Emergency medicine and intensive care joint session

G106 CURRENT PRACTICE AND OPINION REGARDING THE USE OF THERAPEUTIC HYPOTHERMIA AFTER CARDIAC ARREST SURVIVAL IN CHILDREN: A SURVEY OF UK PAEDIATRIC INTENSIVE CARE CONSULTANTS TO INFORM THE COLD-PACK STUDY

B Scholefield, H Duncan, K Morris. *Paediatric Intensive Care Unit, Birmingham Children's Hospital, Birmingham, UK*

Aim: Therapeutic hypothermia improves the neurological outcome in adults after cardiac arrest and term neonates with hypoxic ischaemic encephalopathy. There is currently no evidence to support its use in the paediatric population following cardiac arrest. This survey of UK paediatric intensive care unit consultants aims to ascertain current practice in the UK and attitudes and opinions to guide the feasibility of a multicentre randomised controlled trial (RCT) of therapeutic hypothermia after cardiac arrest in children (the Cold-PACK study).
Method: Between 1 October and 23 November 2008, 149 consultant paediatric intensivists in the UK were invited to complete a web-based survey of current practice in therapeutic hypothermia and opinions regarding future research.
Results: 120/149 (80.5%) responded with 113 usable surveys (75.8%). 48% reported "always" or "often" using therapeutic hypothermia after the return of spontaneous circulation after cardiac arrest in children, whereas 33% stated they never used therapeutic hypothermia, with "not enough research evidence" as the commonest reason (32/35). 65% of responders stated not knowing if therapeutic hypothermia currently improved survival after cardiac arrest. 91% of users of therapeutic hypothermia do not have a protocol for its use and there is wide variation in practice with respect to the depth and duration of hypothermia and methods of cooling. 100% use at least one surface cooling method, with the commonest being the water blanket (78%). Commencement of cooling is attempted in the emergency department by 33% and in the referring hospital before transport by 46%. Reported duration of cooling ranged from 4 to 72 h; 63% cool for at least 24 h, 31% cool for at least 48 h but only 4% cool for 72 h or longer. Only 32% of respondents target a temperature used in the adult and neonatal studies (33 $\pm$ 1°C) with 44% aiming for 34–35°C. 88% of all consultants surveyed would support an RCT of hypothermia versus normothermia in children and agree it is ethical (89%) and deferred consent could be used (85%).
Conclusions: Wide variation in UK practice in the use of therapeutic hypothermia and a state of clinical equipoise is demonstrated by this survey, which shows support for a UK multicentre collaboration in a future RCT of therapeutic hypothermia after cardiac arrest in children.

G107 MICROCIRCULATORY CHANGES IN CHILDREN WITH SEVERE MENINGOCOCCAL DISEASE CORRELATE WITH CLINICAL RECOVERY AND MARKERS OF ENDOTHELIAL DYSFUNCTION

[1]F Paize, [1]I Sinha, [1]E Carrol, [2]A Riordan, [1]N Makwana, [2]R Sarginson, [1]G Jeffers, [1]C Parry, [1]A Thomsom, [1]CA Hart. *[1]University of Liverpool, Liverpool, UK; [2]Royal Liverpool Children's Hospital, Alder Hey, Liverpool, UK*

Aims: Orthogonal polarisation spectral imaging (OPS) non-invasively visualises the microcirculation in real time. Studies using OPS in adults with severe sepsis show microcirculatory abnormalities. This has not previously been studied in children. Disturbances in the microcirculation result from endothelial activation mediated through adhesion molecules. We aimed to ascertain whether microcirculatory disturbances are present in children with meningococcal disease (MCD) and whether these disturbances correlate with plasma levels of adhesion molecules.
Methods: Twenty children admitted to the paediatric intensive care unit with MCD were recruited. The sublingual microcirculation was visualised using OPS at admission and at timed intervals until extubation. All OPS images were obtained by the same investigator. Images were analysed by two blinded investigators, by assessment of the microvascular flow index (MFI), capillary density (CD), proportion of perfused vessels (PPV) and perfused vessel density (PVD), as detailed in previous studies. Plasma intracellular cell adhesion molecule type 1, vascular cell adhesion molecule type 1, E-selectin and P-selectin were measured at admission.
Results: All children survived. Significant reductions in MFI, CD, PPV and PVD were found in children with MCD at admission compared with controls ($p<0.005$). These differences were no longer significant before extubation. There were strong correlations between MFI and PPV and adhesion molecules (see table). A correlation was found between CD and P-selectin ($r = -0.53$, $p<0.05$). Correlations were also found between the amount of resuscitation volume required and MFI ($r = -0.52$, $p<0.05$) and PPV ($r = -0.47$, $p<0.05$). MFI at admission also correlated with the total length of inotropic support required ($r = -0.56$, $p<0.05$) and the total length of ventilatory requirement ($r = -0.48$, $p<0.05$).
Conclusion: These results confirm microcirculatory dysfunction in children with severe MCD and microcirculatory recovery alongside clinical recovery. Microcirculatory variables correlate with markers of endothelial activation and may predict the need for inotropic and ventilatory support. OPS could be a useful adjunct in guiding resuscitation in severe sepsis in children.

Abs G107 Table Correlations between microcirculatory outcome measures and cell adhesion molecules

	ICAM-1	VCAM-1	E-selectin
MFI	$r = -0.88$, $p<0.01$	$r = -0.88$, $p<0.01$	$r = -0.87$, $p<0.01$
PPV	$r = -0.59$, $p<0.01$	$r = -0.52$, $p<0.01$	$r = -0.63$, $p<0.01$

ICAM-1, intracellular cell adhesion molecule type 1; MFI, microvascular flow index; PPV, proportion of perfused vessels; VCAM-1, vascular cell adhesion molecule type 1.

G108 PREDICTION OF UNFAVOURABLE OUTCOME AFTER CHILDHOOD BRAIN TRAUMA USING PAIRED SERUM BIOMARKERS

T-Y Lo, P Jones, R Minns. *University of Edinburgh, Edinburgh, UK*

Aims: We aimed to determine whether combinations of two serum biomarkers may achieve higher outcome predictive values than individual biomarker levels in childhood brain trauma.
Methods: A prospective observational study was conducted involving 28 critically ill children following brain trauma. Day 1 post-injury serum concentrations of eight different biomarkers (S100b, NSE, IL6, IL8, IL10, SICAM, L-selectin and endothelin) were quantified using ELISA. Global outcome was assessed at 6 months post-injury using the Glasgow outcome score. Outcome predictive values were assessed using receiver operator characteristic curve (ROC) analysis and its multivariate extension.
Results: None of the eight biomarkers assessed individually achieved an area under the ROC curve (AUC) of more than 0.95 for predicting an unfavourable outcome, but five of the 20 biomarker pairs assessed had this high degree of outcome predictability. Combining S100b serum level with either L-selectin or IL6 achieved an AUC of 0.98, with 96% specificity and 100% sensitivity for unfavourable outcome prediction.

Conclusions: Prognostic pairs combining serum levels of two biomarkers offer superior outcome predictive values for an unfavourable outcome after childhood brain trauma than may be achieved using individual marker levels.

G109 MORTALITY RATES AND RANDOMISED CONTROLLED TRIALS: A UK NEONATAL AND PAEDIATRIC INTENSIVE CARE SURVEY (THE BRACELET STUDY)

[1]C Snowdon, [1]S Harvey, [1]D Elbourne, [2]R Tasker, [3]M Ward Platt, [1]P Brocklehurst. *[1]London School of Hygiene and Tropical Medicine, London, UK; [2]Department of Paediatrics, Cambridge, UK; [3]Royal Victoria Infirmary, Newcastle, UK*

Background: Increasing numbers of children are enrolled into neonatal or paediatric intensive care randomised trials but there is little information about how many die, either overall or across trials and across collaborating centres.
Aims: To determine trials activity in neonatal and paediatric intensive care in 2002–6 and levels of trial involvement for individual units, the numbers dying before discharge and variation in mortality across units and trials.
Methods: Two linked questionnaire surveys: (1) of units; (2) of trials.
Results: 149/176 (85%) neonatal and 28/32 (88%) paediatric units responded. 50 trials (36 neonatal, 14 paediatric) were identified. Half of the responding units had participated in one or more of these trials. 3349 children participated. Numbers enrolled ranged from one to 56 per unit. 534 children (16%) subsequently died: 522 (17%) in neonatal trials and 12 (6%) in paediatric trials. Deaths were unevenly distributed across both individual trials and units.
Conclusions: A substantial number of bereaved parents, clinicians and triallists are potentially affected by deaths among trial participants. Numerically, the issue is most salient for the neonatal specialty, although the deaths that were identified were particularly concentrated in a small number of units and trials, suggesting variable levels of experience with bereavement in a trial context. There is little evidence to guide clinical collaborators and trial teams in how to address this matter. Qualitative and methodological work with bereaved parents, clinicians and trial teams is in progress.

G110 USE OF AMBULATORY INTRAVENOUS CEFTRIAXONE IN PAEDIATRIC A&E: A USEFUL ALTERNATIVE TO ADMISSION?

J Smith, S Alexander. *University of Edinburgh, Edinburgh, UK*

Introduction: Fever is one of the most common reasons for children to attend an A&E department. The literature suggests that the presence of occult bacteraemia in the feverish child is 1.3–5.6%. There are reports from developing countries treating children on an ''ambulatory'' or ''outpatient'' basis with intravenous antibiotics. Overall, it is a relatively rare method practised in the UK, some would even say controversial. In our paediatric A&E there is a practice of using ambulatory ceftriaxone in certain patients.
Aims: To look at the numbers and demographics of children receiving ambulatory intravenous antibiotics, including indications for use, results of investigations, length of treatment, failure of treatment and cost implications. When appropriate to compare management with that stated in national guidelines.
Methods: The period of 1 December 2007 to 31 March 2008 was chosen as a busy period during winter. Patient details were added to a proforma at the time of treatment. Computer records were cross-referenced after the study period looking at all children who attended (9216 in total). If they had attended on consecutive days, notes were retrieved and inspected for evidence of ambulatory treatment.
Results: 36 children received ambulatory ceftriaxone (age range 6 months to 15 years) in the 4-month period. Indications included lymphadenitis (two), tonsillitis (one), petechiae (10), periorbital cellulitis (five), pyrexia of unknown origin (12), urinary tract infection (six). The average duration of ceftriaxone was 2.3 doses (range one to four) plus varying oral courses. The white cell count ranged from 4.7 to 28.8, neutrophil count 0.2 to 19.2, C-reactive protein less than 5 to 132. There were two positive blood cultures (coagulase-negative staphylococcus), which were felt to represent contamination and not true occult bacteraemia. There were nine urinary tract infections on culture. There was one failure of treatment requiring admission for four times daily antibiotics for worsening lymphadenitis. The use of ambulatory antibiotics in the ''pyrexia of unknown origin'' group is generally against advice stated in the National Institute for Health and Clinical Excellence guideline ''Fever without focus.'' The cost saving for the group managed as outpatients as opposed to inpatients was calculated at £41 544.
Conclusions: Ambulatory ceftriaxone is a child-friendly alternative to hospital admission in the well child. No occult bacteraemia featured in this small population. There is inevitable overtreatment of children with viral illnesses.

G111 DO CHILDHOOD BURNS PRESENTING IN EMERGENCY DEPARTMENTS FALL INTO RECOGNISED PATTERNS? CAN THESE PATTERNS ALERT CLINICIANS TO POTENTIAL INFLICTED INJURIES OR NEGLECT AND INFORM PREVENTION?

S Jones, A Kemp, S Maguire. *Department of Child Health, Cardiff University, Cardiff, UK*

Aims: The aetiology of childhood burns changes over time according to hazards in the home and the wider environment. Children present to A&E departments with burns on a regular basis. However, there are few epidemiological studies on the pattern of burns in these children as most studies are conducted in burns and plastics inpatient units. Clinicians need an understanding of the pattern of accidental burns in children before they can identify inflicted injury or burns that have arisen from neglect. Preventive strategies can be informed from an understanding of the agents and mechanisms of burns, and standard assessment details obtained on presentation.
Methods: We are conducting an ongoing epidemiological study of burns to children (<16 years) seen in A&E departments. We are collecting data regarding the age and developmental stage of the child, level of supervision, the agent and mechanism of injury, the pattern, severity and distribution of the burn, first aid attempts and the dates of injury and presentation.
Results: To date, 102 children are included in the study: 15% (0–1 years), 44% (1–3), 3% (3–5), 16% (5–11), 21% (11–16). These include 47% scalds, 44% contact burns and 9% flame burns. The patterns of burns are characteristic for different age groups. 73% of the scalds and 47% of the contact burns are sustained by under 3 year olds who sustain the injuries in the home setting. The frequent agents are beverages causing scalds to the upper body and contact burns to palms of hands and feet from hair straighteners, irons, oven doors and radiator pipes. In contrast, 71% of burns in children over 11 years of age are contact burns and flame burns. The burns mainly occurred outside the home, on various parts of the body, involving agents such as food, motor exhausts and petrol. 78% of children presented promptly after injury and 69% had some first aid before presentation. All of the under 5 year olds had a health visitor referral, 12% of cases were transferred to local burns units, half of which (6% of total) had a child protection referral.
Conclusions: Burns to children fall into recognised patterns according to age and developmental stage. Cases that fall outside of these typical patterns should alert clinicians to possible inflicted injury or neglect issues and help inform prevention. With help from health visitors about first aid, and advice about safety in the home, these incidents could be reduced.

G112 NICE HOT CHILDREN: AN AUDIT COMPARING FEVERISH CHILD ASSESSMENT WITH NICE GUIDANCE IN A PAEDIATRIC EMERGENCY DEPARTMENT, STAFFED BY PAEDIATRICIANS, PAEDIATRIC EMERGENCY MEDICINE DOCTORS AND A DEDICATED TEAM OF PAEDIATRIC EMERGENCY MEDICINE NURSES (28 000 UNDER 16S/YEAR)

A Scott, R Khanna. *Sunderland Royal Hospital, Sunderland, UK*

Aim: To compare the current practice of assessing feverish children with National Institute for Health and Clinical Excellence (NICE) guidance (CG47 ''Feverish illness in children''). Audit standards: 100% of feverish children should be assessed using a ''traffic light system''; 100% of feverish children should have temperature, heart rate (HR), respiratory rate (RR) and capillary refill time (CRT) measured. 100% of feverish children with RED features (without apparent source) should have full blood count, C-reactive protein, blood culture and urine testing.
Method: Prospective audit conducted (1–7 October 2007). Forty-five children with axillary temperature greater than 37.5°C at triage identified. Paediatric emergency department notes were reviewed and further data were taken from electronic computer records and inpatient notes.
Results: The traffic light system was not used; notes were reviewed to assign the likely category (see table 1). RED children: two had no definite diagnosis, both had suggested tests (see table 2).

Abs G112 Table 1 Observations recorded at triage

Observations	T	HR	RR	CRT
%	100	91	51	29

CRT, capillary refill time; HR, heart rate; RR, respiratory rate; T, temperature.

Abs G112 Table 2 Attendance outcome

		Outcome	
Traffic light category	Number	Admitted	Discharged
RED	5 (11%)	5	0
AMBER	7 (16%)	5	2 (29%)
GREEN	33 (73%)	3	30 (91%)

Conclusion: There is a need to improve the recording/documentation of basic observations, which all feverish children should have. The traffic light system is more amenable for non-specialist settings, eg, primary care, to aid assessment and planning for further care needs. Our overall assessment and management are effective and NICE compliant without adopting the traffic light system. We plan to continue using existing triage methods and thorough, timely medical assessment.

G113 DOES A STANDARDISED SCORING SYSTEM OF CLINICAL SIGNS REDUCE VARIABILITY BETWEEN DOCTORS' ASSESSMENTS OF THE POTENTIALLY DEHYDRATED CHILD?

[1]D Roland, [2]C Clarke, [3]M Borland, [3]E Pascoe. *[1]Leicester Royal Infirmary, Leicester, UK; [2]Royal Perth Hospital, Perth, Australia; [3]Princess Margaret Hospital for Children, Perth, Australia*

Background: Clinical assessment of dehydration in children is often inaccurate. We aimed to see if a scoring system based on standardised clinical signs would reduce the variability between doctors' assessment of dehydration.
Methods: A clinical scoring system was developed using seven physiological variables based on previously published research. The estimated percentage dehydration and severity scores were recorded for 100 children presenting to a paediatric emergency department with symptoms of gastroenteritis and dehydration by three doctors of different seniority (resident medical officer (RMO), registrar and consultant). Agreement was measured using the intraclass correlation coefficient (ICC) for percentage ratings and total clinical scores and kappa for individual characteristics.
Results: Estimated percentage dehydration ranged from 0% to 9% (mean 2.96%) across the three groups. Total clinical scores ranged from 0 to 10 (mean 2.20). There was moderate agreement among clinicians for the percentage dehydration (ICC 0.40). The level of agreement on the clinical scoring system was identical (ICC 0.40). Consultants gave statistically lower scores than the other two groups (consultants vs RMO $p = 0.001$; consultants vs registrars $p = 0.013$). There was a marked difference in agreement across characteristics comprising the scoring system, from kappa 0.02 for capillary refill time to 0.42 for neurological status.
Conclusion: The clinical scoring system used did not reduce the variability of assessment of dehydration compared with doctors' conventional methods. In order to reduce variability improving education may be more important than the production of a scoring system, as experience appears to be a key determinant in the assessment of a potentially dehydrated child.