	0.58	2.54

endothelial growth factor (VEGF). While the majority of very preterm infants develop early ROP, only a minority proceed to tROP. We hypothesised that this progression is associated with a genetic predisposition to increased production of growth factors and other cytokines.

Methods: Buccal scrape samples were collected from 62 infants who had received laser treatment in the neonatal period for ROP, and from 68 gestation matched infants who had not had tROP. DNA was extracted and polymerase chain reactions used to produce material for polymorphism analysis. The frequencies of VEGF +405(G-C), VEGF 936 (C-T), TNFa 308 (G-A),and TGFB1 509(C-T) were determined in the two populations.

Results: The frequencies of the polymorphisms VEGF 936, TNFa 308 and the TGFB1 509 were similar in the two groups. The distribution of alleles at VEGF +405 was significantly different between the two groups (p=0.011). Twice as many tROP children were homozygous for (G-G), associated with higher VEGF production.

Conclusions: The progression of ROP to tROP in very preterm infants may be influenced by genetic differences in VEGF production. Future efforts at prevention of tROP might be directed at blocking excess VEGF production.

P5 WHY IS ALNA INSUFFICIENT TO MEET THE DHA DEMANDS OF THE PRETERM INFANT?

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Aims: Preterm infants fed formulas containing only α linolenic acid (ALNA), the precursor of docosahexaenoic acid (DHA), have lower concentrations of DHA in the CNS than breast fed infants[1] whilst DHA enriched preterm formulas are associated with developmental advantages.[2] This suggests that supplying ALNA alone cannot meet DHA demands.[2] We used isotopic tracers to examine the factors that may constrain DHA supply from ALNA.

Methods: 20 preterm infants [Median (range) corrected gestation 33 (30–37) weeks, study weight 1690 (1036–2080) g] were given 20 mg/kg of [U-^{13}C] ALNA emulsified within the formula feed. ^{13}C content of stool measured using CF-IRMS was used to measure absorption. Excretion of $^{13}CO_2$ on breath over 24 hours was used to estimate partitioning of [U-^{13}C] ALNA towards beta-oxidation. Blood samples (1ml) were taken at 0, 6, 24, 72, and 168 h; plasma lipids extracted and labelled n-3 fatty acid concentrations were measured by GCC-IRMS [3].

Results: Median (range) ^{13}C excretion in stool was 7.0 (2.0–26.2) % of administered dose and was negatively correlated with gestation (r= –0.57, p=0.008). Median breath $^{13}CO_2$ excretion was 12.8 (7.6–19.0) % of absorbed dose and correlated with weight gain (r=0.51,p=0.04). All babies synthesised labelled DHA, median 0.35 (0.03-0.56) μmol/L per 168 h equivalent to 3.6 % of available ALNA (or < 6 mg/d for a 1.69 kg infant on current preterm formula).

Conclusions: The preterm infant's ability to meet DHA requirements may be constrained by the poor absorption of ALNA, particularly in the younger babies. Moreover, although DHA synthesis from ALNA appears greater than that seen in adults,[3] these results suggest that DHA synthesis may still be insufficient to meet the demands of the developing infant (estimated to be 35 mg/kg/d [4]).

1. Farquharson J, Cockburn F, *et al. Lancet* 1992;**340**:813.
2. Simmer K. The Cochrane Library, Issue 3, 2002.
3. Burdge GC, Jones AE, Wootton SA. *Br J Nutr* 2002;**88**:355–64.
4. Clandinin MT, *et al. Early Hum Dev* 1981;**5**:355–66.

P6 RANDOMISED DOUBLE-BLIND TRIAL OF LCPUFA-SUPPLEMENTATION USING FISH OIL AND BORAGE OIL IN PRETERM INFANTS

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Background: The efficacy and safety of LCPUFA-supplementation of formulas for preterm infants remain unresolved issues with available supplement studies yielding conflicting results.

Aim: To test the efficacy and safety of LCPUFA-supplementation using gamma-linolenic acid (GLA) as a precursor of arachidonic acid (AA), and docosahexaenoic acid (DHA) in preterm infants up to 9 months post-term.

Methods: 238 preterm (<35 weeks, <1750g birthweight) infants randomly assigned to receive unsupplemented formula or formula supplemented with LCPUFAs from fish oil (DHA) and borage oil (GLA) up to 9 months post-term. Preterm formulas fed until hospital discharge, and post-discharge formulas from discharge to 9 months. Main outcome measures: Bayley Mental and Psychomotor Indices (MDI, PDI) at 18 months post-term and Knobloch, Passamanick and Sherrard's Developmental Screening Inventory at 9 months post-term. Safety outcome measures: anthropometry at 9 and 18 months, feed tolerance, infection and clinical complications.

Results: There were no significant differences in neurodevelopment between randomized groups overall, but, in a preplanned sub-group analysis, LCPUFA-supplemented boys had significantly higher Bayley MDI than controls (difference 5.7 points (95% CI 0.3 to 11.1), p=0.04). LCPUFA-supplemented infants also showed significantly greater weight gain (mean difference 310g (95% CI 30 to 590g), p=0.03) and length gain (mean difference 1.0cm (95% CI 0.02 to 1.9), p=0.05) by 9 months post-term, with a significantly greater effect in males. Plasma fatty acid measurements suggested conversion of GLA to AA in supplemented infants.

Conclusions: This large trial, using the relatively inexpensive strategy of providing GLA from borage oil as a source of AA, showed: (a) efficacy, in terms of outcome benefits for growth and neurodevelopment, notably in males; (b) no adverse effects. These data have implications for LCPUFA-supplementation strategy in preterm infants.

P7 ASSOCIATION BETWEEN INFANT NUTRITION AND BLOOD PRESSURE IN EARLY ADULTHOOD: THE BARRY CAERPHILLY GROWTH COHORT STUDY

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Aims: To determine whether early infant nutrition, as measured by intake of reconstituted dried formula milk in the first 3 months of life, is associated with blood pressure in early adulthood.

Methods: Long term follow up (1997–1999) of a randomised controlled trial (1972–1974) into which mothers and their offspring were randomised to milk supplementation or usual care (Barry Caerffily Growth (BCG) study). 679 males and females aged between 23 and 27 years were seen at follow-up. Systolic and diastolic blood pressures were recorded.

Results: Subjects who were followed up were similar to those who were not for a range of social and demographic factors. There was a clear positive dose response relationship between dried milk intake at 3 months of age and systolic blood pressure in early adulthood (p=0.004): the mean systolic blood pressure was 120.2mmHg versus 114.0mmHg in the highest versus lowest quartiles of intake. Dried milk intake at 3 months of age was positively associated with diastolic blood pressure (highest versus lowest quartiles: 71.2mmHg *v* 68.9mmHg; p=0.059). In multivariable linear regression models adjusted for sex, intervention group, birthweight z-scores (standardised for sex and gestational age), social class in childhood, age at follow-up, alcohol and smoking, intake of dried milk was positively associated with systolic and diastolic blood pressure. For each increase in quartile of dried milk intake (ounces) there was a 1.27mmHg (95% CI: 0.45 to 2.10) increase in systolic and 0.62mmHg (0.04 to 1.22) increase in diastolic blood pressure. These coefficients were attenuated when adult BMI and height were included in the models, but the association of dried milk intake with systolic blood pressure remained significant (1.07; 0.27 to 1.87). The association of dried milk intake and systolic blood pressure was stronger in males than females (p for interaction: 0.034).

Conclusions: These results are consistent with the hypothesis that high blood pressure in later life is influenced by early postnatal nutrition, independent of birthweight. The public health implications of our findings are important, since reductions in population mean blood pressure levels observed in this study would be predicted to be as more effective in reducing blood pressure-related morbidity or mortality than targeting interventions at high-risk individuals only The suggestion of postnatal nutritional influences on adult health offers the possibility that interventions to optimise infant nutrition may have important long-term health benefits.

P8 CONFIDENTIAL ENQUIRY INTO STILLBIRTHS AND DEATHS IN INFANCY (CESDI): PROJECT 27/28. AN ENQUIRY INTO QUALITY OF CARE AND THE EFFECT ON THE OUTCOME OF THE PRETERM INFANT: NEONATAL FINDINGS

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Aim: To identify variations in standards of care that might contribute to death in preterm infants born at 27 to 28 weeks gestation.

Methods: *Design*: Case control study. *Cases:* 366 neonatal deaths occurring in England, Wales and Northern Ireland from 1st September 1998 to 31st August 2000. *Controls*: 395 survivors randomly selected from the same cohort. *Primary exposure*: Deficiencies in neonatal care in the first week of life. *Standards for enquiry:* Deficiency of care based on pre-established clinical standards and expert opinions of best practice. Reviewers could not be blinded to outcome but applied strictly defined criteria. *Measure of effect*: Odds ratio (OR) adjusted for gender, growth restriction and severity of illness shortly after birth.

Results: *Resuscitation at birth:* Timely attendance of skilled staff was not achieved in 45% of all deliveries. Intubation difficulties were common. *Early thermal care:* Seventy four % of infants who died and 59% of survivors had an admission temperature below the standard of 36°C and substandard early thermal care was observed more frequently in infants who died (OR 1.4 (1.0–1.94)). *Surfactant:* Most intubated infants (96%) received surfactant however administration delay was frequent. *Ventilatory support:* More deficiencies (e.g. poor ventilation strategies and failure to respond to blood gases) were identified in infants who died (50%) than in survivors (34%) OR: 2.08 (1.49–2.9). *Cardiovascular support:* Deficiencies (e.g. delay or failure to use inotropic support) were more frequent in infants who died (34%) than in those who survived (20%) (OR: 2.13 (1.45–3.15)). *Organisation of care:* Deficiencies (e.g. staffing levels and lack of senior support) were more frequent among infants who died (OR: 2.06 (1.42–2.98)). *Transport:* Substandard neonatal care during transport was more common in infants who died (OR: 7.96 (2.22–28.48)).

Conclusion: Recommendations at trust, national and commissioning levels based on these findings may improve survival in preterm infants born at 27–28 weeks.

P9 THE PREDICTIVE VALUE OF EARLY CEREBRAL FUNCTION MONITORING (CFM) FOR NEURODEVELOPMENTAL OUTCOME AFTER NEONATAL HYPOXIC-ISCHAEMIC ENCEPHALOPATHY (HIE)

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Introduction: Early CFM may be useful in directing novel neuronal rescue therapies to those infants at greatest risk of severe adverse outcome.

Aim: To determine the predictive value of CFM trace in first 6hrs of life on one-year neurodevelopmental outcome of Sarnat Stage 2/3 HIE.

Methods: Prospective cohort study of 25 consecutive term admissions with Sarnat Stage 2/3 HIE. 6hr and 24hr CFM trace and 7 day MRI were scored blind to 1-year outcomes. One-year outcomes were based on neurological assessment by Neonatologist, and Revised Griffiths Developmental Assessment. The CFM trace was scored according to the upper (u) and lower (l) voltage limits (in μV) of the background trace as follows: Normal: u>10, l>5, Mild suppression: u>10, l<5, moderate suppression: u<10, l<5, severe suppression: u<5, l<5.

Results: 12 (48%) were inborn. 21 (84%) had 5-min Apgar ⩽5 and 13 (52%) had 5-min Apgar ⩽3. 12 had a cord pH, which was <7.0 in 5 (42%) and 21 (84%) had base deficit ⩾14 on first arterial blood gas. 20 (80%) required intubation in delivery room and 8 (32%) took first gasp/breath ⩾10 mins age. 5 (20%) had Sarnat Stage 3 HIE. One-year outcomes were: 13 normal, 1 moderate disability, 8 severe disability, 3 neonatal deaths. The Positive Predictive Value (PPV) and Negative Predictive Value (NPV) for severe disability or death were as follows: Moderate or severely suppressed CFM trace at 6hrs of age; PPV 61%, NPV 100%. Severely suppressed CFM trace at 6hrs; PPV 78%, NPV 75%. Non-normal CFM trace at 24hrs; PPV 77%, NPV 92%. Abnormal MRI at 7 days age; PPV 53%, NPV 100%. First gasp/breath ⩾10 mins; PPV 100%, NPV 82%.

Conclusion: A severely suppressed CFM trace at 6hrs had a reasonable PPV for severe adverse outcome. However, this was outperformed by the time to first gasp/breath ⩾10 mins, which may therefore be a more useful tool to direct neuronal rescue therapies. In terms of use in parental counselling, a normal or only mildly suppressed CFM trace at 6hrs, a normal CFM trace at 24hrs, and a normal MRI are each strongly predictive of a normal outcome.

P10 OUTCOME AT 5–7 YEARS OF THE WESSEX CONTROLLED TRIAL OF UNIVERSAL NEONATAL HEARING SCREENING (UNHS)

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Objective: We previously reported the early results of the (only published) controlled trial (1993–96) of UNHS.[1] The present study ascertained five years later, in the same birth cohort that had been enrolled in the trial of UNHS, the impact of UNHS on the rate of early referral among all cases of congenital bilateral permanent childhood hearing impairment (CBPCHI) ⩾40 dB HTL.

Methods: Ascertainment of cases and review of files of all such cases known to audiology departments, teachers of the deaf and S&L therapists.

Results: A total of 70 (130 per 100 000) cases of bilateral PCHI had been confirmed in the 53,781 children that had been in the earlier trial of UNHS. Comparing babies born during periods of the trial *with* UNHS to those born during periods *without* UNHS, the proportion of all cases diagnosed by age 5 to 7 years of age that had been referred before age of 6 months of age was:

(a) 23 of 32 (72%) versus 4 of 20 (20%) (difference 52%, 95% confidence interval (CI) 24 to 69%) cases of moderate or severe CBPCHI.

(b) 3 of 5 (60%) versus 6 of 13 (46%) cases of profound CBPCHI (difference 14%, not significantly different from 0) and

(c) The relative risk of referral before age of 6 months for all CBPCHI was 2.32 (95%CI 1.33 to 4.05) and the risk difference was 0.40 (95%CI 0.166 to 0.578).

Conclusion: The UNHS programme in this trial lead to a 2.3 fold rise to 70% in the percentage of all CBPCHI =40 dB HTL that was referred before 6 months of age. This benefit occurred predominantly among those with moderate or severe losses. The effect of this on speech, language and related outcomes will be the subject of a further report.

1. WUNHSTG, *Lancet* 1998;**352**:1957–64.

P11 COGNITIVE AND BEHAVIOURAL STATUS IN EXTREMELY PRETERM CHILDREN AT 6 YEARS

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Aims: Recent meta-analysis[1] has indicated that very low birthweight children (VLBW) have a mean IQ 0.7 SD below controls and are 2.5 times more likely to have ADHD. We examine these conclusions using the cognitive and behavioural outcome for a population based study of children born ⩽25w gestation in the UK and Ireland in 1995 (EPICure).

Methods: Cognitive function at 6y was measured by 8 well-trained psychologists, using the Kaufman-ABC. Behavioural function was evaluated using the Strengths and Difficulties Questionnaire, completed independently by the parents and teachers. Matched comparison children within the same class were recruited in mainstream schools.

Results: Of the 308 survivors, 241 (78%) were assessed at a median age of 6 years, 4 months and their performance compared to that of 159 classmates. Mean differences in mental processing (MPC: Index: 81±21; comparison: 106±12) and Achievement (AS) were highly significant amounting to 2.1SD (MPC) and 1.7 SD (AS). Index children were 59 times more likely to have severe cognitive deficits (<-2 SD; OR=59 (95%CI: 14 to 250) than comparison children. The processing of simultaneous information was more impaired than sequential information processing. Parental and teacher reports of behavioural problems were similar in indicating a highly increased prevalence of pervasive attention deficit/hyperactivity (ADHD) (OR=6.2 (2.6-15.2)). Parents also reported more emotional, conduct and peer problems and that extremely preterm children were less prosocial in their behaviour.

Conclusions: The cognitive and behavioural difficulties reported for VLBW children are also found in the newer generation of extremely preterm children. The prevalence of seriously cognitively impaired children is high and their parents perceive generalised behaviour difficulties more frequently in their offspring.

1. Bhutta *et al*, *JAMA*;**288**(6):728–37.

P12 DEVELOPMENTAL AND NEUROLOGICAL DISABILITY IN EXTREMELY PRETERM CHILDREN AT 6 YEARS

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Aims: EPICure is a population-based study of children born ⩽25w gestational age in the UK and Eire from March to December 1995. We report the neuro-developmental status of this population at 6 years.

Methods: 7 paediatricians performed formal neurological assessments and 8 psychologists the Kaufman ABC (IQ). Disability was graded as severe (non-ambulant; IQ <–3SD; blind; profound SNHL) or moderate (ambulant CP; IQ –2 to –3SD; other functional visual or hearing loss; autism).

Population: Of the 308 survivors, none had died since 2½y, 15 were lost to follow-up/abroad, the parents of 23 refused and 29 did not respond to contact; 241 (78%) were assessed in school at a median age of 6.33 years.

Results: Of the assessed children, 35 (14.5%) had severe disability, 24 (10%) had moderate disability, 70 (29%) had other impairments with no functional loss and 112 (46.5%) were unimpaired. The proportion of children with disability was 29% at 23w, 33% at 24w and 19% at 25w (χ^2 trend p=0.003). Among boys, 20% had severe and 15% moderate disabilities compared to 9% and 5% of girls (χ^2 trend p=0.002). Odds ratio for boys with any disability: 2.4 (95%CI: 1.4–4). After controlling for sex, the relationship with GA remained. Children from multiple pregnancies had similar disability rates to singletons. Affected domains are shown in the table.

Using our own reference group (n=159) to define the normative data for classification of disability (mean IQ 106 (sd: 12)) the proportion of index children with severe and moderate disability each rose to 22%, respectively.

Conclusions: The absolute proportion of children classified with disability depends upon the reference range used. The prevalence of disability in this high-risk group remains high in early school years.

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Overall grading of disability	>1 domain affected	Domains affected		
		Neuromotor	Cognitive	Sensory
Severe (n=35)	26 (74%)	21 (60%)	35 (100%)	12 (34%)
Moderate (n=24)	0	4 (17%)	17 (58%)	3 (13%)

P13 HYPOTHERMIA IS NOT NEUROPROTECTIVE WHEN COMMENCED 3 HOURS AFTER HYPOXIA-ISCHAEMIA (HI) IN THE NEWBORN PIGLET

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Background: We have shown that Selective head cooling (SHC) is neuroprotective when started immediately after the insult in our pig model of HI. However current clinical trials of hypothermia (HT) require a period of delay before commencing HT in order to gain parental consent.

Aim: To determine whether a delay of 3 hrs influences the neuroprotective effect of HT.

Method: Thirty two piglets (median age 24hrs) received a 45min global HI insult (the severity of which is judged by the length of time CFM aEEG amplitude is below <7iv) followed by randomisation to one of three groups for the 24hr period after the insult: i) Normothermia (NT) maintaining T_{rectal} at 39°C, ii) SHC using a cap perfused with cold water to maintain T_{rectal} at 34 -35°C, iii) Total Body HT (TBHT) using a cooling blanket to maintain T_{rectal} at 34–35°C. Pigs in the NT group had a median T_{rectal} of 39.1°C (IQR 38.8–39.1°C) for the 24 hrs following the insult, whilst pigs in the SHC group were cooled to a T_{rectal} of 34.2°C (IQR 33.8–34.6°C) during this period and those in the TBHT group to 34.4°C (IQR 34.0–34.6°C). Neurological assessments took place at 30, 48 and 72 hrs after the insult. At 72 hrs the pigs were anaesthetised and the brains perfusion fixed for neuropathological assessment using light microscopy. Six regions of the brain were scored from 0 (0%) – 4 (>75% damage) (Total brain neuropathology score 0–24).

Results: The severity of the insult was similar in all groups (NT *v* SHC *v* TBHT (29.6/45min *v* 32.6/45 *v* 32.4/45 (p=0.5) of low aEEG amplitude)). The neurology scores at 30, 48, and 72 hrs were similar in all groups. There was no difference in the total neuropathology scores between the 3 groups (NT median 1.75(range 0.5–18) *v* SHC 2(0.5–24) *v* TBHT 2.5(0.5–16) (p=0.7)).

Conclusions: A 3 hour delay in the introduction of HT after HI in newborn pigs abolishes the neuroprotective effects that are seen when it is started immediately. Current clinical trials of HT should aim to start therapy as soon as possible. The delay involved in obtaining informed consent may deprive infants of a treatment which has been shown to be effective.

P14 BODY COMPOSITION IN SEVERELY DISABLED CHILDREN FED EITHER ORALLY OR VIA GASTROSTOMY

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Gastrostomy feeding in the severely disabled child with oral-motor dysfunction leads to improved quality of life for the caregiver and weight gain. However, little information exists on the compartmental make up of this weight gain.

Aim: To measure body composition and investigate differences between those fed via gastrostomy (GF) and those fed orally (OF).

Methods: Body composition was assessed by O^{18} dilution in 16 (10 male) GF and 10 (5 male) OF disabled children.

Results: There were no significant differences in the median (range) ages between GF or OF children (4.8 (1.9–10.9) and 4.8 (1.3–9.8) respectively). Overall the children were underweight (wt SDS –3.0 (–4.6 to 2.7)) with OF children being more underweight than GF (wt SDS –3.8 (–4.6 to –1.6) and –2.9 (–4.3 to 2.7), p=0.02). There was no significant difference in fat free mass (FFM) between

groups (Table). Fat mass (FM) was significantly greater in GF children, but not when expressed as %fat. Comparing the measured value with that predicted from reference standards for children, FFM was significantly reduced in both groups (p<0.0001), with no significant difference in the reduction between groups (Tbl). However, GF children had greater FM than expected which was significantly greater than OF children and even greater than in reference children (Tbl).

Abstract P14

Measurement	GF	OF	P value
FFM (kg)	11.0 (6.7 to 23.0)	8.9 (6.4 to 12.5)	0.70
FM (kg)	5.5 (0.4 to 12.8)	2.9 (1.7 to 4.5)	0.02
%fat	31.4 (2.88 to 49.93)	23.3 (15.0 to 32.7)	0.06
ΔFFM	–5.27 (–0.45 to –13.0)	–5.26 (0.35 to –11.9)	0.62
ΔFM	2.37 (5.67 to –2.23)	–0.19 (1.58 to –1.21)	0.007

Conclusion: Gastrostomy feeding in the disabled child improves overall weight gain, but this gain is almost entirely accounted for by increases in FM. Using %fat as a nutritional marker is misleading, as there is a marked reduction in FFM in both GF and OF children. The health implications of this imbalance require further investigation. (Δ = measured-predicted)

P15 THE UNITED KINGDOM CHILDHOOD CANCER STUDY: AN INVESTIGATION INTO THE POSSIBLE CAUSES OF CANCER

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Aims: To test if childhood cancer is caused by; exposure to ionising radiation, hazardous chemicals (before conception, in-utero or postnatally); abnormal response to infectious agents (in-utero postnatally); exposure to low frequency electromagnetic fields (postnatally).

Methods: Between 1991 and 1998 the parents of children newly diagnosed with leukaemia/cancers were recruited by 10 Regional centres into a case-control study, linking interview information obtained with medical records data, biological samples, and household measurements of radon gas, terrestrial gamma radiation and electric/magnetic fields.

Results: 3838 case children (1736 leukaemias) and 7629 controls were studied. The principal findings to date are: no evidence to support association between childhood cancer and radon gas, gamma radiation, electro-magnetic fields, neonatal administration of intramuscular vitamin K, parental smoking, parental occupation, or breast-feeding. Biological studies have, however, suggested that low function detoxifying enzymes (eg NQ01) and of genes which increase free folate may influence the development of infant and childhood ALL. The risk of developing common ALL, was associated with peptide binding pocket profiles common to certain HLA-DPB1* alleles.

Conclusions: Initiation of pre-malignant clones occur in utero but post natal genetic events are required. Ongoing analysis is focussing on both in utero and postnatal events.

P16 CLINICALLY SILENT SUBDURAL HAEMORRHAGES IN THE NEWBORN NEONATE

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Aims: (1) To image clinically normal newborn infants to detect the presence of any intracranial bleed. (2) To follow up any neonate with a bleed and establish its natural history.

Methods: Newborn babies were imaged within 24 hours of delivery. All details of the labour and delivery were recorded. MR imaging was performed on a dedicated 0.2T Niche MR system. Images were obtained in axial and coronal planes using T1, T2 and gradient echo weighted images.

Results: 93 newborn infants have been scanned to date. Final delivery achieved: 42 (45.1%) normal vaginal delivery, 9 (9.7%) ventouse (3 metal cup, 6 silastic), 9 (9.7%) emergency sections, 13 (14%) elective sections, 20 (21.5%) forceps (18 Neville Barnes, 2 Keillands). 3 had documented subdural collections that were clinically silent throughout their duration. All three of these babies were delivered by forceps following a failed attempt at a ventouse delivery. 13 babies were delivered by forceps, and 1 by emergency Cesarian section, following an attempt at a ventouse delivery. Analysis of pregnancy, labour and delivery factors in the 3 babies with subdural collections compared to these 13 did not show any significant factors, (duration of second stage of labour, Apgars and caput using Student's t test all had p values that were not significant) apart from the delivery method. The subdural collections had all completely resolved on follow up MR scans at 4 weeks of age.

Conclusion: Clinically silent subdural haemorrhages occur in the newborn neonate. These may be related to a traumatic instrumental delivery.

P17 ARE THERE PATTERNS OF BRUISING WHICH ARE DIAGNOSTIC OR SUGGESTIVE OF ABUSE IN CHILDREN? A SYSTEMATIC REVIEW

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Aim: Bruising is the commonest presenting feature of physical child abuse: however it is not always easy to distinguish abuse from accident. Yet such a decision is crucial to our assessment. We have therefore conducted a Systematic Review to answer the question: are there patterns of bruising which are diagnostic or suggestive of abuse in children?

Methods: We have conducted an all language literature search of original articles and abstracts for the period 1970–2002 from health and social science databases. We reviewed 148 full text papers. Fifteen reviewers conducted two independent reviews of each paper, and a third review if necessary. All used standardised criteria for defining the study type and specially devised Data Extraction, Critical appraisal and Evidence forms.

Results: We included 23 papers: seven assessed bruising in normal children, 14 bruising in abused children and two in both. Details of bruising patterns on 3792 'normal' children confirm that bruising is directly related to mobility not age in younger children. No bruising was found to back of limbs, hands, feet or buttocks in 1755 normal children under two years. 60–90% of 2–4 year olds have bruises, but <1% have bruising to buttocks, neck or ear. The peak prevalence of bruising is 5–9 year olds, but 99% have no bruising to chin, ears or neck. Sixteen papers present data on 1634 abused children. The key finding is the difference in bruising to cheeks, back, buttocks, posterior thigh and chest (p<0.001) between abused and non-abused children. Clustering of bruises to face, buttocks, arms, outer thighs are very commonly described. Fractures are frequently unaccompanied by bruises.

Discussion: This review presents data on over 3000 normal and over 1500 abused children. It presents some useful information particularly on normal patterns of bruising in babies and young children. However more funded research on bruising on abused children is clearly needed.

P18 TRENDS IN EARLY RECOGNITION OF LIFE-THREATENING NEONATAL CARDIOVASCULAR MALFORMATIONS

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Aim: Earlier recognition of life-threatening cardiovascular malformations (CVM) in the neonate should lead to an improvement in outcome. This study investigates the timing of recognition of serious neonatal CVM.

Methods: A retrospective analysis of the time of diagnosis of all serious CVM in 1985–2000 in one health region. Diagnoses considered life threatening were all babies with hypoplastic left heart, pulmonary atresia with intact ventricular septum, simple transposition of great arteries (TGA), or interruption of the aortic arch (IAA), and babies with the following conditions requiring intervention or causing death within 28 days; coarctation of aorta (CoA), aortic valve stenosis (AS), pulmonary stenosis / tetralogy of Fallot, pulmonary atresia other than as above, and total anomalous pulmonary venous connection.

Results: Of 569 767 live births, with 3431 cases of CVM in infancy, 541 had a life-threatening CVM as defined above. Overall, 33% remained undiagnosed by discharge from hospital. The timing of diagnosis is shown in the fig. Diagnoses more likely to be unrecognised at discharge were CoA (68%), IAA (65%), TGA (38%) and AS (30%). Although antenatal diagnosis increased from 3% to 14%, there was no improvement in pre- discharge recognition of serious CVM. Despite this, infant mortality fell from 59% to 26%.

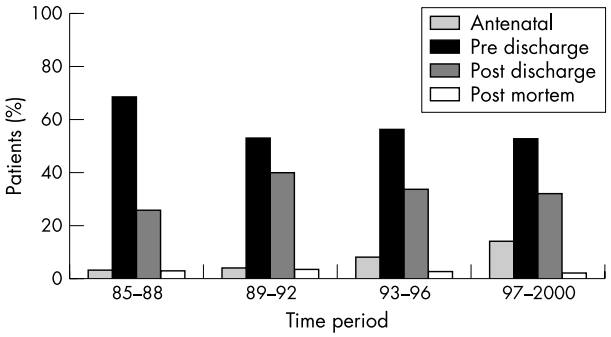

Figure 1 Abstract P18

Conclusions: 33% of life-threatening CVM are not recognised before discharge from hospital. There has been no improvement in early diagnosis in the last 16 years. The trend to earlier discharge might be a contributory factor.

P19 VISUAL IMPAIRMENT IN VERY PRETERM CHILDREN AT 7 YEARS

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Aims: To determine the prevalence of visual impairments in children born very preterm, compared with term children, to examine the relationship between impairments and earlier cerebral ultrasound appearances and retinopathy, and to explore the correlation between impairments and visual perception, motor and cognitive functioning.

Population: 279 children at 7 years of age born before 32 weeks of gestation in Liverpool during 1991–92 and attending mainstream schools, and 210 term controls.

Methods: Visual acuity was assessed by Snellen charts and strabismus by the cover test, stereopsis using the TNO random dot test and contrast sensitivity using Cambridge Low Contrast Gratings. Visual perception and motor abilities were assessed using the Developmental Test of Visual Motor Integration (VMI) and the Movement ABC, intelligence with the Wechsler Intelligence Scale for Children. Perinatal, cranial ultrasound and retinopathy screening data were extracted from the neonatal records.

Results: Children born preterm were significantly more likely to wear glasses (12.8% *v* 4.3%) to have poor visual acuity (6.5% *v* 1.4%) reduced stereopsis (41% *v* 12.4%) and strabismus (13.6% *v* 1.4%). Contrast sensitivity was similar. Visual impairments were significantly related to poorer scores on the VMI, ABC and IQ tests. Visual impairments in this group were not significantly related to neonatal cranial ultrasound appearances or stage of retinopathy.

Conclusions: Children born very preterm and without major neurodevelopmental sequelae, have an increased prevalence of visual impairments at primary school age which are associated with defects in visual perception, motor and cognitive function. The aetiology may be a generalised abnormality of cortical development rather than a perinatal focal lesion of the brain.

P20 IS TREATMENT FOR STRAIGHT EYED AMBLYOPIA WORTHWHILE? RANDOMISED CONTROLLED TRIAL OF TREATMENT OF UNILATERAL VISUAL ACUITY DEFICIT DETECTED AT PRE-SCHOOL SCREENING

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Background: Pre-school vision screening has been introduced in many districts to aid the early identification of amblyopia without manifest squint: 'straight eyed amblyopia'. This has conventionally been treated by spectacle correction supplemented by occlusion of the better eye if necessary. However the effectiveness of this treatment has never been formally tested and its value has recently been questioned.

Methods: This randomised controlled trial in 8 UK treatment centres recruited 177 children, mean age 48 months, with acuity in the worse eye of 6/9 to 6/36 and without manifest strabismus. They were randomly allocated to FULL treatment of spectacle correction followed by occlusion if required, or to GLASSES only, or to NO treatment. All outcomes were assessed 'blind' after one year's follow-up using LogMAR acuity testing.

Results: 164 (93%) subjects were followed-up. Children in the GLASSES and FULL treatment groups had incrementally better uncorrected and corrected visual acuity at follow up than the NO treatment group (p =0.04 and 0.001, linear regression, respectively) but the mean difference in corrected acuity between FULL and NO treatment was less than one Snellen line (0.11 logMAR P t-test <0.0001). In those with initial acuity ≤6/18 (N=64) the corrected acuity difference was greater (0.20 logMAR p<0.001) while for the 104 children with acuity ≥6/12 the difference was insignificant (0.04 logMAR p=0.14).

Conclusions: Treatment for unilateral visual acuity deficit detected at pre-school vision screening is worthwhile for those with significantly reduced acuity, but children with 6/9 or 6/12 acuity in the worse eye, who are the majority currently failing screening, receive little benefit from treatment.

P21 OUTCOMES OF MENINGOCOCCAL DISEASE DURING THE TEENAGE PEAK

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Aims: Meningococcal disease (MD) is a major cause of morbidity as well as mortality in teenagers. No studies have specifically examined the long term complications of developing MD in adolescence. We examined the social, psychological and functional outcomes of MD during the teenage peak.

Methods: A prospective population-based case-control study of MD 146 cases in 15–19 year olds and age & sex matched controls was undertaken in 6 regions of England in 1999–2000. 101 case-control pairs were selected for follow up by structured interview 18–36 months later. Outcomes included measures of premorbid IQ (National Adult Reading Test (NART), current IQ (WAIS-R), short-term memory (Rey Auditory Verbal Learning Test (RAVLT List B)), depression (Beck Depression Inventory), mental health status(SF-36 MCS), physical health status (SF-36 PCS) and quality of life (QOL). Group differences assessed by bivariate linear regression controlling for age.

Results: Mean age 19.4 years; 46%M. No significant differences on NART. See table.

Abstract P21

Variable	Means		p
	Cases (n=101)	Controls (n=101)	
WAIS	102.1	104.3	0.15
SF-36 PCS	48.4	51.8	0.4
SF-36 MCS	46.6	53.5	0.07
RAVLT (List B)	5.93	6.45	0.04
Beck Depression Inventory	8.04	6.91	0.18
QOL (estimate of change since MD)	4.45	5.37	<0.001
QOL (currently compared to peers)	4.2	4.7	<0.01

Conclusion: Survivors of MD in adolescence have poorer quality of life and a trend towards poorer mental health functioning and higher rates of depression than highly matched controls. Full-scale IQ and physical health status do not seem to be significantly affected. Neuropsychological testing revealed proactive interference, indicating a deficit in cognitive flexibility, storage and short term memory skills. Aftercare of MD survivors should address possible memory, QOL and mental health issues.

P22 IMPROVED DIAGNOSIS OF TUBERCULOSIS IN SOUTH AFRICAN CHILDREN USING A T CELL BASED ASSAY

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Aims: To assess the clinical utility of a novel T cell based assay in the diagnosis of tuberculosis in children with a high prevalence of HIV.

Methods: Children aged 2 months—14 yrs with suspected TB were recruited. All had routine investigations including Tuberculin Skin Test (TST). In addition peripheral blood mononuclear cells were tested for responsiveness to ESAT 6 and CFP10 (antigens specific for M.Tuberculosis) using the INFγ ELISPOT assay.

Results: Of 57 children with confirmed TB, 80% had a positive ELISPOT compared with 35% for theTST (p<0.001). Of 133 children with confirmed or highly probable TB, the sensitivity of the ELISPOT assay was 83% compared with 63% for the TST (p<0.001).

In the 30 children with HIV co-infection the sensitivity of the TST fell significantly to 36% (p=0.002) and in those with malnutrition (n=59) it fell to 44%(p=0.001). In contrast the sensitivity of the ELISPOT was not significantly adversely affected by either HIV or malnutrition. (p=0.17, 0.2).

Conclusions: The sensitivity of the ELISPOT for active TB was higher than the TST, and, unlike the TST, was not significantly diminished by HIV co-infection or malnutrition. This study identifies the ELISPOT assay as a potentially valuable diagnostic tool in children with suspected TB in areas with a high prevalence of TB and HIV.

P23 FREQUENT REPLACEMENT OF THE URINE COLLECTION PAD REDUCES THE LIKELIHOOD OF SAMPLE CONTAMINATION

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Background: Urine collection pad (UCP) is an easy, rapid and non-invasive method to diagnose urinary tract infections (UTI) in children still in nappies. However interpretation is frequently confounded by faecal/skin flora contamination (>10^5org/ml). Our previous study showed that modification of the method by incorporating a moisture sensitive enuresis alarm[1] (to reduce contact time between perineal skin and wet UCP) did not reduce the contamination rate below 21%, but did make the technique easier and faster to use. In this study we tested the hypothesis that contamination of the UCP is related to its contact time with dry skin before urine is passed.

Aims: To compare the incidence of >10^5org/ml mixed growth in samples from UCPs (incorporating a moisture sensitive alarm) with and without frequent replacement with a fresh UCP.

Method: Febrile children (<2yrs) with suspected UTI were randomised to 2 collection methods; the same UCP kept in the nappy until urine passed (alarm signal), or the UCP replaced with a fresh UCP every 30 minutes until urine passed (alarm signal).

Results: 80 children were enrolled and 68 samples were collected (single UCP 37, replaced UCP 31). UTI occurred in 3/68 (4%). In the remaining 65 samples, heavy mixed growth contamination occurred in 1/31(3%) of the group where UCP was freshly changed every 30 minutes compared with 10/35(29%) in the group with same UCP left until urine passed (p=0.008).

Conclusion: Changing to a fresh UCP every 30 minutes significantly reduces the rate of perineal skin flora contamination of UCP samples to minimal levels. This represents a simple and clinically useful improvement to technique.

1. *Arch Dis Child* 2002;**86**(suppl 1):A72(G220).

P24 IS ANTENATAL RENAL PELVIC DILATATION A RISK FACTOR FOR RENAL SCARRING IN CHILDHOOD?

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Introduction: Moderate antenatal renal pelvic dilatation (ARPD) is predictive of postnatal vesicoureteric reflux (VUR). However, this is only important if affected children subsequently develop the most significant complication of VUR, renal scarring. Scarring virtually always begins in the first 4 years of life and is best detected by dimercaptosuccinic acid (DMSA) scanning. We assessed the prevalence of scarring in older children who had moderate ARPD and compared it to that in our local paediatric population.

Method: A DMSA scan was performed on 189 children over the age of 4 years who had ARPD of 5–15mm antero-posterior or transverse diameter but no subsequent intervention. Cases were recruited from those routinely reported to 2 local antenatal databases before the association between ARPD and VUR had been described. Evidence of proven urinary tract infection was sought from the general practitioner of each child.

Results: The scarring rate for boys was 0/133 = 0% (95% CI 0 to 2.8) and for girls was 1/56 = 1.8% (95% CI 0.3 to 9.4). The corresponding values for the local population were 0.17% for boys and 0.52% for girls. We used a Bayesian approach with a prior distribution assumed for the population scarring rate: the mean is given by the population rate and the variance is controlled by a parameter, *N*. For a wide range of *N* the probability of 0 boys scarring was between 0.88 and 0.95, and for 0 or 1 girls scarring was between 0.93 and 0.95. Therefore the values for scarring obtained from the children with moderate ARPD are in keeping with those from the local population. The same is true for the values for the rate of urinary tract infection.

Conclusion: Our data show that there is no evidence of a relationship between moderate ARPD and renal scarring despite its apparent association with VUR. It may therefore be inappropriate to investigate newborns with moderate ARPD for VUR.