School of Child & Adolescent Health

UNIVERSITY OF CAPE TOWN

ANNUAL RESEARCH DAYS 2013

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Programme and Abstract Book

29th & 30th October
D3 Lecture Theatre, D Floor
Red Cross War Memorial Children's Hospital

CPD Points

Tuesday, 29 October 2013 ***4 points***
Wednesday, 30 October 2013 ***7 points***

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

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Title: **RAPID DIAGNOSIS OF PULMONARY TUBERCULOSIS IN AFRICAN CHILDREN IN A PRIMARY CARE SETTING USING XPERT MTB/RIF ON RESPIRATORY SPECIMENS: A PROSPECTIVE STUDY**

Authors: Heather J. Zar, Lesley Workman, Washiefa Isaacs, Jacinta Munro, Keertan Dheda[2], Widaad Zemanay[3], Mark P. Nicol[3]

Affiliation: Department of Paediatrics and Child Health, University of Cape Town and Red Cross War Memorial Children's Hospital, [2]Department of Medicine, University of Cape Town, [3]Division of Medical Microbiology and Institute for Infectious Diseases and Molecular Medicine, University of Cape Town, National Health Laboratory Service, Groote Schuur Hospital, Cape Town, South Africa

Background:
Rapid, accurate diagnosis of pulmonary TB (PTB) in hospitalised children using Xpert MTB/RIF is possible, but there are no paediatric studies in primary care, where most children are managed, and where microbiologic diagnosis is rarely attempted. The aim of this study was to investigate the diagnostic accuracy of Xpert in children in primary care**.**

Methods:
Repeated induced sputum (IS) and nasopharyngeal (NPA) specimens were obtained from children with suspected PTB at a clinic in South Africa and diagnostic accuracy of Xpert on a concentrated sample compared to a reference standard of IS culture and to smear.

Findings:
384 children (median age 38.3 months; 31 (8.1%) HIV-infected) had one paired IS and NPA; 309 had 2 paired specimens. A positive smear, Xpert or culture occurred in 5 (1.3%), 26 (6.8%) and 30 (7.8%) children respectively. Xpert on IS detected 17/30 culture-confirmed cases (56.7%, 95% CI 39.2 – 76.2) compared to Xpert on NPA [12/30 (40.0%, 95% CI 24.6 – 57.7), p=0.2]. Incremental yield from a second IS was 16.7% for culture and 33.3% for Xpert. Specificity of Xpert on IS and NPA was 98.9·2% and 99.3% respectively. Xpert results were available sooner than culture (median 1 vs. 13 days, p<0.005).

Interpretation:
Xpert on respiratory specimens enabled rapid detection of PTB in children in primary care. Xpert detected almost 5 times the number of cases as smear microscopy; the yield increased with a second test.

Funding:
National Institute of Health, USA (1R01HD058971-01), National Health Laboratory Services Research Trust, the Medical Research Council of South Africa, the National Research Foundation (NRF) South Africa and the EDCTP (TB-NEAT; IP.2009.32040.009).

Ethics approval: 045/2008

Title: **WHOLE BLOOD TRANSCRIPTOME BIOMARKER OF RISK OF TB DISEASE IN *M. TUBERCULOSIS*-INFECTED ADOLESCENTS**

Authors: Adam Penn-Nicholson, Daniel Zak*, Wendy Whatney, Mzwandile Erasmus, Ethan Thompson*, Lynn Amon*, Smitha Shankar*, Michele Tameris, Hennie Geldenhuys, Hassan Mahomed, Alan Aderem*, Thomas Scriba, Willem Hanekom

Affiliation: South African Tuberculosis Vaccine Initiative, University of Cape Town, South Africa
*Seattle Biomedical Research Institute, USA

Objective:
The biological determinants of progression from infection with *M.tb* to pulmonary disease remain largely unknown. We aimed to identify prospective gene expression signatures that predict TB disease risk in *M.tb*-infected adolescents.

Methods:
We performed a longitudinal cohort study in 6,363 adolescents to determine incidence and prevalence of *M.tb* infection and TB disease. Among individuals who were *M.tb*-infected at enrolment, we selected 45 who developed pulmonary TB during 2 years of follow-up (progressors), and 90 demographically matched controls who remained healthy (non-progressors). Whole transcriptome mRNA expression in direct *ex vivo* whole blood was measured by RNA-sequencing from samples taken at various times prior to the diagnosis of TB. To identify classifiers of prospective risk of TB, we developed a robust network analysis framework involving ensembles of exon-exon junction pair support vector machine models.

Results:
A biomarker constructed from a discovery subset of 36 cases and 74 controls identified approximately 1,200 genes that were differentially expressed at temporal windows up to 2 years before TB diagnosis. Gene set enrichment analysis showed that a large proportion of these differentially expressed genes were associated with interferon responses, inflammation and myeloid cells. We developed 2 classifiers that allowed prospective discrimination of progressors from non-progressors with accuracies up to 70-80%, as estimated by extensive cross-validation, up to 1.5 years before TB diagnosis. Findings were validated in an independent cohort of prospective samples from 9 progressors and 16 non-progressors. Models were confirmed by multiplex qRT-PCR.

Conclusion:
Our data suggest that peripheral blood mRNA expression signatures, measured up to 1.5 years before TB disease, allow prediction of risk of TB. Up-regulation of genes associated with inflammatory and myeloid cell pathways were prominent among those at risk of TB. Validated correlates of risk of TB will allow targeted prophylactic treatment of persons at high risk of disease progression and preferential enrollment of such persons into TB vaccine efficacy trials.

Title: **ABDOMINAL TUBERCULOSIS: AUDIT AT RED CROSS WAR MEMORIAL CHILDREN'S HOSPITAL FROM 2004 TO 2012**

Authors: Dr. N. Adjei; Dr. L. Goddard; Dr. R. De Lacy; Dr. K. Pillay

Background:
Abdominal TB includes infection of the gastrointestinal tract, peritoneum, mesentery, abdominal lymph nodes, liver, spleen and pancreas. Forms of Abdominal TB include peritoneal, primary and secondary intestinal TB. These differences are of diagnostic, epidemiologic and preventive significance especially in TB endemic countries. Abdominal TB is often a diagnostic challenge particularly when pulmonary TB is absent. However, early diagnosis improves outcomes.

Method:
We report our retrospective review of cases of abdominal TB treated at Red Cross Hospital from 2004 to 2012.

Results:
We reviewed 20 patients, 10 boys and 10 girls of mean age of 7.5 years (range 2-12years) who were diagnosed with abdominal TB. Two patients (10%) were below 4 years of age. Common abdominal presentations were abdominal pain in 11, abdominal distension in 7 and abdominal mass in 5 patients. Non specific symptoms include fever and weight loss in 13 and night sweats in 7 patients. TB contacts were recorded in 3 patients. Two patients had retroviral diseases and were already on HAART, and 3 had severe malnutrition. Nine patients had ascites, serous in 7, faeculent in 1 patient and chylous in 1 patient. Four patients had surgical abdominal pain and 1 had chronic intestinal obstruction. Laparotomy was performed in 4 patients. Among the diagnostic procedures 15 patients had abdominal ultrasound, 14 had CXR, 5 had laparoscopy, 3 had magnetic resonance and 3 colonoscopy. Hilar adenopathy on CXR were recorded on 4 patients. Mantoux test was done in 12 patients and eight were positive. The diagnosis of abdominal TB was confirmed microbiologically in 11 patients (10 positive for acid fast bacilli and 3 positive cultures for MAC) and histopathologically in 12 patients. Increased adenosine deaminase levels in ascitic fluid were recorded in 2 patients. The other remaining patients were diagnosed by abdominal imaging, tuberculin skin test, history of exposure and positive response to antituberculous treatment. Diagnostic findings included multifocal lungs and mesenteric or peritoneal TB 4 patients, bowel and mesenteric TB 12, peritoneal TB 2 and TB colitis 2. Eleven patients completed the antituberculous therapy at Red Cross Hospital. Two patients had complication of enterocutaneous fistulas, 1 had ileostomy with later ileal anastomosis and 1 died. The mean time of diagnosis was 9.6days (range 1-81days).

Conclusion:
Western Cape has high incidence of TB but abdominal TB is not so common. In all 14 patients had TB involving the bowel and mesentery making it imperative to differentiate between the various forms of abdominal TB since that will help in diagnostic approaches, epidemiological actions and preventive interventions. The frequent diagnostic procedures were abdominal ultrasound and chest X-ray and other diagnostic procedures were done based on their results hence it may be possible to develop a diagnostic algorithm around these two procedures.

Title: **BIOMARKERS OF NEUROLOGICAL INJURY AND INFLAMMATION IN CHILDREN WITH TUBERCULOUS MENINGITIS**

Authors: Ursula K Rohlwink[1], Katalin A Wilkinson[2, 3], Llewellyn Padayachy[1], Ralph Diedericks[4], Robert J Wilkinson[2, 3, 5], Anthony A Figaji[1]

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Objective:
Tuberculous meningitis (TBM) in children is associated with high mortality and severe morbidity. Little is known of the determinants of outcome, however the inflammatory response and ensuing ischemia are important factors. Tools to assess injury severity, monitor interventions, and predict outcome are lacking. This study examines novel neuro-specific biomarkers in paediatric TBM and their association with outcome, as well as novel methods of monitoring brain function.

Methods:
All children presenting to Red Cross War Memorial Children's Hospital (RCCH) with probable TBM and hydrocephalus (HCP) were eligible. Blood and cerebrospinal fluid (CSF) were taken on admission and over 3 weeks and were analysed for neuro-specific biomarkers S100B, neuron-specific enolase (NSE) and glial fibrillary acidic protein (GFAP) using ELISA. Brain monitoring was performed with non-invasive near-infrared spectroscopy (NIRS), as well as continuous invasive brain oxygen and intracranial pressure (ICP) monitors where possible. Data on radiological and clinical outcome were collected.

Results:
A total of 45 patients were enrolled in this study. The mortality rate was 20%, HIV was uncommon and the culture positivity yield was almost 50%, substantially higher than historical data from RCCH. Preliminary biomarker data show that elevated *CSF* S100B, NSE and GFAP, and *serum* S100B and NSE in TBM were significantly associated with mortality. Preliminary radiological data from 37 patients showed that 67% had cerebral infarcts and two thirds with spinal imaging had asymptomatic concurrent spinal pathology. Lumbar punctures in patients with gross spinal pathology often yielded no CSF due to extensive exudate in the caudal spinal canal. Late deterioration in ICP control (mean = 8 weeks post-admission) occurred in 17% of patients despite medical treatment and more than half of patients with communicating HCP had to undergo a shunt. Almost 15% of patients returned to RCCH with progressive cerebral TB disease despite being on appropriate treatment.
Brain oxygen monitors detected episodes of low brain oxygenation in keeping with clinical and radiological outcome. Brain oxygenation was very sensitive to fluctuations in ICP even when ICP was within the normal range.

Conclusion:
TBM presents many challenges to treating clinicians and further insight into the pathophysiology and effective treatment of this disease is required. Biomarkers and physiological measures have the potential to increase our understanding, guide management, and help prognosticate.

Ethics number 318/2010

Title: **WHOLE BLOOD INHIBITION OF *M. TUBERCULOSIS* GROWTH IN PRE-ADOLESCENT CHILDREN AND YOUNG ADULTS**

Authors: Richard Baguma, Adam Penn-Nicholson, Sara Suliman, Mzwandile Erasmus, Jonathan Day, Bernadette Pienaar, Lynnett Stone, Willem Hanekom, Thomas Scriba.

Affiliation: South African Tuberculosis Vaccine Initiative (SATVI), Institute of Infectious Disease and Molecular Medicine, School of Child and Adolescent Health, University of Cape Town, South Africa.

Background:
On average, approximately 10% of *M. tuberculosis (M.tb)* infected individuals progress to active pulmonary TB disease. Despite relatively consistent acquisition rates of *M.tb* infection, the progression rate to disease markedly varies with age. Pre-adolescent children above the age of 4 years are at significantly lower risk of TB compared with adolescents and adults. This differential risk presents an opportunity to identify immune mechanisms of *M.tb* control, or of progression from infection to active TB disease. We measured *in vitro* inhibition of *M.tb* growth by peripheral blood cells as a potential surrogate of *in vivo* control of *M.tb* infection. We hypothesized that immune cells from preadolescent children mediate greater inhibition of *M.tb* growth than cells from young adults.

Methods:
Healthy pre-adolescent children aged 8 years and young adults aged 18 years, representative of low and high risk groups of TB, respectively, were enrolled. *M.tb*-infection was diagnosed by Quantiferon Gold In-Tube assay. To determine host ability to control *M.tb* growth, whole blood from each participant was inoculated with 3 different strains of *M.tb*; namely H37Rv, HN878 and CDC1551. Mycobacterial growth in whole blood culture was measured after 96 hours using mycobacterial growth indicator tubes (MGIT).

Results:
Blood from both age groups inhibited growth of *M.tb* strain H37Rv to a greater degree than HN878 or CDC1551. No significant differences in growth inhibition of any of these strains was observed between 8 and 18 year olds. *M.tb* growth inhibition was also not different in blood from *M.tb*-infected and uninfected persons, in either age group.

Conclusion:
Our data suggest that whole blood growth inhibition assays do not provide a useful measure of age-associated differential host control of *M.tb* infection. Our results of equivalent growth inhibition in *M.tb* infected and uninfected persons was unexpected given previous evidence of greater growth inhibition in infected persons from settings not endemic for TB. We propose that universally high levels of mycobacterial sensitization in persons from TB endemic settings may impart broad inhibition of mycobacterial growth, irrespective of *M.tb*-infection status. This sensitization may mask the augmentative effects of mycobacterial sensitization on mycobacterial growth inhibition that is typical in non-endemic settings.

Title: **THE PATHWAYS TO CARE RESEARCH PROJECT – A LONGITUDINAL PATIENT CENTRED INVESTIGATION OF CRITICALLY ILL AND INJURED CHILDREN IN CAPE TOWN, SOUTH AFRICA**

Authors: Hodkinson P[1], Reid S[1], Wallis L[1], Ward A, Argent A[1].

Affiliation: [1]University of Cape Town, Cape Town, South Africa,
[2]University of Oxford, Oxford, United Kingdom.

Introduction:
Good critical care can have a profound influence on the outcomes in children, but to improve this we need to identify, understand and quantify the barriers to optimal critical care, including the emergency management and referral of the critically ill child.

Objectives:
The study obtained data on the entire acute critical care episode for a sample of critically ill children, to identify preventable failures in care.

Methods:
A year long observational study of the care from initial illness onset to Paediatric Intensive Care Unit (PICU) admission at the Red Cross War Memorial Children's Hospital, or to death in a sample of health facilities. Data including all medical records and interviews with carers were collected, followed by expert review. Care in each case was reviewed for compliance with standards of care, identification and grading of "modifiable factors" and assessment of the quality of care, avoid-ability of death/ Paediatric Intensive Care Unit (PICU) admission and/or severity at admission to PICU.

Results:
The "pathway" to care for the 282 children involved a referral process through multiple facilities and EMS transfers, with delays at specific "bottlenecks" in the system. PICU admission may be preventable in almost a third of cases, and the severity of illness potentially avoidable in almost 70%. Issues identified included access, initial assessment and management, referral, appropriate and timeous transfer crew, and delays in accessing PICU.

Conclusions:
The outcomes of the study identify key areas for improving quality of critical care across systems and disciplines.

Title: **THE DISTRIBUTION OF VENTILATION IN MECHANICALLY VENTILATED INFANTS AND CHILDREN IN DIFFERENT BODY POSITIONS – AN EIT STUDY**

Authors: Lupton-Smith A; Argent AC; Rimensberger P; Morrow BM

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

Introduction:
Recent studies in neonates and healthy children have refuted the understanding that ventilation is distributed preferentially to the nondependent lung regions in children. There are no recent studies in mechanically ventilated children beyond the neonatal age.

Objective:
To determine the distribution of regional ventilation in mechanically ventilated infants and children in different body positions.

Methods:
Thoracic electrical impedance tomography (EIT) measurements were taken in mechanically ventilated children in supine, left and right side lying. The distribution of ventilation was described using end-expiratory to end-inspiratory relative tidal impedance change (ΔZ). Comparisons were made with measurements from spontaneously breathing children.

Results:
Preliminary data on the first ten mechanically ventilated participants (two male) aged 8 months to 3 years are presented. Five (50%) demonstrated the expected greater ventilation in the non-dependent lung, however this was marginal and ΔZ was relatively equal between left and right lungs in left ($p=0.85$) and right ($p=0.84$) side lying, respectively. No significant differences were found between left and right lungs, respectively, when dependent ($p=0.45$) and nondependent ($p=0.22$). No significant differences were found in ΔZ in left and right lungs respectively between mechanically ventilated and spontaneously breathing children.

Conclusion:
Preliminary data suggests that ventilation may be relatively equally distributed in mechanically ventilated children. The distribution may be more complex than previously thought and not all children display greater ventilation in the non-dependent lung. Studies are underway to determine the effect of disease state, respiratory muscle activity, and individual variability on the distribution of ventilation.

HREC ref 126/2012

Title: **PATHWAYS TO CARE OF THE CRITICALLY ILL CHILD – A NURSING PERSPECTIVE**

Authors: R. Gillespie[1], P. Hodkinson [1], A. Ward [2], L. Wallis [3], B. Morrow [1], Argent [1]

Affiliation: [1]University of Cape Town Department of Paediatrics, Cape Town, South Africa, [2]Primary Health Care Sciences, University of Oxford, Oxford, United Kingdom, [3] University of Cape Town, Department of Emergency Care

Background:
Data on critically ill children admitted to the PICU at the Red Cross War Memorial Children's Hospital in Cape Town suggests that there may be problems during the "pathway" to care, from first contact with medical services through to PICU admission.

Aim:
To identify pathways to care of critically ill or injured children, and link this with the role of nurses.

Methods:
Data on 282 children admitted for emergency reasons to the PICU of Red Cross War Memorial Children's Hospital (RCWMCH) and those who died in RCWMCH emergency unit and nearby facilities were prospectively collected over a one-year period.

Results:
Nearly all children were seen at various healthcare facilities. These included clinics, community health centres, district, regional and tertiary referral hospitals. Nursing staff were involved at every step of the pathways, except the emergency transport of patients between institutions. Nurses were primarily responsible for triage and in many cases for initial clinical assessment, administration of therapy, assistance with resuscitation and ongoing monitoring of vital signs. Nurses were also responsible for communication with emergency medical services and ongoing observation of the children while awaiting transportation. Various nurse categories were involved, however their paediatric emergency care training and experience is unknown.

Conclusions:
When considering the role of the nurse in the care of the critically ill child, it is clear that nurses have a wide variety of roles in very different settings. This has important implications for training programmes and for discussion on the role of nurses.

Title: **FLUID OVERLOAD IN A SOUTH AFRICAN PAEDIATRIC INTENSIVE CARE UNIT (PICU)**

Authors: N.Ketharanathan, M.McCulloch, B.Morrow, C.Wilson, S.Salie, J.Ahrens, B.Rossouw, A.Argent

Affiliation: Division of Paediatric Critical Care, Red Cross War Memorial Children's Hospital (RCWMCH), Cape Town, South Africa

Introduction:
Fluid resuscitation is integral to paediatric critical care, but fluid overload (FO) is associated with poor outcome.

Objective:
To describe the incidence of FO≥10% in PICU patients and determine factors impacting on outcome.

Methods:
Prospective observational study of 100 consecutive children admitted to PICU over one month. FO (%) is maximum positive fluid balance relative to weight (admission, convalescent or post-mortem). Continuous data are expressed as median (interquartile range).

Results:
Of the 100 patients (aged 9.5 (2-39) months; PIM2 score 0.07 (0.03-0.2); admission weight 7.9 (3.6-13.7) kg); 59 and 40 received fluid resuscitation before (8 (4-15) ml/kg) and during (10 (3-27.5) ml/kg) PICU admission respectively.
FO using admission weight was 3.5 (2.1-4.9) %.Three patients had FO of ≥ 10%, even after correction for convalescent weight.
66 patients were ventilated for 3 (1-7) days. PICU and hospital length of stay were 3 (1-6) and 13 (6-23) days respectively.
28-day mortality was 10%. Patients who died received larger bolus volumes in PICU (20.0 (5.0-65) ml/kg vs. 0 (0-11) ml/kg; p=0.003); higher FO using admission weight (4.9 (2.9-9.3)% vs. 3.4 (1.9-4.8)%, p=0.04); lower minimum glomerular filtration rate (22 (15–50) vs. 71.5 (43-13); p=0.006); higher vasopressor dependency index (0.4 (0.1-1.3) vs 0 (0-0); p=0.001); and higher procalcitonin (13.1 (8.5-89.7) vs 3.4 (0.5-18.6); p=0.02) than survivors.

Conclusion:
The incidence of FO≥10% was low. Large fluid boluses in PICU; higher FO%; poor renal function and infection were associated with mortality.

Title: **A RETROSPECTIVE REVIEW OF CHILDREN WHO DIE FOLLOWING EMERGENCY CARE WITHIN THE MEDICAL EMERGENCY ROOM AT RED CROSS WAR MEMORIAL CHILDREN'S HOSPITAL OVER A 12 MONTH PERIOD (1ST JANUARY-31ST DECEMBER 2008)- AN INTERIM ANALYSIS**

Authors: Dr Heloise Buys [1,2] (Principal investigator), Dr Alina Marian [3] , Rudzani Muloiwa[1,2]

Affiliation: [1] Emergency and Ambulatory Paediatrics, Red Cross War Memorial Children's Hospital [2] Department of Paediatrics, UCT [3]Department of Family Medicine, UCT

Aim:
To evaluate and describe the deaths of critically ill children that present to a medical emergency unit.

Study Design:
A retrospective descriptive review of children that died following emergency care within the medical emergency room 1st January to 31st December 2008.

Setting:
Red Cross War Memorial Children's Hospital 1st January - 31st December 2008.

Methods:
Children that died following treatment in the medical emergency service within the study period were eligible for inclusion. Children attending for trauma-related problems or those attending for booked visits and Dead on Arrival (DOA) children that were not seen at RCWMCH's S12, MEU, and MOPD areas were excluded. The number of deaths , demographics of the children dying, triage details, chief presenting complaint, clinical state on arrival, critical events in the medical resuscitation room, resuscitation therapy delivered, time to death, the cause of death where known and the place/ward where death occurred were evaluated.

Results:
Baseline: 136 children received some of their acute medical management in the MEU room, 69 (51%) were male 67 (49%) female. 98 (73%) were referred, 36(27%) self-referred. Thirty-seven (28%) came directly from home, 65 (49%) came from PHC facilities and 20 (15%) came from general practitioners. EMS transport was used in 69 (52%) of cases, own transport was used in the other 63 (48%). Sixty percent of the children were below 1 year, the median age was 8 (IQR 3-17) months. Fifty percent of the children were moderately to severely underweight for age; the median weight for age z-score (waz) was -1.99 (IQR -3.2 to -0.98). Thirty four (25%) children were HIV-infected, 68 (50%) uninfected, 8 (5%) exposed and 26 (19%) were untested; 74 (54%) children had a chronic underlying medical condition.
At referral centre: Of those referred, 3 were intubated, 39 /96 (41%) were given oxygen, 12/96 (12%) were given fluid boluses, 30/95 (37%) received antibiotics- ceftriaxone in 26, 22/96 (23%) had a glucose check at the referral centre.
Triage and time of arrival: 80 (59%) arrived between 08:00-18:00; 31 (23%) between 18:00 and 23:00 and 24 (18%) arrived between 23:00-08:00. 99 (73%) children had a triage form, 36 (27%) did not. Triage categories: 99 (74%) were red, 34 (25%) were 0range, 1 Green and 1 uncoded. The most common triage complaint was a severe Airway/Breathing problem in 54 (40%) children and respiratory distress in 11(8%), shock in 17 (12.6%), convulsions in 11 (8%), coma in 2 (2%), diarrhoea with dehydration in 6 (4%), and other in 25%.
Critical events in MEU: 11 (8%) children arrived in full cardiac arrest. 30 (22%) were intubated and 106 (79%) were given oxygen; 109 (81%) received their antibiotics. 94 (72%) had a glucose check. Ten children died in Med Reg, 33 (26%) were transferred to ICU, 38 (30%) went to the high care wards, 40 (32%) went to the SSW, 7 (6%) to the E wards, 4 (3%) to theatre and the rest to other wards. Fifty-five (41%) received a fluid bolus (10-60ml/kg), 19 (14%) were started on inotropes.
Time delays were evaluated: There was no significant delay from time of arrival into triage however the children spent a median of 3hr 15minutes (IQR 2hr7min-4hr55min) minutes in Med Reg before transfer out. Patients going to PICU spent a median time of 3hr 24min (IQR 2hr 5min- 4hr 54min)[range 40min- 11 hr42min] in Med Reg. The median time to antibiotics was 1hr 48 minutes (IQR 1hr-2hr54min). The median time to death for the children was 3 (IQR 1-12.5) days, range 0-77 days. The 5 most common causes of death were septicaemia in 66 (27%), ARI in 59 (24%) acute diarrhoea in 30 (12%), meningitis in 18 (7%), congenital heart condition in 11 (5%). Most children had more than one contributory cause of death.

Conclusion:
An open door policy for critically ill children must remain in force at the MEU at this institution. Public access to EMS is suboptimal and needs to be improved. GPs need to improve their referral practices for the safety of the children they see. The ETAT triage tool clearly identifies ill children and prioritises them for urgent care by assigned category. Initial management and approach to illness in children could be improved at PHC level. Senior presence in the MEU afterhours may still improve the outcome of critically ill children who may at first sight appear to be unsalvageable. Further improvements in emergency care in the MEU may lead to better outcomes and possibly reduce mortality. This analysis may generate new hypotheses for further research in the field of emergency care for children.

ETHICS No: HREC 369/2012

Title: **FLUID BOLUS THERAPY WITHIN THE EMERGENCY DEPARTMENT OF A TERTIARY AFRICAN CHILDREN'S HOSPITAL** (ETHICS No: HREC 025/2013)

Authors: Wilson C[*]; McCulloch MI[+], Buys H[+], Diedericks R[+], Morrow B[+], Levin M[*], Argent AC[+].

Affiliation: [*] Department of Paediatrics, Imperial College, London [+] School of Child and Adolescent Health, University of Cape Town, Red Cross War Memorial Children's Hospital

Objective:
To evaluate the use of fluid bolus therapy for children presenting in shock to Red Cross War Memorial Children's Hospital (RCWMCH).

Methods:
Over four months, February to June 2013, we prospectively evaluated critically ill children who clinically required treatment with a fluid bolus within the Medical Emergency Unit (Med Reg) at RCWMCH. Children who required treatment within Med Reg, predominantly those triaged "red", were enrolled if they received a bolus for impaired perfusion. Children were excluded if they received a bolus for reasons other than impaired perfusion. A subset of children were consented to be placed on study monitor which allowed collection of continuous data on basic physiological parameters (heart rate, respiratory rate, blood pressure, oxygen saturations) during their acute resuscitation.

Results:
In total 125 children were reviewed. 3 have been excluded here due to insufficient data for analysis. Of the remaining 122 children (median age 6.25 months (IQR 2.0 – 12.3)) 57 were female and 65 were male. 105/122 (86%) presented with diarrhoea and 9/122 (7.3%) died.

Children receiving fluid bolus therapy as part of emergency resuscitation are critically ill: median pH prior to bolus therapy at RCWMCH was 7.15 (IQR 7.06 – 7.25) and 23/120 (19%) had an initial pH <7. Median lactate was low at 1.9 (IQR 1.3 – 3)

37/120 (31%) children had received a bolus before they arrived in MEU, (mean volume 30.5mls/kg).
Median bolus was 27.5mls/kg (IQR 20-40). 9 received ≥ 60mls/kg. 32/120 (27%) received further treatment with fluid bolus in the 24 hours following admission.

The 42 children who received >40mls/kg of fluid bolus, when combining fluid received in MEU and prior to arrival, were 5 fold more likely to receive inotropes ($p<0.05$).

Of 122 children, 91 were managed with either no respiratory support or oxygen alone. 31 needed either CPAP or invasive ventilation. Children who received a combined total of more than 40mls/kg in MEU and prior to arrival (42/122) were more likely to require either CPAP or invasive ventilation ($p=0.006$).

1 child died in Med Reg, 43 were admitted to the rehydration unit, 36 to the general wards (including high cares) and the remaining 42 to ICU. 24 of 42 children who received >40mls/kg (in combination before arrival and in Med Reg) were admitted to ICU compared to 18 of 79 who received ≤ 40mls/kg (OR 4.51, $p=0.0002$).

Conclusion:
The profile of children receiving treatment with fluid bolus therapy is different to that in the FEAST study; in particular a history of loose stool is more predominant. In these children, receiving >40mls/kg was associated with an increased need for ICU and respiratory support although it is not clear whether fluids contributed to respiratory failure. It is likely that the question of whether fluid administration is associated with adverse effect (as raised in the FEAST trial) in settings where PICU is available will require further randomised studies.

Title: **OPTIMISING THE CONTENT OF THE BEDSIDE NURSING SHIFT HANDOVER IN THE PAEDIATRIC INTENSIVE CARE UNIT AT RED CROSS WAR MEMORIAL CHILDREN'S HOSPITAL**

Authors: Clare Davis and Assoc. Prof. Minette Coetzee

Introduction:
Delivery of a quality shift handover is vital to the continuation of nursing care. It is however internationally recognized as being a perilous time for patients since ineffective handover practice can result in inadequate or unsafe nursing care. Specifically, omissions and errors in the content of a handover are noted as a barrier and that standardization of content is advised as a strategy to facilitate an effective nursing handover.
Despite the complexity of the clinical setting, little published research details the necessary content of a nursing shift handover in the PICU. Implementation of strategies to standardize content in other settings have proven to be effective, however effecting and sustaining change a change in practice is described as a challenge. An increased use of participative change management methodologies is emerging as a result.

Objective:
The aim of this study was, in part, to optimise the content of the nursing shift handover in the Paediatric Intensive Care Unit (PICU) at Red Cross War Memorial Children's Hospital, Cape Town, by use of a participative approach.

Methods:
An action research approach was used and this abstract reports on one aspect of a larger study. Through collaboration with a core group of registered nurses from the PICU, and by use of action research cycles consisting of focus groups and handover observations, the current content of the nursing shift handover was first made visible. This visibility then enabled the will to optimize practice and the identification, implementation and evaluation of strategies appropriate to the setting.

Results:
The initial action research cycles highlighted that the content of nursing shift handover was not explicit or predictable. The expected content was collectively determined with the core group and used to further analyse the spoken content of the handover observations. This resulted in the omission of information and considerable variation between the spoken content of registered nurses. In response, a handover information form was collaboratively designed, implemented and tested.
The form was intended to primarily facilitate the collation of information and act as an aid memoire. Initial data had however revealed that this may mean that it would be regarded simply as extra paperwork, and therefore it was also designed to serve as the final written entry in the nursing notes. Evaluation of the form, by focus groups, demonstrated that the form was efficient at optimising the quality of the content of the bedside handover but concerns still existed about its efficiency as an entry into the nursing notes.

Conclusion:
With respect to this aspect of the wider study, three clear lessons were learnt. Firstly, that an awareness of current practice is crucial to enable the will for change to develop. This also allows for appropriate optimization strategies to be identified. Secondly, that changes made to the handover system not only impact on the system of documentation but that furthermore the capacity for change to be effective and sustainable, may be dependent on the appropriateness of the optimization strategy for both systems. Thirdly, that making a change in healthcare is complicated by the need to prioritise the delivery of a clinical service.

Ethics approval number: HREC 531/2011

Title: **RETINPATHY OF PREMATURITY IN A COHORT OF NEONATES AT A TERTIARY NEONATAL UNIT IN CAPE TOWN, SOUTH AFRICA**

Authors: Q Keraan[1], Y Joolay[1], C Tinley[2], MC Harrison[1], AR Horn[1]

Affiliation: [1]Neonatal medicine, Department of Paediatrics, University of Cape Town
[2] Department of Ophthalmology, University of Cape Town

Background:
Screening for Retinopathy of prematurity (ROP) is recommended to prevent the associated blindness that can occur in severe cases. Studies at Groote Schuur Hospital (GSH) in preceding decades did not detect ROP requiring treatment. Subsequently there were insufficient resources for continued screening. However, advances in neonatal care have improved survival of very low birth weight infants; this may affect the prevalence of ROP.

Objective:
The objectives of this study were: i) to determine the prevalence and severity of ROP in a prospective cohort of preterm infants; ii) to describe association of pre-specified risk factors; and ii) to assess the feasibility of screening for ROP in our resource-limited setting.

Methods:
Research funding was obtained to employ a single nurse for 2 days a week to facilitate screening for ROP at GSH from November 2012 to May 2013. Neonates, with birth weight < 1251gm or gestational age < 31 weeks, were eligible for screening. Following informed consent, screening was performed by a paediatric ophthalmologist at 4 weeks chronological age or 32 weeks corrected gestational age and at follow-up examinations as indicated. Perinatal characteristics and clinical data including potential risk factors were collected and analysed.

Results:
Screening was performed in 135 of 191 eligible infants; 48 died before screening, one refused consent and five defaulted the screening visit. Compliance in many of the infants was dependent on telephonic reminders. The mean gestational age and weight at birth were 30.1 ± 1.9 weeks and 1056 ± 172 g respectively; 64.9% required resuscitation at birth. Seventy-four infants were female (54.8%). Only black (57.0%) and coloured (42.9%) ethnic groups were represented. A total of 313 ROP screening examinations were performed; 38.5% of infants required a single examination and 16.3% required more than four. ROP was diagnosed in 40 (29.6%) infants: Eight (5.9%) infants had clinically significant ROP (stage 3 or with plus disease); no infants had stage 4 or 5 ROP; and two infants required laser treatment. The infants with ROP had a lower mean gestational age and lower mean birth weight than those without ROP: 29.2 ± 1.6 vs. 30.5 ± 1.9 weeks (P = 0.0003) and 988 ± 181 g vs. 1085 ± 160 g (P = 0.0026) respectively. Infants with ROP were more likely to have received a blood transfusion (P < 0.0001); to have late onset sepsis (P = 0.024); and to have received breast milk exclusively (P = 0.005). The level of respiratory support; the need for oxygen therapy; and the occurrence of apnoea, early sepsis or severe intraventricular haemorrhage were similar between those with or without ROP. On multivariate analysis, the only variable independently associated with ROP was gestational age.

Conclusions:
Clinically significant ROP was found in this study. In contrast to previous studies conducted in this setting, two patients required laser treatment. Extensive resources were required for successful screening. The independent association with gestational age suggests that infants with the lowest gestation should be prioritised for screening in our resource-limited setting.

HREC 509/2012

Title: **OUTCOMES OF INBORN VS OUTBORN VERY LOW BIRTWEIGHT INFANTS (< 1500G) IN THE GROOTE SCHUUR NEONATAL NURSERY**

Authors: L Gibbs, L Tooke, AR Horn and M C Harrison

Affiliation: Neonatal Medicine, Dept. of Paediatrics, University of Cape Town

Background:
Current evidence suggests that Very Low Birth Weight (VLBW) infants delivered in specialised tertiary centres have better outcomes than their outborn counterparts. Based on these findings, the Metro West referral policy was revised in May 2012. The new policy states that women presenting with preterm labour and/or rupture of membranes where gestation is more than 26- 30 weeks, and expected birth weight is 700g – 1200g, should be referred to the tertiary services at Groote Schuur Hospital (GSH) for delivery. Although in-utero transfer is preferred, any neonates delivered at a MOU within our referral area would also be eligible for transfer for definitive care in the GSH Neonatal Nursery. Outcomes of Inborn vs outborn VLBW neonates have not been studied in the South African context, and this policy change created an opportunity to assess our own neonatal outcomes as well as optimise the referral process within the Metro West.

Objectives:
To identify the characteristics of inborn and outborn VLBW infants in our population, compare clinical outcomes in these groups.

Methods:
All VLBW infants admitted to the nursery are captured in the Vermont Oxford Network database. This resource was interrogated for relevant clinical data over a one year period from the 1st January 2012 to 31st December 2012.

Results:
518 patients were included in the review, 450 of who were inborn, and 68 outborn.
Infant Characteristics:
The mothers of inborn neonates were more likely to have received prenatal care (92.2%) than their outborn counterparts (51.5%) while prenatal steroids were given in 67.3% of inborns and only 14.7% of outborns. 73.5% of inborn and 14.7% of outborn neonates were delivered via caesarean section, with a higher prevalence of maternal hypertension in the inborn group (55.8% vs. 4.4%), and chorioamnionitis in the outborn group (10.6% vs. 4.9%). 57.4% of outborn and 14.6% of inborn neonates received ventilatory support, but this number is influenced by the fact that many outborns are ventilated for transfer. A similar number had hypothermia on admission to the nursery (43.2% vs. 40.6%) and received surfactant (54.9% vs. 63.2%).
Outcomes:
Inborn neonates had a mortality rate of 20% compared with 27.9% of outborns. Outborn neonates had a higher incidence of late infection (17.6% vs. 8.2%), necrotizing enterocolitis (7.4% vs. 5%) and severe perivetricular-intraventricular haemorrhage (11.5% vs. 3.7%). Outborn neonates also had a longer period of admission (mean length of admission 43 days) compared with their inborn counterparts (35 days).

Conclusion:
A higher proportion of outborn neonates have markers for poor outcomes. Hypothermia is prevalent in both groups. Mortality is 28% compared with 20% of inborns, with a particularly discrepancy in the 700 – 800g group (78% compared to 44%). Serious morbidity is approximately three times higher in survivors in the outborn group. Further research may prove valuable in revising admission criteria, optimising care and decreasing morbidity and mortality.

Title: IS THERE AN ASSOCIATION BETWEEN HIV INFECTION, ANTIRETROVIRALS AND SEVERE EARLY ONSET PRE-ECLAMPSIA?

Authors: Linda Riemer, Michael Harrison, Lloyd Tooke

Affiliation: Neonatal Medicine, Dept. of Paediatrics, University of Cape Town

Background:
Almost 1 in 3 pregnant women in South Africa are HIV positive and should be receiving antiretrovirals (ARVs) during their pregnancy. A previous study conducted at the Groote Schuur Hospital (GSH) nursery showed a significantly increased HIV exposure rate amongst extremely low birth weight infants (ELBW) ≤1000g when compared to those greater than 1000g (28% vs 16%). Over 50% of ELBWs at GSH are delivered because of pre-eclamptic toxaemia (PET).

Objectives:
1) To determine if there is a significant difference in HIV exposure between the ELBW group and bigger babies born at GSH
2) To determine if there an association between maternal HIV and PET
3) To determine if there an association between maternal ARV use and PET

Methods:
A folder review was done on all infants ≤ 1000g born at GSH from August 2011 – January 2013. This information was obtained from an existing database. Data were entered onto an excel spread sheet and included indication for delivery, HIV exposure and ARV exposure. Data were analysed with Stata 11 (Stata Corporation, College Station, TX). The Fisher exact and $\chi 2$ tests were used to compare proportions.

Results:
There were 206 eligible ELBW babies born during the study. 11 folders could not be traced leaving 195 infants. The mean birth weight was 847g and the mean gestational age 29 weeks. 59% of the mothers had severe early onset PET. 46 of the mothers were HIV positive with 36 of these receiving antenatal ARVs. There was a significant difference between the HIV exposure rate in the ELBW cohort (24%) and the rest of the babies born at GSH (17%) ($p = 0.02$). There was no significant association between PET and mothers with HIV. There was however, a significant difference in the development of PET between mothers on ARVs (77%) and those not on ARVs (56%) ($p = 0.01$).

Conclusions:
ARV's may contribute to the development of severe PET. Although the pathophysiology of PET is not completely understood, it is an immune mediated condition. ARVs may therefore stimulate the supressed immune systems of HIV+ women to increase their risk for this disease. Toxic effects of ARVs may also play a role by damaging the placenta.

Ethical approval: HREC 283/2011

Title: **SUCCESSFUL PREVENTION OF MOTHER-TO-CHILD TRANSMISSION OF HIV IN A BIRTH COHORT IN SOUTH AFRICA**

Authors: David M le Roux[1], Landon Myer[2], F Caroline Nilsson[1], Mark P Nicol[3], Heather J Zar[1]

Affiliation: [1]Department of Paediatrics and Child Health, Red Cross War Memorial Children's Hospital and University of Cape Town; [2]School of Public Health, University of Cape Town; [3]Division of Medical Microbiology, University of Cape Town

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Background / aims:
South African national guidelines (2010) for prevention of mother-to-child transmission (PMTCT) of human immunodeficiency virus (HIV) recommended zidovudine (AZT) from 14 weeks gestation for pregnant women with CD4 count more than 350 x 10^6/l, and life-long triple anti-retroviral therapy (ART) for those with lower CD4 counts. Revised PMTCT guidelines introduced in April 2013 recommend all pregnant women commence life-long ART irrespective of their CD4 count. A birth cohort investigating risk factors for childhood pneumonia commenced in Paarl, South Africa in March 2012. The aim of this report was to investigate the effectiveness of the PMTCT guidelines among children in this birth cohort.

Methods:
Women were enrolled in the birth cohort during the second trimester (20 to 28 weeks); children are followed till 2 years of age. Pregnant mothers received routine antenatal care at the local clinics where enrolment into the birth cohort also occurred. Maternal HIV status was confirmed antenatally and post-partum. Results of maternal CD4 counts and infant 6 week HIV DNA PCR tests were accessed from the laboratory results system.

Results:
Between March 2012 and March 2013, 486 pregnant women were enrolled in the birth cohort; 89 (18%) were HIV-infected. Information regarding PMTCT regimens was available for 80 women; 43 (54%) received AZT only, while 37 (46%) received full ART. CD4 counts of women receiving AZT tended to be higher (median 426 x 10^6/l, interquartile range (IQR) 319 to 612 x 10^6/l) than those receiving full ART (median 331, IQR 274 to 487 x 10^6/l), but this difference was not significant (Wilcoxon rank-sum p=0.06). Of the HIV-infected women, 25 (28%) were newly diagnosed with HIV in pregnancy. CD4 counts of women who were newly diagnosed were similar to those of women who knew their HIV status before this pregnancy (median 397 vs 421 x 10^6/l, Wilcoxon rank-sum p=0.96).

Follow up information on 82 HIV-exposed infants (91%) was available; 6 HIV-infected women moved out of the study area while still pregnant, 1 HIV-infected woman had a miscarriage. 47% of HIV-infected women initiated breastfeeding. 1 HIV-infected mother and her newborn baby moved out of the study area before HIV testing was performed. HIV DNA PCR results at 6 weeks were available for 81 infants; all of which were negative.

Conclusion:
In this cohort of women who accessed antenatal care early, less than half of the HIV-infected women received full ART, and less than half initiated breastfeeding. Prevention of vertical transmission of HIV was 100% effective at 6 weeks. Excellent PMTCT results can be achieved in the routine health care system when services are accessed early in pregnancy.

Ethics Approval: University of Cape Town, HREC REF 401/2009
Funding: Bill and Melinda Gates Foundation; SATS GSK Fellowship, FIDSSA

Title: **BIRTH PREVALENCE OF CONGENITAL CMV(cCMV) IN HIV-EXPOSED INFANTS IN SOUTH AFRICA**

Authors: SManicklal, A.M. van Niekerk, S.M. Kroon, C. Hutto, M. Hsiao, S.B. Boppana

Background:
Cytomegalovirus is the most common cause of congenital infection worldwide, affecting 0,2-2,4% of all live births and leading to mental retardation, hearing deficits and developmental disability. The incidence of cCMV is higher in populations with a high CMV seroprevalence. Impaired maternal immunity increases the rates of reactivation and re-infection. In South Africa approximately 250 000 women with HIV give birth every year. There are no study data about the rate of cCMV in HIV-exposed infants in South Africa.

Objective:
To determine the incidence of congenital CMV(cCMV) in HIV-exposed newborns at Mowbray Maternity Hospital in the Metro West region of the Western Cape.

Methods:
This was an unlinked, anonymous, cross-sectional survey. HIV-exposed babies in the post-natal wards of Mowbray Maternity Hospital were recruited from April to October 2012. Mothers were eligible if they were known to be HIV-infected, 18years and older, less than 14days post delivery, living in the greater Cape Town area and had given written, informed consent. Maternal age, CD4count and date, type and duration of ARV prophylaxis, infant gestational age and birth weight were documented. A buccal saliva swab was collected from the newborns at least 6hours after delivery and a minimum of 2hrs after a breastfeed. They were placed in viral transport medium and sent to the NHLS Virology lab at GSH, frozen at -80˚, and stored. Once full recruitment was complete, the samples were shipped, in one batch on dry ice, to the University of Alabama Virology Lab, USA, for real-time CMV PCR testing and genotype analysis. The PCR positive samples were also tested by rapid culture method to confirm the PCR result. There were no follow up visits and mothers were not informed of the infants CMV status.
Results: 748 HIV-exposed newborns were screened. cCMV was detected in 22 newborns giving a prevalence of 2,94% (95% CI 1.73-4.13). Overall, 98% of mothers used prenatal antiretroviral prophylaxis. Maternal age (median 28 years, IQR 25-32), gestational age at delivery (median 38 weeks, IQR 38 - 38), type of ARV prophylaxis (sdNVP 1.3%, prenatal AZT 44.1%, triple ARV 52.4%), infant feeding choice (breastfed 66%, infant formula 34%), duration of ARV (median 139 days, IQR 98-216), and birth weight (median 3060g, IQR 2670-3420) were not significantly associated with cCMV. Prenatal CD4 count was known in 746 mothers. Eight (6,3%) of 128 babies with maternal CD4 counts less than 200cells/µL and 14 (2,3%) of 618 babies with maternal CD4 counts greater than 200cells/µL had cCMV ($p = .021$). Maternal CD4 count less than 200 cells/µL was independently associated with the risk for congenital CMV (aOR 2.74; 95% CI, 1.12 - 6.73).

Conclusion:
We have shown that congenital CMV prevalence in HIV exposed infants is high, at nearly 3% and that a CD4 count less than 200 cells/µl is independently associated with an increased risk of cCMV.
Discussion: Further studies are warranted to investigate the risk factors for cCMV and associated burden of disease in our population, especially hearing loss and neurodevelopmental delay. Selective screening may be warranted.

Ethics approval number: HREC REF: 444/2011

Title: **TRANSTHORACIC ECHOCARDIOGRAPHIC PREDICTION OF MINIMAL DIAMETER OF PATENT DUCTUS ARTERIOSUS FOR INTERVENTIONAL OCCLUSION AT THE RED CROSS CHILDREN'S HOSPITAL, SOUTH AFRICA**

Authors: Emily Fogel and Rik De Decker

Affiliation: Dept of Paediatric Cardiology, Red Cross War Memorial Children's Hospital

Background:
Echocardiography is used as a basis of patient selection for the occlusion of patent ductus arteriosus (PDA) by interventional catheterisation. In addition, echo may be used for the estimation of the minimal (isthmal) PDA size, a critical parameter required for correct device size selection for PDA occlusion. There may be clinical and cost implications for the patient when PDA dimensions are inaccurately measured, such as device embolisation, aortic arch or pulmonary artery stenosis, haemolysis, residual leakage of PDAs and the deployment of multiple occlusive devices.

Objective:
The aim of the study is to assess the accuracy of transthoracic 2D echocardiography measurements of minimal PDA diameter before interventional occlusion. The objective is to evaluate the potential risks of using 2D echocardiography as a quantitative basis for pre-occlusion PDA size estimation as required for the accurate selection of occlusive devices.

Methods:
Echocardiographic and interventional catheterisation reports of paediatric patients were retrospectively reviewed from January 2003 to July 2013. The minimal PDA diameter measurements obtained by echocardiography and angiography (the gold standard) were compared and statistically analysed.

Results:
A total of 227 PDA occlusions were undertaken in the period under review, yielding the largest cohort of direct correlation of echocardiographic vs angiographic PDA dimensions in the literature. There was a poor, but significant correlation between 2D echocardiographic measurements of the minimal PDA diameter and angiographically measured dimensions ($r = 0.39$, $p=0.0002$). Bland-Altman analysis revealed a clear trend of echocardiographic overestimation of the smaller PDAs (median of 2.4mm), but underestimation of the larger PDAs (median of 4.0mm).

Conclusions:
Our data suggest that 2D echocardiography alone is currently not a sufficiently accurate method to obtain the true PDA diameter measurement for device size selection. It is therefore recommended that device and candidate selection for interventional catheterisation not be exclusively based on echocardiographic measurements of the minimum ductal diameter. Consequences of this finding for the management of patients with PDAs by interventional occlusion are discussed.

- Ethics approval number: RECREF R013/2013

Title: **INTERIM ANALYSIS OF THE TOXICITY OF RED CROSS WAR MEMORIAL HOSPITAL'S TREATMENT PROTOCOL R_X 2071(ADAPTED FROM MRC AML 15)**

Authors: Karla Thomas[1], Alan Davidson, Marc Hendricks, Ann van Eyssen

Affiliation: [1] Haematology-Oncology Service, Red Cross Children's Hospital, Department of Paediatrics and Child Health, University of Cape Town, Cape Town, South Africa

Aim:
To assess the toxicity of R_X2071 (MRC AML 15-based protocol) which is used to treat children with acute myeloid leukaemia (AML).

Methods:
This was an interim analysis used to determine the toxic effects of R_X2071 on patients diagnosed with AML between 2007 and 2012 at Red Cross Children's Hospital. Since 2009 patients with APL and t(15;17) have been treated on R_X2091 which includes ATRA for induction up to 90 days and 6MP and MTX in the maintenance phase. All patients with APL and trisomy 21 were excluded from the analysis. Data pertaining to toxicity was obtained and captured from patient folders.

Results:
There were 35 children treated with R_X2071; 18 males and 17 females ranging from 0.33 to 12.51 years. The median age for males was 5.62 years and for females 6.7 years. There was a median of 4 neutropaenic fevers per patient. The majority of febrile neutropaenias (91/135) lasted for more than 7 days. There were 32 positive blood cultures and 7 positive fungal cultures. One patient needed inotropic support for septicaemia. There was a median of 8 packed cell transfusions and 11 platelet transfusions per patient. There were no fatal haemorrhages in induction. There was no toxicity- related deaths in this cohort of patients.

Conclusion:
Treatment-related toxicity, predominantly myelosupression and infection, associated with R_X2071 can be managed with good supportive care to minimise morbidity and avoid death from toxicity.

Ethics nr: 235/2012

Title: **SUBFASCIAL LOCAL ANESTHETIC WOUND INFUSION VS STANDARD POST-OPERATIVE ANALGESIA IN PEDIATRIC POST-OPERATIVE PAIN CONTROL**

Authors: Machoki M. S, AJW Millar, Alexander, Cox S, Thomas J, Albertyn H, Numanoglu N,

Introduction:
Post-operative analgesia currently relies on multimodal therapy consisting of epidural analgesia, intravenous opioid (usually morphine) and acetaminophen (Perfalgan) infusion. Epidural analgesia requires expertise, is costly, is time consuming and may be associated with a high failure rate. Local wound infusion, which has been effectively utilized in the adult population with promising results, has not been prospectively tested both for efficacy and patient physiological function in children. We hypothesized that the use of a surgeon-placed wound infusion catheter and subsequent continuous infusion of bupivacaine would offer equivalent pain control with a reduced incidence of technical failure when compared to the standard of care.

Methods:
Prior to commencing a randomized double blinded control study we embarked on a pilot study of bupivacaine wound infusion. Using a validated pain assessment tool among patients 12 years and below undergoing laparotomy or open appendectomy we selected a series of patients in whom a wound infusion catheter was laid on the closed peritoneum with a separate exit point away from the closed wound. 0.2 % bupivacaine was initially bolused at 2mls/kg at anesthetic reversal and infused at 0.2ml/kg/hr thereafter for 48 hours. Selection of patients was based on the following exclusion criteria: age above 12years or below 3mo, neurological impairment, ventilation at the time of first pain assessment and history of adverse reaction to bupivacaine. Consent from the guardian, assent from patients above the age of 7 years, consent from the attending surgeon and ethics approval from the UCT was obtained. The patient was also given acetaminophen regularly and morphine infusion was used as top-up analgesia if required. Pain assessments were performed for each patient at regular intervals by a single assessor who had training in pediatric pain management. The duration of surgery, length of incision, perioperative antibiotics, wound class risk of surgical site infection, return to full feeds, drug adverse reactions, hospital stay, surgical site infection and wound catheter complications were recorded for each patient. The total dose of morphine, other opioids and acetaminophen were also recorded.

Results:
In a series of 24 patients (5 open appendectomy & 19 laparotomy) we analyzed the pain scores of 16 patients (3 open appendectomy & 13 laparotomy) who had undergone subfascial wound catheter placement at the time of surgery with continuous bupivacaine infusion post-operatively. The average FLACC (Face, Legs, Activity, Cry & Consolabilty) pain score in this series was 2.5, with no wound infections and no bupivacaine related complications. This score equates to an absence of significant pain.

Conclusion:
In this pilot phase, continuous subfascial bupivacaine infusion has been shown to be a safe and effective technique for post-operative pain control and is deemed applicable for a larger randomized trial

Title: **INTRAOPERATIVE BLOOD TRANSFUSION PATTERNS IN SURGERY FOR NON-SYNDROMIC CRANIOSYNOSTOSIS**

Authors: Padayachy LC, Micheals J, Figaji AA, Fieggen AG, Lechthape-Gruther R, Peter JC

Introduction:
Blood transfusion in craniosynostosis surgery is almost routine in our current practice, as reported blood loss for these procedures can range from 20 -500% of estimated blood volume (EBV). There are specific intraoperative factors which have been identified as relevant in determining transfusion threshold and appropriateness of red cell volume of transfusion (RCTV).

Methods:
We performed a review of patients operated on for non-syndromic craniosynostosis at the Red Cross Children's Hospital, between 2008 and 2012, and identified 42 cases during this period, which had received intraoperative blood transfusions.

Results:
Packed red cells were used in 97% of the transfusions. We assessed the association between a number of continuous variables, including age, weight, gender, type of procedure, length of procedure, starting Hb, blood product and adequacy of transfusion. The endpoints evaluated were RCTV and ratio of postransfusion Hb ($Hb_{PI)}$ to starting Hb ($Hb_{baseline)}$. Length of procedure > 121min ($p=0.09$), starting Hb <10g/dL ($p<0.05$) and type of procedure ($p<0.05$) appear to have the most significant relationship with adequacy of transfusion. The mean starting Hb was 11.46 g/dL ± 1.3, and the mean post-operative Hb 11.35 g/dL ± 2.3, however only 47,37% of patients had a post-tranfusion Hb within 20% of their baseline value. The majority of inadequately transfused patients appear to be scaphocephaly repairs, with 52.6% of patients in this group having Hb_{PI} > 20% of the baseline value.

Conclusion:
Tranfusion practice for craniosynostosis repair at our institution appears to vary significantly depending on the type of procedure performed and the length of these procedures. Review of our current practice regarding transfusion thresholds and blood conservation techniques are required.

Title: **THE PREVALENCE OF ANAEMIA IN CHILDREN AT THE MEDICAL EMERGENCY UNIT (MEU), SHORT STAY WARDS (SSW) AND MEDICAL OUTPATIENT DEPARTMENT (MOPD) AT RED CROSS WAR MEMORIAL CHILDREN'S HOSPITAL (RCWMCH) FOR 2012**

Authors: Martie Wege, Patricia Harley, Rudzani Muloiwa

Introduction:
Anaemia is considered a massive public health problem in children although the actual prevalence for anaemia in children from Cape Town and most resource poor communities remain unclear. According to the WHO, the prevalence of anaemia in South Africa in healthy pre-school children are 24.1%.
We hypothesise that children aged 6-36 months presenting to RCWMCH, have a much higher prevalence of anaemia than predicted for pre-school children in South Africa.
The WHO use a Hemoglobin of <11.0 to define anaemia, for our specific context and lab values we used a cut off value of ≤10.5.

Methods:
This is a retrospective quantitative cross-sectional study with both descriptive and analytic elements were carried out in two phases.
Data from the NHLS at RCWMCH were used to determine the prevalence of anaemia for children aged 6 - 36 months that had their first FBC (Full blood count) done in the MEU, MOPD or SSW between the 1st of January 2012 and the 31st of December 2012. Children that had a previous FBC done during the year of 2011 were excluded from the study.
There was a total of 36 898 FBC's were done for the year 2012 at RCWMCH. 2661 patients fulfilled the criteria for inclusion.

Results:
Anaemia was found in 1088/2661 (40.8%) of children. There was no statistical significant difference
($x!$ $p = 0.27$) in the prevalence between boys (52%) and girls (48%) ($\chi 2$ p=0.27).
Children that had their FBC done at the MEU or in the SSW had a significantly higher prevalence of anaemia compared to those seen in MOPD with a prevalence of 42.7% vs 34.9%; ($\chi 2$ p=0.001).
Children 6-12months had an anaemia prevalence of 44.7% (373/834), 1-2 years 41% (482/1173) and 35.6% (1223/654) of children 2-3 years of age. This was in keeping with a 10% decline in the prevalence of anaemia with increase in age category; RR1 0,9 (95% CI 0.84 – 0.95).
Microcytosis was present in 747/1088 (68.6%) of anaemic children. Microcytosis was also found in 592/1573 (37.6%) of children without anaemia.

Conclusions:
The prevalence of anaemia in unwell children at RCWMCH are almost double than the predictable prevalence for children in South Africa. Anaemia is significantly more prevalent in the younger and acutely more sicker children. A second phase of the study, already underway, will aim to determine and identify the management of anaemia in children at RCWMCH.

Acknowledgement:
NHLS Haematology Laboratory at RCWMCH

Title: **THE EPIDEMIOLOGY OF CHILD HOMICIDE IN SOUTH AFRICA – IS THERE A LINK TO CHILD ABUSE?**

Authors: Shanaaz Mathews[1], Naeema Abrahams[2], Rachel Jewkes[2], Lorna Martin[3] and Carl Lombard[4]

Affiliation: [1]Children's Institute, University of Cape Town
[2]Gender and Health Research Unit, Medical Research Council
[3]Division of Forensic Medicine and Toxicology, University of Cape Town
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Background:
Homicide of children, particularly child abuse and neglect related deaths are preventable. Yet, thousands of children die each year from homicide with limited public health and policy attention. This is the first national study on child homicide in a middle or low income setting and aims to describe the incidence of overall child homicide and fatal child abuse in South Africa.

Objective:
To describe the incidence of overall child homicide and fatal child abuse by age and gender in South Africa.

Methods:
A cross-sectional mortuary-based national study was conducted at a proportionate random sample of 38 medical legal laboratories to identify all child homicides for 2009. Data was collected from mortuary files, autopsy reports and police interviews.

Results:
We estimate that 1 018 (95% CI: 843 – 1 187) child homicides occurred in 2009, with an overall rate of 5.5/100 000 (95% CI: 4.6/100 000 – 6.4/100 000) children under the age of 18 years. We found a far greater homicide rate for boys (6.9/100 000 (95% CI: 5.6/100 000 – 8.3/100 000)) than girls (3.9/100 000 (95% CI: 3.2/100 000 – 4.7/100 000)). Nearly half (44.5%) of child homicides were related to child abuse and neglect, and three quarter of girl homicides were related to fatal child abuse compared to a quarter of boys. The homicide rate of (21.7/100 000 (95% CI: 14.2-29.2)) for teenage boys (15-17 years) was nearly five times the teenage girls' rate (4.6/100 000 (95% CI: 2.4 – 6.8)).

Conclusions:
South Africa has a child homicide rate more than double the global estimate. Nearly half of all child homicides are due to child abuse and neglect, with these deaths most likely preventable. Developing strategies to prevent child homicide and fatal child abuse requires urgent attention. This study highlights the need to increase government budgets to implement evidence-based primary prevention programmes to reduce child homicides.

Ethical Clearance No: Medical Research Council EC09-021

Title: **RELIABLE MEASUREMENT OF PROPORTIONS AND ABSOLUTE CELL COUNTS FROM FIXED AND CRYOPRESERVED WHOLE BLOOD**

Authors: Elisa Nemes, Benjamin M. N. Kagina, Willem A. Hanekom and Thomas J. Scriba

Affiliation: 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.

Background and objective:
The absolute number and relative proportions of peripheral blood cell subsets are sensitive to human health and disease. Quantification of immune cell subsets may be used as biomarkers of disease in different clinical settings. Measurement of absolute cell counts is usually performed on fresh whole blood. However, it is impractical to complete real-time assays in large clinical trials or field studies with multiple follow-up time points. These logistical difficulties may be overcome by cryopreservation of samples, which can then be analysed in batch.

We compared proportions and absolute cell subset counts in fresh and fixed whole blood, and assessed the effects of long term cryopreservation thereon.

Methods:
Fresh whole blood from 10 healthy donors was processed in two ways. Whole blood was immediately stained, then erythrocytes were lysed and white cells fixed prior to flow cytometric analysis (Lyse No Wash reference protocol). Alternatively, erythrocytes were first lysed and white cells fixed, permeabilised and analysed using an intra-cellular staining (ICS) protocol. Multiple aliquots of fixed cells were stored in liquid nitrogen. These were thawed and analysed by ICS every month for up to 1 year. Outcomes were proportions and absolute counts of granulocytes, lymphocytes, CD14+ monocytes, CD3+ T cells, CD19+ B cells and Ki-67+ activated T cells within the CD45+ leukocyte population. Fluorescent reference beads were used to calculate absolute cell counts.

Results:
The best agreement between cell measurements in fresh and fixed, permeabilised whole blood was observed for proportions of CD19+ B cells, while the worst agreement was observed for absolute count of granulocytes. Regardless, cell proportions and absolute counts obtained using the two methods were highly correlated; the minimum correlation coefficient was 0.84.
Duration of cryopreservation had little effect on cell proportions and absolute counts. The median coefficient of variation (CV) across all donors for all outcomes over time was 9.17%. Proportions of CD3+ T cells (median CV: 1.96%) were least affected by long-term cryopreservation, while absolute count of Ki-67+ CD3+ T cells was most affected (median CV: 13.96%).

Conclusions:
We show that peripheral blood cell subsets can be reliably quantified in fixed and permeabilised whole blood, even after sample cryopreservation for 1 year.
This protocol is ideal for batch analysis of samples from large field studies, or when advanced flow cytometry equipment is not readily available.

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Title: **A RETROSPECTIVE STUDY ON THE EFFECTS OF COLISTIN THERAPY IN CHILDREN WITH MULTI-DRUG RESISTANT GRAM NEGATIVE BACTERIAL PATHOGENS - IMPACT OF HIV STATUS ON OUTCOME**

Authors: Dimitriades Konstantinos[ab], Morrow Brenda May[b], Jeena Prakash[a]

Background:
Nosocomially acquired multidrug resistant (MDR) gram negative pathogens are important contributors to PICU mortality and morbidity, with limited treatment options.

Objective:
To investigate the outcomes of all children treated with colistin for infection with MDR gram negative pathogens whilst admitted to the Inkosi Albert Luthuli Central Hospital PICU between September 2009 and March 2011.

Methods:
A retrospective observational study using routinely collected data. Primary endpoints were mortality and safety. Secondary endpoints evaluated clinical and microbiological outcomes. Cases were stratified according to HIV status.

Results:
Twenty- seven children received colistin during the study period. Eight patients (29.6%) were HIV infected, six (22.2%) were HIV uninfected but exposed, and 11 (40.7%) were HIV uninfected and unexposed. A total of 30 courses of colistin were dispensed. The most common MDR gram negative organisms cultured were: *Acinetobacter spp*. (n = 22, 81.5%), *Pseudomonas aeruginosa* (n = 11, 40.7%), and *Klebsiella pneumoniae* (n = 7, 25.9%).
Mortality was 37%, with no significant difference between HIV strata. No adverse drug reactions were noted.
A composite clinical improvement was noted in 16 courses (53.3%) of colistin. Only 30% of colistin courses used in HIV infected children resulted in an improved clinical assessment as compared to 83.3% of courses in HIV uninfected/unexposed children (p=0.04). In HIV infected children, five of 10 (50%) courses of colistin showed bacteriological clearance compared to the HIV uninfected/unexposed group where all cases showed bacterial eradication (*p*=0.02).

Conclusion:
HIV infected children had a poorer clinical and bacteriological response to colistin treatment than HIV uninfected/unexposed children. These results require confirmation with prospective studies in order to determine whether findings are due to poor microbial response, immunodeficiency or repeated re-infections.

Title: **IMPACT OF INTRAPLEURAL FIBRINOLYTICS ON THE OUTCOME OF EMPYEMA IN CHILDREN**

Authors: Zampoli M, Kappos A, Verwey C. Mamathuba R and Zar HJ

Affiliation: Division of Paediatric Pulmonology. Red Cross War Memorial Children's Hospital; Department of Child and Adolescent Health, University of Cape Town.

Background:
Management of pleural empyema includes chest drain insertion for free drainage of pleural fluid. Surgical intervention for loculated empyema is required if symptoms do not resolve with drainage alone. Installation of intrapleural fibrinolytics has been shown in some studies in high income countries to be beneficial in childhood empyema.

Aim:
To compare the outcomes of children with empyema before and after the introduction of intrapleural alteplase at Red Cross War Memorial Children's Hospital (RCWMCH).

Methods:
Clinical, aetiological and outcome data was prospectively collected in children admitted with empyema to RCWMCH between December 2006 and December 2011. Routine pre-emptive intrapleural alteplase (Tissue Plasminogen Activator), administered according to a standard protocol and indications, was introduced in September 2009. Outcomes in children treated with fibrinolytics were compared to the historical cohort who did not receive fibrinolytics. Primary outcome was need for surgery. Secondary outcomes were duration of hospital admission, complications and mortality.

Results:
142 cases of empyema were admitted during the study period with a median age of 17 months (IQR 8-43 months), 81 (57%) were males. After excluding cases where fibrinolytics were contraindicated (36) or no chest drain was inserted (7), data on 99 cases (52 with fibrinolytics; 47 without fibrinolytics) was available for comparison. Demographics, nutritional status, HIV status clinical characteristics and empyema aetiology were similar in both groups. The rate of surgery decreased from 38% (18/47) in patients not treated with alteplase to 10% (5/52) in patients treated with alteplase (RR 0.25; 95% CI 0.1-0.6). The median duration of hospital stay did not differ significantly (alteplase 9.5 days (IQR 7-16); no alteplase 12 days, (IQR 10-20); p=0.09). Complications relating to empyema (alteplase 10%; no alteplase 13%) and treatment (alteplase 8%; no alteplase 4%) were few and similar in both groups. Overall mortality was low (6 deaths; 4.6%), with 2 deaths occurring in each group respectively.

Conclusion:
Introducing intrapleural alteplase in children with empyema resulted in a 4 fold reduction in need for surgery. Intrapleural alteplase should be used in children with empyema.

Conflicts of interest: none declared

Title: **MODIFYING THE CLINICAL CASE DEFINITION OF PERTUSSIS INCREASES THE SENSITIVITY OF DIAGNOSIS IN CHILDREN SUSPECTED OF BORDETELLA PERTUSSIS INFECTION**

Authors: Rudzani Muloiwa[1], Mischka Moodley[2], Heather J. Zar[1]

Affiliation: [1]Department of Paediatrics & Child Health, Red Cross War Memorial Children's Hospital, University of Cape Town, [2] National Health Laboratory Services & Division of Medical Microbiology, Faculty of Health Sciences, University of Cape Town

Background:
From January 2001 until December 2012, only 57 children were notified for pertussis at the Red Cross War Memorial Children's Hospital (RCWMCH). This suggests a very low incidence of pertussis, a failure to detect the cases or failure to notify. The World Health Organisation (WHO) defines a surveillance clinical case of pertussis as one with a cough of at least 14 days duration with at least one of paroxysms, post-tussive vomiting or an inspiratory whoop. Since 2009, a highly specific *Bordetella pertussis* PCR has been available at RCWMCH to confirm infection with the organism. Laboratory confirmation is however not essential for notification.

Objective:
We set out to determine the proportion of all children tested for *Bordetella pertussis* infection fulfilling the WHO clinical case definition for pertussis as well as determine the proportion of children with confirmed infection fulfilling this case definition and a modification thereof.

Methods:
A retrospective folder review was undertaken between December 2012 and April 2013. A list of patients from the RCWMCH who had a PCR test for *Bordetella pertussis* between May 2009 and December 2012 was generated from the records of the National Health Laboratory Services. Data including history on admission, clinical examination, management and results of investigations were extracted.

Results:
Three hundred and five folders had sufficient data to be included in the review. The median age of the children was 2.3 months (IQR 1.4 - 4.0 months). Forty-six out of 279 (16.5%) with known immunization status were not up to date with their vaccines for age. Only 74/279(26.5%) had received three or more doses of a pertussis containing vaccine.

Bordetella pertussis infection was confirmed in 75/305 (25.6%) of the children. The WHO clinical case definition for pertussis was fulfilled in 50/305 (16.4 %). Although the proportion was higher in the PCR confirmed compared to the unconfirmed group (RR 2.3; 95% CI 1.5 – 3.3), only 23/75 (30%) fulfilled the clinical case definition.

The proportion of confirmed cases fulfilling the case definition increased to 69% (52/75) when the duration of cough was dropped from the definition. It further increased to 77% (58/75) when apnoea was added to this modified case definition.

Conclusion:
Modifying the WHO case definition of pertussis increases the sensitivity of clinical case detection. There is an urgent need to review the clinical case definition of pertussis, taking into account the "atypical" clinical presentation of pertussis in young and partially immunized children as well as limitations of current laboratory diagnostic methods.

Funding acknowledgement:
Hamilton Naki Clinical Scholarship

Title: **MECHANICAL INSUFFLATION-EXSUFFLATION FOR PEOPLE WITH NEUROMUSCULAR DISORDERS – A SYSTEMATIC REVIEW**

Authors: Brenda Morrow[1], Marco Zampoli[1,2], Helena van Aswegen[3], Andrew Argent[1,2]

Affiliation: [1]Department of Paediatrics, University of Cape Town
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[3]Physiotherapy Department, University of the Witwatersrand (WITS)

Background:
People with neuromuscular disorders (NMDs) may have weak respiratory muscles which make it difficult for them to effectively cough and clear mucus from the lungs. This places them at risk of recurrent chest infections and chronic lung disease. Mechanical insufflation-exsufflation (MI-E) is one of a number of techniques available to improve cough efficacy and mucus clearance.

Objectives:
To determine the efficacy and safety of MI-E in reducing mortality and morbidity in people with NMDs.

Search methods:
On 20 August 2012, we searched the Cochrane Neuromuscular Disease Group Specialized Register, CENTRAL (2012, Issue 8 in *The Cochrane Library*), MEDLINE (January 1966 to August 2012), EMBASE (January 1980 to August 2012) and Clinical Trials.gov. We also conducted hand-searches of reference lists and conference proceedings.

Selection criteria:
Randomised or quasi-randomised clinical trials, and randomised cross-over trials in which MI-E was used to assist airway clearance in people with a NMD and respiratory insufficiency, compared with placebo, no treatment or alternative cough augmentation techniques.

Data collection and analysis:
Authors independently assessed trial eligibility, extracted data, and assessed trial quality according to standard Cochrane methodology.

Results:
Forty-nine papers were identified by the search, after removing duplicates, of which five studies with 105 participants were found eligible for inclusion in this review. All included trials were short-term studies (two days or less), measuring immediate effects of the interventions. No outcome measurements on mortality, morbidity, quality of life, serious adverse events or any of the other outcomes that we prespecified as of interest in the review were presented.
One study was a randomised cross-over trial over two days, in which two interventions were applied twice daily in randomly assigned order, with a reverse cross-over the following day. Four studies applied each of multiple interventions to every included participant, in random order. One study reported fatigue as an adverse effect of MI-E, using a visual analogue scale. Peak expiratory cough flow (PECF) was the most common outcome measure, reported in four studies. Based on three studies, MI-E may improve PECF compared to an unassisted cough. All interventions increased PECF to the critical level necessary for mucus clearance. Included studies did not clearly show MI-E to improve PECF more than other cough augmentation techniques. Based on one study, with potential assessor bias, the addition of MI-E may reduce treatment time when added to a standard airway clearance regimen with manually assisted cough. MI-E appeared to be tolerated as well as other cough augmentation techniques, based on three studies which reported comfort visual analogue scores.

Conclusions:
The results of this review do not provide sufficient evidence on which to base clinical practice as we were unable to address important short- and long-term outcomes, including adverse effects of MI-E. There is currently insufficient evidence for or against the use of MI-E in people with NMDs. Further randomised controlled clinical trials are needed to test the safety and efficacy of MI-E.

Title: **DILATED CARDIOMYOPATHY IN DUCHENNE MUSCULAR DYSTROPHY AT RED CROSS CHILDREN'S HOSPITAL: RELATION TO GENETIC PREDICTORS AND STEROID THERAPY**

Authors: Rachelle Gietzen, Kathie Walker, Jo Wilmshurst, Rik De Decker

Affiliation: Depts of Neurology and Cardiology, Red Cross Children's Hospital

Background:
Duchenne Muscular Dystrophy (DMD) is a severe muscular degenerative disease caused by several different gene mutations of the dystrophin gene. There are two major mutation hotspots in the dystrophin gene resulting in large exon deletions. DMD morbidity and mortality is frequently associated with dilated cardiomyopathy (DCM) and hotspots may be predictive of DCM. Current treatment includes ACE-inhibitors (ACEI) and oral steroids until non-ambulant (the patient is confined to a wheelchair).

Objective:
This study sought to determine if the genetic prediction of onset and/or severity of cardiomyopathy at different hotspot mutations in patients with DMD is possible, and to assess whether these hotspots may be related to the efficacy of steroid treatment to ameliorate deterioration of cardiac function.

Methods:
The study is a retrospective case review of all children with DMD managed at the Red Cross War Memorial Children's Hospital in Cape Town, South Africa since 1990. All boys with a positive exon deletion of the dystrophin gene at one of two hotspots (exon 2-20 and exon 45-54) were included. Cardiomyopathy was assessed by echocardiographic screening: left ventricular ejection fractions (EF) were used to assess cardiac function and an EF of <55% was considered abnormal. Cardiac function during steroid treatment and after the cessation of steroid treatment (when no longer ambulant) was determined.

Results:
Sixty-nine boys underwent DNA analysis to confirm their diagnosis: 30 boys had a confirmed positive exon deletion of the dystrophin gene at one of the two hotspots. No association with cardiomyopathy was apparent between the hotspots that were deemed protective or predictive. However, subjects with a mutation at hotspot 1 showed normal cardiac function after cessation of oral steroids (EF mean decrease of 3.67%), as compared to those with a hotspot 2 mutation, which had worsening cardiac function (EF mean decrease of 15.5%).

Conclusions:
There was no correlation between different hotspots being predictive of or protective for dilated cardiomyopathy. Dystrophin gene mutations in hotspot 1 appear to maintain stable cardiac function despite the cessation of oral steroid therapy. Mutations in hotspot 2 however, appear to be predictive for cardiac deterioration after cessation of steroid therapy. As is typical of work on DMD, this case series has a limited sample size and further investigation seems warranted to determine if patients with certain mutations should remain on steroid therapy after loss of ambulation.

- Ethics approval number: RECREF R013/2013

Title: **A VALIDATION OF A PAEDIATRIC GUIDELINE ON BASIC ELECTROENCEPHALOGRAM INTERPRETATION FOR CLINICIANS**

Authors: Veena Kander (BTech), Jo Wilmshurst MD

Affiliation: Departments of Neurophysiology and Paediatric Neurology, Red Cross War Memorial Hospital

Background:
Epilepsy is one of the most common serious disorders of the brain. Proper diagnosis and adequate management improves outcome. Sub-Saharan Africa however suffers from a paucity of trained physicians. In addition to clinical skills, the effective use of diagnostic resources such as electroencephalograms (EEGs) is severely restricted.

Aim:
The aim of this study was to validate a handbook on the interpretation of EEGs in children which would support doctors who are not necessarily specialists in paediatric neurology.

Method:
A prospective study was performed. Thirteen paediatric trained clinicians were recruited to report on twenty EEGs (10 selected and 10 "random" prospective). They consisted of 7 local and 6 international participants who comprised of n= 2 newly qualified neurologists (n=1 from Kenya), n=1 training neurologist, n=7 paediatricians (n= 4 from Nigeria & n=1 from Rwanda), n=1 training paediatrician and n=2 medical officers. On completion of the pre-test electroencephalograms each participant was provided with a handbook on basic EEG interpretation. After one month, participants were given another twenty EEGs (10 selected and 10 "random" prospective) to report. During the post-test, they completed a survey of their opinions on the usefulness of the handbook.

Results:
Eleven of the thirteen invited participants completed the study. Two failed to complete due to busy schedules and delayed delivery of the handbook. The pre-test results showed a median percentage of 50 with a minimum to maximum range of 0 (outlier) to 90%. In the post-test results the median increased to 70% with the minimum percentage increasing from 0 to 45%. The p value of <0.06 supported a strong trend between the post-test compared to pre-test results. Two participants declined in the post-test analyses. In comparison between the participants exposed to additional 1-on-1 teaching and those who only used the handbook, the results showed that the participant who had 1-on-1 teaching yielded significantly better outcome on all variables tested on EEG reporting and on analysis of the survey.

Conclusion:
The post-test results showed a strong overall trend towards improved EEG interpretation ($p<0.06$) compared to the pre-test results. This lends support to the success of the handbook as a basic guide to paediatric EEG interpretation.

The handbook is not intended to make the participant an expert at electroencephalography interpretation, but is intended to train doctors to be safe to screen EEG for important key diagnostic markers which would alter a child's management.

Title: **THE TUBEROUS SCLEROSIS COMPLEX ASSOCIATED NEUROPSYCHIATRIC DISORDERS (TAND) CHECKLIST - PILOT VALIDATION OF A NEW SCREENING TOOL FOR NEUROPSYCHIATRIC MANIFESTATIONS IN TUBEROUS SCLEROSIS COMPLEX**

Authors: Leclezio L.[1], Jansen A.C.[2], Whittemore V.H.[3], Wilmshurst J.[4], Schlegel B.[4] and de Vries P.J.[1]

Affiliation: [1]Division of Child & Adolescent Psychiatry, University of Cape Town, South Africa. [2]Pediatric Neurology Unit, UZ Brussel, Vrije Universiteit Brussel, Brussels, Belgium. [3]National Institute of Neurological Disorders and Stroke, National Institutes of Health, Bethesda, MD, USA. [4]Department of Paediatric Neurology, Red Cross War Memorial Children's Hospital, University of Cape Town, South Africa.

Background:
Tuberous Sclerosis Complex (TSC) is a multi-system disorder that includes a range of neuropsychiatric manifestations. The majority of individuals with TSC will be affected by neuropsychiatric problems in their lifetime, with prevalence rates in the region of 90%. However, a UK survey suggested that no more than 20% of those with TSC ever receive actual assessment and/or treatment. At the 2012 International TSC consensus conference the Neuropsychiatry Panel coined the term TAND (TSC-Associated Neuropsychiatric Disorders) and recommended that all individuals with TSC should be screened for TAND annually. To aid in the systematic enquiry of the behavioural, psychiatric, neuropsychological and psycho-social difficulties experienced by individuals with TSC, a TAND Checklist was developed. Here we describe the first 2 stages of pilot validation of the TAND Checklist.

Method:
The study was performed using mixed methodology. In stage 1 the aim was to examine face and content validity. We gathered quantitative and qualitative feedback from 16 international TSC experts and 42 parents/carers on the TAND Checklist. Stage 2 examined concurrent validity and involved the face-to-face administration of the refined TAND Checklist with four other validated assessment tools to 20 South African parents of individuals with TSC in the Western Cape.

Results:
Expert clinicians as well as families rated the TAND Checklist to have good face and content validity. Some concerns were expressed about the likely use and subsequent validity of the TAND Checklist. Stage 2 results showed moderate to very good correlations across key domain and subdomain scores examined, suggesting good concurrent validity with the other four assessment tools used.

Conclusion:
Pilot validation of the TAND Checklist supported face and content validity, and showed surprisingly good external validity. Findings suggest that this simple, pen-and-paper tool may be a helpful aide memoire in the identification and subsequent treatment of TAND.

Keywords:
TSC, TAND.

Title: **EARLY WHITE MATTER EFFECTS OF ALCOHOL EXPOSURE ON THE INFANT BRAIN**

Authors: Donald, K; Fouche, J; Roos, A; Koen, N; Howells, F; Woods, R; Zar, H; Narr, K; Stein, D.

Background:
Globally, substance use and substance use disorders contribute a significant proportion of the burden of disease in low, middle, and high income countries. In particular, South Africa has one of the highest prevalences of alcohol use disorders and foetal alcohol syndrome world-wide. Neuroimaging studies of prenatal alcohol exposure have reported differences in the structure and metabolism of many brain circuits, but little has been reported on the impact in early infancy. Diffusion tensor imaging (DTI) has proved to be a particularly useful tool for investigating white matter tracts, but has not been studied early in infancy in subjects with prenatal exposure to alcohol.

Methods:
Infants aged 2-4 weeks of age were imaged using DTI sequences on a Siemens Magnetom 3T system. Eleven healthy unexposed infants (mean age: 22.3 days SD 7.2; 7 males, 4 females) and 20 alcohol exposed infants (mean age: 20.2 days SD 4.5; 11 males, 9 females) were included in this preliminary tract-based spatial statistics (TBSS) analysis.

Results:
When comparing fractional anisotropy (FA) between alcohol-exposed and healthy infants, significant decreases ($p < 0.05$) in FA were found for the following white matter regions: the inferior cerebellar peduncle, fornix, corona radiata, cingulum, cerebral peduncle and internal capsule.

Conclusion:
These results indicate that even in newborn infants the neurobiological effects of prenatal alcohol exposure are observable, with reduced white matter integrity. This has not been previously reported in infants at this age when the confounding post-natal environmental influences on infants and children from these backgrounds have not yet come into play The location of the findings is consistent with previously reported studies of white matter tracts in older children with a diagnosis of foetal alcohol syndrome.

Title: **GAIT OF CHILDREN WITH HIV ENCEPHALOPATHY AND SPASTIC DIPLEGIA: IS IT SIMILAR TO SPASTIC DIPLEGIC GAIT PATTERNS IN CEREBRAL PALSY?**

Authors: NG Langerak[1,2], J du Toit[3], M Burger[2], MF Cotton[4], PE Springer[5], B Laughton[4]

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Objective:
Spastic diplegia secondary to human immunodeficiency virus encephalopathy (HIVE) has clinical manifestations similar to those described in children with spastic diplegic cerebral palsy (CP). To date no description of the pathological gait patterns of children with HIVE has been documented. Three-dimensional gait analysis (3DGA), with comprehensive physical examination, is an objective tool to assist in the clinical decision making regarding optimal management of children with HIVE. The aim of this study was to describe the gait pattern of children with spastic diplegia secondary to HIVE, and to determine if this is similar to gait in children with spastic diplegia and CP.

Methods:
Ambulant children aged between 4 and 10 years, diagnosed with spastic diplegia due to HIVE, were selected for this cross-sectional study. 3DGA (using an 8-camera Vicon system) provided information about the gait pattern, and physical examination (including assessments of muscle tone, strength, motor control, contractures, and bony deformities of the lower extremities) was conducted to determine the underlying reasons for gait deviations. Participants were divided into groups based on distinctive different gait patterns quantified by observational screening of frontal and sagittal videos and 3DGA outcomes. Due to small sample size only descriptive statistical analysis was possible.

Results:
Fourteen children (8 males and 6 females) with a mean age of 5.7 ± 0.8 years (range 4.3 – 6.8years) were studied. The study-cohort was divided into two groups based on distinctive gait patterns observed on the 3DGA. Group I (n=9) presented only with limited abnormalities, while Group II (n=5) displayed a more pathological gait pattern including stiff knee and equinus ankle abnormities. These results of 3DGA were in line with the findings on physical examination.

Conclusion:
This study provides the first description of gait patterns and related physical characteristics of children with spastic diplegia due to HIVE. The children with HIVE could not be classified in the typical spastic diplegic CP gait patterns and we were unable to clarify the differences between the two Groups. We encourage longitudinal clinical, gait, and neuroimaging studies to establish a better understanding of the underlying neuropathological mechanisms and natural history of HIVE and spastic diplegia. This research should result in evidence-based guidance for optimizing management of children with HIVE and spastic diplegia.

Title: **LUMBAR PUNCTURES IN THE MEDICAL EMERGENCY UNIT AT RED CROSS WAR MEMORIAL CHILDREN'S HOSPITAL: AN EVALUATION**

Authors: C Procter, H Buys, J Thomas

Background:
Lumbar punctures (LPs) are commonly performed in the paediatric medical emergency unit (MEU) department to diagnose or exclude meningitis. Traumatic lumbar punctures cause diagnostic uncertainty which prolongs hospital stay and may result in unnecessary antibiotic treatment and increased costs to the hospital and patients. It is important to determine factors that may be important in reducing traumatic LPs. There is a paucity of studies on this topic from subsuharan Africa. Previous studies have shown inconsistent results and the use of sedation has not previously been studied.

Aims:
To determine the incidence of traumatic or unsuccessful lumbar punctures and the factors influencing this in the Medical Emergency Unit (MEU) and Short Stay Ward (SSW) at Red Cross War Memorial Children's Hospital, Cape Town.

Methods:
From February to April 2013 we analysed the lumbar punctures performed in the medical emergency unit and short stay ward at Red Cross Children's Hospital. Details of the procedure, sedation and analgesia used, techniques and CSF results obtained were collected using a post procedure questionnaire completed by the doctor performing the procedure. All children requiring a LP in the MEU and SSW were eligible for inclusion. Children who had their LPs done in other wards or hospitals were excluded.

Results:
Data were collected from 350 children. 142 (41%) were female and 208 (59%) were male. Sixty three percent were <12 months age, the median age was 4.8 (IRQ 1.5-21.7) months. Their median weight-for-age z-score was -0.97 (IQR -2.2 to 0.1). LPs were done to exclude meningitis in 99% (347) cases. 86% of the doctors claimed to have done >50 LPs. The LP was unsuccessful (traumatic or dry) in 113/350 (32%) cases. No significant difference was found in the rate of unsuccesful LPs with increased experience, p=0.497.

Sedation was used in 107 (31%) children and increased the likelihood of a successful LP, p= 0.001; RR1.3 (95%CI 1.13-1.49) except in those under 3 months of age where sedation did not signicantly reduce the likelihood, p=0.61. In those where no sedation was used (242), local anaesthetic with EMLA cream did not significantly reduce the incidence of traumatic tap, p=0.122; RR1.18 (95%CI 0.95-1.41).

The black spinal needle was used in 292 (83%). Of these the stylet was removed early in only 15% so the number in this group was small. There was a suggestion of association with improved success rates but this was not statistically significant in this study, p=0.068. A family member was present in 8% of cases, this did not increase the likelihood of success, p=0.7. The median duration of treatment in hospital was 4 (IQR 2-5) days, range 1-21 days in 79 children.

Conclusion:
There is a high prevalence of traumatic LPs at this institution. Sedation reduces the risk of bloody taps but is not routinely used. In this study no other procedural factors were found to significantly reduce the prevalence of unsuccessful LPs. Traumatic taps increase the risk of being treated unnecessarily and prolong hospitalization. Whether a procedural sedation protocol in the MEU and SSW reduces the rate of traumatic LPs and hence unnecessary treatment requires further study.

ETHICS HREC/REF 173/2013.

Title: **CLINICAL PRESENTATION OF PAEDIATRIC KIDNEY DISEASE AT QUEEN ELIZABETH CENTRAL HOSPITAL (QECH), BLANTYRE, MALAWI**

Authors: Dr Zondiwe Mwanza, Department of Paediatrics and Child Health, QECH, Malawi
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Background:
Anecdotal evidence suggests paediatric kidney disease in Malawi is common. Studies from sub Saharan Africa have indicated that glomerular disease is a leading cause of kidney injury and contributes to the burden of end stage kidney disease. There is no literature from Malawi or the sub-region on kidney disease in children.

Method:
We conducted a prospective study at a large teaching hospital. The aim was to determine the clinical phenotype of paediatric kidney disease. Fully anonymised demographic, clinical and laboratory data was collected over 9 months. These parameters were analysed by a nephrologist and paediatrician to determine the most likely diagnosis. Paediatric Renal clinic and Ward referrals were included in the study. Renal histology is unavailable locally.

Results:
Thirty eight patients, 19 male, mean age 7.9 years. One tested HIV positive, 17 were non-reactive and 19 were HIV unknown. The median creatinine at presentation was 1 mg/dL (range 0.1-33 mg/dL). Twenty (53%) patients presented with glomerular disease; 11 nephritic syndrome, 9 steroid sensitive nephrotic syndrome. Six (16%) patients were admitted with non-glomerular acute kidney injury; 4 died during admission. Four (10%) patients had urological disease with impaired kidney function; two (5%) had chronic kidney disease and six (16%) had uncertain diagnoses.

Conclusion:
Glomerular diseases predominate in this study although the histological subtype is unclear. The mortality from acute kidney injury in children is high. Improving patient outcomes by developing diagnostic services including renal histopathology and early intervention for acute kidney injury are priorities for the paediatric renal service.

Title: **IMPACT OF REVASCULARIZATION ON HYPERTENSION IN CHILDREN WITH TAKAYASU'S ARTERITIS- INDUCED RENAL ARTERY STENOSIS**

Authors: Ladapo TA[1], Gajjar P[1], Scott C[1], Angus A[2], Numanoglu A [2], McCulloch M[1], Nourse P[1]

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

Objectives:
To determine the effect of revascularization on reno-vascular hypertension in children with Takayasu arteritis induced renal artery stenosis.

Methods:
A 22 year retrospective review. Renal artery stenosis (RAS), confirmed by angiography was considered significant if >50% of the lumen was occluded. Reno-vascular hypertension was defined as systolic and/or diastolic blood pressure ≥95th percentile for age, sex and height on ≥3 occasions in the presence of haemodynamically significant RAS. Blood pressure at 3 and 6 months post-surgery was obtained. Hypertension was: cured if normotensive off anti-hypertensives; improved if so on the same or reduced number of medications, and failure otherwise. Benefit was taken as improvement or cure. Association between outcome and some variables were determined. Significance was set at $p< 0.05$.

Results:
Fifty-nine children with male: female ratio 0.7:1 and age range 1.10-14.65years (median= 9.98) were reviewed. All were hypertensive with mean systolic and diastolic blood pressures of 161.5mmHg (±36) and 106.5mmHg (±31) respectively with number of anti-hypertensives ranging 1-10. All received standard medical therapy for TA. RAS, present in 45(76.3%) children was bilateral in 30, right-sided in 8 and left-sided in 7. Twenty one procedures consisting 7 each of Percutaneous transluminal angioplasty (PTA), auto-transplantation and graft insertions were performed. Four had contralateral nephrectomy while 16 had nephrectomies only. Outcome data was available for 17 children at 3 months and 14 at 6 months. Cure, improvement and failure rates at 3 months were 2/17(11.8%), 7/17(41.2%) and 8/19(47%). This was similar at 6 months except in 1 patient with failure who later demonstrated improvement. Association between outcome and age (*p=0.51*), sex (*p=0.32*), number of pre-surgery anti-hypertensives (*p=0.18*) and stenosis sites (*p=0.22*) were not statistically significant. Three children in whom there was failure were eventually nephrectomised with cure.

Conclusion:
Revascularization is beneficial on blood pressure control in about half of children with TA. Factors that may predict outcome are not apparent from this study. Review of pre and post-operative angiograms may yield additional useful information.

Title: **CHARACTERISTICS AND OUTCOME OF CHILDREN ADMITTED TO A SOUTH AFRICAN PAEDIATRIC INTENSIVE CARE UNIT (PICU) FOLLOWING CARDIAC ARREST**

Authors: John Adabie Appiah[1,2]; Shamiel Salie[1,2]; Brenda Morrow[2]; Andrew Argent[1,2]

Affiliation: [1]Red Cross War Memorial Children's Hospital
[2]School of Child and Adolescent Health, University of Cape Town

Objective:
To describe the characteristics and outcomes of children admitted to PICU following cardiac arrest from January 2010 to December 2011.

Methods:
Retrospective descriptive study of routinely collected data.

Results:
Of 2501 PICU admissions, 110 (4.4%; 58.7% male) had preceding cardiac arrest, 80.6% of which occurred in hospital. Median (IQR) age was 7.2 (2.5 – 21.6) months; 30.8% had chronic underlying disease. Children presented most commonly with respiratory (n=28, 27.2%), cardiovascular (n= 22, 21.4%), and gastrointestinal disease (n= 20, 19.4%).
Cardiopulmonary resuscitation (CPR) was given for median (IQR) 10 (5 – 20) minutes. Thirty-five (34%) patients received no adrenaline, 44 (42.7%) received up to 3 doses of adrenaline, and 24 (23.3%) received more than 3 doses of adrenaline during resuscitation. Duration of CPR and number of adrenaline doses did not significantly influence patient outcome.
PICU mortality was 38.5%, with half these deaths occurring within 24 hours of PICU admission. Standardised mortality ratio (actual/mean predicted) was 0.7. The median (IQR) length of stay in PICU and hospital were 3 (1 – 8) and 27 (9 -52) days respectively.
65.2% of survivors had normal Paediatric Cerebral Performance Score on hospital discharge, 12.2% had mild disability; 12.2% had moderate disability and 10.3% had severe disability.
Paediatric risk of mortality (PIM2) score was the only variable independently associated with mortality on multiple logistic regression (adjusted OR 1.05; 95% CI 1.02 – 1.07; p=0.0009).

Conclusion:
Mortality was lower than predicted in children admitted to PICU following cardiac arrest. Most survivors had normal neurological function on hospital discharge.

HREC Rec/Ref: 344/2012

Title: **TREATMENT OF CHILDHOOD TUBERCULOSIS: CARGIVERS' PRACTICES AND PERCEPTIONS**

Authors: Sabine Bélard[1,2,3], Lindy Bateman[1], Washiefa Isaacs[1], Lucia Madolo[1], Jacinta Munro[1], Lesley Workman[1], Heather J Zar[1,2*]

Affiliation: [1]Department of Paediatrics and Child Health, Red Cross War Memorial Children's Hospital, University of Cape Town, Cape Town, South Africa; [2]Institute of Infectious Disease and Molecular Medicine, University of Cape Town, Cape Town South Africa; [3]Centre of Tropical Medicine and Travel Medicine, Division of Internal Medicine, Academic Medical Centre, University of Amsterdam, Amsterdam, The Netherlands

Introduction:
The caregiver of a child requiring antituberculous medication is key to successful drug delivery and treatment outcome. Little is known about the practices and perspectives of caregivers regarding paediatric tuberculosis (TB) treatment. Understanding these is a prerequisite for improving management of childhood TB. The aim of this survey was to investigate caregivers' practices and perceptions of TB treatment in children.

Methods:
A prospective questionnaire-based study at Red Cross War Memorial Children's Hospital, Cape Town, South Africa, addressed caregivers of children receiving antituberculous treatment and enrolled in a cohort study evaluating novel TB diagnostics. Caregivers were interviewed face-to-face using standardized questionnaires. Questionnaires were performed on the child's follow up visits one (M1), three (M3) and six (M6) months after TB treatment initiation.

Results:
434 questionnaires were performed between May 2011 and April 2013; 427 were complete and included in final analyses. These questionnaires were obtained from caregivers of 253 children; 168 (39%) were done at M1, 165 (39%) at M3, and 94 (22%) at M6. The median age of children was 41 months (IQR: 20-81; age at first visit of each child). TB drugs were generally obtained from clinics which were most commonly visited 1-3 times per week. Only 86/162 (53%) and 109/155 (70%) children had been weighed at the TB clinic at M1 and M3, respectively. Caregivers administered TB drugs most commonly in the mornings (52%) and after meals (69%). Two thirds of interviewees crushed, dissolved and mixed the tablets with beverages or food. The majority (almost 90%) of respondents rated drug administration "very easy", "easy" or "not difficult". Few adverse drug reactions were reported. 34/253 (13%) children received concomitant antiretroviral treatment which was most commonly given prior TB medication.

Conclusion:
Administration of TB drugs differed substantially from recommended practice. Weight for dosage adjustment was not performed in many children, most caregivers mixed crushed TB tablets with beverages or food, and treatment was most commonly administered after meals, all potentially contributing to sub-therapeutic drug levels.

Funding:
NIH, MRC

Ethics approval number: 045/2008

Title: **IS THE RESUSCITATION ROOM PRIMARILY RESERVED FOR THE CRITICALLY ILL CHILD (TRIAGE CODE RED) BEFORE 23H00 AT THE RED CROSS WAR MEMORIAL CHILDREN`S HOSPITAL?**

Authors: C. Bonaconsa [1,3,4] ;M. Coetzee[1,3,4]; A.C Argent[2,3,4]

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

Objectives:
At the Red Cross War Memorial Children`s Hospital flow to various venues in the medical emergency unit is streamlined on the basis of a child's triage code and the time of day. This study aimed to describe the current patterns of flow across time periods in a day and to identify what helps and hinders stabilisation in this busy emergency unit setting.

Methods:
The study was conducted in the medical emergency unit of the 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 seven month register review of the resuscitation room and Hospital statistics (number of triage codes in weighing room). The qualitative methodology of ethnography underpinned the study.

Results:
Data revealed an unexpected complexity of this environment. Children treated in resuscitation room (according to triage codes) over seven month period were as follows: triage code green presented as a median of 81 (range 67-117); triage code orange 391(323-428) and triage code red 150 (125-166). A further analysis of treatment over a 24 hour period indicated that 2421 children were treated in the resuscitation room between 08h00 and 23h00; while 1908 were treated between 23h00 and 08h00. Before 23h00, 220 (9.1%) were assigned as triage code green; 1185(49%) triage code orange; 891 (36.8%) triage code red while 125 (5.1%) were not assigned a triage code. Further demonstrated was the percentage of children remaining in the resuscitation room for longer than 4 hours: triage code green (43.4%); triage code orange (31.3%) and triage code red (22.4%).

Conclusions:
The medical emergency unit is a complex setting where children with both acute and complex conditions are seen. Planned process and practice norms of flow are hampered by the broad nature of admissions to the medical emergency unit (which extend beyond children presenting with acute medical conditions). The triage tool used to stream children is designed to identify acuity and not necessarily complexity resulting in mixed triage demographics to the resuscitation room before 23h00. Mixed triage demographics in the resuscitation room before 23h00 possibly deters from resources of time and staffing intended towards the care of the critically ill child.

Title: **DYNAMIC TECHNETIUM LIMB PERFUSION STUDIES HELP WITH SURGICAL DECISION MAKING IN CHILDREN WITH PUPURA FULMINANS AND MENINGOCOCCAEMIA**

Authors: Anita Brink[1], Sharon Cox[2] and Michael D Mann[1]

Affiliation: Departments of Paediatrics and Child Health (Nuclear Medicine)[1] and Paediatric Surgery[2], Red Cross War Memorial Children's Hospital, University of Cape Town, South Africa

Objective:
To study the use of limb perfusion scans in children with limb-threatening ischaemia and determine whether such scans are helpful in clinical decision making.

Method:
This retrospective study compared the clinical, scan and surgical findings in children who had limb perfusion scans for critical limb ischaemia from 2001 until 2011. Records were reviewed and the data analysed for aetiology, clinical findings, limb perfusion results, operative findings and outcome.

Results:
20 patients were studied. The aetiologies were; meningococcal septicaemia (n 9), septic shock (n 6), hypovolemic shock due to gastroenteritis (n 4) and electrical burns (n 1). The ages ranged from 1 month to 12 years with a median age of 7 months. Tissue showing absent perfusion on the scan was found to be necrotic at operation, while areas showing reduced, but present perfusion on the scans were found at surgery to be viable.
Conclusions: This study describes a method of performing limb perfusion studies in children with critical peripheral ischaemia .Hands are occasionally technically difficult to image. Limb perfusion studies correlated well with surgical findings. Scans were found to be a useful adjunct in making treatment decisions, surgical planning and parent counselling.

Ethics approval number: HREC REF 592/2010

Title: **CHANGING THE PRACTICE OF 'CHINESE WHISPERS': AN ACTION RESEARCH APPROACH TO OPTIMISE THE PICU NURSING SHIFT HANDOVER**

Authors: Clare Davis and Assoc. Prof. Minette Coetzee

Introduction:
Described as being similar to a chain of 'Chinese Whispers', handover of information between health professionals is internationally recognised as a necessary but potentially risky aspect of patient care. Consequently, the World Health Organisation called for a standardised handover approach. Effecting a change in healthcare has been identified as a challenging task and an increased use of participative change management methodologies is emerging as a result.

Objective:
The aim was, by use of a participative approach, to optimise the quality and efficiency of nursing shift handover in the PICU at Red Cross Children's Hospital.

Methods:
Using an action research approach participants from the study setting, together with a facilitator, worked in action research cycles to diagnose the existing handover practice and plan, and to implement and evaluate strategies to optimise features identified as requiring optimisation.

Results:
PICU nursing shift handover consists of a bedside, shift leader and unit handover. This study concentrated on the bedside and unit handover. Analysis of the bedside handover identified features that required optimisation related to both the content of handover and its process. This led to implementation of a handover information form and a conversation with nursing management to request assistance in ensuring a protected handover window period. Analysis of the unit handover also identified potential for optimising the process. The handover was converted to an electronic handover presentation and situated in the staff tea room. A standard operating procedure was also proposed to make the optimal bedside and unit handover practice explicit and provide a document for use in future. Evaluation of these strategies demonstrated their potential to optimise the pre-existing handover practice.

Conclusion:
Progress towards the optimisation of handover practice in this setting is evident from the results, but actioning a change and optimising practice was found to a challenge. Key conclusions from the study are as follows: handover in this setting is not simple – it is a complex practice consisting of three different handover episodes; handover is a sub-system within the larger complex system of healthcare, and it should be expected that making a change to one sub-system is likely to impact on another; and, action research as a methodology, was valuable in making the current practice visible and generating ideas for change. It can however require frequent re-engagement with those in higher positions, the ease of which can be dependent on the vital need to maintain the clinical service.

Ethics approval number: HREC 531/2011

Title: **MICROSPORIDIOSIS IN RENAL TRANSPLANT PATIENTS: TWO CASE REPORTS FROM A PAEDIATRIC POPULATION**

Authors: Ladapo TA[2], Nourse P[1], Du Buisson CJ[1], Gajjar P[1]

Affiliation: [1]Red Cross War Memorial Children's Hospital, Department of Paediatrics, University of Cape Town, South Africa
[2]IPNA Fellow, Department of Paediatrics, Lagos University Teaching Hospital, Idi-Araba, Lagos, Nigeria

Purpose:
To report our experience with microsporidiosis in two paediatric renal transplant patients.

Method:
Retrospective folder review.

Results:
Two patients, A and B are 13-year-old females that received deceased donor renal transplants from the same donor in August 2012. Immunosuppression included induction with Basiliximab and methylprednisone and maintenance using Tacrolimus, Azathioprine and Prednisone. Patient A developed acute cell mediated rejection, cytomegalovirus (CMV) and tuberculosis re-activation and was managed with intensified immunosuppression, ganciclovir and anti-tuberculous medications respectively. She again developed features of Macrophage activation syndrome which required cessation of immunosuppression and treatment with polyclonal immunoglobulin and dexamethasone. Subsequently, she developed persistent high-grade pyrexia with no apparent clinical focus and for which extensive cultures were negative. She however had intermittent diarrhoea. She received multiple antimicrobial regimens with no improvement and worsening renal function. Renal biopsy showed extensive microporidiosis. Patient B developed severe acute cell mediated rejection 1-month post transplantation, managed with antithymocyte immunoglobulin. She also required treatment for CMV reactivation. About 5 months after transplantation, she presented with diarrhoea and worsening renal function and subsequently developed features of macrophage activation syndrome. Microsporidium was seen on renal biopsy and isolated from her urine. Both patients were started on high doses of albendazole with sustained improvement of clinical features and graft function.

Conclusion:
Microsporiodiosis should be considered in the differential diagnosis of pyrexia of unknown origin in severely immunocompromised solid organ transplant recipients, particularly when associated with diarrhoea.

Title: **A COST-EFFECTIVE STRATEGY FOR PRIMARY PREVENTION OF ACUTE RHEUMATIC FEVER AND RHEUMATIC HEART DISEASE IN SOUTH AFRICAN CHILDREN WITH PHARYNGITIS**

Authors: James H. Irlam, Bongani M. Mayosi, Mark E. Engel, Thomas A. Gaziano

Primary prevention of ARF and RHD in children depends on prompt and effective diagnosis and treatment of pharyngitis at the primary level of care. Primary prevention has not been widely adopted in developing countries due to health system constraints, poor public awareness, and a concern about its cost-effectiveness. A feasible strategy of primary prevention should limit costly diagnostic testing, minimize unnecessary antibiotic treatment, and be sensitive enough to minimize missed diagnoses.

Methods:
We undertook a cost-effectiveness analysis of seven strategies for the primary prevention of ARF and RHD in children with Group A Streptococcus (GAS) pharyngitis in a RHD study area in Cape Town: (1) empirical treatment with IM penicillin (Treat All); (2) treatment based on a positive throat culture (Culture All); (3) treatment based on a symptomatic score of 2 or greater on a modified WHO clinical decision rule (CDR 2+); (4) treatment based on a CDR score of 3 or greater (CDR 3+); (5) treating those with a CDR score of 2 or greater, culturing those with CDR scores less than 2 and then treating positive cultures (CDR2+, Culture CDR negatives); (6) treating those with a CDR score of 3 or greater, culturing those with CDR scores less than 3 and treating positive cultures (CDR3+, Culture CDR negatives); and (7) observation only (Treat None)

Results:
A GAS prevalence of 15%, an ARF attack rate of 0.3%, and a risk of penicillin-induced anaphylaxis of 1 per 10 000 were deemed appropriate for this setting. A base-case analysis of the costs (2010 $US), effects (in quality-adjusted life years or QALYs gained) and incremental cost-effectiveness ratios (ICERs) showed that:

- Treating all children presenting with suspected GAS pharyngitis with IM penicillin is marginally the least costly strategy
- There is little difference in the effectiveness of the strategies
- Treating only children with 2 or more symptoms (CDR2+) on a 3-symptom score CDR is the most cost-effective strategy
- Culturing all children is by far the most costly strategy.

The model results were sensitive to a decrease in GAS prevalence below 12.9%, an increase in the ARF attack rate to above 1%, and an increase in the risk of penicillin-induced anaphylaxis to above 3.4 per 10 000 cases.

Conclusions:
The most cost-effective strategy for primary prevention of ARF and RHD in urban South African children presenting in primary care with sore throat is diagnosis with a simple symptomatic clinical decision rule (CDR) and treatment with a single dose of intramuscular penicillin. This strategy should complement primordial and secondary prevention efforts.

REC number: 212/2009

Publication citation:
Irlam J, Mayosi BM, Engel M, Gaziano TA. Primary prevention of acute rheumatic fever and rheumatic heart disease with penicillin in South African children with pharyngitis: a cost-effectiveness analysis. Circ Cardiovasc Qual Outcomes. 2013 May 1;6(3):343-51.

Title: **INCIDENCE AND SEVERITY OF CHILDHOOD PNEUMONIA IN A BIRTH COHORT IN A PERI-URBAN AREA IN SOUTH AFRICA**

Authors: David M le Roux[1], Landon Myer[2], Mark P Nicol[3], Heather J Zar[1]

Affiliation: [1]Department of Paediatrics and Child Heath, Red Cross War Memorial Children's Hospital and University of Cape Town; [2]School of Public Health, University of Cape Town; [3]Division of Medical Microbiology, University of Cape Town

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Background / aims:
Despite substantially reduced incidence over the last decade, childhood pneumonia remains the major cause of global under-5 mortality. The impact of conjugate vaccines against *Streptococcus pneumoniae* and *Haemophilus influenzae b* on pneumonia incidence is not well described in African countries. This study investigates pneumonia incidence and severity in a South African birth cohort immunised with these vaccines.

Methods:
Active pneumonia case detection was performed. Pneumonia incidence was calculated for the birth cohort's first year. Case definitions and treatment were according to IMCI and national guidelines; congenital pneumonias were excluded.

Results:
Between June 2012 and May 2013, 377 children were enrolled. 18% were HIV-exposed, but none were HIV-infected. 145 child-years of follow-up were accrued; median follow-up was 132 days (IQR 67-201). 45 pneumonia episodes occurred in 41 children, incidence 0.31 episodes per child-year (e/cy), 95%CI 0.23 – 0.43). First pneumonia events occurred before 14-week vaccinations in 27 children (66%); the earliest event occurred at 21 days. 16 cases of severe pneumonia required hospitalisation, incidence 0.11 e/cy, 95% CI 0.06 – 0.18; 29 ambulatory episodes occurred, incidence 0.20 e/cy, 95%CI 0.13 – 0.29. Hospitalised cases were younger than ambulatory cases: median age 48 days (IQR 33 – 61 days), vs 95 days, (IQR 69 – 155 days), p=0.0001. Hospital case fatality was 13%. No child progressed from ambulatory to severe pneumonia.

Conclusion:
There was a high incidence of pneumonia; ambulatory pneumonia was twice as common as severe pneumonia. Hospitalised cases were significantly younger than ambulatory cases.

Ethics Approval: University of Cape Town, HREC REF 401/2009

Funding: Bill and Melinda Gates Foundation; SATS GSK Fellowship, FIDSSA

Title: **PEDIATRIATRIC ELECTRICAL INJURY: A RETROSPECTIVE REVIEW**

Authors: Machoki M. S, Rode H.

Introduction:
Electrical burn injury in children below the age of 13years is uncommon in the developed world. It is, however, a significant preventable cause of morbidity in developed countries. The true incidence of electrical injury is unknown in Africa. Information relating to the number of patients treated with burn injury at different centers, the mechanism of injury, time to presentation, anatomical sites involved and clinical findings is necessary to tailor preventive initiatives and future management protocols.

Methods:
In preparation for a prospective study on the demographics, degree of injury, clinical findings, management and long term functional outcome of pediatric patients treated for electrical injury at the burn unit at our institution, we performed a retrospective patient record review of patients treated for electrical burn injury from April 2001 to March 2012.
Data relating to patient gender, age at the time of injury, place of injury, involved site, burn surface area, time to presentation, electrocardiography findings, hospital stay, time to first surgery, mortality and functional outcome was derived from clinical notes through a case report form using Microsoft Excel ™ and transferred onto Statistical Software for Social Sciences (SPSS) v21 for descriptive analysis.

Results:
In the 10 year review of patients presenting to Red Cross War Memorial Children's Hospital burns unit, 70 patients had electrical injury. The mean age was 70 months (range of 4 to 157months), 46% were female, 54% male and majority (82.9%) of the injuries involved the hand and/or fingers. Most of the patients were injured within the house or in the compound (77.1%) from low voltage contact. Two cases of mortality resulted from high tension wire contact injury. The short term functional ranged from minimal loss of finger function to moderate loss of function requiring occupational therapy. Assessment of long term outcome is not possible in this review due to loss of follow-up in a significant number of patients.

Conclusion:
This review highlights the need for a prospective assessment of pediatric patients presenting with electrical burn injury to inform preventive measures and institute management protocols geared to restoration of function since most of the injuries involve the hand.

Title: **THE EFFECT OF PRONE TURNING ON REGIONAL LUNG VENTILATION IN PAEDIATRIC ACUTE RESPIRATORY DISTRESS SYNDROME (ARDS) OR ACUTE LUNG INJURY (ALI) - A PILOT STUDY**

Authors: Morrow BM[1]; Rimensberger P[2]; Argent AC[1,3]

Affiliation: [1]Department of Paediatrics, University of Cape Town, Cape Town, South Africa
[2]Geneva University Children's Hospital, Geneva, Switzerland
[3]Paediatric Intensive Care Unit, Red Cross War Memorial Children's Hospital, Cape Town, South Africa

Introduction:
Turning patients from supine to prone may improve oxygenation in children with acute respiratory distress syndrome (ARDS). It is suggested that proning recruits atelectatic dorsal lung regions, limits anterior chest wall movement and promotes more uniform alveolar ventilation.

Aims:
To measure changes in regional lung ventilation when turning hypoxic patients from supine to prone.

Methods:
A sample of convenience of mechanically ventilated children with ARDS/ALI and poor oxygenation were measured using electrical impedance tomography in supine (baseline) and 5, 20 and 60 minutes after being turned prone. Arterial blood gases were taken before and one hour after the turn. Repeated- measures ANOVA was used to determine differences in relative regional impedance between responders and non-responders.

Results:
Seven participants (five male, median (range) age 12.2 (3.8 - 25.0) months) were enrolled. Median (interquartile range) PaO2 at baseline was 9.1 (5.1– 13.1) kPa.
Three (42.9%) patients improved PaO_2 by 3.3 (2.1 - 4.3) kPa after turning (responders). The remaining four patients had a decrease in PaO_2 of 1.0 (0.5 - 5.1) kPa after turning prone (non-responders).
Relative dorsal lung impedance (proportional to regional tidal volume) decreased significantly in the responders relative to the non- responders following prone turning (**$p = 0.007$**); with no difference between groups in global or ventral lung impedance change ($p > 0.5$).
No adverse events occurred during the study period.

Conclusions:
Preliminary data suggest that improved oxygenation attributable to prone turning may not be due to redistribution of ventilation to dorsal lung regions as previously thought. This requires confirmation with a larger sample size.

HREC Rec/Ref: 269/2008

Title: **TRANSCRIPTOMIC PROFILING OF MYCOBACTERIA-SPECIFIC CD4 T CELLS USING MICROFLUIDIC QRT-PCR**

Authors: M. Musvosvi, A. Penn-Nicholson, O. Dintwe, W. Hanekom and T. Scriba.

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

Objective:
Understanding the role of CD4 T cells in controlling *Mycobacterium tuberculosis* infection is critical for the development and evaluation of novel vaccination strategies against tuberculosis. Generally, immunogenicity of novel TB vaccines has been determined by measuring the frequency of Th1 cytokine-expressing CD4 T cells. However, recent results suggest that frequencies of mycobacteria-specific Th1 cytokine expressing CD4 T cells do not correlate with risk or protection against TB. Exactly which functions specific CD4 T cells should possess for protective immunity remain unknown. We proposed to characterize a comprehensive range of T cell functions that reach beyond those historically hypothesized to be critical for protection. We optimized methods for gene expression using a high throughput microfluidic qRT-PCR platform (BioMark™ HD System). Using this platform we performed an in-depth characterisation of the transcriptomic profile of mycobacteria-specific CD4 T cells.

Methods:
Effector memory (CD45-CCR7-), central memory (CD45RA-CCR7+), naïve (CD45RA+CCR7+), and mycobacteria-specific (HLA class II tetramer stained) CD4 T cells were sorted from PBMC using a FACS Aria II. Cells were sorted directly into Invitrogen CellsDirect lysis buffer and reverse transcription and specific gene pre-amplification of cDNA was performed. Multiplex qRT-PCR was performed on pre-amplified cDNA samples using 96 primer-probe sets in a 96.96 Dynamic Array Chip on a BioMark HD System.

Results:
Dozens of mRNA transcripts could be simultaneously quantified from as few as 2 mycobacteria-specific CD4 T cells. Analysis of the mRNA expression profiles of effector memory, central memory, naïve, and mycobacteria-specific CD4 T cells showed that each cell subset had a unique transcriptomic profile. We observed differential mRNA expression of genes encoding cell surface proteins known to discriminate between effector memory, central memory, and naïve CD4 T cell sub-populations. Memory CD4 T cells also expressed higher levels of chemokine receptors, such as CXCR3 and CCR6 and effector molecules, such as IFN-γ, TNF-α, IL-2, granzyme A and B, granulysin and perforin, relative to naïve CD4 T cells.

Conclusions:
We have optimized a qRT-PCR assay for high-throughput quantification of gene expression in low numbers of sorted mycobacteria CD4 T cells. We now wish to apply this assay to transcriptional profiling of mycobacteria-specific CD4 T cells induced by vaccination and infection.

Title: **A CLINICAL AND MOLECULAR INVESTIGATION OF TWO FAMILIES WITH SIMPSON-GOLABI-BEHMEL SYNDROME**

Authors: C.Pretorius, K.Fieggen, P Beighton

Introduction:
Simpson-Golabi-Behmel syndrome (SGBS) is an X-linked overgrowth syndrome. It is characterised by macrosomia, distinctive facial features, and multiple congenital abnormalities. Two genes have been found to be associated with SGBS. They are glypican 3 (*GPC3*) and glypican 4 (*GPC4*). Mutations in *GPC3* are detected in 37-70% of affected males.
The aim of this research was to describe the phenotype of two unrelated boys and to attempt to make a molecular diagnosis in their families by investigating *GPC3*.

Methods:
This study is a case series with a clinical and molecular component. Two male probands were identified, proband B and S. Their clinical records were reviewed to obtain relevant history and their physical manifestations were documented.
DNA was extracted from proband B and S as well as their mothers. All eight exons of *GPC3* were amplified by polymerase chain reaction (PCR). The products were first analysed for large gene deletions and thereafter sequencing analysis was undertaken to identify point mutations.

Results:
The clinical phenotype of proband B and S was documented and found to be consistent with that reported in the literature.
DNA analysis of proband B revealed a mutation in exon 4 of *GPC3*. This mutation consisted of a deletion of four nucleotides, TAGA, at nucleotide position 1071, and an insertion of three nucleotides, CTT. This mutation can be labelled as p.358Arg-PheFSX373 (NM_004484.3).
No deletion or mutation in *GPC3* was identified in proband S.

Discussion:
The boys who were included in this investigation exhibited many of the more common features seen in SGBS.
The phenotype of the boys included in this research is similar to that previously reported in the literature. On this basis clinicians in South Africa can be guided by the literature in the diagnosis of SGBS. The main clinical manifestations which prompted a diagnosis of SGBS in the two boys were macrosomia, coarse facial features, macroglossia and a grooved tongue.
The importance of regular tumour surveillance is reinforced in this research by virtue of the Wilms tumour that proband B developed.
The molecular analysis of proband B's DNA revealed a frameshift mutation resulting in a premature stop codon. The mutation found in proband B represents a novel, and likely disease-causing mutation.

Title: **THE EFFICACY OF CYCLOSPORIN I HIV PATIENT WITH FOCAL SEGMENTAL GLOMERULOSCEROSIS – A CASE REPORT**

Authors: Solarin A[1], Gajjar P[2], Nourse P[2]

Affiliation: [1]ISN/IPNA Fellow, Department of Paediatrics, Lagos State University Hospital, Ikeja, Lagos, Nigeria.
[2]Red Cross War Memorial Children's Hospital, Department of Paediatric Medicine, School of Child and Adolescent Health, University of Cape Town, South Africa.

Objective:
Describe the use of cyclosporine in the treatment of steroid resistant FSGS in HIV infected patient.

Method:
Case review of 10years 9months old HIV positive patient, on HAART since 2003. He presented at 8years 6 months with nephritic nephrotic picture, protein creatinine ratio of 0.99g/mmol, albumin of 15g/l, cholesterol of 7.9, C3 and C4 levels were slightly raised and serum creatinine level of 29 micromol/L. Histological findings showed segmental sclerosis in two out of 30 glomeruli with overlying mesangial hyperplasia but no evidence of collapsing glomeruli or interstitial changes characteristic of HIVAN.
He had a six week course of prednisone without response. Subsequently, he was commenced on cyclosporine initially at 3mg/kg/dose twice daily. However dose was adjusted to 20 per cent of normal dose once weekly following persistent high levels of cyclosporine. He was continued on low dose prednisone, and enalapril and HAART.
Blood pressure maintained within normal limits for age, sex and height. Urine protein creatinine ratio, albumin, creatinine, cholesterol as well as cyclosporine levels were monitored.

Results:
The Patient went into remission within 3 months of commencing cyclosporine. He has remained in remission on low dose weekly cyclosporine with 3 occasions of 1+ to 2+ proteins on dipstick. Protein creatinine ratio has improved to 0.04g/mmol, serum albumin has increased to 28g/l, and serum creatinine remained within normal limit. Cholesterol levels are now within normal limits. Estimated GFR using Schwartz formula is 130ml/min/1.73m^3 and the viral load remains undetectable to date.

Conclusion:
Low dose weekly cyclosporine has shown to be efficacious in the treatment of FSGS in HIV positive patient and may be beneficial in preventing progression to end stage renal disease.

Title: **THE CHALLENGE OF INTRODUCING A BREASTFEEDING POLICY IN A CHILDREN'S HOSPITAL**

Authors: Joan Stain[1], Angela Leonard[2], Candice Bonaconsa[2], Joanne Lucas[1], Shihaam Cader[1],

Purpose:
A multidisciplinary working group called "breastfeeding is best" (BiB) worked together with ward breastfeeding champions to formulate and introduce a policy to promote and support breastfeeding in the Children's Hospital. The BiB group wants to assist the South African national collaborative to decrease the under-five infant and child mortality (Millennium development goal no. 4 and the Tshwane declaration 2011).

Key Objectives of the Study:
An intentional effort to improve promotion and support of breastfeeding by increasing staff competency in breastfeeding practices.
To assist in promote and support of exclusive breastfeeding within the first six months of life.
To improve the support given to mothers of breastfeeding infants.
To support the Minister of Health, Dr Aaron Motsoaledi, in the quest to decrease child mortality by "making breastfeeding a priority in all facilities treating children".

Population:
Multidisciplinary staff at the Children's hospital and breastfeeding mothers of babies admitted to the hospital.

Methodology:
Carry out short surveys and discussions to gather information for writing a policy in line with the World Health Organization's 'Ten steps of successful breastfeeding'.

Monitoring strategies:
Monthly evaluation of staff competency in breastfeeding practices.
The breastfeeding champion in the ward keeps a journal where breastfeeding challenges and interactions with breastfeeding mothers are recorded.

Results and Implications for Practice:
Have a written breastfeeding policy for the institution. Started processes to implement the steps of the policy. Support of the breastfeeding mothers by providing them with privacy, comfort and meals.
Increasing staff competency with training related to breastfeeding practices.

References:

1. The Children's Hospital Trust Survey, 2011. *2011 Annual Report.* Available: http://childrenshospitaltrust.org.za/wp-content/uploads/7234%20CHT%20Anual%20Report.pdf[2013,April 15].
2. World Health Organisation, 1989. *Protecting, promoting and supporting breast-feeding: The special role of maternity services.* Available: http://whqlibdoc.who.int/publications/9241561300.pdf[2013,April 15].
3. South African Child Gauge 2009/2010: The Children`s Institute, University of Cape Town.
4. Tshwane declaration 2011.

The poster was done as part of a project in collaboration between Red Cross War Memorial Children's Hospital and the Child Nurse Practice Development Initiative of the University of Cape Town.
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[2] Child Nurse Practice Development Initiative, University of Cape Town
Previous presentation: This poster was presented at the International Council of Nurses' 25th Quadrennial Congress in May 2013, Melbourne, Australia.

Title: **ACUTE PROMYELOCYTIC LEUKAEMIA (APL): A SINGLE CENTRE EXPERIENCE IN AFRICA**

Authors: Ann Van Eyssen, Luhan Swart, Alan Davidson, Marc G Hendricks, Karla Thomas

Objective:
To review all the cases of APL diagnosed and treated over a ten year period at Red Cross War Memorial Children's Hospital (RCWMCH).

Methods:
A retrospective analysis of the charts of children treated for APL at RCWMCH between January 1999 and December 2009.

Results:
In this 10 year period, 98 children were diagnosed and treated for Acute Myeloid Leukaemia (AML). 15 of these 98 children had APL. These diagnoses were made on bone marrow morphology, flow cytometry and cytogenetic analysis of the patient's blasts. Each child in this group had clones carrying the classic translocation (15; 17) mutation. The age of presentation of these children was between 35 to 149 months. There were 10 girls and 5 boys. All of these children were treated with ATRA 45mg/m^2 for 30 days, with a further 60 days of ATRA if there was a response to therapy. 12 were treated with a modified Berlin-Frankfurt-Münster (BFM) 87 protocol. 3 received treatment with a protocol based on United Kingdom Medical Research Council (UK MRC) AML 15. All, except 2 of these patients were alive at 20months after completion of therapy. 1 had died due ATRA syndrome 4 days after diagnosis; the other was in remission when killed in a motor vehicle accident within 1 year of treatment completion.

Conclusions:
APL comprised 15.3% of all patients diagnosed and treated for AML between 1999 and 2009. All patients demonstrated the classic t (15; 17). There was an excellent 20 month survival rate (Overall survival 90%).

Title: **NEUTROPHILIC SKIN DISEASE AND INFLAMMATION**

Authors: K. Webb[1],*, C. Scott[1]

Affiliation: [1]Paediatric Rheumatology, University of Cape Town, Cape Town, South Africa

Introduction:
Robert Sweet first described a syndrome with a painful, erythematous nodular plaques, neutrophilic dermal infiltrates, fevers and peripheral neutrophilia. This cluster of syndromes became known as Sweet's syndrome. There have been many published cases in children of neutrophilic dermatoses and fever which are labeled as Sweet's syndrome. Recently, however, neutrophilic dermatoses have been associated with some autoimmune and autoinflammatory diseases.

Objectives:
To present 3 cases of children with differing manifestations of neutrophilic skin disease and systemic inflammation and postulate on different possible autoinflammatory pathophysiological causes.

Methods:
Retrospective case review was conducted.

Results:
Patient 1 is a 3 year old child was referred from dermatology with recurrent intermittent episodes of annular erythematous lesions, arthralgias, fevers, red eyes and irritability. Clinically she had episcleritis, conjunctivitis, fevers, failure to thrive, markedly elevated inflammatory markers and a microcytic anaemia. Skin lesions were painful, annular erythematous plaques with cutis laxa. Histology demonstrated a neutrophilic dermatosis which responded to a course of steroids.
Patient 2 is a 6 month old girl who presented in 2012 with erythematous, nodular plaques on trunk, arms, legs and face since 6 weeks of age. These were accompanied by fever, raised white cells and raised inflammatory markers. She had been steroid dependant since 6 weeks of age. Histology showed a leukocytoclastic neutrophilic lobular panniculitis and dermatitis.
Patient 3 is a child with panniculitis (neutrophilic on histology) raised inflammatory markers, arthritis and lipodystrophy. She also presented with hepatitis, myositis, nephritis and macrophage activation syndrome. She was diagnosed with chronic atypical neutrophilic dermatosis, lipodystrophy and elevated temperature (CANDLE) syndrome, a recently described autoinflammatory condition.

Conclusion:
We review the recent evidence that autoinflammation may play a role in neutrophilic skin diseases, including recent reports of therapy with IL1 inhibition. We propose that some conditions previously labelled Sweet's Syndrome could possibly represent a manifestation of autoinflammatory conditions.

Disclosure of Interest:
None Declared

Title: **KAWASAKI DISEASE AND BCG REACTIVATION. A USEFUL DIAGNOSTIC SIGN IN EARLIER DIAGNOSIS**

Authors: Kate Webb, Heloise Buys, Chris Scott

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Introduction:
Kawasaki disease is a well described small vessel vasculitis in children. Bacille Calmette-Guérin (BCG) is a tuberculosis purified protein derivative vaccine that is used in South Africa at birth as part of the extended programme of immunization (EPI). Kawasaki disease was first described to be associated with BCG reactivation in 1987 by a Japanese Group[1]. It has subsequently been described by many groups around the world[2-10].

Case reports:
Patient 1 is a 15 month old boy who had had a fever, irritability and had a morbilliform rash involving the face, scalp, trunk, axilla and groin. There were typical mucosal lesions, with erythematous lips and conjunctivitis. He had cervical lymphadenopathy. He had induration and erythema around his BCG scar with no evidence of TB. He required 2 doses of IVIG before defervescence.
Patient 2 is a 6 month old child who presented after 5 days of fever, red cracked lips, a morbilliform rash over her trunk and limbs, as well as some peeling of her perineum. She had a red, raised BCG site and was very ill with features of macrophage activation syndrome. She was given intravenous gammaglobulin and high dose aspirin and quickly defervesced. At her 2 week follow up she had a 5.7mm anuerysm in her left descending coronary artery and was started on anticoagulation therapy.

Discussion:
We review the literature and pathophysiology regarding the association between BCG reactivation and Kawasaki disease.

It is proposed that, in a country with universal BCG immunization, BCG reactivation is an important indicator of Kawasaki disease in young infants and may aid in the earlier diagnosis and treatment in these patients.

1. Hsu YH, Wang YH, Hsu WY, Lee YP. Kawasaki disease characterized by erythema and induration at the bacillus calmette-guerin and purified protein derivative inoculation sites. *Pediatr Infect Dis J*. 1987; 6(6):576-578.
2. Antony D, Jessy PL. Involvement of BCG scar in kawasaki disease. *Indian Pediatr*. 2005; 42(1):83-84.
3. Boon RL. Useful clue in kawasaki disease. *Emerg Med J*. 2010; 27(8):618.
4. Chalmers D, Corban JG, Moore PP. BCG site inflammation: A useful diagnostic sign in incomplete kawasaki disease. *J Paediatr Child Health*. 2008; 44(9):525-526.
5. Garcia Pavon S, Staines Boone T, Hernandez Bautista V, Yamazaki Nakashimada MA. Reactivation of the scar of BCG vaccination in kawasaki's disease: Clinical case and literature review. *Rev Alerg Mex*. 2006; 53(2):76-78.
6. Kuniyuki S, Asada M. An ulcerated lesion at the BCG vaccination site during the course of kawasaki disease. *J Am Acad Dermatol*. 1997; 37(2 Pt 2):303-304.
7. Seo JH, Yu JJ, Ko HK, Choi HS, Kim YH, Ko JK. Diagnosis of incomplete kawasaki disease in infants based on an inflammation at the bacille calmette-guerin inoculation site. *Korean Circ J*. 2012; 42(12):823-829.
8. Sinha R, Balakumar T. BCG reactivation: A useful diagnostic tool even for incomplete kawasaki disease. *Arch Dis Child*. 2005; 90(9):891.
9. Uehara R, Igarashi H, Yashiro M, Nakamura Y, Yanagawa H. Kawasaki disease patients with redness or crust formation at the bacille calmette-guerin inoculation site. *Pediatr Infect Dis J*. 2010; 29(5):430-433.
10. Weinstein M. Inflammation at a previous inoculation site: An unusual presentation of kawasaki disease. *CMAJ*. 2006; 174(4):459-460.

Title: **A CASE SERIES OF HIV ARTHROPATHY IN CAPE TOWN**

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Introduction:
HIV arthropathy is well described in adults. Few studies have looked in depth at HIV arthropathy in children, and the characteristics of this entity have not been fully described.

Aim:
To present a retrospective case series of children with HIV arthropathy in Cape Town

Methods:
A retrospective chart review was undertaken for cases of HIV arthropathy at Red Cross Hospital, Tygerberg Hospital and Groote Schuur Hospital. Demographic, clinical, laboratory and treatment data were collected. WHO Staging for HIV was done.

Results:
15 patients were identified. 4 patients had insufficient data to be included.
10/11 Patients were boys.
Median age of presentation of arthritis was 10,2yrs (2,8-13,4). Arthritis was the presenting feature of HIV in 8/11. WHO Stage 3 HIV was diagnosed in 9/11 patients. Polyarthritis (8/11) was the predominant rheumatological feature. None of the children had enthesitis. One child presented with dactylitis. Uveitis was present in 2/11. Three out of eleven had previously had TB and active TB was identified in 2 children. None of the children were on HAART at presentation. Median ESR was 122 (39-143) RF was done in 6/11 children and was negative in 6/6. HAART was initiated in 9/11 patients. Two patients were lost to follow up at our institution. All patients were treated with Ibuprofen. 9/11 were treated with chloroquine. Prednisone was used in 3/11 patients, methotrexate in 2/11 and sulphasalzine in 1/11. Intra-articular steroid injections were performed in 5/11 patients.

Conclusion:
In our case series, HIV arthropathy occurred in older boys, usually with late diagnosis of HIV, before HAART therapy and was the presenting feature of HIV in the majority. Polyarthritis was the most common mode of presentation. TB exposure was a frequent feature. Most children were treated with HAART therapy, ibuprofen, chloroquine.

Title: **COORDINATING CLINICIAN: A EXPERIMENT IN PAEDIATRIC CLINICAL GOVERNANCE IN THE WESTERN CAPE PROVINCIAL GOVERNMENT IN SOUTH AFRICA**

Authors: Westwood ATR, Engelbrecht E

The challenge:
The Department of Health (DOH) of the Western Cape provincial government (capital – Cape Town) provides services from community to quaternary levels. Its hierarchical line management structure and the dominance of university hospitals in service provision made dealing with cross-platform discipline-specific issues difficult.

The solution:
A half-time paediatric specialist post was created to coordinate discipline-specific matters, and support and advice to line and programme managers. The other half of the paediatrician's time was spent in clinical service. With the support of a representative provincial coordinating committee (PCC), this paediatrician was to assist the DOH in priority areas in child health, develop standards of care, and improve and assess quality of care (QOC) across the province. Similar posts were created in other disciplines.

The experience:
The post and PCC had the most impact in the following areas: defining levels of care, facilitating interventions such as tackling gastroenteritis, setting standards for outreach, extending standard QOC activities, improving links between rural regional and urban tertiary/academic services. Advocacy for children within the DOH was facilitated. Limitations included neonatal care coordination, reporting lines and the lack of an executive role.

The conclusion:
The role proved effective for developing pathways to care and facilitated decision-making. The clinical role encouraged peer engagement. Greater central support is required to coordinate neonatal care effectively. Regional equivalents of this role would facilitate local application of standards, while a more executive role for a child health specialist at provincial level would accelerate policy-making.

Title: **MICROBIOLOGICAL YIELD OF OROPHARYNGEAL SWAB COMPARED TO INDUCED SPUTUM IN CHILDREN WITH CYSTIC FIBROSIS (CF) < 5 YEARS OF AGE**

Authors: Zampoli M, Morrow B, Carrara H, Whitelaw A, Zar H; Westwood A

Background:
Oropharyngeal (OP) swab is a common sputum sampling technique in young children with CF. Sputum induction (IS) with hypertonic saline has not been investigated in this population.

Objective:
To compare the bacteriological yield of OP swabs and IS samples in children < 5 years of age with CF.

Methods:
Paired OP swab and IS samples were collected in children < 5 years of age attending a CF clinic in Cape Town, South Africa. OP swabs were taken prior to sputum induction with 5% hypertonic saline.

Results:
76 paired OP swab and IS samples from 90 sampling opportunities were obtained in 27 children (mean age 21 months; range 1-44 months). Culture results were concordant in 39 (51%) paired samples of which 27 were negative cultures. The culture yield from IS for all bacteria was significantly higher compared to OP swabs (47/76 (62%) vs. 28/90 (31 %); p<0.001). *Staphylococcus aureus (*OP swab 17/90 (18.9%); IS 28/76 (36.8%); p=0.015) and non-CF bacteria (OP swab 10/90 (11.1%); IS 23/76 (30.3%); p=0.003) were the commonest isolates. The sensitivity, specificity, PPV and NPV of an OP swab compared to IS for CF-pathogens was 55%, 95%, 89% and 74% respectively. Minor nose bleeds after nasopharyngeal suctioning occurred on 13 occasions.

Conclusion:
Sputum induction is safe and superior to an OP swab in young children with CF. The role of OP swabs during routine sputum sampling needs further investigation.

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