



# School of Child & Adolescent Health

UNIVERSITY OF CAPE TOWN

ANNUAL RESEARCH DAYS 2012



100 | FACULTY OF HEALTH SCIENCES  
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CENTENARY



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## Programme and Abstract Book

23rd & 24th October

D3 Lecture Theatre, D Floor

Red Cross Children's Hospital

## CPD Points

Tuesday, 23 October 2012

4 points

Wednesday, 24 October 2012

7 points

**Please sign the attendance register on both days to claim your points.**

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**Title:** AN EVALUATION OF A NEW TRIAGE PROCESS: PAEDIATRIC- SOUTH AFRICAN TRIAGE SCALE (P-SATS), AT A CENTRAL PUBLIC CHILDREN'S HOSPITAL, CAPE TOWN, SOUTH AFRICA

**Authors:** Dr Heloise Buys<sup>1</sup>, Dr Rudzani Muloiwa<sup>1</sup>, Ralph Diedericks<sup>1</sup>, Zanele Nxumalo<sup>2</sup>, Dr Catherine Wedderburn<sup>1</sup>

**Affiliation:** <sup>1</sup>Red Cross War Memorial Children's Hospital & Department of Paediatrics, UCT  
<sup>2</sup>Red Cross War Memorial Children's Hospital

**Objective:**

To evaluate the P-SATS tool in the medical emergency services at Red Cross Children's Hospital.

**Design:**

A prospective observational study.

**Setting:**

Red Cross War Memorial Children's Hospital, Cape Town, South Africa.

**Methods:**

Triage data on children presenting to the medical emergency services from 28<sup>th</sup> May-15<sup>th</sup> June 2012 were analysed prospectively. The number of children in each triage category Red-emergency/ Orange-very urgent/ Yellow-urgent and Green- non-urgent and their disposal was evaluated. The timing of the different components of the triage process was also evaluated.

**Results:**

Of 1801 children, 1114 children had sufficient information to be analysed. The median age was 23.6(IQR 7.2-56.8) months; 8.5% (94) were aged less than 2 months; 44% (491) were female. 39(3.5%) children were triaged Red-emergency, 242(22%) Orange-very urgent, 286(26%) Yellow-urgent and 547 (49%) Green /non-urgent. Twenty two% (234/1114) of all the triaged children were admitted: 97.4% (38/39) of the Red category, 39.3% (95/242) of the Orange category, 30.1% (86/286) of the yellow while 97.3% (532/547) children in the Green category were discharged. There was a significant difference in the two timed components of the triage process: time taken to triage using clinical signs without Triage Early Warning Score (TEWS) measurement lasts a median of 2 (IQR 1-2) minutes, with TEWS, triage lasts 7 (IQR 5-10) minutes per child (Wilcoxon signed-rank test  $p < 0.0001$ ). Overall concordance between the triage process using clinical signs without Triage Early Warning Score (TEWS) measurement and the process including the TEWS was 93.7% ( $\kappa=0.79$ ).

**Conclusions:**

The clinical sign-based triage process appears to be a reliable triage tool, and is closely correlated with the complete tool employing TEWS. Performing TEWS in all children significantly lengthens the triage time and may hugely impact on the efficiency of a busy triage area. Its feasibility in busy paediatric emergency units in resource-constrained centres needs review.

**Running title:** PSATS and paediatric emergency units

**Key words**

Triage; children; resource-constrained centres



**Title:** FEASIBILITY OF IMPLEMENTING THE FOOD-BASED DIETARY GUIDELINES (FBDGs) IN PRIMARY SCHOOL CURRICULUM IN THE WESTERN CAPE

**Authors:** KA Nguyen<sup>1</sup>, MK Hendricks<sup>1</sup>, A de Villiers<sup>2</sup>, L Bourne<sup>1,2</sup>, JM Fourie<sup>2</sup>

**Affiliation:** <sup>1</sup>SCAH, University of Cape Town; <sup>2</sup>CDLU, Medical Research Council

**Introduction:**

South African Food-Based Dietary Guidelines (FBDGs) were developed as a nutrition education tool to improve public awareness and practices of healthy food consumption and physical activity.

**Objective:**

To explore perceptions of educators about the feasibility of implementing FBDGs in the national curriculum of primary schools in the Western Cape.

**Methods:**

Combined quantitative and qualitative methodologies were used. We report on the quantitative component. Self-administered questionnaires were completed by educators (N=256) at twelve primary schools across different quintiles in three education districts, Metro Central (MC), Metro East (ME) and Cape Winelands (CW).

**Results:**

Respondents assessed FBDGs as appropriate to South African schoolchildren (94%), could be used as an education tool (97%) and fill gaps in the current curriculum about healthy dietary habits (91%). Besides Life Orientation, FBDGs could be taught in other learning areas from grade 3 to 7. Important barriers to implementing FBDGs in the curriculum by educators were their workload (61%), insufficient time (46%), learners' disadvantaged background (43%) and the educator's lack of knowledge (33%). Other approaches to teaching children about FBDGs included linking it to the National School Nutrition Programme (NSNP) (82%), tuck-shops (79%), parent meetings (75%), school nutrition policy (73%) and school assembly (57%). Educators in MC and high income schools perceived tuck-shops and school assembly as the best means to teach pupils about FBDGs (P <0.001), whereas educators in the CW prioritised NSNP as the best mean to teach about FBDGs (P <0.05).

**Conclusions:**

Implementing FBDGs in the national school curriculum is seen as important together with optimizing the school physical environment. Key factors required for successful implementation in the curriculum are sufficient educational materials, adequate time allocation, and appropriate educator training.

**Ethics approval number: 498/2010**

**Title:** WHAT FACILITATES AND HINDERS STABILISING A CRITICALLY ILL CHILD IN THE MEDICAL EMERGENCY UNIT AT THE RED CROSS WAR MEMORIAL CHILDREN'S HOSPITAL IN CAPE TOWN SOUTH AFRICA? A DESCRIPTIVE ETHNOGRAPHIC STUDY

**Authors:** C. Bonaconsa<sup>1,3,4</sup>; M. Coetzee<sup>1,3,4</sup>; A.C Argent<sup>2,3,4</sup>

**Affiliation:** <sup>1</sup>Child Nurse Practice Development Initiative, <sup>2</sup>Division of Paediatric Critical Care and Children's Heart Disease, <sup>3</sup> School of Child and Adolescent Health, <sup>4</sup>University of Cape Town and Red Cross War Memorial Children's Hospital, Cape Town, South Africa

**Objectives:**

The objective was to identify and describe factors which facilitate and hinder optimal stabilization of the critically ill child in the medical emergency department.

**Methods:**

The study was conducted in the medical emergency unit of the Red Cross War Memorial Children's Hospital. Data was collected through direct observations (by one observer) of all activities around 10 children from triage red (at entrance) through to transfer out of the area; retrospective clinical data of observed pathways; field notes; unstructured interviews and a six month register review of the Resuscitation room. The qualitative methodology of ethnography underpinned the study.

**Results:**

From these observations the complexity and unpredictability of this environment became apparent. A child could not be observed in isolation, but the complex nature of "other activities" largely influenced stabilisation. Themes of process (actual activities related to patient care) and structure (elements in the system) were identified. Results highlight structural factors (practice norms of access; roles; resources; communication and teamwork) impact on care rendered at the bedside (patterns of practice; assessment and history; maintained monitoring; gathering additional data and treatment). Other contributors to pressure include: location of the medical emergency unit; interruptions and bottlenecks. A structured analysis system was developed to reflect the information collected.

**Conclusions:**

The medical emergency unit is a complex setting with multiple factors that impact on how critically ill children are stabilised. Data shows how structural factors impact on care rendered. Despite these challenges, this research concludes that optimising stabilisation for the critically ill child is not prioritised by the system in this setting.

**Title:** CHILD PASSENGER SAFETY IS NO ACCIDENT: 2012 BUCKLE-UP SURVEY

**Authors:** Mavengere, Chiedza; Mtambeka, Pumla; Schulman, Dorothy; Abrahams, Yumna; Mitchel, Kimberly and Bungane, Yonela.

**Objective:**

This observational study sought to explore and examine the role of human behavior in reducing the impact of road accidents through buckling up of parents, caregivers and drivers themselves, but more specifically, their children.

**Methods:**

The methodology used for data collection and data analysis was quantitative research method. A research team undertook an observational study at the main gate of the Red Cross War Memorial Children's Hospital. These observations were conducted over a two day period in August and September from 9am to 3pm. Descriptive statistics were used to analyse the quantitative data.

**Results:**

A total of 1965 individuals (adults and children) in 1249 cars were observed during this study. These adults included both visitors and staff members. The results showed that more adults (55%) (drivers and passengers) were not wearing seat belts. Also, 79% of children in these cars were unrestrained in either a car safety seat or seatbelt and only 21% of the children were properly restrained.

**Conclusions:**

This study demonstrated the great need to create more awareness on the risks associated with not restraining children in motor vehicles. Educating parents and caregivers on child passenger safety in motor vehicles proves paramount. Appropriate information and education regarding the age and weight appropriate safe restraint methods of both adults and children remain pivotal to decrease the burden of road traffic crashes.

**Title:** A SITUATION ANALYSIS OF THE NEEDS AND SERVICES AVAILABLE FOR CHILDREN WITH DISABILITIES, AND DISABLING CHRONIC ILLNESSES IN THE WESTERN HEALTH SUB-DISTRICT OF CAPE TOWN

**Authors:** Andrew Redfern, Kirsty Donald, Anthony Westwood

UCT ETHICS APPROVAL 9/9/2011 (HREC 425/2011).

**Objectives:**

The purpose of the current study is twofold: (1) identify the number of children known with disability, or disabling chronic illnesses in the Western Health Sub-district of Cape Town, and compare this with the expected number based on estimated local and international prevalences; (2) identify and analyse the health services that currently exist for these children, and the number of children currently utilising them.

**Methods:**

A point prevalence survey was conducted using a multi-pronged approach. Information of children was gathered from Red Cross Hospital electronic patient database (Clinicom), New Somerset Hospital Paediatric OPD, special care centres/special schools and relevant NGO's. Red Cross data included outpatient attendances or admissions between Jan 2010 and Feb 2012 of children from specific post codes, who had either specific ICD 10 codes (known to be associated with disability or a disabling chronic illness eg. Cerebral palsy) or who had attended selected speciality clinics (Cerebral palsy, Development, Spinal defects, Neuromuscular). NSH POPD data was collected by a doctor at the clinic during the first 6 months of 2011. Relevant NGO's were asked to provide information of children in the relevant areas if available. Basic demographic details of all children at institutions involved in the care or education of children with disability from the relevant geographical area were obtained. This information was gathered between January 2011 and Sept 2012, depending on when the institutions responded. All results were entered into an excel spreadsheet, and then duplicates were deleted. Facilities other than hospitals were also asked to provide basic details of equipment, staff, and amount of ancillary support from medical and allied health professionals.

**Results:**

580 children were identified from the Red Cross Clinicom system and NSH POPD (556 & 14 respectively). Four out of six special care centres provided information, and one out of eight schools for children with special educational needs. There were 164 severely disabled children in 4 special care centres, and 149 children at one school with moderate intellectual disability. An NGO involved in supporting families of children with autism had 33 children on their database from the relevant area. The total number of children identified in this incomplete dataset, when pooling all the above data and removing duplicates, was 878. Of the children in the special care centres, just under 10% of children had attended Red Cross during the 2 year period analysed.

The centres/schools ranged from 62 to 100% of capacity, with an average of 91%. The carer to number of children ratio in the special care centres averaged 1: 8.7. Allied health professional support to special care centres was quite variable. Most centres had at least a monthly visit from a physio, speech and occupational therapist, although one only had physio input twice a year, and one centre had no OT or SLT input at all. Only 1 centre had a visit from a doctor 4 times a year, and another centre had a full time nursing sister. Apart from this there was no input or support from medical, nursing or psychiatric professionals.

**Conclusions:**

Although data-set is incomplete, some conclusions can be made. Based on expected prevalences, it is clear that a number of children with severe disability are not attending special care centres, and that this may be due to a lack of capacity. It is of concern that despite the lack of medical and nursing support to institutions caring for children with complex medical needs, very few (<10%) of these children attend a central hospital regularly. The ability of these institutions to provide a nurturing, caring, stimulating and rehabilitating environment, given the staffing levels and levels of ancillary support, is questionable. The interpretation of these results should be made with caution, due to a number of factors. Firstly, it is recognized that this is an imperfect methodology with numerous flaws. The data is also incomplete. Notwithstanding this, it can be stated fairly confidently that a number of children with some form of disability or disabling chronic illness are not being cared for within the current health and educational system.

**Title:** HOSPITAL ACQUIRED INFECTIONS IN PAEDIATRIC POSTOPERATIVE CARDIAC PATIENTS IN A SOUTH AFRICAN PAEDIATRIC INTENSIVE CARE UNIT (PICU)

**Authors:** Appel I; Morrow BM; Argent AC

**Affiliation:** Paediatric Intensive Care Unit, Red Cross War Memorial Children's Hospital and Division of Paediatric Critical Care and Children's Heart Disease, School of Child and Adolescent health, University of Cape Town.

**Introduction:**

Hospital acquired infections (HAIs) are an important cause of morbidity and mortality after paediatric cardiac surgery.

**Aim:**

To determine the incidence, risk factors and outcome of postoperative HAIs.

**Methods:**

A prospective observational study of all post-operative cardiac patients admitted to PICU from September 2011 to March 2012.

**Results:**

110 patients (median age 19 months; 43% male) undergoing 126 surgical procedures were enrolled. Nine (8.2%) patients died (six with HAI,  $p=0.2$ ). 60 HAIs (mainly bacterial) occurred in 43 (39%) patients (68.3% pulmonary; 13.3% blood; 11.7% wound; 3.3% urine; 3.3% tissue).

Underweight for age (adjusted odds ratio, OR: 4.07; 95% CI 1.23 – 13.48,  $p = 0.02$ ), low cardiopulmonary bypass temperature (0.86; 0.75 – 0.98;  $p = 0.03$ ), increased duration of arterial lines (1.51; 1.04 – 2.20;  $p = 0.03$ ) and intercostal drains (ICD) (1.29; 1.014 – 1.64;  $p = 0.04$ ) were associated with HAI on multivariate analysis.

Patients with HAI spent median (IQR) 6 (4 – 13) and 21 (9 – 38) days in PICU and hospital compared to 3 (2 – 5) and 9 (7 – 13) days in uninfected patients ( $p < 0.0001$ ).

**Conclusions:**

The incidence of HAI in this population was high with identified associative factors and significant resource and clinical implications.

[ilseappel@hotmail.com](mailto:ilseappel@hotmail.com)

Junior Investigator

Ethics Rec/Ref: 424/2011

**Title:** DOES A DEDICATED COORDINATOR FACILITATE THE PROCESS OF IMPLEMENTING A SUSTAINABLE PRACTICE IMPROVEMENT INITIATIVE TO REDUCE THE INCIDENCE OF VENTILATOR ASSOCIATED PNEUMONIA IN THE PAEDIATRIC INTENSIVE CARE UNIT (PICU) AT RED CROSS WAR MEMORIAL CHILDREN'S HOSPITAL?

**Authors:** Heide Kunzmann, Brenda Morrow, Michele Youngleson, Gary Kantor, Andrew Argent

**Affiliation:** Paediatric Intensive Care Unit, Red Cross War Memorial Children's Hospital and School of child and Adolescent Health, University of Cape Town

**Background and Objectives:**

Ventilator associated pneumonia (VAP) is a nosocomial pneumonia which develops in ventilated patients after 48 hours of intubation. Many of the ± 1200 children admitted to the PICU annually require intubation and mechanical ventilation, where they are at risk of developing VAP.

Previous studies in this population showed the incidence of VAP to be high (>40/1000 ventilator days) was associated with higher than predicted mortality and double the duration of stay in the PICU and duration of ventilatory support. Therefore, VAP was targeted in a practice improvement initiative in conjunction with the "Best Care Always" project.

**Methods:**

Infection control improvement measures and the "VAP bundle" (comprising five elements) were implemented but compliance was initially poor. The need for a full time VAP coordinator was identified to educate, monitor and observe the staff to adhere to the VAP bundle and reliably report the VAP incidence.

A VAP coordinator was therefore appointed full time for an initial four weeks followed by weekly input. Daily compliance and ventilator diagnoses were reported using standardized tools, at the same time of day.

**Results:**

Data were collected over a 10-month period (October 2011 to July 2012). Prior to appointing the VAP coordinator; data were obtained unreliably, compliance was poor and the VAP rates high. Following the four-week period VAP bundle compliance improved (Figure 1). The VAP rate dropped from 55 to 3/1000 ventilated days ( $p<0.0001$ ) between October 2012 to July 2012 (Figure 2).

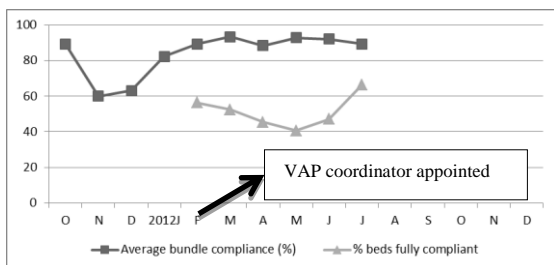


Figure 1

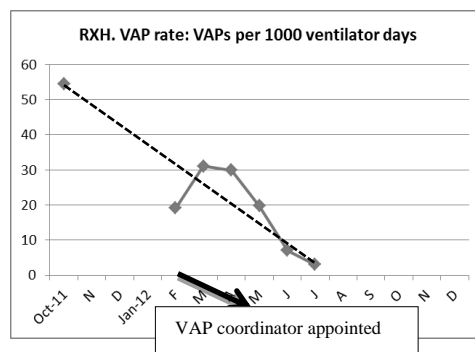


Figure 2

**Conclusions:**

After a VAP coordinator was implemented it was possible to develop sustainable processes to ensure the collection of reliable numbers for measuring VAP bundle compliance, ventilated days and VAP identification. The proportion of beds fully compliant to all VAP bundle elements reached 65% (with a target of 90%) and the VAP rate dropped significantly.

[heidekunzmann@yahoo.com](mailto:heidekunzmann@yahoo.com)

Junior Researcher

**Title: THE NORTH SOUTH DIVIDE: DISTRIBUTION AND OUTCOME OF RESPIRATORY VIRAL INFECTIONS IN TWO PAEDIATRIC INTENSIVE CARE UNIT (PICU) IN CAPE TOWN (SOUTH AFRICA) AND NOTTINGHAM (UNITED KINGDOM)**

**Authors:** Lonngren C<sup>1</sup>; Morrow BM<sup>2</sup>; Vyash H<sup>1</sup>; Hardie D<sup>4</sup>; Argent AC<sup>2,3</sup>

**Affiliation:** <sup>1</sup> Nottingham University Hospital; <sup>2</sup> School of Child and Adolescent Health, UCT; <sup>3</sup> PICU, Red Cross War Memorial Children's Hospital; <sup>4</sup> Division of Virology, UCT.

**Background:**

Viral respiratory tract infections (RTI) are major causes of infant and child death and severe illness across the world. South Africa studies report that viral RTI were common in children in PICU, associated with significant morbidity and mortality which may relate to the high burden of comorbidities, malnutrition and HIV in this population. Nosocomial viral RTI acquisition has also been highlighted as a potentially serious problem in the context of limiting cohorting and lack of isolation facilities. Thus paediatric viral RTI may differ substantially between developed and developing countries.

**Objectives:**

To investigate the spectrum, course, seasonality and outcome of severe viral RTI in two PICUs from a developed (United Kingdom, UK) and developing country (South Africa, SA).

**Methods:**

A retrospective descriptive study of all patients with positive respiratory viral PCR (from nasopharyngeal aspirates, tracheal aspirates, or nonbronchoscopic bronchoalveolar lavage taken during PICU admission) from July 2009 to July 2011. The medical folders of virus positive patients were reviewed for demographic, clinical and outcome data.

**Results:**

646 positive specimens yielding 765 viral isolates (74% from SA) from 599 patients (319 [53.3%] male) were obtained from both study sites. Patient characteristics, viral isolates and outcomes are presented in Table 1. Rhinovirus, respiratory syncytial virus and adenovirus were the most commonly isolated, with adenovirus being more prevalent in the SA site (24.3% vs. 16.8%,  $p = 0.03$ ). Possible or probable nosocomial viral RTI acquisition occurred in 78% of isolates in SA, compared to 48% in the UK site ( $p < 0.0001$ ).

Patients who died were older; had greater risk of mortality scores; had greater incidence of adenovirus infection and likely nosocomial viral acquisition compared to survivors. Factors independently associated with mortality on multiple regression analysis were: being in the SA site (adjusted OR 3.4, 95% CI 1.4 – 8.5;  $p = 0.008$ ); age (months) (OR 1.0, 95% CI 1.0 – 1.02;  $p = 0.001$ ); PIM2 score (%) (OR 1.0, 95% CI 1.01 – 1.03;  $p = 0.0002$ ) and adenovirus infection (OR 3.0, 95% CI 1.8 – 5.0;  $p < 0.0001$ ).

**Table 1**

	TOTAL n=599	SA n=433	UK n=166	P
Age (months)	6.0 (2.3 – 16.5)	6.1 (2.6 – 14.4)	5.4 (1.6 – 27.6)	0.8
PIM2 score	0.06 (0.02 – 0.13)	0.07 (0.03- 0.17)	0.03 (0.01 – 0.06)	<0.0001
Any comorbidity n(%)	324 (54.1)	227 (52.4)	97 (59.1)	0.1
Ventilated n (%)	484 (80.8)	350 (80.1)	134 (81.7)	0.8
PICU LOS (days)	6.0 (3.0 – 11.0)	7 (4 – 13)	3 (2 – 5)	<0.0001
Hospital LOS (days)	15.0 (8.0 – 28.0)	18 (10 – 32)	8 (5 – 15)	<0.0001
Mortality n (%)	81 (13.5)	74 (17.1)	7 (4.3)	<0.0001

**Conclusions:**

Viral RTI was more common and more severe in the SA compared to the UK PICU study site. Hospital acquired viral RTI acquisition was highlighted as an important concern in the SA PICU and requires further investigation.

**HREC Ref/Rec: 178/2012**

**Title:** ACINETOBACTER INFECTIONS IN THE PAEDIATRIC INTENSIVE CARE UNIT (PICU) OF A TERTIARY HOSPITAL IN SOUTH AFRICA

**Authors:** Deveshni Reddy; Brenda Morrow; Andrew Argent

**Affiliation:** Paediatric Intensive Care Unit, Red Cross War Memorial Children's Hospital and School of Child and Adolescent Health, UCT.

**Background:**

*Acinetobacter baumannii* is recognized as an important cause of nosocomial infections in PICU patients where it contributes significantly to morbidity and mortality. At present, little paediatric data exists regarding these infections.

**Aims:**

To document the characteristics and outcome of patients infected with *A. baumannii* in the PICU at Red Cross War Memorial Children's Hospital (RCWMCH) during 2010, comparing them with those who were not infected.

**Methods:**

This was a retrospective case-control study. Included cases were all patients admitted to the PICU from 1 January 2010 to 31 December 2010 in whom *A. baumannii* was isolated. The next sequential admission to PICU after an included case, in whom *A. baumannii* was not cultured, was selected as a control. Clinical, microbiological and outcome data were retrieved from the PICU and National Health Laboratory Service (NHLS) databases.

**Results:**

*A. baumannii* was isolated in 194 patients: (46.9% from tracheal aspirates; 47.4% from nonbronchoscopic bronchoalveolar lavage; 5.2% from blood culture and 0.5% from nasopharyngeal aspirates) a median (interquartile range) 3 (1 – 7) days after admission to PICU. 107 (55.2%) were colonised; 61 (31.4%) were infected and infection status with *A. baumannii* was unknown in 26 (13.4%) due to missing data. 88.7% were resistant to aminoglycosides; 80.9% were resistant to penicillins with beta lactamase; 77.3% were cephalosporin resistant; 75.3% carbapenem resistant and 0.5% colistin resistant. Outcome and patient data are presented in the Table.

	Cases n=194	Controls n=194	p
Gender male:female	107:87	119:75	0.2
Age (months)	5.6 (2.3 – 18.8)	8.4 (2.5 – 37.9)	0.07
Admission weight (kg)	6.0 (3.5 – 10.0)	7.9 (3.9 – 13.0)	0.02
PIM2	0.0842 ( 0.0491 – 0.1679)	0.0572 (0.0170 – 0.1664)	0.002
Emergency admission	171 (88.1%)	140 (72.2%)	0.0001
Main reasons for admission			
<b>Pneumonia</b>	<b>82 (42.3%)</b>	<b>42 (21.6%)</b>	<b>&lt;0.0001</b>
Cardiac	50 (25.8%)	45 (23.2%)	0.55
Sepsis	25 (12.9%)	16 (8.2%)	0.1
Gastroenteritis	18 (9.3%)	19 (9.8%)	0.9
Neurological impairment	19 (9.8%)	18 (9.3%)	0.9
<b>Traumatic brain injury</b>	<b>13 (6.7%)</b>	<b>1 (0.5%)</b>	<b>0.003</b>
Burns and other trauma	11 (5.7%)	13 (6.7%)	0.7
<b>Duration of PICU stay (days)</b>	<b>10.0 (7.0 – 18.0)</b>	<b>2.0 (1.0 – 5.0)</b>	<b>&lt;0.0001</b>
<b>Duration of IPPV (days)</b>	<b>9.0 (5.0 – 15.0)</b>	<b>1.0 (0.0 – 3.0)</b>	<b>&lt;0.0001</b>
Mortality	18 (9.3%)	19 (9.8%)	0.9

**Conclusions:**

*A. baumannii* is an important pathogen in this PICU, associated with increased PICU length of stay and duration of ventilation, but not with mortality.

**HREC Rec/Ref: 580/2011**

**Junior investigator**

[deveshni.reddy@uct.ac.za](mailto:deveshni.reddy@uct.ac.za)



**Title:** THE EFFICACY OF PROPHYLACTIC ANTIBIOTICS IN THE MANAGEMENT OF PNEUMONITIS FOLLOWING KEROSENE (PARAFFIN) INGESTION IN CHILDREN

**Authors:** Balme KH, Roberts JC, Zar H, Mann MD.

**Affiliation:** Poisons Information Centre, Department of Paediatrics and Child Health, Red Cross War Memorial Children's Hospital and University of Cape Town

**Correspondence:** [kh.balme@uct.ac.za](mailto:kh.balme@uct.ac.za); FHS HREC 095/2010

**Context:**

Hydrocarbons, especially kerosene (paraffin), are the most common agents involved in childhood poisoning in developing countries. In South Africa, there are an estimated 40 000-60 000 kerosene ingestion cases per year. At Red Cross War Memorial Children's Hospital (RCWMCH), an average of 100 cases per annum was seen (2003-2008). The lung is the target organ affected during kerosene ingestion and aspiration causes a chemical pneumonitis. Animal studies have shown that the natural course of the inflammatory disease process resolves within 10 days. But the lungs may be susceptible to secondary bacterial infection. In humans, the clinical features of inflammation and infection are difficult to distinguish. A South African study in children concluded that secondary infection is rare, as all recovered spontaneously without antibiotics. There has only been one human study to date which has looked at the role of antibiotics in the management and outcome of children with kerosene-associated pneumonitis.

**Objective:**

To assess the efficacy of prophylactic antibiotics in the management of kerosene-associated pneumonitis in children; to identify risk factors that may impact on severity and outcome; and to identify common conditions which result in symptoms and signs indistinguishable from kerosene pneumonitis.

**Methods:**

A double-blind placebo-controlled trial of prophylactic antibiotics in the management of kerosene-associated pneumonitis following ingestion was performed at RCWMCH from July 2010 to September 2011. Sequential children were randomised to receive placebo or amoxicillin. Each child was followed-up at 3 and 5 days post-ingestion. The primary outcome measure was the number of treatment failures in each group; defined as any child who was deteriorating at any time and required a change to their treatment regimen. Secondary outcome measures were the length of hospital stay and the symptoms and signs at follow-up.

**Results:**

Seventy-four patients were enrolled: 35 received placebo and 39 active treatment. In the placebo group, there were 32 treatment successes (32/35; 91%; 95% CI 78-97) and three treatment failures (3/35; 9%; 95% CI 3-22). In the active group, there were 37 treatment successes (37/39; 95%; 95% CI 83-99) and two treatment failures (2/39; 5%; 95% CI 1-17). There was no significant difference between groups (RR = 0.60; 95% CI 0.11-3.37). The median length of hospital stay for placebo (0.5 days; 0-1.0) and active (0.5 days; 0.5-1.0) groups was identical. The overall assessment of symptoms and signs at Days 3 and 5 post-ingestion was similar. There were no risk factors for clinical severity at presentation. The only significant risk factor for treatment failure was residence in formal housing (Fischer,  $P < 0.05$ ). Upper respiratory tract infection (URTI) and active *mycobacterium tuberculosis* (TB) disease, confounding conditions for treatment failure, were found equally in both treatment successes and failures.

**Conclusion:**

Secondary infection of kerosene-associated pneumonitis following ingestion in children is rare and prophylactic antibiotics do not improve outcome. However, as there are no predictive risk factors for deterioration, the omission of antibiotics in the management of these patients does not obviate the need for routine reassessment by a medical practitioner.

**Title:** BACTERIAL MENINGITIS IN NEONATES AND CHILDREN IN SOUTH AFRICA

**Authors:** Karla Thomas, Mike Levin, John Simpson, Henri Carrara

**Aims:**

To investigate the aetiology of acute bacterial meningitis in South African newborns and children from 2005 - 2010.

**Methods:**

This was a retrospective descriptive and analytical cross sectional study. The subjects of this study were patients in the paediatric population ( age 0 – 12 years) who had positive cerebrospinal fluid (CSF) culture results from 2005 – 2010. All provinces, whose data, was captured on the Corporate Data Warehouse (CDW) during this time, were included. Only culture positive CSF due to bacteria were included.

**Results:**

The sample size was 6030. The distribution among the years was as follows: 2005:411; 2006:1186; 2007:1140; 2008: 1135; 2009:1090; 2010: 1068. The break down per age group was: 0 – 28 days: 1178; 1 – 3 months: 711; 3 months to 5 years: 3166 and > 5 years – 12 years: 975. In the neonatal group the two most common causative organisms were Gram negative bacilli 32.08% (95% CI 29.42% - 34.76%) and Group B Streptococcus 30,48% ( 95% CI 27.85% – 33,11%). Coagulase negative staphylococci was the third most common causative organism contributing 12.56% ( 95% CI 10.67% - 14.46%) *L. monocytogenes* only contributed to 0.17%.

The 1 – 3 month group had a different distribution of organisms with Gram negative bacilli contributing 31.08% ( 95% CI 27.68% - 34.49%) and *S.pneumoniae* 23.35% (95% CI 20.24% - 26.46%).

*S. pneumoniae*[44.63% (95% CI 42.90% – 46.36%)] was the most common organism in the 3 month – 5 year age group. *N. meningitidis* and *H. influenzae* contributed 8,05% (95% CI 7.11% – 9%) and 4.45% ( 95% CI: 3.73% - 5.17%) respectively. The Gram negative bacilli accounted for 17.59%( 95% CI: 16.27% - 18.92%)

*S. pneumoniae* [55.49% (95% CI 52.37% – 58.61%)] emerged as the most common organism in the >5 – 12 year age group. The gram negative bacilli contributed 10.05% (95% CI 8.16% - 11.94%) while *N. meningitidis* and *H.influenzae* accounted for 7.90% (95% CI 6.20% – 9.59%) and 2.67%(95% CI: 1.65% – 3.68%) respectively.

The prevalence of *S. pneumoniae* prior to the conjugate pneumococcal vaccine was 40.29% while after the introduction the prevalence was 20.96% .

**Conclusion:**

The most common causative organisms in the neonatal period are the gram negative bacilli and group B streptococci. *S. pneumoniae* is the most common causative organism of bacterial meningitis among South African children > 3 months. The advent of the conjugate pneumococcal vaccine has seen a decrease in the prevalence of *S. pneumoniae*.

**Title:** CORRELATION BETWEEN TRANSCUTANEOUS BILIRUBIN AND TOTAL SERUM BILIRUBIN LEVELS AMONG PRETERM NEONATES AT GROOTE SCHUUR HOSPITAL

**Authors:** Dr. Abdallah Yaser (MB.Ch.B, M.Med), Dr. Natasha Rhoda (MB.Ch.B, FC (Paed), Cert (Neon) S.A), Dr. Lloyd Tooke (MB.Ch.B, FC(Paed), M.Med, Cert(Neon)S.A)

**Background:**

High levels of unconjugated bilirubin in the newborn can cross the blood-brain barrier causing encephalopathy and later cerebral palsy. To prevent this, repeated blood withdrawals are necessary to ascertain bilirubin levels. Non-invasive, painless and blood conserving screening through transcutaneous bilirubinometry is becoming more acceptable especially for term and near term neonates. For preterm infants transcutaneous bilirubin (TCB) measurement is still under scrutiny.

**Objective:**

This study was conducted to determine how transcutaneous bilirubin (TCB) levels from three different body sites related to total serum bilirubin (TSB) level in preterm neonates not under phototherapy at Groote Schuur Hospital.

**Methods:**

A cross sectional study was conducted between May 2012 and August 2012. TCB levels were ascertained on 106 preterm neonate of gestational age less than 35 weeks who were less than one week old and whose TSB level had been requested. TCB levels were measured using a Minolta JM103 over the forehead, sternum and interscapular regions within thirty minutes of blood collection. Data was entered onto an Excel spread sheet then transferred to STATA version 10. Correlation coefficients were computed and sensitivity, specificity, positive and negative predictive values and Receiver Operative Curves were generated to determine the reliability of TCB measurement.

**Results:**

Of the 106 enrolled preterm neonates, mean gestational age was 31weeks, and mean birth weight was 1262grams. For preterm neonates of gestational age less than 30 weeks the correlation between TSB and TCB from forehead, sternum and interscapular region were 0.87, 0.88, and 0.86 respectively. For preterm neonates of gestational age  $\geq 30$ weeks the correlation between TSB and TCB from forehead, sternum and interscapular region were 0.70, 0.84, and 0.78 respectively. With respect to initiation of phototherapy, the sensitivity, specificity, positive and negative predictive values for TCB forehead were 0.79, 0.97, 0.91, and 0.76 respectively, for TCB sternum 0.68, 0.97, 0.97 and 0.70 respectively and for TCB interscapular region 0.93, 0.76, 0.84 and 0.89 respectively.

**Conclusion:**

Transcutaneous bilirubin measured using a Minolta JM103 (forehead, sternum or interscapular regions) correlate well with total serum bilirubin levels for all gestational ages. Interscapular TCB has the best sensitivity (0.93).

**Recommendation:**

In view of the high sensitivity (0.93) of the interscapular TCB, this site should be used for screening preterm neonates less than 35 weeks gestational age in order to minimize pain and blood loss in this population.

**Title:**            **INTERNATIONAL PRETERM CAFFEINE GUIDELINES – ARE THEY APPLICABLE IN A SOUTH AFRICAN SETTING?**

**Authors:**        K Browde, M C Harrison and L Tooke

**Affiliation:**    Neonatal Medicine, Department of Paediatrics, University of Cape Town

**Background:**

Apnoea of prematurity is a common problem affecting more than 50% of babies born before 32 weeks gestation. Caffeine therapy has proven effective in decreasing this condition while also showing longer term neurodevelopmental benefit. Many international nurseries discontinue prophylactic caffeine at a corrected gestational age of 35 weeks as the risk of apnoea is low. The caffeine policy developed at Groote Schuur Hospital nursery was based on these recommendations. However, gestational age in our babies is in most cases determined by Ballard scoring at birth which often underscores maturity, particularly in growth restricted babies. There have been concerns that in our setting such recommendations may not be appropriate.

**Objectives:**

- 1) To establish whether Caffeine is being prescribed correctly as per protocol
- 2) To determine if treatment is being discontinued appropriately

**Methods:**

A prospective data collection was completed on all infants who were discharged home during a 2 month period between 1<sup>st</sup> December 2011 and 31<sup>st</sup> January 2012. Inclusion criteria were all infants less than 35 weeks or to whom caffeine had been prescribed during their admission. Sources of information included infant records and medication charts.

**Results:**

55 babies fulfilled inclusion criteria. All infants born at less than 35 weeks were correctly started on prophylactic caffeine as per protocol and 2 patients of 36 weeks gestation were started on caffeine, one of these as a result of apnoea. The daily dose was adjusted for increasing weight per protocol in just 44% of cases and discontinued at 35 weeks in only 33% of cases. Of those discontinued inappropriately, the majority were stopped before 35 weeks due to the infants demonstrating clinical maturity beyond the estimated gestational age. No babies developed apnoea after caffeine cessation.

**Conclusion:**

Caffeine is being administered to all eligible babies but the doses are not being adequately increased for increasing weight. The decision to discontinue caffeine is not being based on the protocol in the majority of infants but rather being determined by the clinical maturity displayed. We speculate that the likely reason for this is that the Ballard estimation at birth requires a level of expertise and often underscores growth restricted babies. We postulate that in infants where gestational age is uncertain, physiological maturity such as the ability to feed may be a more accurate indicator to stop caffeine than estimated gestation. This has implications for effective resource management in reducing length of hospital stays.

**Title:**           **RESOURCE IMPLICATIONS OF ADOPTING A RESTRICTIVE NEONATAL BLOOD TRANSFUSION POLICY**

**Authors:**       S Pillay, L Tooke, Y Joolay, N Rhoda, M Raban, A R Horn and M C Harrison

**Affiliation:**    Neonatal Medicine, Department of Paediatrics, University of Cape Town

**Background:**

The risk of anaemia of prematurity is inversely related to an infant's gestational maturity and birthweight. Groote Schuur Hospital (GSH) nursery admits in excess of 500 VLBW infants per year. Blood transfusions are not without risk and constitute a significant financial burden on resource limited services. In line with current evidence, GSH nursery has recently introduced a restrictive blood transfusion protocol to minimise transfusions and manage costs. We performed a service based study to review adherence and performance.

**Objectives:**

- 1) To determine whether we are adherent to the new protocol.
- 2) To determine whether adopting a restrictive transfusion policy results in cost savings

**Methods:**

A retrospective data collection was completed on all infants that received red blood cell transfusions in the GSH nursery over a 6 month period between 1<sup>st</sup> July 2011 and 31<sup>st</sup> December 2011. Records were obtained from the blood bank and the babies folders. Data collected were compared to the transfusion policy to determine adherence. Blood transfusion numbers for a similar period prior to the restrictive policy (1<sup>st</sup> July 2008 and 31<sup>st</sup> December 2008) were obtained for comparison.

**Results:**

The restrictive transfusion protocol was adhered to in 100% of cases in the study period. 42 patients received blood transfusions (BTF) with a total of 64 BTF out of 1097 admissions. Over 60% of the transfusions were to babies born less than 30 weeks of gestation with most transfusions occurring between 14 and 28 days. No adverse events were recorded except that one baby developed NEC post transfusion. In comparison, a total of 121 transfusions were given to 102 babies out of a total of 940 admissions in the same period in 2008. Comparison between the number of blood transfusions administered in 2008 and 2011 showed a highly statistically significant difference ( $p < 0.001$ ). The total cost of the blood products used in the 6 months of 2011 was R 48 640 compared with R 91 870 in 2008 based on current prices.

**Conclusions:**

We have demonstrated that it is possible to achieve 100% compliance in adhering to a ward policy while standardising neonatal care. We were able to halve the number of blood transfusions and achieve significant cost benefits. Following evidenced based guidelines delivers high standards of care while also making the most effective use of resources.

**Title:**           **OUTCOME OF RADIOACTIVE SYNOVIORTHESIS IN HAEMOPHILIAC ARTHROPATHY**

**Authors:**       Govender RD, Dix-Peek SI, Hoffman EB

**Objectives:**

Spontaneous intra-articular haemorrhages are the most frequent bleeding episodes encountered in the haemophiliac population, causing pain, joint deformity and arthropathy. Chronic haemophiliac arthropathy is characterised by persistent joint swelling, proliferative synovitis, and damage to or loss of articular cartilage. Elimination of the synovitis is key to prevention of recurrent intra-articular haemorrhages and joint damage. The purpose of the study was to investigate the indications for, and outcome of, radioactive synoviorthesis for haemophiliac arthropathy.

**Methods:**

A retrospective folder review was done to assess the results of 12 intra-articular injections of radioactive Yttrium-90 colloid, performed in 10 patients from November 1993 to December 2006. Patients were referred by the Haematology Unit if they had a target joint, as defined as >4 bleeds into the same joint in the preceding 6 months. Follow up was conducted at 6 monthly intervals, assessing clinical and radiological outcomes.

**Results:**

The average age at time of injection was 10.6 years (Range 6-15). The average duration of follow-up was 35 months (range, 6 to 60 months). The radiological involvement of the target joint, the pre- and post-treatment range of movement, presence of synovitis and bleeding events were compared from presentation to that at follow up.

Prior to injection, 10 of the 12 involved joints had a bleeding episode. Following Yttrium injection only 1 out of 12 joints had a bleed in the subsequent 6 months. Prior to injection, 9 of the 12 involved joints had clinically apparent synovitis. Following injection only 1 out of 12 joints had clinically apparent synovitis.

Range of movement of each target joint was assessed and compared to that at follow-up. Nine target joints (75%) showed a favourable improvement in range of movement. Those with a favourable radiological score had a better clinical outcome, but even those with a poor score showed improvement.

**Conclusion:**

In this study, intra-articular injection of radioactive Yttrium-90 colloid was shown to:

- Significantly reduce bleeding events in a Haemophiliac cohort
- Resolve synovitis in joints with haemophiliac arthropathy
- Improve range of movement in the majority of patients
  - This was best in those with a better radiological appearance at presentation.
  - Those with a poorer radiological grade also showed some improvement suggesting that while results are less certain, patients may still benefit from intervention.

**Title:** THE EFFECT OF TWO DIFFERENT PLASTERING METHODS ON THE RATE OF MAJOR SURGERY FOR IDIOPATHIC CLUBFOOT

**Authors:** Dr Anria Horn (Registrar, Orthopaedics); Dr Stewart Dix-Peek; Prof EB Hoffman

**Objective:**

Serial manipulations and casting for the treatment of congenital clubfoot has long been the practice internationally. There are, however, a great variety of manipulative techniques being practiced with differing results. We aim to determine how the rate of major surgery, ie. a full posteromedial-release (PMR), as initial surgical intervention has changed since introducing the Ponseti method of plastering at our centre in 2002. We also aim to determine whether pre-operative radiographs have any bearing on the type of surgery performed.

**Methods:**

Clinical records and radiographs of all patients presenting to our clubfoot clinic in the years 1999-2000 and 2009-2010 respectively were reviewed. Patients were included if they had clinical clubfoot, and excluded if they presented after 3 months of age, had undergone prior treatment or suffered from associated congenital anomalies. We then determined which patients underwent PMR as primary surgical intervention following serial castings. We also measured the radiographic parameters on all available radiographs (tibiocalcaneal, talometatarsal-I, lateral and AP talocalcaneal angles) and performed statistical analysis to determine their value in predicting the type of surgery required.

**Results:**

In the pre-Ponseti group we included 83 feet of which 34 had undergone PMR. In the Ponseti group there were 68 feet, of which none had undergone PMR. This was found to be statistically significant. Of the measured angles, the tibiocalcaneal and lateral talocalcaneal had the highest correlation with clinical severity (.67 and -.45 respectively).

**Conclusion:**

Employing the Ponseti method of plastering has significantly decreased the need for major surgery at our centre. This is in keeping with published results internationally. We found the tibiocalcaneal angle to be the most predictive of need for major surgery, and the talometatarsal-I to be the least predictive. The role of pre-operative X-rays, however, remains unclear as surgical decisions are made on clinical grounds.

**Title:** A DESCRIPTION OF THE USE OF ABDOMINAL CT SCAN IN PEDIATRIC BLUNT ABDOMINAL TRAUMA IN A LARGE SOUTH AFRICAN CHILDREN'S TRAUMA CENTER

**Authors:** Bronwen Roman, Peter Hodkinson, Baljit Cheema, Angus Alexander

**Objectives:**

To describe the use of abdominal CT scan, and the clinical implications of positive findings following blunt abdominal trauma through analysis of the indications, timing, priority, findings and subsequent clinical management of children who underwent abdominal CT scanning at Red Cross War Memorial Children's Hospital (RCWMCH).

**Methods:**

A retrospective chart review of all children under the age of 13 years who had an abdominal CT scan following blunt abdominal trauma, from January 2010 to December 2011. Patient demographics, injury mechanism, indication for CT, timing, priority, CT findings and management following CT were all analyzed.

Results: A total of 86 patients were identified, with a median age of 7.0 years. Fifty-five were (64%) male. Forty-nine (57%) patients presented secondary to pedestrian vehicle accidents and 33 (38%) had an associated head injury. A surgical consultation was requested in 60 (70%) patients, with a CT done prior to definitive care in 64 (74%) cases. Abdominal pain/tenderness was present in 24 (28%) and was the most common indication for CT. Thirty (35%) CT's were reported as normal, with the liver the most commonly injured solid organ in 22 (26%) patients. Following the CT, 76 (88%) patients were treated non-operatively. Ten (12%) patients had surgery as a result of CT findings. Of these 10, seven (70%) presented with abdominal pain/tenderness as indication for CT, and 5 (50%) presented 2 days or more after injury.

**Conclusion:**

In this series only 1 out of every 10 patients that has an abdominal CT for blunt abdominal trauma, required surgery as a result of radiological findings. Given the concerns of radiation exposure during an abdominal CT and the low clinically significant yields in this age of conservative management, we question the need for such widespread use of abdominal CT for pediatric trauma.

*Ethics Approval Number: 406/2011*



**Title:** PENICILLIN ALLERGY AT A TERTIARY CENTRE IN CAPE TOWN, SOUTH AFRICA

**Authors:** Tamara Kerbelker, Michael Levin

**Introduction:**

Penicillin is an important antibiotic for childhood infectious illnesses. Cutaneous reactions while on penicillin are often misdiagnosed as allergy. An incorrect diagnosis of drug allergy is associated with significant adverse effects on the patients quality of life and has implications such as the prescription of alternate antibiotics that may be more expensive, less effective and have potential side effects.

**Objective:**

A drug allergy service commenced in our unit in July 2002 with on average only 4 challenges performed a year. New protocols were implemented in Jan 2011. To determine the prevalence of true penicillin allergy (either positive blood test or drug provocation proven) in a cohort of patients with self- reported penicillin allergy.

**Method:**

This is a retrospective review of the patients with self- reported penicillin allergy for the period 1 January 2011 – 30 June 2012. A list of patients seen with potential penicillin allergy was compiled from clinic records. The information extracted from the hospital records were age of reaction, gender, time interval from ingestion to reaction and nature of reaction. The results of ImmunoCAPs to penicilloyl G, penicilloyl V, ampicilloyl and amoxicilloyl were recorded. The results of skin prick tests to the major and minor antigenic determinants, as well as amoxicillin and ampicillin were extracted. The outcome of drug provocation tests was also recorded.

**Results:**

Thirty one subjects had penicillin ImmunoCAPs®, and those with negative ImmunoCAPs® underwent skin prick tests. If negative, these children had drug provocation tests. Fifty two (n=16) percent of patients were male. The median age at challenge was 6 (IQR 6-12) months. The median time from reaction to ImmunoCAP® was 14 (IQR 6-39) months. Nine percent (n=3) ImmunoCAPs were positive. All skin tests were negative. Drug provocation tests were performed on these 28 subjects. Four patients had a reaction (19% of the whole cohort and 14% of those who underwent challenges) There were 2 children with immediate reactions. One had angioedema and the other a macular rash. One child had an intermediate reaction and one a late reaction, both macular rashes. None of the reactions involved the cardiovascular or respiratory system. Overall 22.6% of patients had true penicillin allergy.

**Conclusions:**

Skin rashes while on penicillin are a common childhood occurrence, and the majority are misdiagnosed as penicillin allergy. The workup for penicillin allergy is step wise, and only those with negative Immunocaps® and skin prick tests will go on to drug provocation challenge. Eighty percent of children with self reported penicillin allergy are in fact tolerant. The provision of a negative diagnosis removes parent and patient anxiety and allows easier and more cost effective treatment of childhood infections. The penicillin challenge service is necessary to sift out true from self reported allergy.

**Title:** PROSPECTIVE CORRELATES OF TB DISEASE RISK IN *MYCOBACTERIUM TUBERCULOSIS*-INFECTED ADOLESCENTS

**Authors:** Adam Penn-Nicholson, Daniel Zak<sup>\*</sup>, Wendy Whatney, Mzwandile Erasmus, Hassan Mahomed, Alan Aderem<sup>\*</sup>, Thomas J. Scriba, Willem Hanekom

**Affiliation:** South African Tuberculosis Vaccine Initiative and School of Child and Adolescent Health, Institute of Infectious Disease and Molecular Medicine, University of Cape Town, South Africa.  
<sup>\*</sup>Seattle Biomedical Research Institute, Seattle, Washington, USA

Contact email: adam.penn-nicholson@uct.ac.za

**Objective:**

Tuberculosis (TB) is a major global health problem, with a third of the world's population infected with the causative bacterial pathogen, *Mycobacterium tuberculosis* (Mtb). An Mtb-infected person has a 10% lifetime risk of developing active pulmonary TB, yet the determinants of progression from infection to disease remain largely unknown. We aimed to identify prospective gene expression signatures that predict TB disease risk in Mtb-infected adolescents.

**Methods:**

We enrolled 6,363 adolescents in a longitudinal cohort study to determine incidence and prevalence of Mtb infection and TB disease. Blood was collected every 6 months, and PBMC and other blood products stored. We selected 35 adolescents who were Mtb-infected at enrollment and developed pulmonary TB disease during 2 years of follow-up (cases), and 65 demographically matched controls who remained healthy despite Mtb-infection (controls). Whole transcriptome mRNA expression in direct *ex-vivo* whole blood was measured using RNA-sequencing.

**Results:**

Our preliminary analyses of RNA from blood collected 1-2 years before diagnosis of TB in cases identified hundreds of significantly up-regulated or down-regulated genes in cases relative to controls. Modular analysis showed that genes associated with the interferon response, inflammation and myeloid cells are up-regulated in cases, and genes associated with lymphoid lineage, T cells and protein synthesis are down-regulated in cases, relative to controls. We also identified a preliminary signature of risk of TB disease which allows prospective discrimination of cases from controls with ~80% accuracy up to 1.5 years before TB diagnosis.

**Conclusion:**

Our data suggest that mRNA expression of certain genes, measured up to 1.5 years before TB disease, can be applied to identify prospective correlates of risk of TB. Such a correlate may allow prediction of disease risk well in advance of the onset of symptoms. The next step will entail validation of these signatures in an independent cohort.

**Title:** PROSPECTIVE EVALUATION OF PATIENTS REFERRED FOR ADMISSION TO A SOUTH AFRICAN PAEDIATRIC INTENSIVE CARE UNIT (PICU) : PATIENT PROFILES, REASON FOR ADMISSION OR REFUSAL, AND OUTCOME.

**Authors:** Ahrens JO<sup>1,2</sup>, Morrow BM<sup>1</sup>, Argent AC<sup>1,2</sup>

**Affiliation:** <sup>1</sup> Division of Paediatric Critical Care and Children's Heart Diseases, SCAH, UCT.  
<sup>2</sup> PICU, Red Cross War Memorial Children's Hospital (RXH), Cape Town.

**Background:**

Patients referred for PICU admission are triaged according to predetermined criteria, or clinicians' clinical judgement. Regular audit is needed for appropriate PICU resource utilisation.

**Aim:**

To profile all patients referred for PICU admission; compare outcome of those admitted to those refused admission; and document factors influencing triage decisions.

**Method:**

Prospective observational single centre study of all patients referred for PICU admission from 1 January to 30 June 2008.

**Results:**

764 patients were referred to PICU; 618 (80.9%) were admitted and 146 (19.1%) were refused admission.

Source of Referrals	
RXH	82% (20% refused)
Cape Town Metropole (excluding RXH)	14% (17% refused)
Rest of Western Cape Province	3.5% (15% refused)
RXH Referrals Refusal Rate	
General medical wards	30% refused
Emergency / acute care services	10% refused

Urgency of referrals	
Elective (32% of referrals)	20.1% refused
Emergency (68% of referrals)	18.6% refused
Reason for Refusals	
Elective referrals	No beds available 98%
Emergency Referrals	No beds available 50%
	Futile / too ill 25%
	Not ill enough 8.1%

Hospital Mortality	
Admissions	15.3%
Refusals	8.1%

**Conclusion:**

Mortality amongst PICU admissions and refusals was similar. The main reason for refusal was limited PICU bed space.

[johan.ahrens@uct.ac.za](mailto:johan.ahrens@uct.ac.za); HREC Rec/Ref: 500/2007

**Title:** CHARACTERISTICS AND OUTCOME OF LONG-STAY PATIENTS IN A PAEDIATRIC INTENSIVE CARE UNIT IN CAPE TOWN, SOUTH AFRICA

**Authors:** Tracey Nupen; Brenda Morrow; Andrew Argent

**Affiliation:** Paediatric Intensive Care Unit, Red Cross War Memorial Children's Hospital and School of Child and Adolescent Health, UCT.

**Objectives:**

To describe a rational basis for the definition of a long-stay patient (LSP) in a paediatric intensive care unit (PICU); to review the characteristics and outcomes of the patients who comply with the LSP definition; to assess the proportion of resources allocated to the LSP cohort; and to determine if the results of this study could be used as a predictive tool for future admissions.

**Methods:**

A retrospective descriptive study of data collected over one calendar year (2009) from a 20-bedded multidisciplinary PICU was conducted. The definition of a LSP in this setting was established using various models. The characteristics and outcomes of the long- and short- stay groups were compared using nonparametric Mann-Whitney U and Chi<sup>2</sup> tests. The proportion of ICU days consumed by LSP was calculated. Human Research Ethics Committee approval was obtained (Ref/Rec 105/2011).

**Results:**

1126 PICU admissions with a total of 5936 PICU bed days were reviewed. LSP were defined as having a PICU stay of >19 days (>95<sup>th</sup> percentile of the median and visual "tail" of the distribution curve). 54 (4.8%) LSP utilised 1807 (30.4%) bed days with an associated mortality of 29.6%. Significant differences between LSP and short-stay patients are presented in Table 1.

	<b>Long-stayers N=54</b>	<b>Short stayers N= 1072</b>	<b><i>p</i></b>
Male gender n (%)	26 (48)	660 (62)	0.049
Age (months) median (IQR)	4 (2 – 17)	9.0 (2.0 – 34.0)	0.03
Weight (kg)	4.75 (3.1 – 10.2)	7.15 (3.6 – 13.6)	0.04
Risk of mortality (PIM2)	0.096 (0.0487 – 0.1490)	0.0712 (0.0255 – 0.1938)	0.4
Emergency admissions	46 (85.2)	786 (73.3)	0.05
Mortality	16 (29.6)	129 (12.0)	0.0002
Standardised mortality ratio	2.4	0.7	0.002
Duration ICU stay	29.5 (25 – 40)	2 (1 – 5)	<0.0001
Proportion of bed days (%)	0.5 (0.43 – 0.67)	0.04 (0.02 – 0.08)	<0.001

Continuous data are median (interquartile range)

On multiple regression analysis only female gender was associated with the outcome of long-stay making it impossible to develop a predictive model. There were no differences between long stay patients who died vs. those who survived.

Conclusion: Long-stay patients represent a small percentage of PICU admissions yet have a significantly increased mortality and consume a disproportionate amount of resources compared with short-stay patients. No predictive model could be established for the early recognition of potential long-stay patients in order to effectively plan PICU bed allocation. Further investigations are needed to assess the quality of life of survivors of long PICU stay.

**Junior Investigator**

**Title:** **BARDET BIEDEL SYNDROME IN SOUTH AFRICA: THE CLINICAL PHENOTYPE OF A SINGLE FOUNDER MUTATION IN BBS 10.**

**Authors:** K. Fieggen, A. Esterhuizen, C. Milligan, B. Henderson, E Heon

**Objectives:**

To delineate the ethnic distribution and clinical phenotype in a cohort of South African BBS patients with the K2431fsX15 mutation in BBS 10 and discuss the implications for genetic testing and counseling in this disorder in South Africa.

**Method:**

A descriptive cross sectional study collating clinical data retrospectively in a genetically homogenous group of BBS patients from South Africa.

**Results:**

A total of 38 patients from 37 families were tested. 27 of these (71%) were homozygous for the K2431fsX15 BBS 10 mutation. The ethnic distribution of patients referred for testing reflected the observation that BBS is more common in Black South Africans (32 of 37 families 86%). Of those homozygous for this mutation, 26 (96%) were Black South Africans from different language groups suggestive of a founder effect. The phenotype showed variability characteristic of the disorder with some overlap with other ciliopathies. The onset of visual disability was early in our cohort and renal abnormalities were infrequently encountered.

**Conclusions:**

The high frequency of homozygosity for a single mutation in an ethnic subset of the South African population is suggestive of a founder effect. This has allowed establishment of a diagnostic test with a high yield in our local population. Better understanding of the phenotype may improve earlier recognition of the disorder to allow for appropriate intervention. Testing may support the clinical diagnosis and permit carrier and prenatal testing in informative families.

**Title:** LETHAL MULTIPLE PTERYGIUM SYNDROME OVER A 20YEAR PERIOD

**Authors:** Nomlindo Makubalo, Karen Fieggen, Helen Wainwright

**Objectives:**

To review Lethal Multiple Pterygium Syndrome (LMPS) diagnosed perinatally in our division over a 20 year period. To determine the frequency in various ethnic groups which may be suggestive of possible founder effects.

**Methods:**

We retrospectively reviewed the Groote Schuur Hospital fetal medicine and post mortem records for all fetuses/infants with this diagnosis over the last 20 years. A descriptive analysis was done.

**Results:**

Over the study period 33 cases were identified in 30 families. Three couples had more than one affected fetus. Antenatal ultrasound diagnosed 21 cases and 12 cases were diagnosed post mortem. Post-mortem confirmed all antenatally diagnosed cases. Of those diagnosed antenatally 30% of mothers opted for termination of pregnancy. Where a decision was taken to continue with the pregnancy 21% subsequently presented with IUD. Multiple contractures were present in all affected fetuses; pulmonary hypoplasia was present in 78%; fetal hydrops in 33% and cleft palate in 33%. The majority (72%) of mothers were from the Xhosa ethnic group and the ethnicity of the remaining 28% is unknown.

**Conclusion:**

Lethal Multiple Pterygium Syndrome is a rare autosomal recessive genetic disorder. Our findings suggest a higher than expected incidence in the Xhosa population of South Africa suggestive of a possible founder effect. Recognition of this lethal condition and its genetic nature is important for counselling families. Further molecular studies are indicated to explore the molecular basis of LMPS in our population to allow for detection of carrier status and facilitate early accurate diagnosis.

**Title:**            **MANAGEMENT OF CHILDREN WITH DOWN SYNDROME AT RED CROSS CHILDREN'S HOSPITAL**

**Authors:**        Nana S, Donald K, Fieggan K

HREC REF: 492/2011

**Objectives:**

To describe the standard of health care offered to Down syndrome at Red Cross Children's Hospital.  
To evaluate to what extent international guidelines and recommendations are being implemented.  
To assess consistency of care and routine follow up.

**Methods:**

A retrospective folder review of children confirmed with Down syndrome was undertaken. Fifty folders of children attending Red Cross Children's Hospital between the period 2005-2010 were reviewed. Children were between one and five years of age.

**Results:**

Care of Down syndrome children at Red Cross Children's Hospital differed to recommended guidelines by the American Academy of Pediatrics and the UK Down syndrome Medical Interest Group. For example, 77% of patients had documented cardiac reviews, 54% had documented thyroid function test whilst only 20% and 6% had ENT and ophthalmology reviews respectively.

A large number of children (26%) had been lost to follow up whilst 15% of children had passed away as a result of infectious related diseases.

**Conclusion:**

Significant difference between recommended guidelines and review of health care of Down syndrome at Red Cross Children's Hospital. Many identifiable factors contributing to this, including: poor socio-economic environment, higher risk of infectious diseases, lack of caregiver and medical professionals' awareness, health care systems not structured appropriately and over burdened and poor record documentation. Complications of Down syndrome are associated with significant mortality and morbidity, therefore consistent and comprehensive follow up is important.

**Title:** THE USE OF TOTAL PARENTERAL NUTRITION IN HIV POSITIVE CHILDREN ON HAART

**Authors:** Dr. S. Budree; Dr. L. Goddard; Dr. R. De Lacy; S. Cader; B. Saayman

**Introduction:**

The high prevalence HIV infection in South Africa contributes significantly to the burden of diarrhoeal disease in our paediatric population. Diarrhoea is a very common manifestation of HIV disease, especially as the immune system deteriorates and viral loads increase. A significant proportion of HIV infected children progress to chronic diarrhea (AIDS enteropathy), which is characterized by epithelial dysfunction and malabsorption. Opportunistic infections of the gastrointestinal tract also play a major role in the progression to chronic diarrhea.

The use of TPN in HIV infected children is associated with an increased risk of sepsis, in particular, catheter related infections. Unfortunately, there is a paucity of literature evaluating the use of TPN in HIV infected children.

**Aim:**

This study explores the characteristics and the outcome of TPN use in a small cohort of children who are HIV infected and on HAART.

**Methods:**

A descriptive cohort of TPN use in HIV infected children over a 3-year period (2009-2011). All HIV positive children who received TPN from 2009 to 2011 were included in this study. Patient's names, folder numbers and indications for TPN use, were obtained from a TPN database kept at Red Cross Children Hospital.

Data collected from a folder review included age, sex, ward, period on TPN, sepsis complications (as determined by a positive blood culture result), and outcomes (death or discharge).

**Results:**

A total of 16 patients were treated on TPN during the three-year period. In 2009, 7 patients (3.3%) out of a total of 211 patients who received TPN; 2010 – 2 patients (0.7%) (total of 293 patients on TPN); 2011 – 7 patients (3%) (total of 230 patients on TPN). Patient's ages ranged from less than one month to 38 months old with a median age of 4 months. There were 9 male and 7 female patients.

The main indication for TPN was chronic diarrhea with 6 patients requiring TPN, 4 patients treated post surgery for Necrotising enterocolitis (NEC), 4 patients following surgery for intestinal perforation, 2 patients for mucositis secondary to chemotherapy.

Cumulatively, all 16 patients received a total of 379 days on TPN over the 3-year period, with an average of 27 days per patient on TPN (range 3-82 days).

8 patients (50%) suffered from confirmed (blood culture positive) episodes of septicemia. The predominant organisms were ESBL Klebsiella pneumonia, Acinetobacter baumannii and Pseudomonas aeruginosa.

Of the 5 patients who died, all 5 had cultured ESBL Klebsiella Pneumonia on blood culture while on TPN. All 5 patients demised in the ICU, 2 patients with chronic diarrhea, 2 with Necrotising Enterocolitis and one with intestinal perforation. Patient's ages ranged between 2 and 7 months old. 4 patients died while on TPN and 1 patient demised 4 days after TPN was stopped.

11 patients (69%) improved on TPN, four patients with chronic gastroenteritis, 3 with intestinal perforation, 2 with NEC and 2 with mucositis.

**Conclusion:**

TPN administration in severely ill HIV positive children needs to be done cautiously. There appears to be high risk of sepsis in these children, particularly from virulent hospital acquired organisms such as ESBL Klebsiella Pneumonia.

TPN however is still life saving in this group of patients and should be considered, in select patients, as one of the treatment modalities in the management of these patients.

**References**



**Title:** A SINGLE BASEPAIR MUTATION CAUSES CYSTINOSIS IN THE MAJORITY OF WESTERN CAPE PATIENTS.

**Authors:** Nandhlal J, Owen EP, Leisegang F, Gajjar P, Nourse P

**Affiliation:** Red Cross Childrens Hospital, UCT, NHLs

**Background:**

Cystinosis is caused by mutations in the CTNS gene and is relatively common in Cape Town. While many mutations have been diagnosed in other race groups, local mutations are unknown. The local phenotype has also not been described.

**Method:**

In the last 5 years 17 patients [African Black (8) and Cape Coloured (9)] with suspected cystinosis were referred for molecular analysis of the CTNS gene. In 14 of the patients the clinical data was available. A retrospective chart review was conducted on these patients and the following information was collected: Age at presentation, sex, developmental progress, presenting signs and symptoms, blood and urine biochemistry. Molecular analysis was done in all patients and six parents. Genomic DNA was extracted from EDTA blood or fibroblasts, and exons 1-13 of the CTNS gene were sequenced together with the splice sites and 100bp of intronic sequence on either side of each exon. In some cases mRNA was extracted from fibroblasts, then reverse transcribed and the CTNS cDNA sequenced.

**Results:**

A molecular diagnosis of cystinosis was made in 16/17 patients: Several intronic changes were noted. The cDNA analysis of 6 patients revealed an insertion of 10bp before exon 12 caused by a mutation G>A in the intronic sequence (c.971-12G>A). This mutation was then confirmed in genomic DNA in homozygous form in 13/17 patients and in heterozygous form in 3 patients. Hence full molecular diagnosis of cystinosis was made in 16/17 patients. This mutation has been reported once before however the race of the patient was not reported. Clinical: Fourteen patients analysed (6 black, 8 mixed race). Mean age at presentation: 2 years and 5 months (range: 5 months-5 years). All patients presented with a history of vomiting and polyuria. All patients had developed Proximal Renal Tubular Acidosis at presentation. At last follow up six patients had developed chronic kidney disease (two end stage). 1 patient has hypothyroidism. 13 patients had corneal cysteine crystals. All patients had raised white cell cysteine at diagnosis (0.9-3.6 nmol cysteine/mg protein).

**Conclusion:**

We report the CTNS mutations found in 17 patients from the Western Cape, South Africa. All the patients presented with classical nephropathic/infantile cystinosis and were diagnosed at the Childrens Red Cross hospital in Cape Town. A full molecular diagnosis of cystinosis was made in 16/17 patients. G>A mutation in intron 11 (c.971-12G>A) was present in 16/17 patients confirmed with cystinosis and is the most frequent mutation seen in Black African (Xhosa speaking) (94%) and Cape Coloured patients (78%). It is recommended that all cystinosis patients with possible Black African ancestry be tested for the mutation with the possibility of prenatal diagnosis being offered.

**Title:** **RENAL BIOPSY IN CHILDHOOD NEPHROTIC SYNDROME: A NEW HISTOPATHOLOGICAL TREND.**

**Authors:** Odetunde OI<sup>1</sup>, Nourse P<sup>1</sup>, Gajjar P<sup>1</sup> and Komala Pillay<sup>2</sup>

**Affiliation:** Paediatric Nephrology Unit, Department of Paediatric Medicine,<sup>1</sup> Anatomical Pathology Department,<sup>2</sup> University of Cape Town and Red Cross War Memorial Children's Hospital, Cape Town, South Africa.

**Background:**

In children, about 80% of primary nephrotic syndrome has minimal change disease (MCNS). The term minimal change nephritic syndrome has become synonymous with steroid sensitive nephritic syndrome because of the sensitivity to steroid therapy, such that renal biopsy is not usually indicated in MCNS. However, renal biopsy is required in patients whose clinical features are not in keeping with that of MCNS. In this study we document the histopathological pattern of children who were diagnosed nephrotic syndrome and required renal biopsy who presented at Red Cross Children's Hospital between year 2003 and 2011(Eight years).

**Aims & Objectives:**

To determine the histological patterns of renal biopsied of patients with primary childhood nephrotic syndrome at Red Cross Hospital.

**Methodology:**

This is a retrospective descriptive study. The charts and medical records of biopsied patients with nephrotic syndrome and their histopathological reports of renal biopsies were reviewed.

**Result:**

One hundred and thirty (130) primary nephrotic syndrome patients were biopsied in the period of eight years (2003 -2011). Age range of 1month to 14years and mean age of  $4.9 \pm 2$  years with mode age of 2years. Male: Female 1:1.7, 60(46.2%) were mixed race, 44(33.8%) Afro-Africans, 23(17.7%) Euro-Africans and 3(2.3%) Asian-Africans race. Steroid resistance 45(34.6%), atypical presentation 36(27.7%), frequent relapses 23(17.7%), steroid dependence 19(14.6%), and congenital nephrotic syndrome 7(5.4%) were the indication for renal biopsy in this patients. The biopsies report showed mesangial proliferative nephropathy (mesangioproliferative) 62(47.7%), focal segmental glomerulosclerosis (FSGS) 25(19.2%), minimal change nephrotic syndrome (MCNS) 16(12.3%), membranoproliferative( mesangiocapillary) 13(10.0%), and others 14(10.8) .

**Conclusion & Recommendation:**

We conclude that mesangioproliferative histopathological sub-type represents a remarkable percentage of our biopsied primary nephrotic syndrome and clinical presentation is that of atypical. It is therefore pertinent for more studies on this histological subtype in the region.

**Title:** PULMONARY FUNCTION TESTING IN HIV INFECTED CHILDREN

**Authors:** Samadi N<sup>1</sup>, Gray D<sup>1</sup>, Smith E<sup>2</sup>, Zar HJ<sup>1</sup>

**Affiliation:** <sup>1</sup>Division of Paediatric Pulmonology, Department of Paediatrics and Child Health, Red Cross War Memorial Children's Hospital, University of Cape Town, <sup>2</sup>Center for Infectious Diseases and Epidemiology Research, University of Cape Town.

**Background:**

Lung disease is common in HIV infected children but there is little data on pulmonary function testing (PFT). PFT may provide an objective measurement of respiratory impairment and reversibility with therapy.

**Aim:**

To describe PFTs in HIV infected children and associated features.

**Method:**

A prospective study of PFT in HIV infected children enrolled in an isoniazid (INH) prophylaxis study from 2005 till 2009. A minimum of 3 flow volume loops with bronchodilator responsiveness were performed on children older than 5 years. Demographic, clinical and immunological staging were recorded. Pulmonary function tests were compared to predicted normal values for height and gender and reported as percentage predicted; abnormalities were defined as having an obstructive, restrictive or mixed pattern.

**Results:**

90 children had PFTs, of which 56(62%) were technically acceptable. Most, 52(93%), were on antiretroviral therapy.

*Demographics of study group*

**Variable**

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Median age (years)	8.1 (6.9 – 9.7)
Median time on ARV's (years)	5.3 (4.4 – 6.5)
Sex M	30 (54 %)
WHO classification	
Stage 1	0 (0%)
Stage 2	3 (5%)
Stage 3	29 (52%)
Stage 4	22 (39%)
Unknown	2 (4%)
Previous TB: Yes	10 (18%)
No	46 (82%)
ARVs at time of PFT	
Yes	52 (93%)
No	4 (7%)
z-score weight median	-0.60 (-1.2 – 0.1)
z-score height median	-1.3 (-1.8 - -0.5)

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12 (21%) had abnormal PFT of whom 8 (14%) had restrictive, 1 mixed (2%) and 3 (6%) obstructive lung disease. 10 (18%) showed reversibility of the large airways (1 obstructive and 9 normal PFTs) and 15 (27%) showed reversibility in small airways (4 restrictive, 2 obstructive and 9 normal PFTs) following bronchodilator administration. 16 (27%) had an FEF(25-75) less than 80% predicted. There was no correlation between abnormal PFTs and clinical staging (p=1), immunological staging (p=0.3), TB reported prior to the study (p=0.6), use of antiretroviral therapy (p=0.61) or duration of antiretroviral treatment (p=0.82).

**Conclusion:**

Approximately a quarter of children had abnormal lung function, with most demonstrating some reversibility. However, this cohort represents a select population of relatively well children on antiretroviral therapy.

[naisansamadi@gmail.com](mailto:naisansamadi@gmail.com)

**Title: THE DISTRIBUTION OF VENTILATION IN INFANTS AND CHILDREN IN RESPONSE TO DIFFERENT BODY POSITIONS.**

**Authors:** Lupton-Smith AR<sup>1</sup>, Argent AC<sup>1,2</sup>, Rimensberger P<sup>3</sup>, Morrow BM<sup>1</sup>

**Affiliation:** School of Child and Adolescent Health, UCT<sup>1</sup>; Paediatric Intensive Care Unit, Red Cross War Memorial Children's Hospital<sup>2</sup>; University Children's Hospital, Geneva<sup>3</sup>.

**Background:**

Positioning of ill and critically ill patients may be used to optimise ventilation and V/Q matching. Current teaching in the paediatric population is that ventilation is directed to the non-dependent lung, opposite to that of adults. However, several recent studies in neonates and infants up to six months of age have questioned these results. There is no current literature on children older than six months.

**Objective:**

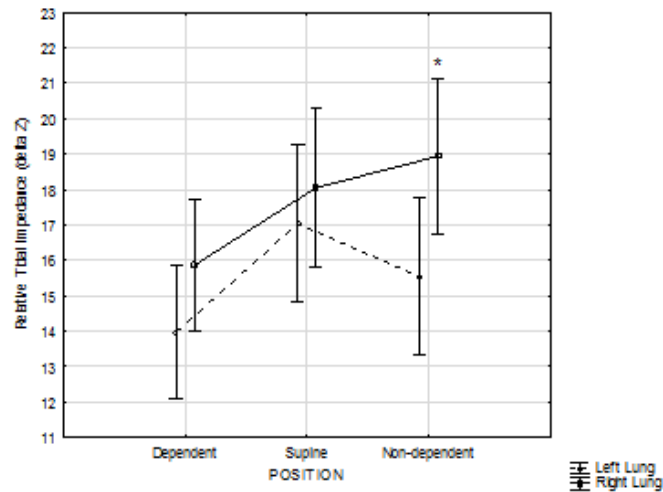
To determine the regional distribution of ventilation in infants and children in response to different body positions.

**Methods:**

Spontaneously breathing, healthy infants and children between the ages of 6 months and 9 years attending RCWMCH without lung disease or conditions impacting on respiratory mechanics were included in the study. 16 neonatal electrodes were placed around the thorax and measurements were taken using Electrical Impedance Tomography (EIT) in supine, prone, left and right side lying. Analysis was performed off line. Statistical analysis was performed using descriptive statistics, two-way ANOVA's, and t-tests.

**Results:**

56 participants (31 male) were included in the study. In side lying only 20 (36%) of participants consistently followed the paediatric pattern. The right lung was significantly better ventilated when non-dependent compared to the left lung (Figure 1). In supine and prone only two (4%) of participants consistently followed the paediatric pattern. The dorsal lung was significantly better ventilated in both supine and prone positions ( $p < 0.001$ ).



**Figure 1** Relative tidal impedance ( $\Delta Z$ ) between left and right lungs in dependent and non-dependent positions. \*  $p=0.03$  between left and right lungs.

**Conclusion:**

Regional distribution of ventilation in the paediatric population is more complex than previously thought. Future research is underway to determine the effects of mechanical ventilation, different disease states, respiratory muscle weakness and the effect of time on the regional distribution of ventilation in infants and children.

Ethics Approval: 126/2012.

[aluptonsmith@gmail.com](mailto:aluptonsmith@gmail.com)

(Junior Investigator)

**Title:**           **DESCRIPTIVE STUDY OF THE INVESTIGATION AND MANAGEMENT OF FOREIGN BODY INGESTION IN CHILDREN IN SOUTH AFRICA**

**Author:**        Dr Caroline Delpont

**Objective:**

Foreign body (FB) ingestion is a common paediatric presentation to emergency centres (EC's) in South Africa (SA). There are no formal guidelines for the management of FB ingestion in SA. This study describes the investigation and management of FB ingestion at a major paediatric EC.

**Methods:**

A retrospective chart review was conducted for the period 1<sup>st</sup> January-31<sup>st</sup> December 2010 using data from Red Cross War Memorial Children's Hospital (RCWMCH). All patients ≤ 13 years of age with a history of FB ingestion were included. FB's in the nose and ears were excluded. Data included: ingestion to presentation time, presenting symptoms, investigations performed, management, follow-up and complications.

**Results:**

184 patients were eligible for the study, but only data from 146 were included-38 excluded due to poor record keeping and folders not found. The mean age was 36 months with 53% being male. Ninety percent were asymptomatic at presentation. The most common types of FB's ingested were: metal 62% (with coins (45% of total) being the commonest overall), non-metal 14%, food 13% and other (miscellaneous) 7, 5%. 137 patients (94%) had radiographs done with a total of 202 radiographs done: 63% chest radiographs, 20% abdominal radiographs and 17% lateral neck radiographs. In a third of patients, the FB was located below the diaphragm. Nine patients (6%) did not have radiographs done as it was either done at local hospitals or not requested. 61 patients (42%) were admitted with 51 (84%) having endoscopy performed. Sixteen patients (11%) returned to the EC for same complaint with 13(82%) having repeat radiographs done.

**Conclusion:**

Almost all patients with a history of FB ingestion had radiographs performed and half had more than two radiographs done. Exposure to radiation increases the risk of developing cancer especially in children. The use of a metal detector would have reduced the number of radiographs done. Guidelines on the management of FB ingestion, including the use of metal detectors, are needed in SA.

**Title:** **HYPOTHALAMIC-PITUITARY-ADRENAL AXIS SUPPRESSION IN CHILDREN AT CAPE TOWN ALLERGY UNITS – PREVALENCE AND PREDICTIVE FACTORS**

**Authors:** Ekkehard W Zöllner, MMed(Paed) MBChB<sup>1</sup>, Carl J Lombard, PhD<sup>2</sup>, Ushma Galal, BSc Hon<sup>2</sup>, Stephen F Hough<sup>3</sup> FCP MMed MD, Elvis M Irusen, PhD<sup>4</sup>, Eugene Weinberg, FCP (SA)<sup>5</sup>

**Affiliation:** <sup>1</sup> Paediatric Endocrinology, University of Stellenbosch, Tygerberg Children's Hospital, Cape Town, South Africa; <sup>2</sup> Biostatistics Unit, Medical Research Unit, Cape Town, South Africa; <sup>3</sup> Endocrinology, University of Stellenbosch, Tygerberg Hospital, Cape Town, South Africa; <sup>4</sup> Allergy Unit, University of Stellenbosch, Tygerberg Hospital, Cape Town, South Africa; <sup>5</sup> Lung Institute, University of Cape Town, South Africa.

**Background:**

Hypothalamic-pituitary-adrenal axis suppression (HPAS) was thought to be rare in children treated with corticosteroids (CS), but may result from recovering HPA function.

Objective: To determine the prevalence & predictive factors for degrees of HPAS in children treated with CS at the allergy clinics of Cape Town.

**Methods:**

143 asthmatic children, 5-18 years old, on ICS with additional CS were recruited. Clinical features compatible with HPAS were documented. Daily and cumulative CS dose, adherence, asthma score and lung functions were recorded. Metyrapone test was performed if the 08:00 hr cortisol (C) was >83nmol/l. Spearman correlation coefficients (r) were calculated between the post-metyrapone ACTH, 11-deoxycortisol (11DOC), 11DOC+C, and each variable. A multiple linear regression model of  $\sqrt{\text{ACTH}}$  & a logistic regression model for HPAS were developed.

**Results:**

Prevalence: All HPAS 65.1(56.5-72.9)%; low 11DOC, 11DOC+cortisol 32.3(23.7-40.9)%; low ACTH, 11DOC, 11DOC+cortisol 16.3(9.3-23.3)%; hypocortisolaemia 6.1(1.8-10.5)%. GIT symptoms in hypocortisolaemic kids were associated with HPAS [OR=20.55(1.3, 329.2)]. Daily ICS+nasal steroid dose (NS)/m<sup>2</sup> correlated significantly with ACTH (r=-0.29, p<0.001) at low doses. Log daily NS/m<sup>2</sup> was significantly associated with HPAS [OR=3.7(1.1-13.6)]. BMI (p=0.048), poor adherence to ICS (p<0.001) and NS (p=0.002) were predictive to  $\sqrt{\text{ACTH}}$ .

**Conclusions:**

About 2/3 of asthmatic children on CS may have a degree of HPAS. In one third the adrenals may still be suppressed while hypothalamic-pituitary function may have recovered. Predictive factors for HPAS are concomitant NS use, high BMI, poor adherence to ICS and NS.

Ethics approval number: 276/2003.

**Title:** THE ROLE OF IL17 IN CHILDHOOD TUBERCULOSIS

**Author:** Elizabeth Whittaker (Junior Researcher)

**Supervisors:** Professors Zar, Nicol and Kampmann

**Affiliations:** Departments of Paediatrics and Medical Microbiology, UCT, South Africa and Department of Paediatrics, Imperial College, London, UK.

**Objective:**

WHO estimates that tuberculosis (TB) causes the death of half a million children yearly. Children have a significantly higher rate of developing TB disease than adults following exposure to an index case. The high susceptibility of very young children to disseminated, severe forms of TB is well documented. Although the specific reasons remain unclear, they are widely perceived to be a consequence of the “immature immune response” in children. What exactly these immature responses consist of is poorly defined. But the factors that predispose to the development of tuberculosis must be better understood so that persons at increased risk can be identified and receive interventions to prevent tuberculosis, be it more appropriate vaccines or immunotherapeutic interventions.

Lately, murine and adult studies have suggested that IL17-producing T cells play an important role in containment of TB, but their role is completely unexplored in children. Gammadelta T cells are known to be present in increased numbers in younger children and additionally are increased in children with active TB compared to both healthy controls and adults with TB, but their potential contribution of IL17 to the immune response in TB disease in children is unknown. We propose that the balance between IL17 and IFN $\gamma$  producing T cells may determine the outcome following mycobacterial exposure and in particular, hypothesize that IL17 producing gammadelta T cells may predominate in younger children with more severe disease. We are currently analysing the blood of children with active pulmonary TB or severe, disseminated TB to identify which T cells are present in order to identify which are the most important in TB containment. In order to compare our results in TB with an age-related reference range in healthy children, we will also analyse the blood of healthy children in representative age groups (<1, 1-2, 2-5, >5). We hope to gain a better understanding of the impact of age on immune responses, in particular mycobacterial immune responses, and to determine the immune mechanisms of mycobacterial control or dissemination.

**Methods:**

Children with tuberculosis were recruited from Red Cross Children’s Hospital. Blood samples were collected at time of diagnosis and at the end of treatment (6 months later). Whole blood was stimulated with SEB, BCG, ESAT-6/CFP-10 peptides or medium, both for a short-term overnight assay and a 6-day lymphoproliferation assay. Supernatants and cells were harvested and stored for analysis by multiplex ELISA and multiparameter flow cytometry. Samples for RNA extraction and identification of upregulated transcription factors were also stored. Phenotypical and functional markers of key T cell populations ( $\gamma\delta$  and CD4+ T cells, IL17 and IFN $\gamma$  producing T cells and regulatory T cells) are measured. Healthy children (not sensitized to ESAT 6/CFP10 antigens, no intercurrent infection or inflammatory condition, no immunocompromise) attending for routine outpatient appointments were also recruited and blood samples collected at a single time point. The same assays were performed.

**Results:**

180 children have been recruited to the study (80 healthy controls and 100 with presumed TB) and 60 children with TB disease have been seen at both time points. Flow cytometry and analysis of these samples is ongoing. Preliminary data already shows significant differences in proliferative capacity and cytokine production of T cells in children with TB compared to healthy controls, in particular in those with disseminated disease. IFN $\gamma$  production by mycobacteria-specific  $\gamma\delta$  and CD4+ T cells appears to be suppressed in those with TB, and IL17 production is conversely increased in  $\gamma\delta$  T cells in children with disseminated TB.

**Conclusion:**

This clinical-immunological study is exploring the differences in host immune responses to mycobacteria. By analysing the role of age and differences in responses in children with different manifestations of TB we have begun to describe key cell populations and effector mechanisms of mycobacterial containment in children.

**ETHICS APPROVAL HREC REF 062/2011**

**Title:** **ISONIAZID PREVENTIVE THERAPY IN HIV INFECTED CHILDREN ON ANTIRETROVIRAL THERAPY LIVING IN A HIGH TUBERCULOSIS PREVALENCE AREA: A RANDOMIZED CONTROLLED TRIAL**

**Authors:** DM Gray<sup>1</sup>, L Workman<sup>1</sup>, CJ Lombard<sup>2</sup>, S Innes, N Grobbelaar, MF Cotton<sup>3</sup>, HJ Zar<sup>1</sup>

**Affiliation:** <sup>1</sup> Department of Paediatrics and Child Health, Red Cross War Memorial Children's Hospital, University of CapeTown, South Africa <sup>2</sup> Biostatistics Unit, Medical Research Council, South Africa, <sup>3</sup> Department of Paediatrics and Child Health, Stellenbosch University, South Africa

**Background:**

Tuberculosis (TB) is a common cause of morbidity and mortality in HIV infected children. Isoniazid preventive therapy (IPT) has been shown to reduce TB incidence in HIV infected children not on highly active antiretroviral therapy (HAART). Data on IPT efficacy in HIV infected children receiving HAART is inconclusive.

**Aim:**

To assess the efficacy, tolerability and safety of isoniazid (INH) compared to placebo in HIV-infected children on HAART living in a high TB prevalence area.

**Method:**

A randomised placebo controlled double blind study of INH was undertaken in HIV infected children on HAART attending three centres in Cape Town, South Africa. Children were randomised to receive INH or placebo either daily or thrice weekly. Participants were prospectively followed from May 2005 to November 2011. The primary outcome measure was tuberculosis disease or death.

**Results:**

One hundred and sixty seven children were randomised to receive INH or placebo and followed for a median of 34 months (IQR 24-52). The median age was 35 months (15-65) and median CD4% 27 (IQR 21-34). Six (4%) children had previous TB treatment and 14 (8%) previously received INH prophylaxis. There was 1 death in a child on INH and none in the placebo group. Eleven (6.6%) cases of TB occurred during the study period; 4 (5%) in the INH and 7 (9%) in the placebo group, incident rate ratio (IRR) for TB was 0.5 (95%CI: 0.15 to 1.75, p=0.284). Amongst the TB cases 5 were culture confirmed; 2 in the INH group and 3 in the placebo group of which all were sensitive to INH. Very few severe adverse events (6; 2%) occurred, with only 1 event of INH related hepatotoxicity. Adherence was good in both groups. Dosing frequency had no impact on TB incidence and adverse events.

**Conclusion:**

IPT is safe and well tolerated in HIV infected children on concomitant HAART. INH showed a trend to protection against TB in HIV infected children on HAART. These results support the need for a larger study to assess efficacy in older HIV infected children on HAART living in high TB endemic areas.

**Ethics:** Research and Ethics Committee of the Faculty of Health Sciences, University of Cape Town (ethics no. 299/2005)



**Title:** REDUCED FREQUENCIES OF BCG-SPECIFIC IFN-G EXPRESSING T CELLS WHEN BACILLUS CALMETTE GUERIN (BCG) IS ADMINISTERED AT SIX WEEKS OF AGE IN UGANDAN INFANTS.

**Authors:** Lutwama F<sup>1,2</sup>, Kagina BM<sup>1</sup>, Day C<sup>1</sup>, Wajja A<sup>2</sup>, Waiswa F<sup>2</sup>, Mansoor Nazma<sup>1</sup>, Kirimunda S<sup>2</sup>, Hughes J<sup>1</sup>, Joloba M<sup>2</sup>, Musoke P<sup>2</sup>, Scriba TJ, Mayanja-Kizza H<sup>2</sup>, Hanekom WA<sup>1</sup>

**Affiliations:** <sup>1</sup>South African Tuberculosis Vaccine Initiative (SATVI), Institute of Infectious Diseases and Molecular Medicine and School of Child and Adolescent Health, University of Cape Town, South Africa, <sup>2</sup>Infectious Diseases Institute, Makerere University College of Health Sciences, Kampala, Uganda

### **Background:**

In Uganda, Bacillus Calmette-Guerin (BCG) is routinely administered soon after birth within a health facility. However, homebirths are prevalent therefore some newborns receive BCG later. We aimed to compare BCG-specific CD4<sup>+</sup> and CD8<sup>+</sup> T cell response in infants who received BCG at birth with those that received BCG at 6 weeks of age. We hypothesised that infants vaccinated at birth would show lower frequencies of BCG-specific CD4<sup>+</sup> and CD8<sup>+</sup> T cells compared with infants vaccinated at 6 weeks of age.

### **Methods:**

We conducted a cross-sectional study. Nine months-old infants who had received BCG at birth or at 6 weeks of age were enrolled. Blood was drawn from each infant. BCG-specific CD4<sup>+</sup> and CD8<sup>+</sup> T cell responses were measured with a short-term whole blood intracellular cytokine assay and multiparameter flow cytometry.

### **Results:**

We enrolled 92 infants; 50 infants were vaccinated with BCG at birth while 42 were vaccinated at 6 weeks of age. All infants showed a robust BCG-specific Th1 (IL-2, IFN- $\gamma$  and TNF- $\alpha$ ), Th17 (IL-17) and perforin CD4<sup>+</sup> and CD8<sup>+</sup> T cells response. Birth vaccinated infants showed a higher frequency of CD4<sup>+</sup> and CD8<sup>+</sup> T cells producing IFN- $\gamma$ .

### **Conclusions:**

Our findings did not support the hypothesis. Immune correlates of protection against TB remains unknown. Therefore, we cannot comment on the clinical relevance of higher frequency of CD4<sup>+</sup> and CD8<sup>+</sup> T cells producing IFN- $\gamma$  in birth vaccinated infants. The higher social economic levels in birth than delayed vaccinated infants may partly explain the observed differences.

**HREC Ref Number :** 176/2012

**Title:** TB INFECTION AND DISEASE AMONG INFANTS YOUNGER THAN 6 MONTHS OF AGE IN A HIGH TB PREVALENCE SETTING

**Authors:** <sup>1,2</sup> Luabeya Kany Kany A, <sup>1,2</sup>Tameris M, <sup>1,2</sup>Geldenhuys H, <sup>1,2</sup> Van der Merwe L, <sup>1,2</sup> Van Schalkwyk A, <sup>1,2</sup>Marwou de Kock, <sup>1,2</sup>Scriba T, <sup>1,2</sup>Hanekom W, <sup>1,2\*</sup>Mahomed H, <sup>1,2\*</sup>Hatherill M

**Affiliation:** <sup>1</sup>South African tuberculosis Vaccine Initiative (SATVI), Institute of Infectious Disease and Molecular Medicine (IIDMM), University of Cape Town, Cape Town  
<sup>2</sup>School of Child and Adolescent Health, Health Sciences Faculty, University of Cape town, Cape Town  
\*Contributed equally

**Background:**

Infants and very young children have the highest age-related risk of progression to miliary and meningitic TB disease following primary infection.

**Objectives:**

To estimate the prevalence of TB infection diagnosed by Quantiferon Gold in-tube test (QFT-GIT) in HIV unexposed infants before 6 months of age and their 2-year cumulative TB incidence on follow up

**Methods:**

We analyzed data of BCG-vaccinated infants who were screened for participation in a TB vaccine trial from July 2009 to April 2011. Infants with a history of household TB exposure were excluded and referred for isoniazid preventive therapy (IPT) if indicated. Medical examination and HIV and QFT-GIT tests were performed on all eligible, otherwise healthy infants. Data on provision of IPT and subsequent diagnosis and treatment of TB disease were collected on QFT-GIT positive infants, from the TB clinic notification registers for the 24-month period after diagnosis of TB infection.

**Results:**

4,758 BCG vaccinated infants were screened at median 18 (IQR: 17-19) weeks of age. 1,961 were excluded on the basis of medical history, including household TB exposure (n=112), and other co-morbidities, including maternal HIV exposure. 3,417 (71.8%) eligible infants had a QFT-GIT result available for analysis. 273 (8%) of tested infants were QFT-GIT positive, 3,136(91.7%) were negative and 9 (0.2%) were indeterminate.

Among QFT-GIT positive infants (n=273), only 58 (21%) infants received IPT at local clinics, based on a positive tuberculin skin test (TST). During the 24 months following the diagnosis of TB infection, the cumulative incidence of reported TB disease was 11 % (n=31/273), with an estimated incidence rate of 5.7/100 person years.

**Conclusion:**

These preliminary data show that, in a high TB prevalence setting, a clinically significant proportion of BCG-vaccinated, HIV uninfected infants are TB infected before 6 months of age, even in the absence of known household TB exposure. Few QFT-GIT positive infants received IPT and the incidence of TB disease within two years of follow up was very high. National TB programme guidelines should consider an isolated positive QFT-GIT result as an indication for IPT.

**Title:** RAPID MOLECULAR DIAGNOSIS OF PULMONARY TUBERCULOSIS IN CHILDREN USING NASOPHARYNGEAL SPECIMENS.

**Authors:** Heather J. Zar, Lesley Workman, Washiefa Isaacs, Jacinta Munro, Faye Black, Brian Eley, \*\*Veronica Allen, \*Catharina C. Boehme, \*\*Widaad Zemanay, \*\*Mark P. Nicol

**Affiliation:** Department of Paediatrics and Child Health, University of Cape Town and Red Cross War Memorial Children's Hospital, Cape Town, South Africa, \*Foundation for Innovative New Diagnostics (FIND), Geneva, Switzerland, Division of Medical Microbiology & Institute for Infectious Diseases and Molecular Medicine, University of Cape Town, National Health Laboratory Service, South Africa

### **Abstract**

Rapid diagnosis of paediatric pulmonary TB (PTB) using induced sputum (IS) specimens is possible using Xpert MTB/RIF. However, there is limited capacity to perform IS in children. Diagnosis using a nasopharyngeal aspirate (NPA) is desirable as this can be easily and non-invasively obtained.

### **Aim:**

To investigate the diagnostic yield from NPAs compared to IS for paediatric PTB

### **Methods:**

Children hospitalised with suspected PTB in a high TB and HIV prevalence area, were enrolled. Paired specimens (NPA and IS) were investigated for *M. tuberculosis* using concentrated, fluorescent acid fast smear, liquid culture and Xpert. The diagnostic accuracy of Xpert and of smear was compared with a reference standard of liquid culture for different specimens.

### **Results:**

535 children [median age 19 months, 117 (21.9%) HIV-infected] had one IS and one NPA; 396 had 2 paired specimens. The number of children with a positive smear, Xpert or culture was 30 (5.6%), 81 (15.1%) and 87 (16.3%) respectively. The yield by culture from IS (84/87 cases, 96.6%) was higher than from NPA (61/87, 70.1%,  $p < 0.001$ ). Amongst 396 children with two paired specimens, there were 63 culture confirmed cases [60 (95.2%) on IS vs. 48 (76.2%) on NPA,  $p = 0.002$ ]. Using mycobacterial culture on any specimen as the reference standard, the sensitivity of two Xpert tests on IS (45/63, 71%) was similar to that on two NPAs (41/63, 65%,  $p = 0.444$ ); the sensitivity of smear was substantially lower than Xpert on IS (21/63, 33%) and on NPA (16/63, 25%). The incremental yield from a second IS specimen was 9 cases (17.6%) by culture and 9 cases (25%) by Xpert; a second NPA increased the culture yield by 10 cases (26.3%) and from Xpert by 11 cases (36.7%). The specificity of Xpert was 99.1% (98.1 - 100) and 98.2 (96.8 - 99.6) on IS and NPA specimens respectively. Xpert was faster than culture (median time to result 0 vs 15 days,  $p < 0.001$ ).

### **Conclusion:**

Xpert testing on 2 sequential NPAs should be the first line investigation in children with suspected PTB particularly in settings where IS and culture are not feasible.

**Title: PANDEMIC INFLUENZA A H1N1 (2009) IN CRITICALLY ILL CHILDREN ADMITTED TO A PAEDIATRIC INTENSIVE CARE UNIT, SOUTH AFRICA**

**Authors:** J.O. Ahrens; B.M Morrow; A.C Argent

**Affiliation:** Paediatric Intensive Care Unit (PICU), Red Cross War Memorial Children's Hospital (RCWMCH); Department of Paediatric Critical Care and Children's Heart Diseases, University of Cape Town

**Objectives:**

To describe the clinical course of children with confirmed pandemic influenza A (H1N1) (nH1N1(2009)) infection admitted to the PICU at RCWMCH from 1 August to 30 September 2009; in comparison with those admitted to the PICU over the same period with other respiratory viral infections.

**Methods:**

A retrospective descriptive single centre study.

**Results:**

During the study period 19 children in 20 PICU admissions tested positive for nH1N1(2009) and 8 patients in 9 admissions had other positive respiratory viral isolates.

	Gender (M:F)	Age (months)	HIV Positive	ICU Stay (days)	Ventilator Days	PELOD Score (admission)	ICU Mortality
nH1N1(2009) pos (N=20)	10:10	12 (1-100)	3/19	8 (2-24)	5 (0-27)	11	5/20
nH1N1(2009) neg (N=9)	8:1	12 (7-25)	1/8	6 (1-16)	4 (0-16)	1	0/9

Continuous data are median (range)

Of the nH1N1 (2009) positive patients, four (20%) tested positive for another respiratory virus, 14 (70%) had major co-morbidities, 6 (30%) were under-weight-for-age one (5%) was overweight-for-age, and mean PIM2 score on admission was 0.059. Four of the 5 fatalities (80%) had major co-morbidities.

Rhinovirus was most commonly isolated in the nH1N1(2009) negative patients (n=7; 77.8%), followed by seasonal influenza A virus (n=2; 22.2%), adenovirus (n=1; 11.1%) and RSV (n=1; 11.1%). Five (55.6%) had major co-morbidities, 5 were underweight-for-age, and the mean PIM2 score on admission was 0.055.

**Conclusions:**

Children admitted to the PICU with confirmed nH1N1(2009) tended to have a longer ICU stay, and higher mortality than those with other respiratory viruses.

**HREC REC/Ref: 512/2009**

[Johan.ahrens@uct.ac.za](mailto:Johan.ahrens@uct.ac.za)

**Title:** AN INNOVATIVE INTEGRATION OF TEACHING METHODS TO OPTIMISE CLINICAL LEARNING

**Authors:** Ms Clare Davis, Ms Hilary Barlow, Ms Inger Hendry, Mrs Lee-Ann White and Dr. Minette Coetzee

**Affiliation:** The Child Nurse Practice Development Initiative, The University of Cape Town, School of Child and Adolescent Health.

**Background:**

Two aspects of nursing education in South Africa are certain. Firstly that combining theory with practice is not as simple as it sounds! Nurses' exposure and accessibility to nursing literature is often limited, and time, language fluency and research literacy pose as considerable challenges to the integration of published literature into practice. Secondly, non-first language learners and practitioners can find it a challenge to communicate in a manner that is academically and clinically correct. This can result in nurses not having the confidence to speak up in clinical settings thus the value of their input to patient care is lost.

Also known is the notion that whilst individuals favour different learning styles, successful learning is most likely when learning occurs in the real world of the learners. Adult learning is also most constructive when active, participatory and driven by enquiry.

**Objective:**

To establish an innovative clinical teaching day within the Postgraduate Diploma in Child or Child Critical Care Nursing to improve the integration of theory into practice and assist students with communication in the clinical setting.

**Methodology and results:**

Through a process of active reflection and natural evolution, the Child Nurse Practice Development Initiative developed an innovative clinical teaching day. In a week otherwise dedicated to clinical placements, students are brought back together for three traditional teaching activities; journal club, bedside patient presentations and clinical tutorials. A degree of preparation and participation is required by the students for each. Intentionally considering student need, course requirements and current local/global health concerns, a common clinical thread is chosen as the theme of each week to which each activity is then aligned.

**Conclusion:**

A wide spectrum of both positive clinical and academic outcomes result from the integrated teaching day, and many important lessons were learnt by the lecturers during the process.

**Title:** NOVEL NAÏVE-LIKE MYCOBACTERIA-SPECIFIC CD4 T CELLS ARE NOT T MEMORY STEM CELLS

**Authors:** <sup>1</sup>O. Dintwe, <sup>1</sup>C. Day, <sup>1</sup>E. Smit, <sup>1</sup>M. Tameris, <sup>2</sup>H. McShane, <sup>1</sup>H. Mahomed, <sup>1</sup>W. Hanekom and <sup>1</sup>T. Scriba.

**Affiliation:** <sup>1</sup>South African Tuberculosis Vaccine Initiative and School of Child and Adolescent Health, University of Cape Town, Cape Town, Republic of South Africa; <sup>2</sup>Centre for Clinical Vaccinology and Tropical Medicine & The Jenner Institute Laboratories, Nuffield Department of Medicine, Oxford University, Oxford, United Kingdom.

Memory T cells are a key characteristic of acquired adaptive immunity. Upon antigen encounter, these cells differentiate from naïve into effector T cells, which clear the pathogen or antigen, before the response contracts to a residual population of central memory T cells. The self-renewing capacity of central memory cells is thought to be important for long-lived immunity. A new subset of memory T cells has recently been described, adding to the complexity of memory T cells. These T memory stem cells (T<sub>SCM</sub>), which express phenotypic markers consistent with naïve T cells (CD45RA<sup>+</sup>CCR7<sup>+</sup>CD27<sup>+</sup>), possess remarkable self-renewing capacity and the ability to repopulate all memory populations.

An unusual population of mycobacteria-specific memory T cells, with phenotypic characteristics of naïve T cells, has been described in numerous studies of human immune responses to *Mycobacterium tuberculosis* (*M.tb*). These “naïve-like” (NL) memory T cells express effector cytokines, but display a CD45RA<sup>+</sup>CCR7<sup>+</sup>CD27<sup>+</sup> “naïve” phenotype.

**Objective:**

To determine if mycobacteria-specific NL CD4 T cells are T<sub>SCM</sub>.

**Methods:**

We accessed cryopreserved peripheral blood mononuclear cells (PBMC) samples from healthy, *M.tb*-uninfected adults and adolescents who took part in phase I/II trials of the novel TB vaccine, Modified Vaccinia Ankara, expressing the mycobacterial protein Ag85A (MVA85A). Subjects were vaccinated with a single dose of 5x10<sup>7</sup> plaque forming units of MVA85A, and blood was collected before and at 7 time points up to 1 year after vaccination. Peripheral blood mononuclear cells (PBMC) were stained with an HLA-DRB1\*03:01 class II tetramer bearing an Ag85A peptide and a panel of memory phenotype antibodies.

**Results:**

*Ex vivo* frequencies of Ag85A-specific tetramer<sup>+</sup> CD4 T cells peaked 7 days after vaccination and returned to baseline levels by 84 days. MVA85A-induced CD4 T cells predominantly displayed an effector (CD45RA<sup>+</sup>CCR7<sup>-</sup>CD27<sup>-</sup>) phenotype during the first 2-4 weeks post-vaccination. As this effector response waned, a population of CD45RA<sup>+</sup>CCR7<sup>+</sup>CD27<sup>+</sup> NL tetramer<sup>+</sup> CD4 T cells emerged. Since the expression of CD95 distinguishes T<sub>SCM</sub> cells from naïve cells, we measured expression of CD95 on tetramer<sup>+</sup> NL CD4 T cells. We found that CD95<sup>+</sup> cells comprised only a very small proportion of the tetramer<sup>+</sup> NL CD4 T cell subset, ranging from 0-2.44%.

**Conclusion:**

We confirmed the presence of Ag85A-specific NL CD4 T cells in MVA85A vaccinated adults and adolescents. However, our data suggest that these NL CD4 T cells are not T<sub>SCM</sub> cells. Further investigation is required to understand the ontogeny and function of this novel mycobacteria-specific memory CD4 T cell subset.

This work was supported by grants from the Wellcome Trust and EuropeAID.

**Title:** ELECTRON MICROSCOPY FINDINGS IN AN AFRICAN CASE OF INTERSTITIAL LUNG DISEASE (ILD) CAUSED BY AN ABCA3 MUTATION

**Authors:** E. Dollie<sup>(1)</sup>, M Zampoli<sup>(2)</sup>, H Zar<sup>(2)</sup>, K. Pillay<sup>(1)</sup>

**Affiliation:** <sup>1</sup>NHLS Histopathology , Red Cross War Memorial Children's Hospital and University of Cape Town.

<sup>2</sup>Division of Paediatric Pulmonology, Red Cross War Memorial Children's Hospital and University of Cape Town.

A female Xhosa infant presented at 6 months of age with persistent cough and shortness of breath. Examination findings included tachypnea, clubbing, hypoxia and diffuse crackles on auscultation. There was a family history of unexplained lung disease: the father and older sibling both died prematurely from their lung conditions. Her clinical course was characterized by life-long persistence of these clinical features interspersed with recurrent respiratory tract infections. A chest x-ray and HRCT were consistent with ILD showing diffuse reticular nodular infiltrates and interlobular thickening. Extensive search for other causes of ILD was negative. Management consisted of continuous oxygen therapy, corticosteroids and hydroxychloroquine.

The patient was hospitalized at 8 years of age with an intercurrent respiratory infection when she unexpectedly died suddenly whilst taking a hot bath. A post mortem lung biopsy was requested.

The light and electron microscopy findings of the lung biopsy are presented. Sections of the lungs showed a honeycomb pattern with extensive interstitial fibrosis, scattered chronic inflammatory infiltrates, smooth muscle metaplasia and evidence of cuboidal metaplasia of alveolar spaces. There was no pleural fibrosis. On immunohistochemistry, both surfactant protein A and B were present. Transmission electron microscopy of the lung showed small lamellar bodies with dense bodies characteristic of ABCA3 deficiency.

**Title:** CONTINUOUS FLOW PERITONEAL DIALYSIS (CFPD): DESCRIPTION OF USE IN CLINICAL SETTING IN CHILDREN WITH ACUTE KIDNEY INJURY.

**Authors:** Du Plessis M, Sinclair G, Gajjar P, Nourse P.

**Affiliation:** Red Cross War Memorial Children's Hospital, University of Cape Town, South Africa.

**Aim:**

To describe the practical use of CFPD in AKI outside the study scenario.

**Introduction:**

Previously described use of CFPD in AKI involved a labour intensive method as clearances and MTAC's were meticulously calculated. In the non-study environment CFPD can be implemented safely in a much more practical way, using the Baxter/Edwards BM25.

**Method:**

CFPD was implemented in five patients with fluid overload and AKI who were not ultra filtrating adequately using conventional peritoneal dialysis. Firstly a second bedside catheter was placed using the Seldinger technique. Only the venous and fluid side of the BM25 was used. Transducers were connected to display in and out pressures. Each patient was treated with CFPD for 6- 8 hours. A three-way tap was connected to the one of the patients' catheters to measure intra-abdominal pressure, which was recorded hourly after stopping the pump for a short while. Abdominal circumference measurements were taken hourly as well. Initial filling was at 20m/kg dialysate fluid. Dialysate flow was set at 100ml/1,73m<sup>2</sup> /min and UF rate at 2.5ml/1.73/min. If IPP was greater than 15cmH<sub>2</sub>O, 5ml/kg was drained from the abdomen at a time to maintain IPP. Conventional blood monitoring was continued.

**Results:**

In all patients CFPD ran smoothly. The mean age of the patients was 36.8 weeks (range: 2 weeks to 2 years). One patient required drainage of fluid from the abdomen for increased IPP. One patient required reversal of flow to unblock catheter. Ultrafiltration was increased 3-5 fold as opposed to conventional PD.

**Conclusion:**

CFPD can be implemented in a safe, practical and effective way in the clinical setting.



**Title:** DEVELOPMENT OF A CONFIDENTIAL ENQUIRY PROCESS IN A DEVELOPING WORLD HEALTH CARE SYSTEM - PATHWAYS TO CARE IN PAEDIATRIC CRITICAL CARE RESEARCH PROJECT

**Authors:** P. Hodkinson<sup>1,\*</sup>, R. Gillespie<sup>1</sup>, A. Ward<sup>2</sup>, L. Wallis<sup>1</sup>, A. Argent<sup>1</sup>

**Affiliation:** <sup>1</sup>University of Cape Town, Cape Town, South Africa, <sup>2</sup>Primary Health Care Sciences, University of Oxford, Oxford, United Kingdom

**Objectives: Background:**

When, where, and how often does care for critically ill children fail? South African childhood mortality remains high and many critically ill children die before they reach high quality intensive care. There is a lack of evidence about the relative importance and frequency of care failures at different points in the care pathway which is crucial in prioritizing allocation of resources to achieve improvements in critical care and a reduction in child deaths.

**The Research Program:**

This was based primarily on the “Confidential Enquiry” style of investigation into a death and panel consensus as to the main remedial issues to improve the system.

**Aim & Objectives:** To identify preventable failures in the medical care of critically ill children at all stages of the care pathway.

**Study Population:**

Red Cross War Memorial Children’s Hospital is a large South African tertiary paediatric hospital. The study will sample approximately 450 children over one year.

**Methodology:**

A sample will be obtained of emergency admissions to the Intensive Care Unit as well as paediatric deaths in healthcare facilities. For each data will be obtained on all aspects of the pathway - from the onset of illness or injury, through access to care, primary health care, hospital emergency management and EMS transfer until ICU admission or death, through review of medical records, and semi-structured interview with carer. An online database will facilitate expert clinical review of each case to identify preventable failures in care.

**Outcomes:**

The aggregate results will underpin development and prioritization of interventions to minimize critical care failure in the future.

**Importance of This Study:**

This study presents a novel approach (particularly in the developing world) to identifying and quantifying flaws in the healthcare system at all levels. It is immensely more difficult to analyse multiple systems rather than individual facilities and we believe this case based approach will prove powerful and informative and offer a model for systems research elsewhere.

**Disclosure of Interest:** Research Support from: Wellcome Grant,

**Ethics Approval:** HREC 211/2011

**Title:** **DEVELOPMENT OF STANDARDS FOR PAEDIATRIC EMERGENCY CARE IN CAPE TOWN.**

**Authors:** P. Hodkinson<sup>1,\*</sup>, A. Argent<sup>1</sup>, L. Wallis<sup>1</sup>

**Affiliation:** <sup>1</sup>University of Cape Town, Cape Town, South Africa

**Background:**

Paediatric healthcare services in South Africa are not meeting goals for childhood mortality. Despite the emphasis on preventive care, efficient curative health services are still integral to improvement.

**Objectives:**

To develop consensus standards for paediatric emergency care, for quality assurance and improvement, and specifically to facilitate a parallel research endeavor looking at pathways to care in paediatric critical care.

**Methodology:**

A taskforce group was formed with representation from all involved with paediatric emergency care (doctors, nurses and EMS personnel) to develop standards based on international models, but to be practical and not overly idealistic to local circumstances.

**Results:**

Initial focus was on emergency access and triage processes, as well as on key early management and referral issues. A draft set of standards based on international and local literature was used as a framework for development, with a series of meetings to debate and refine for local services. The standards would be applicable to all levels (which created many obstacles in defining them), and would focus on emergency conditions that commonly involve an ultimate critical care element under the following subsections: reception and resuscitation, gastro-enteritis, respiratory distress, septic shock, coma/ convulsions, polytrauma/ head injury, burns, and referral & ICU access.

**Discussion:**

We believe that the consensus standards reached by this brief and accelerated process represent a meaningful tool for audit and quality assurance. By involving all role-players at an early stage in the consensus process, the standards are given local credibility and attainability. This will endorse and support the outcomes of audit and research looking at the care provided by the system relative to the standards agreed upon.

**Conclusion:** We present a set of standards developed for use in a developing world paediatric emergency care setting which will spur the development of further standards; allow objective quality assurance; and facilitate research into the healthcare system, consequently improving the quality of emergency care for children in the province.

**Disclosure of Interest:** P. Hodkinson: None Declared, A. Argent Grant / Research Support from: Wellcome Grant, L. Wallis Grant / Research Support from: Wellcome Grant

**Ethics Approval:** HREC 211/2011

**Title:** THE ATTITUDES OF MEDICAL STUDENTS TOWARDS RESEARCH

**Authors:** Hoffman R, Nel D, Rander-Rees S, Burman R, Futter M, Mayosi B

**Affiliation:** Groote Schuur Hospital and Department of Medicine, University of Cape Town, Health Sciences Faculty, Cape Town

**Background:**

Medical research contributes to health care at all levels. Sadly, the workforce of so-called ‘physician-scientists’ actively engaged in research is ageing and steadily decreasing in numbers. A number of mechanisms have been proposed to combat this trend; however, the responsibility will ultimately rest on future generations of health care professionals. It is therefore of utmost importance, that attention is drawn and focussed on the attitudes of medical students’ towards research.

**Aims:**

To ascertain the current extent of extracurricular undergraduate research; to establish the general attitudes of UCT medical students towards research; and to investigate the factors influencing these attitudes.

**Methods:**

An anonymous, cross-sectional, self-administered questionnaire was administered to medical students from years 1 to 6, studying medicine at UCT in 2011. Questions were primarily closed-ended and consisted of Likert scales.

**Results:**

733 medical students were sampled out of a population of 1195 (63%). The mean age was 21 years (range 17-31), with 65% being female compared to 35% male. 53% were preclinical students (1st to 3rd year) compared to 47% who were in their clinical years (4th to 6th year). 22% of students reported that they have been involved in voluntarily extracurricular research, while only 32 students (4%) have presented their work at a conference and only 20 (3%) have published in a peer-reviewed journal. In terms of overall attitude towards research, 61% of students had a positive attitude while the remainder held neutral (30%) or negative (9%) attitudes. Over 90% of students felt that research is important in a developing country like South Africa, and 74% felt that participation in research is important to their medical school education. However, only 44% would like to be involved in research while at medical school, and 7% never want to get involved in research at all. A number of perceived barriers to student research were identified; only 24% of students felt there is enough time in medical school to do extracurricular research and most felt that it is very hard to publish or present their work. Although the majority of students felt that they would get deserved acknowledgement for their involvement in a research project, 76% do not know what research opportunities are available and most felt that it is difficult to find a research supervisor or acquire funding for research projects. Only 34% of students felt that there is adequate training in research methodology at medical school.

**Conclusions:**

Students perceive research to be important and most students have a positive attitude towards it. However few want to get involved in research in medical school and fewer still have produced work worthy of presentation and or publication. Barriers can be addressed in order to improve student attitudes and create a better environment for fostering student research. This might begin to reverse the trend in declining numbers of physician-scientists.

**Category:** Junior researcher

**Junior Contribution:** Project completed entirely by medical students under the supervision of Dr M Futter and Professor B Mayosi.

**Ethics Approval Number:** HREC/REF:251/2011

**Title:** THE PREDICTORS OF GLYCAEMIC CONTROL IN CHILDREN AND ADOLESCENTS WITH TYPE 1 DIABETES, AS INDICATED BY HbA1c LEVELS, IN A POPULATION OF PATIENTS FROM A DIABETES CLINIC IN CAPE TOWN, WESTERN CAPE PROVINCE, SOUTH AFRICA

**Authors:** Catherine Janari and Sarah Murless

**Affiliation:** (2<sup>nd</sup> yr MBChB, UCT)

**Objective:**

This cross sectional interpretive study aimed to determine the predictors of glycaemic control, as measured by glycated haemoglobin (HbA1c), in children, adolescents and young adults with type 1 diabetes. It also aimed to assess whether the Diabetes Clinic at the Red Cross Children's Hospital is achieving the treatment goal set by The International Society of Paediatric and Adolescent Diabetes (ISPAD) guidelines of HbA1c  $\leq 7.5\%$ , and its own target HbA1c levels of  $<8\%$  for pre-schoolers and  $<7\%$  for school children.

**Method:**

Clinical records of patients attending the Red Cross Children's Hospital Diabetes Outpatients Clinic during 1 July 2011 – 30 June 2012 were reviewed. The following clinical and demographic parameters were recorded and analyzed: HbA1c, gender, age, age at time of diagnosis, duration of diabetes, language, income class, residential postal code and number of clinic visits in the one year period.

**Results:**

In the analyzed population (n=250, 138 females and 112 males) the median age was 13yrs (10-15.75yrs). The overall mean HbA1c value for the study sample was 9.6% (SD=1.74%) and the overall median HbA1c value was 9.29% (8.50-10.69). Gender was not a predictor of glycaemic control, and there was not a strong association between HbA1c and number of clinic attendances, however there was a downward trend in HbA1c with increased number of visits. High mean HbA1c was significantly correlated with older age, longer duration of diabetes, later onset of diabetes, lower income class, Xhosa speakers and further distance of residence from the hospital (p<0.05).

**Conclusion:**

Glycaemic control in youth with type 1 diabetes is affected by various patient-related and treatment-related factors. The Diabetes Clinic at the Red Cross Children's Hospital is not achieving its HbA1c treatment goals, which requires changes in health care delivery by means of targeting these influential factors.

**Key words:** Type 1 diabetes, children, young adults, glycaemic control, HbA1c

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**Title:** **BREASTFEEDING IN A PEDIATRIC HOSPITAL IN THE WESTERN CAPE - PERCEPTIONS AND EXPERIENCES OF AUXILIARY NURSES**

**Authors:** Margo Joseph (M.Cur) Supervisor: Dr. D. Skinner

**Objective:**

Breastfeeding is considered the most preferable method of infant feeding and fulfills babies' nutritional needs important to their growth and development. The purpose of this research was to describe the experiences and perceptions of nurses regarding breastfeeding in a pediatric hospital in the Western Cape.

**Methods:**

A descriptive study design with a qualitative approach was used. Purposive sampling was utilized to select thirteen auxiliary nurses to participate in the study. Semi-structured interviews were recorded and transcribed followed by a qualitative data analysis method to identify themes and sub-themes.

**Results:**

According to the auxiliary nurses' perceptions, most of the babies in the pediatric setting were not being breastfed. Breastfeeding was supplemented with formula milk when mothers chose not to breastfeed as a result of various factors. The babies' illness, hospital environment and lack of resources challenged auxiliary nurses when supporting breastfeeding mothers. In addition, interrelated factors influencing breastfeeding support included: shortage of staff; time constraints; heavy work-loads; auxiliary nurses' breastfeeding knowledge and experience; confidence to support breastfeeding and communication regarding breastfeeding.

**Conclusions:**

The research findings indicate that there was a need for breastfeeding promotion in the pediatric setting. Recommendations included: a written breastfeeding policy; breastfeeding training for all health care professionals; better breastfeeding education and support for mothers; the maintenance of breastfeeding during the babies' illness; adequate accommodation for breastfeeding mothers and the support of breastfeeding mothers who are HIV positive.

In response to this work, the BIB Project (Breastfeeding is Best), a collaborative project was launched which aimed to improve breastfeeding practices. The Hospital Training Unit, Practice Development and Dietetics collaborated to address and redirect feeding practices to prioritising the support and encouragement of breastfeeding. The achievements of the group and future plans will be discussed.

**Title:** A PHASE II DOUBLE BLIND, RANDOMIZED, PLACEBO-CONTROLLED DOSE ESCALATION STUDY TO EVALUATE THE IMMUNOGENICITY OF AERAS-402 IN ADULTS RECENTLY TREATED FOR PULMONARY TUBERCULOSIS

**Authors:** Benjamin Kagina<sup>1</sup>, Brian Abel<sup>1</sup>, Nazma Mansoor<sup>1</sup>, Thomas J. Scriba<sup>1</sup>, Jane Hughes<sup>1</sup>, Blessing Kadira<sup>2</sup>, Wendy Whatney<sup>1</sup>, Ali Esmail<sup>3</sup>, Richard van Zyl Smit<sup>3</sup>, Ashley Veldsman<sup>1</sup>, Donata Sizemore<sup>4</sup>, J. Bruce McClain<sup>5</sup>, Margaret A. Snowden<sup>5</sup>, David A. Hokey<sup>5</sup>, Tom Evans<sup>5</sup>, Robert Walker<sup>5</sup>, Mary Bateman<sup>3</sup>, Hassan Mahomed<sup>1</sup>, Gregory D. Hussey<sup>1</sup>, Jerald C. Sadoff<sup>4</sup>, Eric Bateman<sup>3</sup> and Willem A. Hanekom<sup>1</sup>

**Affiliation:** <sup>1</sup>South African Tuberculosis Vaccine Initiative (SATVI), Institute of Infectious Diseases and Molecular Medicine and School of Child and Adolescent Health, University of Cape Town, Cape Town, South Africa, <sup>2</sup>Aeras Global TB Vaccine Foundation, Cape Town, South Africa, <sup>3</sup>University of Cape Town, Lung Institute, Cape Town, South Africa, <sup>4</sup>Crucell N.V., 2301 CA Leiden, The Netherlands, and <sup>5</sup>Aeras Global TB Vaccine Foundation, Rockville, Maryland, USA

### **Background:**

AERAS-402 vaccine is a live, replication-deficient adenovirus (serotype 35), expressing selected immunodominant *Mycobacterium tuberculosis* (*M.tb*) antigens. Vaccination with AERAS-402 is intended to boost the BCG-induced T cell-mediated immunity. AERAS-402 has been shown to be safe and immunogenic in healthy adults and infants. In the event that administration of AERAS-402 proves efficacious, it is likely that the vaccine will be administered to persons with subclinical TB, on TB treatment or post TB treatment.

### **Objective:**

To evaluate the immunogenicity of AERAS-402 when administered at different doses to adults on TB treatment or post-TB treatment.

### **Methods:**

In a phase II, double-blinded, randomized controlled study, escalating doses of AERAS-402 were administered intramuscularly to adult participants who were either on TB treatment for a period of at least one to four months (on treatment group), or who had started TB treatment for at least 12 months (post-TB treatment group). Participants were sequentially allocated to receive the lowest AERAS-402 dose for group 1 to highest dose for group 3. Adults in group 1 were vaccinated with a single shot of AERAS-402 ( $3 \times 10^8$  viral particles) and group 2 with ( $3 \times 10^9$  viral particles) at day 0. Adults in group 3 were vaccinated with AERAS-402 ( $3 \times 10^{10}$  viral particles), a single shot at day 0 and a second, identical dose at day 42. Within each group, control participants were vaccinated at corresponding time points with placebo (sterile buffer containing 20 mmol Tris, 2 mmol MgCl<sub>2</sub>, 25 mmol NaCl, 10% w/v sucrose, 0.2% w/v PS-80 and water), the buffer in which AERAS-402 is formulated. Blood for immunology assays was collected at days 0, 28, 42 and day 182. In addition, blood was collected at days 70 and 84 from dose group 3 participants. In a short-term whole blood assay, we measured the expression of the following cytokines by CD4<sup>+</sup> and CD8<sup>+</sup> T cells: IFN- $\gamma$ , TNF- $\alpha$ , IL-2 and IL-17. These cytokines are thought to be important in TB immunity.

### **Results:**

Administration of AERAS-402 to adults on TB treatment or post-TB treatment induced a detectable and comparable vaccine-specific CD4<sup>+</sup> and CD8<sup>+</sup> T cell response. The vaccine-induced CD4<sup>+</sup> and CD8<sup>+</sup> T cell responses were highest at 28 days post-vaccination. Vaccination with different doses of AERAS-402 induced similar frequencies of specific CD4<sup>+</sup> T cells. We also observed similar cytokine expression patterns of AERAS-402-induced CD4<sup>+</sup> T cell responses in adults on and post-TB treatment, irrespective of the dose and second vaccination.

### **Conclusions:**

AERAS-402 was shown to be immunogenic in adults on or post-TB treatment. Vaccine-specific CD4<sup>+</sup> and CD8<sup>+</sup> T cells were induced. These T cell subsets have been shown to play a positive role in TB immunity. In future, we propose larger similar trials to allow a more detailed immunological assessment.

**Title:** FOOD CHALLENGES AT A TERTIARY CENTRE IN SOUTH AFRICA

**Authors:** Tamara Kerbelker, Michael Levin

**Background:**

Food allergy in children has a worldwide prevalence of 2-3%. This is thought to be higher in the first year of life, and has been estimated at 6-8% in Westernised countries. There are no studies on the characteristics of patients with food allergy in South Africa, but it has been reported as being very rare, especially in the Black African population.

However increasing numbers of children with food allergy are being investigated and treated at the allergy unit of the Red Cross War Memorial Children's Hospital. A dedicated food challenge service was commenced at Red Cross Hospital in 2011.

**Method:**

The folders of those patients who had undergone food challenge in 2011 were reviewed. Age, ethnicity, type of previous reaction, foods implicated, skin prick test results, blood tests and outcome was extracted.

**Results:**

There were 70 open food challenges (OFC) performed at RCWMCH in 2011.

The median age of the patients was 58 months.

The majority of the patients were of Mixed ancestry 60 (86%). Eight (11%) patients were Black African and 2(3%) were white.

The foods most implicated were hen's egg (30), peanut (14), cow's milk (12) and soy (5).

Multiple food allergies were present in 33(47%) patients.

Allergic comorbidity was present in 45(92%) patients. Twenty six (37%) were asthmatic, 62(89%) had atopic dermatitis and 25(36%) had persistent allergic rhinitis.

There were 12 positive challenges. Five (50%) were early reactions, while 5(50%) had late reactions. Of the late reactions, all reported a flare of the child's eczema.

**Conclusions:**

Open food challenges are a useful modality in this setting to diagnose or refute food allergy. Eighty percent of the challenges performed were negative and allowed cessation of dietary exclusions. These children would previously have been advised to exclude the food on the basis of history and blood tests alone. Allergic comorbidity is common in those patients who report food allergy. Hen's egg and peanut allergy are the most common allergies reported and challenged. Cows milk is less frequently challenged in the South African setting possibly due to the higher percentage of breastfed babies than in the first world.

Limitations of this study is that SCORADs were not done on those children with atopic dermatitis before and after food challenge to objectively gauge if there had been a reaction.

**Title:** PATTERNS OF PEDIATRIC INJURY IN SOUTH AFRICA: AN ANALYSIS OF HOSPITAL DATA BETWEEN 1997 AND 2006

**Authors:** Chiedza Mavengere MPH (1), Hadley K Herbert MD (1), Arjan Bastiaan van As MBChB, MMed, MBA, FCS, PhD (1,3), Abdulgafoor M. Bachani PhD, MHS (2), Patricia Mtambeka BA (1), Kent A. Stevens MD, MPH (2), Alastair John Ward Millar, MBChB, FRCS, FRSA, FRACS, FCS, DCH (1,3), Adnan A. Hyder, MD, MPH, PhD (2).

**Affiliation:** (1) Childsafe South Africa, Red Cross War Memorial Children's Hospital, Klipfontein Road, Rondebosch, Cape Town, South Africa 7701. (2) International Injury Research Unit, Johns Hopkins Bloomberg School of Public Health, 615 North Wolfe Street, Baltimore, MD 21205, USA. (3) Department of Pediatric Surgery, Red Cross War Memorial Children's Hospital, Klipfontein Road, Rondebosch, Cape Town, South Africa 7701]

**Objectives:**

Pediatric injuries are associated with significant morbidity and mortality, especially in low- and middle-income countries, yet there is lack of data to characterize the etiology and risk factors associated with childhood injuries. The aim of this paper is to describe the demographics, mechanisms, and severity of injuries during a ten-year time period using hospital-based data in Cape Town, South Africa.

**Methods:**

Data were used from Childsafe South Africa's trauma registry on injured children who presented to the Red Cross War Memorial Children's Hospital's (RCH) Causality Department between 1996 and 2007. Univariate, bivariate, and Poisson regression analyses were performed for demographic characteristics, injury mechanisms, and age-adjusted annual injury incidence.

**Results:**

Between 1997 and 2006, 62,782 injured children with a total of 79,397 injuries presented to RCH. The mean age was 5.4 years (SD±3.5 years) and 61.7% were male. Mechanism of injury included falls (39.8%), road traffic injuries (15.7%), burns (8.8%) and assault (7.4%). 60.2% of injuries were minor, 36.6% were moderate, and 3.2% were severe. The incidence rate ratio of injuries that presented to RCH over ten years was estimated as 0.98 (95% CI, 0.976-0.982; p<0.001), or a 2% annual rate of decline.

**Conclusions:**

Age, gender, mechanism, and severity of injury in pediatric populations have not been described elsewhere in South African national or Sub-Saharan regional data. Findings suggest the need for targeted interventions to address risk factors for pediatric injuries, emphasizing the importance of pediatric surveillance systems as a tool to study injuries in low and middle-income countries.



**Title:** ESTABLISHMENT OF A PAEDIATRIC RENAL TRANSPLANT SERVICE IN TUNISIA

**Authors:** McCulloch MI<sup>1</sup>, Vaidya AC<sup>2</sup>, Adalat S<sup>3</sup>, Abroug S<sup>4</sup>, Abdellatif A<sup>4</sup>

**Affiliation:** <sup>1</sup> Red Cross Children's Hospital, Cape Town, SA; <sup>2</sup>Oxford Radcliffe Hospital, Oxford, UK; <sup>3</sup> Great Ormond Street Children's Hospital, London, UK; <sup>4</sup> Hopital Universitaire Sahloul, Sousse, Tunisia.

**Objective:**

The development of a new Paediatric Transplant program in Sousse, Tunisia as result of collaboration with International Society of Nephrology (ISN) Sister program - including an experienced transplant surgeon and paediatric nephrologist - together with local medical and surgical team in Sousse.

**Method:**

Retrospective review of 9 paediatric recipients who received living related renal transplants over 2 successive 5 day periods in 2010 and 2012.

**Results:**

9 Paediatric patients with chronic renal failure aged 8-14.3years (median 9yrs) and body mass of 20-22kg (median 20kg) were all dialysis dependant prior to transplantation with waiting times of 0.7-8.3yrs (median 3.2yrs). 1 Young adult aged 24years with reflux nephropathy and failed venous access.

Causes of renal failure included nephronophthisis (2), renal cystic disease, glomerulosclerosis, dysplasia (2) and reflux (4).

Immunosuppression included Basiliximab, Tacrolimus, Mycophenolate Mofetil and Steroids.

All patients had primary function of grafts.

Medical complications included diarrhoea, lymphocoele/fluid collection and haemolytic uraemic syndrome requiring conversion to Ciclosporin.

Surgical technique included intra-abdominal positioning of the grafts with one patient requiring an open abdomen for 24hours.

Surgical complication included bleeding with re-do ureteric anastomosis in 1 patient with resultant normal renal function and an ileal perforation in patient with open abdomen. No donor complications were encountered.

At 2years post-transplant, all patients in first group (2010) have done well under local follow-up with normal renal function. To date the second group (2012) are all doing well at 3 months.

Establishment of drug and fluid protocols specific to paediatric transplantation were also established in the local language.

**Conclusions:**

New paediatric transplantation programs are possible even in Africa, with the combined support of International Renal programs (ISN Sister Program) using experienced transplant surgeons and paediatric nephrologists, working together with units where successful adult renal transplant programs already exist. Extensive local team work in Sousse, Tunisia including adult and paediatric staff make establishment of such a program possible with favourable results.

**Title:** THE TIMING OF CLINICAL RESPONSE TO TREATMENT IN CHILDREN WITH PULMONARY TUBERCULOSIS

**Authors:** <sup>1,2</sup>Mpofu N, <sup>1,2</sup>Moyo S, <sup>1,2</sup>Mulenga H, <sup>1,2</sup>Luabeya KKA, <sup>1,2</sup>Tameris M, <sup>1,2</sup>Geldenhuys H, <sup>1,2</sup>Scriba T, <sup>1,2</sup>Hanekom W, <sup>1,2</sup>Mahomed H, <sup>2</sup>Hussey G, <sup>1,2</sup>Hatherill M

**Affiliation:** <sup>1</sup>South African tuberculosis Vaccine Initiative (SATVI), Institute of Infectious Disease and Molecular Medicine (IIDMM), University of Cape Town, <sup>2</sup>School of Child and Adolescent Health, Health Sciences Faculty, University of Cape Town, Cape Town

### **Background:**

Appropriate response to anti-tuberculosis (TB) treatment in children for diagnostic purposes has been defined as resolution of clinical features within 60 days of commencement of TB therapy (Graham et al, JID 2012). However, the proposed time-frame is not evidence-based.

### **Objective:**

To measure the time to clearance of baseline symptoms following initiation of treatment in a cohort of young children diagnosed with pulmonary TB.

### **Methods:**

A prospective cohort study of incident childhood pulmonary TB was conducted in Worcester, South Africa. BCG-vaccinated new-borns were followed up at 90 day intervals for a minimum of 2 years between January 2007 - December 2010. Children were investigated for suspected TB using a standard investigation algorithm. The treatment decision by the attending clinician was made on clinical grounds, independent of a rigorous study TB case definition. After discharge and TB treatment initiation, the outcome of baseline TB symptom resolution was recorded at each study visit.

### **Results:**

346 children, median age 13 months (range 2 to 23 months) had a baseline symptom compatible with pulmonary TB. Base-line symptom distribution was as follows: 54% (N=186) had cough, 51% (N=175) wheeze, 50% (N=173) failure to thrive, 36% (N=126) night sweats, 28% (N=97) loss of appetite, and 12% (N=42) had fever. 191 (55%) of these children were treated for pulmonary TB on clinical grounds. 39% (N= 63) of children treated for TB on clinical grounds were categorized as having Definite or Probable TB by the per protocol case definition. The median time to first post-treatment visit was 63 days. Median time to symptom clearance (all symptoms) was 68 days in clinically TB treated children and 69 days in children not clinically treated for TB. Among TB-treated children with per protocol TB (n=63): median time to symptom clearance (all symptoms) was 73 days. 25% (n= 16) cleared all symptoms by 56 days and 75% (n=47 ) by 84 days. In this group, median times to resolution were 67 days (IQR; 50-81) for cough, 67 days (IQR; 60-76) for wheeze, 66 days (IQR; 56-96) for failure to thrive, and 57 days (IQR; 45-76) for loss of appetite.

### **Conclusions:**

Median time to resolution of all symptoms, with the exception of loss of appetite, in children treated for pulmonary TB is longer than the 60-day period recommended for determination of treatment response for diagnostic purposes.

**Title:** OPTIMISATION OF GENE EXPRESSION PROFILING OF SORTED CD4 T CELLS USING MICROFLUIDIC qRT-PCR

**Authors:** Munyaradzi Musvosvi, Adam Penn-Nicholson, Hassan Mahomed, Willem Hanekom and Thomas Scriba.

**Affiliation:** South African Tuberculosis Vaccine Initiative and School of Child and Adolescent Health, University of Cape Town, South Africa

**Objective:**

It is known that CD4 T cells play an important role in immune control of *Mycobacterium tuberculosis*. However, key questions surrounding the mycobacteria-specific T cell response following latent infection with *M.tb* in humans remain unanswered. Within the CD4 T cell population functional heterogeneity is required for the diverse regulatory and effector functions of antigen-specific CD4 T cells. Simultaneous measurement of dozens of markers is required to reveal the true complexity of specific CD4 T cell responses. We optimized methods for gene expression profiling within small numbers of sorted mycobacteria-specific CD4 T cells, with the aim of characterising the human T cell response to *M. tuberculosis*.

**Methods:**

Peripheral blood mononuclear cells (PBMCs) were thawed and stained with the following antibodies: anti-CD3, anti-CD4, anti-CD45RA, anti-CCR7, and LIVE/DEAD Aqua dye. Live, memory (CD45RA-) and naïve (CD45RA+CCR7+) CD4 T cells were sorted using a FACS Aria II. RNA was extracted from a 10-fold serial dilution of sorted cells, ranging from  $5 \times 10^5$  to 5 cells. cDNA was synthesized and specific gene pre-amplification of cDNA was performed. qRT-PCR was performed on 96 pre-amplified cDNA samples using 96 primer-probe sets in a 96.96 Dynamic Array Chip on a BioMark HD System (Fluidigm).

**Results:**

Expression of 96 genes could be simultaneously quantified from as few as 5 cells. Sorted naïve CD4 T cells expressed higher transcript levels of CCR7, CD62L and CD27, and transcription factors involved in T helper lineage differentiation of naïve T cells, including STAT1, 3, 4, 5 and 6, relative to memory cells. Memory CD4 T cells expressed higher transcript levels of chemokine receptors, such as CXCR3 and CCR6 and effector molecules, such as IFN- $\gamma$ , TNF- $\alpha$ , IL-2, granzyme A and B, granulysin and perforin, relative to naïve CD4 T cells.

**Conclusion:**

We have optimized a qRT-PCR assay for simultaneous quantification of 96 mRNA transcripts in low-frequency CD4 T cells. We now wish to apply this assay to transcriptional profiling of HLA-class II tetramer-sorted CD4 T cells to characterise mycobacteria-specific T cells induced by vaccination and infection.

**Title:** **INCIDENCE OF COMPLICATIONS AFTER IMPLEMENTATION OF AN INTUBATION CHECKLIST IN A SOUTH AFRICAN PAEDIATRIC INTENSIVE CARE UNIT (PICU): A RETROSPECTIVE AUDIT**

**Authors:** Parker NM; Morrow BM; Argent AC

**Affiliation:** Paediatric Intensive Care Unit, Red Cross War Memorial Children's hospital and School of Child and Adolescent Health, UCT

**Introduction:**

Children admitted to PICU frequently require endotracheal intubation and mechanical ventilation. Accurate assessment and safe airway management is fundamental to the care of critically ill children. In July 2010 an intubation checklist was introduced as a clinical improvement measure.

**Aim:**

To audit the incidence, risk factors and outcome of peri-intubation complications after implementation of a standardised pre- intubation safety checklist.

**Methods:**

A retrospective descriptive study of all children undergoing intubation in PICU from July to December 2010.

**Results:**

128 patients (72 (56.25%) male, median [IQR] age 5.3 [1.9 – 18.4] months) underwent 157 intubations in 134 PICU admissions. Mortality was 13.4%; no deaths were directly related to intubation events.

The checklist was completed in 107 (68.2%) cases. Reasons for non-completion were not available. Patients without checklists had median (IQR) predicted mortality (PIM2) of 0.07 (0.03 – 0.17) vs. 0.12 (0.05 – 0.25) in those with completed checklists ( $p = 0.02$ ).

111 complications occurred in 60 intubations (38%) with completed checklists. Desaturation was most common ( $n=52$ , 46.8%). Patients experiencing peri-intubation complications were older than those without complications [4.2 (2.6 0 8.4) vs. 1.7 (0.6 – 4.8) months;  $p = 0.001$ ].

**Conclusions:**

Peri-intubation complications occurred frequently. Checklist completion should become standard of care to improve preparedness for intubation and for audit purposes.

**HREC Ref/Rec: 280/2011**

[Nm.parker2@uct.ac.za](mailto:Nm.parker2@uct.ac.za)

**Title:** DESCRIPTION OF A COHORT OF CHILDREN WITH CEREBRAL PALSY AT RED CROSS WAR MEMORIAL CHILDREN'S HOSPITAL

**Authors:** Reneva Petersen, Andrew Redfern, , Jo M Wilmshurst Kirsty Donald

**Affiliation:** Department of Developmental Paediatrics, Red Cross War Memorial Children's Hospital, Cape Town

**Introduction:**

There is limited data available on the characteristics of children with Cerebral Palsy in South Africa.

**Aim:**

To describe a cohort of children with Cerebral Palsy at Red Cross War Memorial children's Hospital.

**Methods:**

The Red Cross children's hospital Cerebral Palsy clinic database was reviewed and data was analysed. Patient folders were reviewed to complete data collection. Gross motor functional classification was used to document functional ability.

**Results:**

A total of 188 patients were reviewed. The mean age was 66months (range 6-190). Of these 124 (66 %) were male and 64 (34% female). Bilateral involvement was found in 80% (n=152) of children and unilateral in the remaining 20 %(n=36). The predominant tone abnormality was spasticity in 78% (n=147) followed by dyskinetic CP (dystonia and choreo -athetosis) in 19.6 %( n=37).Three patients (1%) were predominantly hypotonic and only one patient was reported as ataxic. More than half the cohort was severely physically disabled: GMFCS V= 51% (n=92) and GMFCS IV=15% (n=29). Normal cognition was reported in only 10% of patients (n=19). Sixty six percent had severe to profound global developmental delay (n=123) and 24% (n=45) had mild to moderate global delay with one patient unclassified. Co-impairments were common with 49% (n=92) diagnosed with Epilepsy, 35% (n=62) with visual impairment, 5% (n=11) with hearing impairment, while 32% ( n=59) had musculoskeletal complications. Complications during the perinatal period were reported as aetiological factor in 97 cases (52 %). Of these 76 %( n=74) were due to hypoxic ischaemic encephalopathy. Antenatal causes including congenital structural anomalies accounted for 9.5 % (18) and post neonatal causes for 24% ( n=45) of cases. In 14% (n=28) no clear aetiology could be determined.

**Conclusions:**

In keeping with other developing countries the commonest cause of cerebral palsy at Red Cross War Memorial Hospital is hypoxic ischaemic encephalopathy. Compared to international literature our cohort demonstrated a more severe pattern of physical disability and cognitive as well as other impairments.

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**Title:** A NOVEL ACTA1 MUTATION RESULTING IN A SEVERE CONGENITAL MYOPATHY WITH NEMALINE BODIES, INTRANUCLEAR RODS AND TYPE I FIBRE PREDOMINANCE

**Authors:** K Pillay<sup>1</sup>, E. Dollie<sup>1</sup>, Gianina Ravenscroft<sup>2</sup>, Jo M. Wilmshurst<sup>3</sup>, Padma Sivadorai<sup>4</sup>, William Wallefeld<sup>2</sup>, Kristen J. Nowak<sup>2</sup>, Nigel G. Laing<sup>2</sup>

**Affiliation:** <sup>1</sup>University of Cape Town and National Health Laboratory Services, and the Red Cross Children's Hospital, Cape Town, South Africa

<sup>2</sup>Centre for Medical Research, The University of Western Australia, Western Australian Institute for Medical Research, Nedlands, Australia

<sup>3</sup>Paediatric Neurology and Neurophysiology, The University of Cape Town and the Red Cross Children's Hospital, Cape Town, South Africa

<sup>4</sup>Neurogenetics, Royal Perth Hospital, Perth, Australia

We describe a severe congenital myopathy patient of Xhosa origin with a novel de novo p.Gly152Ala skeletal muscle actin gene (ACTA1) mutation, who died at 6 months of age. The muscle pathology demonstrated abundant cytoplasmic and intranuclear rods, core-like areas and the unusual feature of larger type I than type II fibres. Our results further expand the phenotypes associated with ACTA1 mutations and provide support for the hypothesis that the structural abnormalities seen are a pathological continuum dependent on the precise mutation and biopsy location.

The identification of the intranuclear rods on electron microscopy was pivotal to the diagnosis and gave direction to subsequent genetic testing and prenatal diagnosis for the next sibling.

**Title:** ENTERAL FEEDING PRACTICES IN PRETERM INFANTS IN SOUTH AFRICA

**Authors:** MS Raban, Y Joolay, AR Horn, MC Harrison

**Affiliation:** Neonatal Medicine, Department of Paediatrics, University of Cape Town

**Background:**

Optimal feeding regimes in babies < 1000g have not been established and wide variations occur. The debate on when to initiate feeds and speed of advancement is nuanced by studies which raised concerns that early and rapid feeding strategies increase the risk of feeding intolerance and may be involved in the pathogenesis of necrotising enterocolitis although causality has not been proven. International enteral feeding practices for preterm infants have been surveyed and highlighted a wide variation in enteral feeding practices among paediatricians. South Africa comprises a mix of developed and developing health systems which results in wide variations of resource constraints. Preterm feeding practices have not yet been surveyed in this country and this may inform the design of local collaborative trials to determine optimal preterm infant feeding strategies for South African infants

**Objective:**

To determine the preterm enteral feeding practice of paediatricians in South Africa.

**Methods:**

We invited 288 paediatricians to participate in a cross-sectional web-based survey by email. Practitioners were identified using the Medpages™ database.

**Results:**

We received 31.2% responses. 43.6% were from the state sector and 56.4% from private. Most participants worked in medium sized neonatal units with 6-10 beds. The proportion commencing feeds within the first 24 hours was: 24% in the <25weeks infants, 36% in 25-27 weeks and 65% in 28-31 weeks. Feed volumes are routinely advanced daily in 47% <25weeks, 68% in 25-27 weeks and in 90% of infants 28-31 weeks. 45% of infants <25weeks receive continuous intragastric feeds while 50% in the 28-31 weeks group are on 3 hourly bolus feeds. The majority target full enteral feeds of 161 – 180mls/kg/day. 66.7% have access to donor milk and 77% used breast milk fortifier.

**Conclusion:**

This is the first study surveying feeding practices in SA. This survey did not highlight differences in feeding practices among paediatricians. These data could be valuable to design local collaborative trials to determine optimal feeding strategies.

**Title:** THE IMPACT OF NEONATAL INFECTION SURVEILLANCE TO REDUCE SEPSIS AND BLOOD CULTURE CONTAMINATION RATES

**Authors:** MS Raban, C Bamford, L Tooke, Y Joolay, N Rhoda, A R Horn and M C Harrison

**Affiliation:** Neonatal Medicine, Department of Paediatrics, University of Cape Town

**Background:**

Advancements in neonatal intensive care have improved survival for preterm infants. Despite these advances, neonatal infection remains an important cause of mortality, morbidity and prolonged hospital stays. Blood cultures are the most direct method for detecting bacteraemia in patients. Unfortunately many of these cultures are compromised by contaminants. Reducing contamination rates will improve the specificity of the blood culture and result in a higher positive predictive value, resulting in a significantly more useful test. To guide empirical antibiotic treatment, infection surveillance is important to monitor infection rates, patterns of sensitivity profiles and infection control measures. It can also be used for benchmarking practice and for interventional studies. “Dashboards”, which present and benchmark performance against a series of key indicators, have been shown to be powerful tools in improving patient care and outcomes.

**Objective:**

To determine whether prospective surveillance of bloodstream infections and the introduction of an educational tool can reduce late onset sepsis and blood culture contamination rates in a neonatal unit.

**Methods:**

The study was conducted at Groote Schuur Hospital nursery over a 31 month period. The total number of blood cultures performed and positive growth cultures were extracted from the Microbiology laboratory database on a monthly basis. The period prior to the educational intervention, 1<sup>st</sup> January 2010 to 30<sup>th</sup> April 2011, was used to establish a baseline benchmark. This was then compared to the period following the intervention, 1<sup>st</sup> May 2011 to 31<sup>st</sup> July 2012.

The educational intervention included the establishment of hand washing protocols, blood culture techniques and video tools. A performance dashboard was developed to demonstrate the monthly positive blood culture and contamination rates and this was highlighted and referred to weekly at the unit staff meeting.

**Results:**

Prior to the educational intervention, 1460 blood cultures were taken, 206 (14%) were positive of which 104 (7%) were contaminants. In the period following the intervention, 1282 blood cultures were taken, 131 (10%) were positive of which 42 (3.3%) were contaminants. The number of positive blood cultures and contamination rates after the educational intervention were both statistically significantly reduced ( $p = 0.002$  and  $p < 0.001$  respectively).

**Conclusion:**

This study demonstrates that adopting a relatively simple educational tool, making use of a “dashboard” indicator and benchmarking practice can significantly reduce the level of neonatal sepsis while also reducing contaminated blood cultures.