



Department of Paediatrics & Child Health



UNIVERSITY OF CAPE TOWN
ANNUAL RESEARCH DAYS 2016



Programme and Abstract Book

27th & 28th September

D3 Lecture Theatre, D Floor

Red Cross War Memorial Children's Hospital

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

PROGRAMME AND CONTENTS PAGE

Oral Presentations **Page No.**

Tuesday, 27 September 2016

12H15 – 12H25	<i>Welcome and Opening</i>	B. Morrow	
12H25 – 13H10	Keynote Address: “ <i>Nutritional rickets: the roles of vitamin D and calcium.</i> ”	J. Pettifor	
Session 1: Chairperson:		G. Comitis	
13H15 – 13H30	A novel approach to ductal spasm during percutaneous device occlusion of patent ductus arteriosus.	R. De Decker	6
13H30 – 13H45	A comprehensive needs assessment tool for planning rheumatic heart disease control programs in limited resource settings.	S. Perkins	7
13H45 – 14H00	Children with fulminant dilated cardiomyopathy or myocarditis.	B. Rossouw	8
14H00 – 14H15	Treatment of infants with epilepsy: common practice across the world.	R. Burman	9
14H15 – 14H30	Hearing outcomes in children with meningitis: a retrospective review at Red Cross Children’s Hospital (RCCH).	S. Kuschke	10
14H30 – 15H00	T E A & POSTERS		

Session 2: Chairperson:		L. Cooke	
15H00 – 15H15	An evaluation of the impact of outreach and support child health services on level 2 and level 3 facilities.	W. Breytenbach	11
15H15 – 15H30	Evaluation of the residential therapeutic programme for sexually abused children as part of the Isibindi “Creating Circles of Care” Model – what we are learning about its impact on mental health adjustment.	J. Marco	12
15H30 – 15H45	Risk factors for Bordetella pertussis disease in hospitalised children.	R. Muloiwa	13
15H45 – 16H00	Children Count: tracking progress for children in South Africa.	W. Sambu	14
16H00 – 16H15	Primary nephrotic syndrome in children in Cape Town, South Africa.	D. Reddy	15

16H15 – 16H30	Continuous flow peritoneal dialysis (CFPD) use in children with AKI and inadequate ultrafiltration on convention peritoneal dialysis (PD).	P. Nourse	16
---------------	--	-----------	----

Wednesday, 28 September 2016

Session 3: Chairperson:

D. Gray

08H30 – 08H45	The Drakenstein Child Health Study: investigating the early determinants of child health in South Africa.	H. Zar	17
08H45 – 09H00	Effects of early life pneumonia on lung function in the first 2 years of life in African infants.	L. Willemse	19
09H00 – 09H15	Lung function in HIV infected South African adolescents on antiretroviral therapy: the Cape Town Adolescent Antiretroviral Cohort.	L. Githinji	20
09H15 – 09H30	The use of assisted autogenic drainage in children hospitalised with acute pneumonia in two tertiary hospitals in South Africa.	L. Corten	21
09H30 – 09H45	Clinical predictors of culture confirmed pulmonary tuberculosis (PTB) in a high TB and HIV prevalence area.	L. Frigati	22
09H45 – 10H00	Does prone positioning recruit dorsal lung regions in children with ARDS? An electrical impedance tomography study.	A. Lupton-Smith	23
10H00– 10H15	The utility of nebulised gentamicin for eradicating early pseudomonas aeruginosa infections in children with cystic fibrosis.	B. van Stormbroek	24
10H15– 10H30	Overnight oximetry as a screening tool for moderate-severe obstructive sleep apnoea in children in a resource constrained setting: a pilot study at Red Cross War Memorial Children's Hospital.	M. Zampoli (obo N. Abuosetta)	25
10H30 – 11H00	T E A & POSTERS		

Session 4: Chairperson:		D. Greenfield	
11H00 – 11H15	Field evaluation of HIV point-of-care testing for early infant diagnosis in Cape Town, South Africa.	M. Kroon	26
11H15 – 11H30	Neonatal bacteraemia in a secondary referral hospital in Cape Town: hospital acquired infections, organisms and their antibiotic sensitivities.	W. Mabaso	27
11H30 – 11H45	Impact of birth testing on the uptake at follow-up early infant diagnosis (EID) services in Cape Town, South Africa.	L. Dunning	28
11H45 – 12H00	The influence of anaesthetic method on outcomes of preterm infants delivered by caesarean section in a tertiary hospital in South Africa: a pilot review.	R. Stander	29
12H00 – 12H15	Early onset neonatal sepsis at Groote Schuur Hospital neonatal unit.	L. Golden	30
12H15 – 12H30	Feasibility of pulse oximetry pre-discharge screening implementation for detecting critical congenital heart lesions in newborns in a secondary-level maternity hospital in the Western Cape, South Africa: The “POPSICLE” study.	A. van Niekerk	31
12H30 – 12H45	A comparison of standard C-reactive protein laboratory measurement to point of care C-reactive protein test in a neonatal intensive care unit setting.	K. Prince	32
12H45 – 13H00	Symptomatic congenital syphilis in a tertiary neonatal unit: a retrospective descriptive study.	S. Pillay	33
13H00 – 14H00	L U N C H (Venue: Tea Room, Johnson & Johnson Building, RXH)		

Session 5: Chairperson:		R. Ramesar	
14H00 – 14H15	Identification of genetic features underlying a rare childhood cancer syndrome: Constitutional Mismatch Repair Deficiency (CMMR-D) syndrome.	L. Lamola	34
14H15 – 14H30	Investigating the prevalence of a novel mutation in a novel gene of hearing loss (<i>GRXCR2</i>) amongst sub-Saharan African patients.	T. Masekoameng	35
14H30 – 14H45	Diagnosing complex mitochondrial disorders in a genetically understudied population – lessons from South African mitochondrial neurohepatopathy.	S. Meldau	36

14H45 – 15H00	Investigating the prevalence of selected <i>MYO7A</i> mutations amongst a group of sub-Saharan African patients with non-syndromic hearing loss.	N. Manyisa	37
---------------	--	------------	----

15H00 – 15H30	T E A & POSTERS		
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Session 6: Chairperson:

B. Eley

15H30 – 15H45	Percutaneous endoscopic gastrostomy outcomes in children with neurological impairment.	P. Rose	38
---------------	--	---------	----

15H45 – 16H00	Radiological differences between HIV-positive and HIV-negative children with cholesteatoma.	J. McGuire	39
---------------	---	------------	----

16H00 – 16H15	Faecal carriage of extended-spectrum beta-lactamase- and carbapenemase-producing enterobacteriaceae in healthy infants and their mothers, South Africa.	R. Manenzhe	40
---------------	---	-------------	----

16H15 – 16H30	Resolved lower limb muscle tone abnormalities in children with HIV encephalopathy receiving standard antiretroviral therapy.	T. Mann	41
---------------	--	---------	----

16H30 – 16H45	Review of liver injuries in young children.	A.B. van As	42
---------------	---	-------------	----

16H45 – 17H00	<i>Feedback on Research Day presentations, with Award & Research Prizes by Profs. D. & S. Hall</i>		
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Closing remarks by A.B. van As

- THE SPATIAL DISTRIBUTION OF INJURY MORTALITY OF CHILDREN IN THE WESTERN GEOGRAPHIC SERVICE AREA, CITY OF CAPE TOWN (2011-2015). *Z. Albertyn, D. Coetzee, S. Mathews* 43
- THE ONGOING NEED FOR EDUCATION ON RISK FACTORS FOR SUDDEN UNEXPECTED DEATH OF INFANTS. *M. Kruger, K. Reid, L. Heathfield* 44
- ARTICULATING THE PAEDIATRIC NURSING PRACTICE MODEL OF CARE AT A UGANDAN HOSPITAL – CHALLENGING CURRENT THOUGHT WITH EMERGING EVIDENCE. *A. Leonard, L. Ssenyonga, M. Coetzee* 45
- HOW TRACKING A PATH OF CARE ASSISTED IN MAKING UNSEEN CLINICAL PRACTICE VISIBLE AT CURE CHILDREN’S HOSPITAL OF UGANDA. *A. Leonard, L. Ssenyonga, M. Coetzee* 46
- THE EFFECT OF BODY POSITION ON REGIONAL DISTRIBUTION OF VENTILATION AND MUSCLE ACTIVITY IN MECHANICALLY VENTILATED INFANTS AND CHILDREN. *A. Lupton-Smith, A. Argent, P. Rimensberger, B. Morrow* 47
- GYRIFICATION DIFFERENCES IN 7 YEAR OLD HIV-INFECTED CHILDREN STARTING ART BEFORE OR AFTER 12 WEEKS OF AGE. *E. Nwosu, F. Robertson, M. Holmes, M. Cotton, E. Dobbels, F. Little, B. Laughton, A. van der Kouwe, E. Meintjies* 48
- MORTALITY AMONG 5-17 YEAR OLD CHILDREN IN KENYA. *B. Osano, F. Were, S. Mathews* 49
- PAEDIATRIC CARDIAC CRITICAL CARE ADMISSIONS TO A TERTIARY PAEDIATRIC INTENSIVE CARE UNIT. *B. Rossouw, M. Wege, A. Argent, B. Morrow* 50
- THE IMPACT OF ECHOCARDIOGRAPHY IN A PAEDIATRIC INTENSIVE CARE UNIT. *B. Rossouw, M. Wege, A. Argent, B. Morrow, J. Lawrenson* 51
- ROLE OF FOCUSED ABDOMINAL SONOGRAPHY IN TRAUMA (FAST) AS A SCREENING TOOL FOR BLUNT ABDOMINAL TRAUMA (BAT) IN YOUNG CHILDREN INVOLVED IN HIGH VELOCITY TRAUMA. *W. Tummers, H. Langeveld, J. van Schuppen, J. Wilde, A.B. van As, A. Millar, A. Numanoglu* 52

Title: A NOVEL APPROACH TO DUCTAL SPASM DURING PERCUTANEOUS DEVICE OCCLUSION OF PATENT DUCTUS ARTERIOSUS

Authors: Rik De Decker¹, George Comitis¹, Jenny Thomas¹, Elmarie van der Merwe¹, John Lawrenson²

Affiliation: ¹Red Cross War Memorial Children's Hospital and University of Cape Town
²Tygerberg Children's Hospital and University of Stellenbosch

Objective:

Ductal spasm is a rare, yet important complication of percutaneous device occlusions of patent ductus arteriosus (PDA). Spasm may result in failure of the procedure, under-sizing of the device, or embolisation of the implanted device as the spasm resolves after the procedure. We have developed and describe for the first time a protocol that rapidly and completely reverses the ductal spasm that patients may experience during cardiac catheterisations for PDA occlusion.

Case Series & Methods:

Eight patients (constituting 3.3% of our PDA cases over the past 12 years) presented between 13 and 67 months of age to Red Cross Children's Hospital for transcatheter PDA occlusion. All were preterm-born ("ex-prem babies") with gestational ages of between 25 to 34 weeks. Seven of the eight patients experienced ductal spasm immediately before, during or soon after induction of anaesthesia. One experienced spasm only after entering the PDA with a catheter. After detection of the spasm, the anaesthetist, in consultation with the interventionist, in each case: 1) changed the mode of anaesthesia from inhaled sevoflurane to total intravenous anaesthesia (TIVA) and propofol infusion, 2) reduced the inhaled oxygen fraction to 21%, and, 3) initiated a continuous intravenous infusion of prostaglandin E₁ (PGE₁).

Results:

In all eight patients, the first 2 steps (TIVA and FiO₂ 0.21) resulted in only *partial* relaxation of the spasm, as confirmed on transthoracic echocardiography. *Full* relaxation, to the pre-catheterisation echocardiographically determined dimensions of the PDA, was attained after intravenous PGE₁ infusions of only 10-15 minutes' duration. This was confirmed by anteroposterior and lateral angiography. While maintaining this anaesthetic protocol, six PDAs were successfully occluded. Two were considered to be unsuitable for device occlusion, and referred for surgery. A ninth patient suffered ductal spasm at another institution where intravenous PGE₁ was not available. The spasm resolved only partially after maintaining the first two steps of our protocol (TIVA and FiO₂ 0.21) for a period of 30 minutes. Consequently, an oversized occlusion device had to be implanted to avert the risk of device embolisation.

Conclusions:

1. We have shown for the first time that the PDAs of preterm born babies remain sensitive to the dilatory effect of intravenous prostaglandin for many years after pre-term delivery.
2. By utilising this observation, ductal spasm during transcatheter occlusion may be reliably resolved and the procedure safely completed by a simple anaesthetic protocol that includes the continuous infusion of intravenous prostaglandin E₁.
3. This is the first description of a robust protocol to avoid the complications of ductal spasm during percutaneous PDA occlusion.

UCT HREC No: R017/2014

Never previously presented at SCAH Research Day

Title: A COMPREHENSIVE NEEDS ASSESSMENT TOOL FOR PLANNING RHEUMATIC HEART DISEASE CONTROL PROGRAMS IN LIMITED RESOURCE SETTINGS

Authors: Liesl J. Zühlke, MBChB, MPH, PhD; ^{a, b} David A. Watkins, MD, MPH; ^{b, c} Susan Perkins, MS; ^a Rosemary Wyber, MBChB, MPH; ^{d, e} Jeremiah Mwangi, MA; ^e Joanna Markbreiter, BA (hons); ^f Hlengiwe S. Moloi, MPH; ^a Mark E. Engel, MPH, PhD; ^b Thembikile Shato, BA (hons); ^a Tayla Hermanus, BA; ^a Jantina DeVries, PhD; ^a Clancy Read, PhD ^d

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^c. Division of General Internal Medicine, Department of Medicine, University of Washington, Seattle, WA, United States
^d. Telethon Kids Institute, University of Western Australia, Perth, WA, Australia
^e. World Heart Federation, Geneva, Switzerland

Background:

Rheumatic heart disease (RHD) is an important cause of death and disability among children and young adults in developing countries. However, the various evidence-based interventions that are known to prevent and control RHD have yet to be implemented in many countries.

Objectives: We developed an RHD Needs Assessment Tool (NAT) that can be used to plan, monitor, and evaluate RHD control programs in endemic settings.

Methods:

The RHD NAT follows a mixed-methods approach and is comprised of several quantitative and qualitative data collection instruments. It is based on a conceptual model that follows a patient through the natural history of RHD, identifying key barriers and facilitators to healthcare along this path. The NAT occurs in four phases: (1) situational assessment, including site selection and literature review; (2) facility-based assessment that quantifies local epidemiology and capacity of the health system to deliver RHD care; (3) elicitation of the patient and provider experience of RHD using ethnographic methods; and (4) planning the intervention, including stakeholder mapping and dialogue as well as development of a monitoring and evaluation framework.

Discussion:

The RHD NAT is designed to paint a comprehensive picture of the state of RHD care in an endemic setting and to identify the major gaps to disseminating and implementing evidence-based interventions. The NAT will be made publicly available and at no cost to end users at www.rhdaction.org. Because RHD is a disease of poverty, rapid uptake and implementation of the NAT has the potential to reduce health inequality from cardiovascular disease.

Title: CHILDREN WITH FULMINANT DILATED CARDIOMYOPATHY OR MYOCARDITIS

Authors: Rossouw B*, Argent AC, Morrow BM, Lawrenson J

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Background:

Mechanical cardiac support and transplantation have improved long term outcome of cardiomyopathy and myocarditis children internationally.

Objectives:

To review the outcome of children with fulminant dilated cardiomyopathy (DCMO) or myocarditis in a setting without readily available mechanical cardiac support and transplantation.

Method:

A retrospective 5 year review of consecutive PICU admissions of children with fulminant DCMO and myocarditis to Red Cross PICU between January 2010 and July 2015.

Results:

95 children with a median age of 27.8 months were included. All presented in Ross stage 4 cardiac failure (77% in cardiogenic shock). Admission median lactate was 6.5mmol/l. Admission left ventricular ejection fraction was < 30% in 79% of patients and 9 developed intra-cardiac clots. Etiology was *presumed* viral myocarditis in 87% and idiopathic DCMO in 13%. Adenovirus PCR was positive in 28, Parvovirus in 19 with multiple positive viral studies in 32. The median number of ICU admissions per patient was 1.5 (range 1-5) and length of ICU stay was 14.9 days (1-69). 55% required ventilation for median of 8.1 days. 100% required inotropic support for a median of 8.2 days. 82% received Milrinone, 78% Dobutamine and 33% Adrenaline infusions. The median maximum inotrope score was 21.9. Complications during ICU stay included acute kidney injury in 68% of which two patients needed dialysis, liver derangement in 43%, neurological events in 25% and 34% suffered a cardiac arrest episode. 33% had arrhythmias of which 27% needed electrical cardioversion and 57% drug treatment. 63 (66%) children survived to ICU discharge. The overall hospital survival was 47%. Of the ICU survivors the median number of ward readmissions was 3.7 (range 1-19). Total median length of ward stay was 23.2 days (1-138).

Conclusions:

In our setting without transplantation availability, DCMO and myocarditis is associated with significant duration of hospital stay, morbidity and mortality.

Title: TREATMENT OF INFANTS WITH EPILEPSY: COMMON PRACTICE ACROSS THE WORLD

Authors: RJ Burman¹, JM Wilmshurst¹, WD Gaillard², JH Cross³

Affiliation: ¹Department of Pediatric Neurology, Red Cross War Memorial Children's Hospital, University of Cape Town, South Africa.
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³UCL-Institute of Child health, Great Ormond Street Hospital for Children NHS Foundation Trust, London, United Kingdom

Purpose:

There is currently a lack of high quality data to guide the development of treatment recommendations for infants with epilepsy. The aim of this study was to develop global understanding of the preferred use of treatment interventions and to identify inter-regional differences.

Method:

An electronic survey was distributed to chapters of various global and regional child neurology associations. Questions were focused on current clinical practice including drug and non-drug treatment interventions. Inter-regional comparisons were then identified and analysed using the relevant statistical analysis.

Results:

733 unique responses were captured from 96 different countries. The survey found that overall that there was significant variability between regions ($p < 0.001$, X^2 test). Furthermore, the North American region is more likely to use Levetiracetam in focal, generalized and myoclonic seizures compared to all other regions ($p < 0.001$, X^2 test).

Looking at the use of alternative therapies, overall previous experience with vagal nerve stimulation and epilepsy surgery significantly increases the preferred use of these therapies once seizures have been diagnosed as medically refractory ($p < 0.001$, X^2 test).

Conclusion:

The results from this survey highlight the lack of global consistency in the management of infants with epilepsy. The identified differences in global prescribing practices may provide a useful platform for further investigation into the issues surrounding the management of infants with epilepsy.

Ethics number: This study was conducted under the auspices of the International League Against Epilepsy (ILAE) and accepted by all participating child neurology organisations. As all study participants belong were believe to be affiliated to these bodies, HREC approval was deemed unnecessary.

Presenter's contribution to the project: RJB (presenter) was responsible for data management and analysis for this project. In addition, RJB created all the figures for the paper and contributed to writing of the final manuscript.

Title: HEARING OUTCOMES IN CHILDREN WITH MENINGITIS: A RETROSPECTIVE REVIEW AT RED CROSS CHILDREN'S HOSPITAL (RCCH)

Authors: S. Kuschke¹; M. Baatjies²; S. Peer³

Affiliation: ¹Red Cross Children's Hospital Chief Audiologist

²Red Cross Children's Hospital Audiologist

³Red Cross Children's Hospital ENT Consultant

Background:

Meningitis is one of the leading causes of acquired, permanent hearing loss, with a prevalence of 10%. Early detection results in prompt referral for aural rehabilitation, and cochlear implantation where appropriate. Diagnostic delays, often disabling, result in a lifetime risk of cochlear ossification, denying these children traditional cochlear implantation.

Aim:

To determine the prevalence and degree of severity of meningitis-related sensorineural hearing loss (SNHL) in children referred to the Audiology Department at RCCH.

Method:

An 18 month retrospective folder review at RCCH was performed. All children diagnosed with meningitis and documented audiological assessments were included. Audiological data collected was analysed statistically.

Results:

A total of 17 children were diagnosed with meningitis over this period. The average age at diagnosis was 7.5 months (SD = 14.4; Range = 1-60 months), average time from diagnosis to Audiology referral was 17 weeks (SD = 16.9; Range = 1-60 weeks). Four of the 17 children (23.5%) were diagnosed with severe-profound SNHL - two (50%) were bilateral, the remaining 2 (50%) unilateral. Five of 17 children (29.4%) presented with normal hearing at initial audiological assessment. Three others were found to have a mild CHL (17.6%). The remaining 5 children (29.4%) are awaiting electrophysiological testing and had no behavioural results.

Discussion:

Severe to profound SNHL is strongly associated with this small group. The prevalence of SNHL may be higher than estimated, as five of the 17 children still require testing. There is also a significant delay in referrals. These results prompted the department of Audiology to establish RCCH guidelines for the audiological management of children with meningitis.

Conclusion:

Primary paediatricians need to be made aware of prompt audiological testing for these children. Monitoring of hearing status according to stipulated specific timeframes within these guidelines are crucial in early detection and early aural rehabilitation like a cochlear implantation.

Title: AN EVALUATION OF THE IMPACT OF OUTREACH AND SUPPORT CHILD HEALTH SERVICES ON LEVEL 2 AND LEVEL 3 FACILITIES

Author: W. Breytenbach

Affiliation: HOCU, Paediatrics, George Hospital

Introduction:

Children from the Eden and Central-Karoo districts needing secondary and tertiary care are referred to George Regional Hospital, (GRH) in Eden and from there to Red Cross War Memorial Children's Hospital, (RCWMCH) the tertiary hospital in Cape Town. In 1997 the paediatric department at GRH started with outreach and support (O&S) to some of the surrounding district hospitals. This O&S has grown through the years with regular 2 monthly visits to the bigger district hospitals, and less often to the smaller hospitals. The focus has been ward rounds, outpatients clinics, combined with lectures and bedside teaching together with local doctors. One aim has been the improvement of referral pathways and access to facilitate and enable prompt, timely and appropriate referrals and admissions. Our experience is that O&S leads to an increase in patient-load and referrals to GH and RCWMCH.

Objectives:

To conduct a retrospective descriptive audit of the amount of patients referred to RCWMCH during the period 2000 to 2014 at 3 to 5 year intervals and GH in 2011 and 2014 to show the impact of O&S on level 2 and 3 child health services.

Methods:

Data was collected from the ambulance and patient transport services. The number of paediatric transfers and outpatient visits from Eden and Central-Karoo to RCWMCH were compared for the years 1999, 2005&6, 2011 and 2014.

Results:

Preliminary data shows an increase in outpatient visits from Eden and Central-Karoo to RCWMCH from 277 in 2006 to 988 children in 2011. George Hospital admitted 722 children from the district in 2014.

Conclusion:

A number of factors may have led to increased referrals from the districts to GRH and RCWMCH. These include increased O&S, increased population numbers and improved district hospital care and training. Capacity at regional and tertiary level is needed to maintain and accommodate the increased amount of referrals.

Title: EVALUATION OF THE RESIDENTIAL THERAPEUTIC PROGRAMME FOR SEXUALLY ABUSED CHILDREN AS PART OF THE ISIBINDI “CREATING CIRCLES OF CARE” MODEL – what we are learning about its impact on mental health adjustment

Authors: Jenna-Lee Marco; Shanaaz Mathews & Lizette Berry

Affiliation: Children’s Institute, University of Cape Town

Background:

Sexual abuse is pervasive in South Africa. This has been confirmed through the first national prevalence study on child sexual abuse (CSA), which estimated that one third (35.4%) of children before the age of 18 has experienced some form of sexual abuse. Nevertheless, under-reporting is a huge concern with large numbers of children not accessing supportive or therapeutic services. Furthermore, a lack of appropriate and available services to address the trauma associated with CSA results in long-term psychosocial outcomes perpetuating a cycle of abuse. The primary aim of this study was to conduct an impact evaluation of the Isibindi Model’s Therapeutic Residential Programme for sexually abused children, from rural communities in KwaZulu-Natal and Eastern Cape.

Methods:

This evaluation was one of the first to explore the effect of therapeutic services for sexually abused children. The study was designed as a quasi-experimental longitudinal follow-up study, utilizing the pre and post-test design. The baseline assessment was conducted before the therapeutic programme and the midpoint and endpoint assessments were conducted after the therapeutic programme. 80 children and their caregivers were recruited into the study at baseline; 39 for the intervention group and 41 for the comparison group. Quantitative psychological and behavioural screening and diagnostic tools were used and qualitative interviews were also conducted with carers. The tools used in the evaluation were the Alabama Parenting Questionnaire (APQ), the Strengths and Difficulties Questionnaire (SDQ), the Connor and Davidson Resilience Questionnaire (CD-RISC), the Depression Scale and a 28 item PTSD checklist. Using the DSM-IV criteria for PTSD, the symptom clusters (1 re-experiencing, 2 avoidance & 3 hyper-arousal) and their clinical cut-offs were used to assess the presence of PTSD.

Results:

The qualitative interviews describe the impact of trauma on the lives of this cohort of children, with most children exposed to multiple incidents of trauma over a period of time. In addition, recovery post sexual abuse disclosure is affected by multiple factors, such as perpetrators not arrested and children still living in continued fear. Baseline PTSD scores suggest that overall, nearly a third of children from the intervention and comparison groups had full symptom PTSD (30.8% and 31.7%, respectively). By the endpoint assessment, scores decreased slightly for the intervention group (24.3%) as well as for the comparison group (22.5%) for full symptom PTSD. Partial PTSD scores were at baseline 53.8% for the intervention group and 46.3% for the comparison group. Partial PTSD symptomatology remained high at endpoint with 56.8% for the intervention group and 57.5% for the comparison group. Overall children remained highly symptomatic with similar symptom scores in the intervention and comparison groups.

Conclusion:

This study showed that although children showed some recovery post disclosure, the current therapeutic approach is not showing to have significant effects on trauma recovery. Considering the South African context, where children on a daily basis experience multiple traumas and high levels of complex traumas, prevention and intervention strategies need to be contextually appropriate and unique.

Title: RISK FACTORS FOR BORDETELLA PERTUSSIS DISEASE IN HOSPITALISED CHILDREN

Authors: Rudzani Muloiwa¹, Felix S. Dube², Mark P. Nicol^{2, 3}, Gregory D Hussey⁴, Heather J. Zar¹

Affiliation: ¹Department of Paediatrics and Child Health, Red Cross War Memorial Children's Hospital, University of Cape Town, South Africa,
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³National Health Laboratory Service, Groote Schuur Hospital, Cape Town, South Africa,
⁴Vaccines for Africa Initiative, Division of Medical Microbiology and Institute of Infectious Disease and Molecular Medicine, University of Cape Town, Cape Town, South Africa

Background:

Despite its resurgence in high-income countries, risk factors for pertussis in children in low and middle-income countries (LMIC) are poorly understood. This study assesses risk factors for confirmed pertussis in African children with severe LRTI.

Methods:

Bordetella pertussis infection was confirmed by PCR (IS481+/hIS1001-) on respiratory samples collected from inpatient children at a South African hospital in Cape Town, over a one-year period. Clinical details were gathered.

Results:

Bordetella pertussis infection was confirmed in 32/460 (7.0%) children aged 8 (IQR 4-18) months. Risk of confirmed pertussis was significantly increased in infants younger than two months [aRR 2.37(95% CI 1.03-5.42)]. Children with HIV exposure [aRR 3.53(95% CI 1.04-12.01)] or HIV- infection [aRR 4.35(95% CI 1.24-15.29)] were at increased risk. Mild [aRR 2.27(95% CI 1.01-5.09)] or moderate [aRR 2.70(95% CI 1.13-6.45)] under-nutrition respectively were associated with higher risks. The highest risk was seen in children whose caregivers had *B. pertussis* nasal infection [aRR 13.82(95% CI 7.76-24.62)]. Completion of the primary vaccine schedule was protective [aRR 0.28(95% CI 0.10-0.75)]. Risk of pertussis was not associated with household air pollutants.

Conclusions:

HIV exposure or infection as well as maternal nasal infection with *B. pertussis* and poor nutrition are associated with increased risk of pertussis in African children, especially in young infants. Completed primary vaccine schedule was associated with reduced risk of confirmed pertussis. There is an urgent need to improve primary pertussis vaccine coverage in LMIC and scale it up to include pregnant women, especially those with HIV infection.

Title: CHILDREN COUNT: TRACKING PROGRESS FOR CHILDREN IN SOUTH AFRICA
(www.childrencount.net)

Authors: Katharine Hall & Winnie Sambu

Affiliation: Children's Institute, University of Cape Town

Objectives:

Using statistics from Children Count, an ongoing data and advocacy project of the Children's Institute, we examine progress South Africa has made in improving the socio-economic wellbeing of children in the country.

Methods:

The Children Count project makes use of nationally representative household survey data. Data sources include Statistics South Africa's General Household Survey (2002 – 2014), National Income Dynamics Study (NIDS), Department of Health's HIV surveys, and administrative data from government departments (Health, Education and Social Development). Using STATA, a statistical software, we conduct analyses to generate child-centred statistics that are then used to update and monitor over 40 indicators spanning six domains: demography, income & social grants, housing and services, education, HIV & Health and Nutrition. Where possible, statistics are disaggregated across provinces, age and population groups, as well as geographical areas and income quintiles. Confidence intervals are used to assess whether differences across the groups are real.

Results:

No significant changes have been observed in child population numbers between 2002 and 2014; the country's child (0 – 17 years olds) population currently stands at 18.5 million. However, our analysis shows that while most children lived in rural areas in 2002, majority (56%) now live in the urban areas of the country. Nevertheless, relatively rural provinces such as the Eastern Cape and KwaZulu-Natal still carry a large proportion of the child population. Improvement in socio-economic wellbeing is varied. In some cases, such access to basic sanitation, we see massive improvements over a 12 year period: in 2002, 45% of children in the country lived in households with access to basic sanitation (flush toilets and ventilated pit latrines). In 2014, this had increased to 74%. Other indicators show less striking changes; for example, child poverty rates have remained high over the years. As at 2014, 63% of children (11.7 million) lived below a commonly used poverty line (R923 per person per month) while in 2002, 14.7 million children lived below the poverty line. Research has largely attributed the reduction in child poverty rates to the Child Support Grant (CSG) which now reaches over 11 million children in the country. We find that over a fifth of children (21%) live far away from the primary health care facility that they normally use. Food insecurity and poor nutrition continues to affect a large number of children; 12% of all children suffer from reported child hunger, while 25% of those aged 5 years and below are stunted.

Conclusions:

While South Africa has made progress in improving the socio-economic wellbeing of children in the country, many still live in poverty and lack access to services such as adequate water and proper sanitation. To reduce poverty and inequality and ensure the realisation of socio-economic rights, the South African government must put in place measures to ensure that all children have access to the basic services that they require for survival, while those living in poverty have income support through social grants from an early age, in order to ensure positive outcomes later in life.

Title: PRIMARY NEPHROTIC SYNDROME IN CHILDREN IN CAPE TOWN, SOUTH AFRICA

Authors: Deveshni Reddy; Peter Nourse; Priya Gajjar

Background:

Nephrotic syndrome may be referred to as either primary or secondary depending on the aetiology. Different histological patterns on renal biopsy are associated with different prognoses and responses to steroids, which is the mainstay of treatment for childhood nephrotic syndrome. The literature suggests that specific histological patterns associated with primary nephrotic syndrome may be more prevalent in certain ethnic groups throughout the world. No studies have been conducted about children with primary nephrotic syndrome in Cape Town and the only study conducted in South Africa was in Durban in 1996.

Objectives:

To describe the demographic and presenting clinical features as well as the histological subtypes of children with primary nephrotic syndrome who received renal biopsies over a period of 10 years at Red Cross Children's Hospital. To determine what treatment was administered at the time of initial diagnosis and during the follow up period, and what the response to treatment was.

Methods:

This was a retrospective study conducted in the Renal Unit at Red Cross Children's Hospital in Cape Town South Africa. Our study population included all children with primary nephrotic syndrome who received renal biopsies between January 2006 and December 2015. Patients were identified from both the clinical and National Health Laboratory Services databases. Folders of patients were reviewed and clinical and demographic data were recorded. The data were analysed using standard statistical methods.

Results:

There were a total of 110 patients with primary nephrotic syndrome biopsied from January 2006 to December 2015. Age at time of biopsy ranged from 3 weeks to 15 years old. Males and females were equally represented in the population sample. The majority of patients biopsied belonged to race groups referred to as either coloured (41%) or black (37%) in Cape Town. The predominant histological subtypes found on biopsy were Mesangioproliferative glomerulonephritis in 62 (56,4%) patients, Focal segmental glomerular sclerosis (FSGS) in 18 (16,4%) patients, Minimal change disease in 15 (13,6%) patients and Mesangiocapillary glomerulonephritis in 7 (6,4%) patients. 54 (49,1%) patients were found to be steroid resistant following an initial course of steroids, and 55 (50%) were found to be steroid sensitive.

Conclusion:

The predominant histological subtype found in children biopsied with primary nephrotic syndrome in Cape Town is Mesangioproliferative glomerulonephritis. 50% of the children biopsied were found to be steroid responsive with initial treatment.

HREC REF: 026/2016

Title: CONTINUOUS FLOW PERITONEAL DIALYSIS (CFPD) USE IN CHILDREN WITH AKI AND INADEQUATE ULTRAFILTRATION ON CONVENTION PERITONEAL DIALYSIS (PD)

Authors: Nourse P, Sinclair G, du Plessis M, Argent A

Criticism against the use of acute peritoneal dialysis has been its low clearance and low ultrafiltration (UF) volumes compared to extracorporeal techniques.

Aim:

To determine whether CFPD would improve ultrafiltration in children with acute kidney injury where UF on conventional PD was inadequate on maximum glucose concentration.

Methods:

CFPD was performed on five children with AKI who were fluid overloaded and ultrafiltration was deemed insufficient on conventional PD using 4.25% glucose concentration. CFPD was performed with two bedside-placed catheters using 2.50 % glucose concentration. After initial filling, dialysate flow rate (100 ml/1.73 m² per minute) was maintained with an adapted continuous venovenous hemofiltration machine. Ultrafiltration flow rate was set at 2.5 ml/1.73 m² per minute and adapted as necessary. Ultrafiltration and clearance rates were measured before and after implementation of CFPD.

Results:

Mean age of patients 4.7 months (range 0.43-9); Mean weight: 5.6 kg (2.7-5.6). Mean ultrafiltration was 2.2ml/kg/hour with conventional PD versus 8ml/kg/hr with CFPD. Mean clearances of urea and creatinine were 6.48 and 7.43 ml/1.73 m² per minute with conventional PD versus 22 and 24 ml/1.73 m² per minute with CFPD, respectively. Ultrafiltration and clearance were significantly higher on CFPD than compared to conventional PD. Complications: The in and outflow lines needed to be swapped on one patient otherwise no complications occurred.

Conclusion:

CFPD may be an option to improve ultrafiltration of peritoneal dialysis in children with AKI in who ultrafiltration is deemed inadequate on maximally optimised conventional PD.

Title: THE DRAKENSTEIN CHILD HEALTH STUDY: INVESTIGATING THE EARLY DETERMINANTS OF CHILD HEALTH IN SOUTH AFRICA

Authors: HJ Zar,¹ W Barnett,¹ A Stadler^{1,2}, E von Delft², S Budree¹, A Vanker¹, D Gray¹, N Koen³, S Lubbe⁴, L Myer,⁵ DJ Stein,³ MP Nicol⁶ on behalf of the *Drakenstein child health study team.

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The Drakenstein Child Health Study is a unique, multidisciplinary, South African birth cohort, to investigate the impact of antenatal and early life exposures on child health. A core focus of the study is on the incidence, risk factors, aetiology and long term impact of early pneumonia on child health. Other focus areas include maternal health, child growth, nutrition, neurodevelopment, non-respiratory illnesses, the maternal, child and environmental microbiome and emerging non-communicable diseases. Study visits are conducted at Paarl Hospital and at TC Newman and Mbekweni clinics, which provide a strong primary health care program.

Methods:

Pregnant women from a poor, peri-urban community in Paarl with high exposure to infectious diseases and environmental risk factors were enrolled in the second trimester at 2 clinics – TC Newman (serving a mixed ancestry population) and Mbekweni (serving a Black African population). Women were followed through pregnancy and child birth (all at Paarl hospital); mother-child pairs are followed until children are at least 5 years. Biomedical, environmental, psychosocial, and demographic risk factors are longitudinally measured. Environmental exposures are measured using monitors placed at home visits; tobacco smoke exposure is investigated using urine cotinine measures. Maternal and paternal physical and psychosocial health are longitudinally assessed; follow-up of children is synchronized with routine primary care visits. Active surveillance for pneumonia is done; microbiologic investigations including microbiome and multiplex PCR measures are done longitudinally and at each pneumonia episode; a case control analysis is done to investigate aetiology. Lung function is measured at 6 weeks and annually. Child growth, nutrition and neurodevelopmental outcomes are longitudinally assessed. Lung function is measured in children at 6 weeks, annually and during LRTI episodes.

Results:

1100 mothers were enrolled; all births have occurred and over 1300 child years of follow up have been accrued with high cohort retention. The population is poor (with the Mbekweni population relatively poorer than that from TC Newman), mostly single mothers and 20% of mothers were HIV-infected. Rates of tobacco smoke exposure are very high, approximately a third of pregnant women were active smokers. At birth, 56% of neonates had cotinine levels indicative of exposure, while 18% had levels of active smokers; at 6 weeks of age 53% infants tested positive for exposure. Women had a high prevalence of depression (21%), lifetime trauma (67%) or intimate partner violence (32%). Antenatal depression was strongly associated with decreased infant weight-for-age (WAZ) and head circumference-for-age (HCAZ) z-scores at birth; maternal trauma exposure was also significantly associated

with a reduction in HCAZ at birth. Black African infants had higher birth weight compared to mixed race infants (median WFAZ -0.4 vs. -0.7, $p < 0.001$) and remained heavier and taller throughout infancy. Stunting occurred in 17% at 2 months of age, declining to 13% by 12 months with a higher prevalence among mixed race than Black African children. Exclusive breastfeeding was unusual. Immunization coverage for the EPI schedule was high. By 22 Aug 2016 there were 880 pneumonia cases (641 ambulatory and 239 hospitalized; pneumonia incidence 0.29 episodes per child year; e/cy). The highest incidence occurred in children 1-6 months of age (0.57 e/cy). Organisms most strongly associated with pneumonia were *B. pertussis* [OR 11.1; 95% CI 1.3-92.5], RSV [OR 8.1; 95% CI 4.2-15.4] and influenza virus [OR 4.1; 95% CI 2.1-8.3]; bocavirus, parainfluenza virus, adenovirus or CMV were also associated with pneumonia. Three children had MDR TB. The pneumonia case fatality rate was 1%.

Conclusion:

There are high rates of exposures to several risk factors that may impact on child health; many of these are amenable to preventative interventions. There is a strong association between maternal health, birth outcomes and subsequent child health. Despite high levels of immunization, pneumonia is common in infants; RSV is the predominant pathogen. The study provides data on areas in which known interventions to prevent or ameliorate illness may be strengthened and also identifies novel areas that require development of new interventions.

Acknowledgements: We thank the study staff in Paarl, the study data team and lab teams, the clinical and administrative staff of the Western Cape Government Health Department at Paarl Hospital and at the clinics for support of the study. We acknowledge the advice from members of the study International Advisory Board and thank our collaborators. We thank the families and children who participated in this study.

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Title: EFFECTS OF EARLY LIFE PNEUMONIA ON LUNG FUNCTION IN THE FIRST 2 YEARS OF LIFE IN AFRICAN INFANTS

Authors: [Lauren Willemse](#)¹, Diane Gray¹, Lidija Turkovic², Ane Visagie¹, Carvern Jacobs¹, Graham L. Hall², Heather J. Zar¹

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Background:

Early life lung function is associated with increased risk of respiratory disease in later life. Infection in the first year of life in African infants has been shown to result in lower lung function at one year. It is unknown if this effect persists.

Aim:

Investigate the impact of early life pneumonia on lung function up to two years of age in African infants.

Method:

Infants enrolled in the Drakenstein Child Health birth cohort had lung function tested at ages 6 weeks, one and two years. Testing done during quiet natural sleep, included tidal breathing (TBFVL), exhaled nitric oxide (eNO) and SF6 multiple breath washout (MBW) measures. Infants were examined at the time of and 4-6 weeks after a pneumonia episode.

Results:

220 children were tested at 6 weeks, one year and two years of age. Lung function tracked from 6 weeks through to one and two years. Pneumonia during the first two years of life was independently associated with increased respiratory rate (average 4% higher; 95%CI 1.01, 1.08). When the infant required hospitalization, the effect of increased respiratory rate was stronger (average 6%; 95%CI 1.01, 1.12). This effect on respiratory rate was stronger if the pneumonia incidence occurred within the first year of life (average 5% higher; 95%CI 1.02, 1.09), but tidal volume was more affected if pneumonia occurred in the second year of life (average 3.47mL lower; 95%CI -5.45, 1.49). The effect on tidal volume at two years of age was stronger if the infant required hospitalization (average 2.17 mL reduction; 95%CI -4.22, -0.11).

Conclusions:

Early life pneumonia results in lower lung function at two years of age, an effect independent of baseline lung function. The effect on respiratory rate is stronger if the pneumonia incidence occurred within the first year of life, but tidal volume was more affected if pneumonia occurred in the second year of life. An increased effect on tidal volume is found if these pneumonia required hospitalization. Preventing early life pneumonia will help optimize early lung growth and function as well as strengthening respiratory health in later childhood.

HREC REF: 423/2012

Title: LUNG FUNCTION IN HIV INFECTED SOUTH AFRICAN ADOLESCENTS ON ANTIRETROVIRAL THERAPY: THE CAPE TOWN ADOLESCENT ANTIRETROVIRAL COHORT

Authors: Githinji L¹, Gray D¹, Hlengwa¹ S, Myer L², Zar HJ¹

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Background:

Respiratory disease is the commonest cause of illness in HIV-infected children in Sub-Saharan Africa. Lung function is a useful measure to delineate the spectrum of lung disease, but there is limited data on the spectrum and determinants of lung function in African HIV infected adolescents.

Our study aimed to investigate lung function in South African HIV infected adolescents on antiretroviral therapy (ART) enrolled in a prospective cohort, the Cape Town Adolescent Anti-Retroviral Cohort (CTAAC).

Materials and methods:

HIV-infected adolescents aged 9-14 years, with at least 6 months of ART and enrolled on CTAAC underwent lung function testing. Spirometry (pre and post bronchodilator), single breath carbon monoxide diffusion test, forced oscillation technique, nitrogen multiple breath wash out and six minute walk test were done at enrolment. Healthy HIV negative, age, sex and ethnically matched controls were also tested. Independent two sample t-test or Wilcoxon sum rank test was used to test differences between HIV infected and uninfected adolescents and multiple linear regression was used to determine predictors of lung function outcomes.

Results:

Five hundred and fifteen stable HIV-infected adolescents and 110 HIV negative controls were tested. The mean (SD) age was 12 (1.6) years; 52% were male. Median (IQR) duration of ART therapy was 7.6 (4.6-9.2) years and current CD4 was 714 (561-903) cells/mm³. HIV infected adolescents had lower lung function compared to HIV uninfected controls; forced expiratory volume in 1 sec (FEV₁) 1.60L vs 1.86L, p=0.001, forced vital capacity (FVC) 1.80L vs. 2.00L, p<0.001, FEV₁/FVC 89% vs 93%, p<0.001, transfer factor for carbon monoxide (TLCO) 16.6 vs 18.1mlCO/min/mmHg/L, p=0.048, respiratory system compliance 11.1 vs.13.5ml/cmH₂O,p=0.002 and functional residual capacity (FRC) 1.01L vs.1.16L, p=0.024. Resistance and lung clearance index (LCI) were significantly higher in HIV infected adolescents compared to HIV uninfected adolescents. These differences remained significant after correcting for age, size and gender. Age, sex, height, past pneumonia and TB were predictors of lung function. There was no difference in distance walked in six minutes between HIV infected and uninfected adolescents.

Conclusion:

African HIV infected adolescents on ART have decreased lung volumes, airflow, diffusion capacity and compliance and increased resistance and ventilation homogeneity compared to HIV uninfected adolescents. Previous pneumonia and pulmonary TB were associated with lower lung function.

FUNDING: NIHR01HD074051, SA-MRC, APCDR

HREC 018/2016

Title: THE USE OF ASSISTED AUTOGENIC DRAINAGE IN CHILDREN HOSPITALISED WITH ACUTE PNEUMONA IN TWO TERTIARY HOSPITALS IN SOUTH AFRICA

Authors: Lieselotte Corten, Jennifer Jelsma, Brenda M Morrow

Background:

Pneumonia is the most important respiratory problem in children under the age of five years worldwide, with a mortality rate of up to 18%, and potential chronic pulmonary sequelae. Airway clearance therapy (ACT) may be an appropriate tool to help evacuate secretions from the airways and/or improve ventilation. Three randomised controlled trials (RCTs) have found contradicting results for the use of ACT in children with pneumonia.

Objectives:

This study aimed to determine whether assisted autogenic drainage (AAD), as an adjunctive therapy, was more effective than standard nursing care in infants and young children hospitalised with community or hospital-acquired pneumonia.

Methods:

A RCT was conducted at Red Cross War Memorial Children's Hospital, Cape Town and Dr. George Mukhari Academic Hospital, Pretoria. Clinically stable children with a clinical diagnosis and/or radiological confirmation of pneumonia, between the age of one month and eight years, were included in the study. Exclusion criteria were: bronchiolitis; *Pneumocystis jirovecii* pneumonia; active tuberculosis; any cardiac or respiratory comorbidities; recent history of pneumothorax or thoracic/abdominal surgery; increased intracranial pressure; pleural effusion with or without intercostal drain; chest deformities; any condition for which mobilisation out of bed was contraindicated; osteoporosis; premature (≤ 30 weeks) birth; hospitalised for less than two days; and marked respiratory distress and/or hypoxia. The control group received standard nursing care; the intervention group received bi-daily AAD treatment for 10 to 30 minutes. The primary outcome measure was duration of hospitalisation. The secondary outcome measures included days of fever, days on supplemental oxygen support, respiratory rate (RR) and heart rate adjusted for age, oxygen saturation, adverse events, and mortality rate.

Results:

After screening 896 children, only twenty-nine children (median age 3.5 months, IQR 1.5-9.4, 18 male and 11 female) were eligible for inclusion. No significant differences were found between the intervention and control groups for any of the outcome measures. However, Kaplan-Meier analysis revealed a strong trend towards a shorter duration of hospitalisation in the intervention group ($p=0.06$). Further, within the intervention group, a significant reduction in RR, adjusted for age, was seen ($p=0.02$), which was not seen in the control group ($p=0.22$). Repeated measures analysis showed a statistically, albeit not clinically, significant increase in RR immediately after AAD, returning to baseline values within one hour after treatment. No adverse events were reported.

Conclusion:

AAD appears to be a safe treatment technique in the management of paediatric pneumonia. The study was limited by the small sample size and requires confirmation in larger trials.

Ethical approval number: 532/2013 Trial registration: PACTR201404000706382

This is new research

Title: **CLINICAL PREDICTORS OF CULTURE CONFIRMED PULMONARY TUBERCULOSIS (PTB) IN A HIGH TB AND HIV PREVALENCE AREA**

Abbreviated Title: Clinical Predictors of Culture confirmed TB

Authors: Lisa Frigati (MBBCh, MMed, FCPaed, MScTMIH, Cert PaedID) ^a, Mhairi Maskew (MBBCh, PhD) ^b, Lesley Workman (MPH) ^c, Jacinta Munro (matric) ^d, Savvas Andronikou (MBBCh, PhD) ^e, Mark P Nicol (MBBCh, MMed, PhD) ^f, Heather J Zar (MBBCh, FCPaed, PhD) ^g

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Background:

The burden of childhood tuberculosis (TB) remains significant especially in areas of high HIV prevalence. Clinical diagnosis predominates, despite advances in molecular and microbiological diagnostics.

Aim:

To identify clinical features associated with culture-confirmed pulmonary TB (PTB) in children.

Methods:

Children admitted to hospital were enrolled in a study of novel diagnostics for PTB in South Africa. Standardized clinical, radiological and microbiological data were collected. Definite TB was defined by culture of *M. tuberculosis* from a respiratory specimen. Adjusted odds ratios for definite TB were calculated using a multivariate logistic regression model.

Results:

Adjusted odds ratio (AOR) for definite TB increased with a history of fever for more than 1 week (AOR 8.54, CI 2.37-30.74), with a chest radiograph (CXR) suggestive of PTB (AOR 10.0, CI 3.22 -31.2) and with a positive tuberculin skin test (TST) (AOR 64.4, CI 14.3 -290.5). The likelihood ratio of having definite TB if 2 of these factors (CXR and TST) were present compared with having none of them was 17.7. Cough, household contact with TB, HIV status and wheezing were not significantly associated with definite TB.

Conclusions:

Prolonged fever, CXR suggestive of TB or a positive TST were predictive of definite TB and should be considered in composite scoring systems for TB diagnosis in high HIV prevalence settings. Other commonly associated symptoms were not associated with definite TB.

Key Words: tuberculosis, diagnosis, children, clinical factors

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Title: DOES PRONE POSITIONING RECRUIT DORSAL LUNG REGIONS IN CHILDREN WITH ARDS? AN ELECTRICAL IMPEDANCE TOMOGRAPHY STUDY

Authors: Lupton-Smith, A^{1*}; Argent, A^{1,2}; Rimensberger, P³; Morrow, B¹

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Background:

Prone positioning is commonly used in patients with ALI/ARDS to improve oxygenation. Improved oxygenation is thought to occur due to recruitment of collapsed dorsal lung regions and improved ventilation homogeneity.

Aim:

To determine the effects of prone turning on regional ventilation distribution and homogeneity in children with ALI/ARDS.

Methods:

Thoracic electrical impedance tomography (EIT) measurements were taken in the supine position (baseline) and 5, 20 and 60 minutes after being turned into the prone position. Arterial blood gas measurements were obtained at baseline and after 60 minutes of being in the prone position. Repeated measures ANOVA was used to determine the difference in mean relative impedance change and ventilation homogeneity between responders and non-responders.

Results:

Fourteen participants (9, 64% male) with a median (interquartile range) age of 20(11.6-26.2) months were studied. Seven (50%) participants showed an improved PaO₂ of 2.1(1.5-3.3) kPa ("positive responders"), while seven showed a reduction of 1.1(0.5-1.8) kPa ("negative responders") after 60 minutes. Proportion of ventilation in the dorsal lung was no different between responders and non-responders (p=0.59). Responders showed significantly more variability in ventilation inhomogeneity at baseline compared to non-responders (p=0.005). After 60 minutes ventilation inhomogeneity was significantly less variable in the responders (p=0.02).

Conclusion:

Prone positioning did not result in recruitment of the dorsal lung regions but rather more homogenous ventilation. Children who responded to prone positioning had more variable ventilation inhomogeneity at baseline, compared to those who did not respond.

HREC REC/REF: 269/2008

A Lupton-Smith is registered in the department for a PhD. Contributions to the research were concept development and study design, data collection and analysis, and preparation of the abstract.

Title: THE UTILITY OF NEBULISED GENTAMICIN FOR ERADICATING EARLY PSEUDOMONAS AERUGINOSA INFECTIONS IN CHILDREN WITH CYSTIC FIBROSIS

Authors: Van Stormbroek B, Zampoli M, Morrow BM

Background:

Pseudomonas aeruginosa (Pa) is a commonly isolated pulmonary pathogen in children with cystic fibrosis (CF). If treated early, Pa may be eradicated but if left untreated this organism becomes almost impossible to eradicate, with chronic infection or colonisation leading to a decline in pulmonary function and increased hospitalisations and mortality. The most commonly used Pa eradication strategies globally are not available to most South African patients due to high costs. As a result the CF Clinic at the Red Cross War Memorial Children's Hospital (RCWMCH) uses a cheaper, gentamicin based Pa eradication protocol as standard practice, despite lack of objective supporting evidence.

Objective:

To describe the characteristics and clinical course of children with CF and early Pa infections treated with an inhaled gentamicin-based Pa eradication protocol, and to identify risk factors for re-infection.

Methods:

This was a retrospective descriptive study of children (0-18 years) attending the CF clinic at the RCWMCH who cultured Pa from any respiratory sample between January 2005 and March 2015 and received gentamicin-based Pa eradication treatment (nebulised gentamicin 80mg or 160mg twice daily for 3-6 months with an oral quinolone (Ciprofloxacin 15-20mg/kg bd)). Patients with established chronic Pa infections were excluded. Routinely collected medical data were extracted from patient files and these data were cross checked with data from RCWMCH CF Database and the National Health Laboratory service (NHLS). Continuous variables are expressed as median (interquartile range).

Results:

149 children with CF were managed in the CF Clinic over the study period, of whom 44 (29.5%; 28 (63.6%) male) had incident Pa infections treated with the gentamicin- eradication regimen. Of these 38 (86%) were successfully eradicated. Six (13.6%) patients became chronically colonised with Pa at 22.5 (11.0 – 36.0) months from the index infection.

Children who had successful Pa eradication were younger (age 67.5 (23.0 – 98.0 months); and had better nutritional status (weight for age and BMI Z scores -1.4 (-2.5 - -0.1) and -0.3 (-1.5 – 0.5) respectively) than those with unsuccessful eradication (age 177.0 (143.0 – 189.8) months, $p = 0.03$; weight for age and BMI Z scores -4.6 (-5.3 - -3.2), $p = 0.02$; and -2.8 (-3.7 - -2.3), $p = 0.02$). Those with successful eradication had fewer previous Pa infections than those with unsuccessful eradication (0 (0 – 0) vs. 0.5 (0 – 1); $p = 0.02$). There were no significant adverse events related to the eradication regimen in any patients.

Conclusions:

The use of nebulised gentamicin in eradicating early Pa infections in children with CF appears to be safe and has comparable efficacy to international studies. This regimen may be appropriate for resource limited settings, and further research in this regard is warranted. Poor nutritional status was identified as a possible risk factor for reinfection and progression to chronic Pa infection.

Ethics approval number: HREC Ref 137/2016

TITLE: **OVERNIGHT OXIMETRY AS A SCREENING TOOL FOR MODERATE-SEVERE OBSTRUCTIVE SLEEP APNOEA IN CHILDREN IN A RESOURCE CONSTRAINED SETTING: A PILOT STUDY AT RED CROSS WAR MEMORIAL CHILDREN'S HOSPITAL**

Authors: Abousetta N, Vanker A and Zampoli M.

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

Introduction:

Obstructive sleep apnoea (OSA) is common in children yet often overlooked as symptom- based screening is unreliable. Polysomnography is regarded the gold standard for OSA diagnosis but its utility in resource-constrained settings is limited. Overnight oximetry and the McGill Score is a validated screening tool for moderate-severe OSA. The aim of this study was to describe the spectrum OSA severity in children referred for overnight oximetry at RCWMCH; and report the impact of overnight oximetry on management of children with suspected OSA.

Methods:

A retrospective descriptive study was conducted of patients screened for OSA by overnight oximetry at RCWMCH from December 2012 to December 2014. Clinical data was retrieved from referral forms, oximetry database and medical records. Recordings of 6 hours or more were considered adequate and included in the study. OSA severity was determined using the McGill score. Details on surgical management outcome were documented.

Results:

153 oximetry recordings were identified of which 137 were suitable for analysis. 88 (64%) were male, median age 31.4 [15.8, 65.8] months. McGill's score classified patients as: no/mild OSA (n=55; 40%); moderate OSA (n=23; 17%); severe OSA (n=23; 17%) and very severe OSA (n=36; 26%). Male gender (76% vs 55%, p=0.01), adenotonsillar hypertrophy (83% vs 62%, p <0.01) and low weight-for-age z-score (-1.3 vs -0.7, p=0.03) was significantly more prevalent in children with severe spectrum OSA compared to no/mild/moderate OSA. Overnight oximetry resulted in 78 (57%; 31 mild/mod OSA, 47 severe/very severe OSA) children being referred for surgery and surgery was expedited (median 6 days) in severe spectrum OSA cases. Equally, 59 (43%) avoided unnecessary surgery.

Conclusion:

Overnight oximetry is a simple, inexpensive feasible tool to screen for severe spectrum OSA in children and facilitates prioritisation of surgical intervention in resource constrained settings.

HREC ref 618/2015

Title: FIELD EVALUATION OF HIV POINT-OF-CARE TESTING FOR EARLY INFANT DIAGNOSIS IN CAPE TOWN, SOUTH AFRICA

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Background:

Early infant HIV diagnosis (EID) coverage and uptake remains challenging. Point-of-care (POC) testing may improve access and turn-around-times, but, while several POC technologies are in development there are few data on their implementation in the field.

Methods:

We conducted an implementation study of the Alere q Detect POC system for EID at two public sector health facilities in Cape Town. HIV-exposed neonates undergoing routine EID testing at a large maternity hospital and a primary care clinic received both laboratory-based HIV PCR testing per local protocols and a POC test. We analysed the performance of POC versus laboratory testing, and conducted semi-structured interviews with providers to assess acceptability and implementation issues.

Results:

Overall 478 specimens were taken: 311 tests were performed at the obstetric hospital (mean child age, 2 days) and 167 six-week tests in primary care (mean child age, 51 days). 9.0% of all tests resulted in an error with no differences by site; most errors resolved with retesting. POC was more sensitive [100%; lower 95% CI, 39.8%] and specific [100%, lower 95% CI, 98%]) among older children tested in primary care compared with birth testing in hospital, 90.0%, [95% CI,55.5-99.8%] and 100.0% [lower 95% CI,98.4%], respectively. Negative predictive value was high (>99%) at both sites. In interviews, providers felt the device was simple to use and facilitated decision-making in the management of infants. However, many wanted clarity on the cause of errors to help guide repeat testing.

Conclusions:

POC EID testing performs well in field implementation in a range of health care facilities and appears highly acceptable to health care providers.

This research was presented at IAS 2015, and was scheduled to be presented at UCT's Paediatric Research Day 2015 before cancellation of the event.

(HREC Ref: 666/2013)

Title: NEONATAL BACTERAEMIA IN A SECONDARY REFERRAL HOSPITAL IN CAPE TOWN: HOSPITAL ACQUIRED INFECTIONS, ORGANISMS AND THEIR ANTIBIOTIC SENSITIVITIES

Authors: Wakithi Mabaso¹, Abigail Wood¹, Dave le Roux²

Affiliation: ¹University of Cape Town; ²Department of Paediatrics and Child Health, University of Cape Town and New Somerset Hospital

Background:

Hospital acquired infections are preventable and are an important component of morbidity in neonatal units. Compared to developed countries, low middle income countries like South Africa report 3-20 times more neonatal mortalities, with incidence rates of hospital acquired infections ranging between 11-34%. We looked at the burden of bacterial infections in neonates: paying attention to antibiotic susceptibility, as bacterial resistance contributes significantly in low middle income countries with limited resources and access to healthcare.

Methods:

A retrospective surveillance study was conducted from January 2011 - December 2014. Data was collected from two databases. The first, a real time active surveillance database compiled in the unit by the staff. The second, a laboratory database compiled by microbiologists from the National Health Laboratory Service. Access was only granted to the January 2013 - December 2013 database for comparative purposes. Hospital acquired infections were described as infections cultured after 48hrs of admission. Data was quantitatively described with no statistical analyses applied.

Results:

The cumulative incidence rate of hospital acquired infections was 8.6 per 1000 admissions. A decreasing trend was observed in the unit. Most infections occurred in neonates admitted for the time interval >7-28days. The greatest burden was found in extremely low birthweight, very low birthweight and premature neonates. The most prevalent infecting organisms were E. coli followed by Group B streptococci. The most cultured group was gram negatives. Organisms were most susceptible to meropenem and vancomycin and least susceptible to the 3rd generation cephalosporins. Ten errors were identified when using the NHLS database as a comparative source to the unit's own filing system.

Conclusion:

Cautious use of 3rd generation cephalosporins and drugs like gentamicin and amikacin must be followed due to the problem of increasing bacterial resistance. A relatively low rate of hospital acquired infections was shown in the unit, however this data is not fully representative of our region, for that reason more prospective studies should be undertaken to address this limitation.

Title: IMPACT OF BIRTH TESTING ON THE UPTAKE AT FOLLOW-UP EARLY INFANT DIAGNOSIS (EID) SERVICES IN CAPE TOWN, SOUTH AFRICA

Authors: Lorna Dunning¹, Max Kroon², Lezanne Fourie², Andrea Ciaranello³, Landon Myer¹

Affiliation: ¹Division of Epidemiology & Biostatistics, School of Public Health and Family Medicine, University of Cape Town, Cape Town, South Africa ²Department of Neonatal Medicine, University of Cape Town, Cape Town, South Africa ³Division of Infectious Disease, Medical Practice Evaluation Center, Massachusetts General Hospital, Boston, MA, USA

Introduction:

PCR testing at birth ('birth-testing') is conditionally advised by new World Health Organization guidelines for rapid diagnosis of infants infected with HIV *in utero*. Prompt diagnosis and early introduction of antiretroviral therapy (ART) can dramatically reduce mortality in HIV-infected infants. However, a negative result at birth must be followed by engagement in subsequent routine early infant diagnosis (EID) services (recommended at 6-10 weeks of age) to rule out *intra-partum* infection. There are few data on the implementation of this approach in sub-Saharan Africa and whether birth-testing affects the uptake of subsequent routine EID testing is unknown.

Methods:

We conducted a retrospective cohort study using routine clinical and laboratory data from a large obstetric hospital in Cape Town. All infants suspected to be at high risk of HIV-transmission, underwent birth- testing between July 2013-August 2015. Infants with a negative birth-test were matched to HIV-exposed infants who did not receive birth-testing. Maternal antenatal and obstetric characteristics of neonates were abstracted via folder review. Primary outcome was any subsequent HIV-PCR test before the end of follow-up, ascertained from the National Health Laboratory Service database. Data were analyzed using logistic regression models, examining independent predictors of presentation at follow-up EID testing.

Results:

Overall, 575 neonates underwent birth-testing, with 22 positive (3.8%) and 551 negative results. At follow-up EID presentation (n=871), 4 infected infants were identified (0.4%). Fewer infants who underwent birth-testing presented for later EID compared to infants who did not receive a birth-test (73% vs 85%), (Odds Ratio, 0.46; 95% confidence interval, 0.34-0.62). Infants who underwent birth-testing, also presented for later EID at a significantly older age (mean age 60 days vs.50 days, p<0.001). The significantly lower rate of EID presentation among birth-tested children persisted in multivariable analyses adjusting for maternal age, nadir CD4 cell count, ART use during pregnancy, gestation, infant sex, birthweight and infant feeding modality (Adjusted odds ratio, 0.60 95% confidence interval, 0.40-0.88).

Conclusions:

Neonates undergoing HIV testing at birth may be less likely to present for subsequent EID testing than those not birth-tested. Emphasis must be placed on appropriate counseling provided to caregivers on the need for further HIV testing after negative birth-test results.

Title: THE INFLUENCE OF ANAESTHETIC METHOD ON OUTCOMES OF PRETERM INFANTS DELIVERED BY CAESAREAN SECTION IN A TERTIARY HOSPITAL IN SOUTH AFRICA: A PILOT REVIEW

Authors: R Stander, L Tooke, AR Horn

Objectives:

Delivery of preterm infants by caesarean section (CS) is associated with an elevated risk for morbidity and mortality due to the associated intra-partum emergencies, fetal distress, maternal medication and early delivery due to maternal illness. However, the influence of the method of anaesthesia on this group is contentious. The objectives of this study were to describe the indications for CS and the methods of anaesthesia in a cohort of preterm infants; to identify a uniform subgroup for whom we could compare outcomes vs. anesthetic type; and to describe the need for resuscitation and related short term outcomes in the above subgroup, comparing spinal anaesthesia (SA) to general anaesthesia (GA).

Methods:

We carried out a retrospective, descriptive, cohort study at Groote Schuur Hospital, Cape Town, South Africa. Data was collected on infants born between 1 January and 30 Sep 2014. All preterm infants born at 28 – 35 wks gestation, delivered by CS were eligible for inclusion. Infants with missing data for method of anaesthesia and/or indication for CS were excluded. Indications for CS and type of anaesthesia were obtained from the theatre register. The largest group of infants with similar indications for delivery were identified from the theatre register. Baseline characteristics and short term outcomes for this group were extracted from an existing prospective data base of all infants $\leq 1500\text{g}$ who are born at Groote Schuur Hospital (GSH) (The data base is collected as part of the international Vermont Oxford Data Base). The characteristics and outcomes of infants delivered by SA were compared with those delivered by GA

Results:

There were a total of 249 caesarean sections for preterm infants; data on mode of anaesthesia or indication for CS were missing in 23 infants. Of the remaining 226 preterm caesarean sections; 56 (24%) were delivered via GA and the majority 170 (75%) were delivered under SA. Abnormal CTG, was the commonest indication for CS irrespective of mode of anaesthesia, occurring in 150 (66%) infants; it included diagnoses of fetal distress, fetal compromise, fetal bradycardia, non-re-assuring CTG.

The subgroup of 150 infants delivered for the primary indication of abnormal CTG were studied further: of these, 26 (17%) were delivered under GA and 124 (83%) under SA. There was no difference in mortality between the groups. The median (IQR) Apgar scores at 1 and 5 minutes in the GA group were 3(2-5) and 7(5-8) compared to 6(4-8) and 9(8-10) in the SA group ($p < 0.001$). Oxygen administration and endotracheal intubation were also significantly more frequent in the GA group ($p = 0.028$ and $p = 0.002$ respectively). These findings remained significant after excluding infants who were delivered for a ruptured placenta or prolapsed cord.

Conclusion:

Abnormal CTG was the predominant indication for caesarean section in preterm infants at our institution and spinal anaesthesia for caesarean section is used most often. Preterm infants delivered by GA require more intensive resuscitation than those delivered by SA – a senior clinician should be present at these deliveries.

ETHICS APPROVAL NUMBER: HREC 598/2015

THIS IS NEW RESEARCH.

DR STANDER COLLECTED THE DATA, DID THE LITERATURE SEARCH AND PREPARED THE PRESENTATION.

Title: EARLY ONSET NEONATAL SEPSIS AT GROOTE SCHUUR HOSPITAL NEONATAL UNIT

Authors: L Golden, L Tooke, M C Harrison

Background:

Early neonatal sepsis (ENS) is a significant cause of neonatal admission, morbidity and mortality. Common pathogens include Group B streptococcus and E. coli, but incidence of proven ENS remains low. Diagnostic difficulty often results in overtreatment despite available screening algorithms and risk protocols. Increased admissions and treatment with antibiotics has cost implications and is a major cause of early mother infant separation with further effects in delayed breastfeeding and bonding. Empiric antibiotics are often started and continued without any evidence of sepsis which drives antibiotic resistance, and has recently been shown to result in changes in colonic microbiome, associated with higher risks of necrotising enterocolitis, and in later life of allergy and atopic illnesses.

Objectives:

1. To investigate and document ENS rates at Groote Schuur Neonatal Unit within a defined one year period.
2. To Describe risk factors present, pathogens and outcomes of proven ENS in the same time period

Methods:

We extracted and analysed retrospective NHLS blood culture data for the unit for the time period 1st August 2014 – 31st July 2015. An audit was conducted on files of all true early neonatal sepsis within the database. True early neonatal sepsis was defined as the presence of a positive blood culture taken within the first 72 hours of life and having grown a true pathogen. (i.e. Positive cultures with organisms considered to be contaminants were excluded). A file audit tool was developed, which included clinical data, risk factors for sepsis (based on Groote Schuur Hospital neonatal protocols), and patient outcomes.

Results:

A total of 451 blood cultures were performed within the first 72 hours of life (58% of total blood cultures in the unit), with the vast majority of these cultures taken on day 1 of life (85% of all early cultures). Of the total number of early cultures done, 19 (4.2%) cultures were positive. Nine of these were identified as contaminants; thus only 10 of the early blood cultures were identified as true early neonatal sepsis (2.2% of total). The most commonly cultured pathogen was Klebsiella pneumoniae (n=5, 50%), followed by E coli (n=2, 20%). Two of the Klebsiella pneumoniae species were Extended Beta Lactamase Producers from day 3 blood cultures. Spontaneous preterm labour was the most common antenatal risk factor for sepsis, found in 100% of day 1 and day 2 blood culture cases, followed by prolonged pre labour rupture of membranes (50%). The early neonatal sepsis cases from blood cultures done on day 3 of life displayed different characteristics from those cases of day 1 and 2 cultures - the day 3 cases being more premature patients, presenting with symptoms of acute deterioration without antenatal risk factors for sepsis, and growing organisms considered hospital acquired pathogens. Mortality in this group was 50%.

Conclusion and recommendations:

GSH neonatal unit has a high blood culture rate, with a very low yield of early neonatal sepsis in this group - the most common antenatal risk factor being spontaneous preterm labour. Strict enforcement of protocols for screening of neonates at high risk of early neonatal sepsis is required to avoid the aforementioned cost, social and long term biological effects of unnecessary treatment of neonates. Even in our small group of true early neonatal sepsis cases, there is a clear distinction in clinical and microbiological patterns between the day 1 and 2 of life sepsis cases versus the day 3 cases, lending to our recommendation to explore limitation of our definition of early neonatal sepsis from the current first 72hrs to a more appropriate 48hrs of life.

HREC: R040/2013

Title: **FEASIBILITY OF PULSE OXIMETRY PRE-DISCHARGE SCREENING IMPLEMENTATION FOR DETECTING CRITICAL CONGENITAL HEART LESIONS IN NEWBORNS IN A SECONDARY-LEVEL MATERNITY HOSPITAL IN THE WESTERN CAPE, SOUTH AFRICA: THE ‘POPSICLE’ STUDY**

Authors: A M van Niekerk (Principal Investigator),¹ BSc, MB ChB, DCH (SA), FCPaed (SA), Cert Cardiol Paed (SA); R M Cullis,¹ MB ChB, DCH (SA), FCPaed (SA); L L Linley,¹ MB ChB, FCPaed (SA), Reg Neon (SA); L Zühlke,² MB ChB, DCH, FCPaed (SA), Cert Cardiol Paed (SA), MPH, FESC, PhD (Paed)

Affiliation: ¹ Division of Neonatal Medicine, School of Child and Adolescent Health, Faculty of Health Sciences, University of Cape Town; Mowbray Maternity Hospital, Cape Town, South Africa ² Department of Paediatrics, Red Cross War Memorial Children’s Hospital and Faculty of Health Sciences, University of Cape Town, South Africa

Background:

Early detection of critical congenital heart disease (CCHD) through newborn pulse oximetry (POx) screening is an effective strategy for reducing paediatric morbidity and mortality rates and has been adopted by much of the developed world.

Objectives:

To document the feasibility of implementing pre-discharge POx screening in well babies born at Mowbray Maternity Hospital, a busy government hospital in Cape Town, South Africa. Parent and staff acceptance was assessed.

Methods:

We conducted a prospective study of pre-discharge POx screening in one postnatal ward, following informed parental consent.

Results:

During the 4-month study period, 1 017 of 2 256 babies discharged (45.1%) were offered POx screening and 1 001 were screened; 94.0% of tests took <3 minutes to perform, 4.3% 3 - 5 minutes and 1.7% >5 minutes. Eighteen patients needed second screens and three required third screens. Only 3.1% protocol errors were made, all without consequence. The vast majority (91.6%) of nursing staff reported insufficient time to perform the study screening in addition to their daily tasks, but ~75% felt that with a full nursing staff complement and if done routinely (not part of a study), pre-discharge POx screening could be successfully instituted at our facility. Over 98% of the mothers had positive comments. Two babies failed screening and required echocardiograms; one was diagnosed with CCHD and the other with neonatal sepsis. The sensitivity and specificity were 50% (95% confidence interval (CI) 1.3 - 98.7%) and 99.9% (95% CI 99.4 - 100%), respectively, with a percentage correct of 99.8%.

Conclusions:

POx screening was supported and accepted by staff and parents. If there are no nursing staff shortages and if it is done *routinely* before discharge, not as part of a study, we conclude that POx screening could be implemented successfully without excessive false positives or errors, or any additional burden to cardiology services.

S Afr Med J 2016;106(8):817-821. DOI:10.7196/SAMJ.2016.v106i8.10071

HREC#: 750/13

Title: A COMPARISON OF STANDARD C-REACTIVE PROTEIN LABORATORY MEASUREMENT TO POINT OF CARE C-REACTIVE PROTEIN TEST IN A NEONATAL INTENSIVE CARE UNIT SETTING

Authors: Dr Kim Prince (Student: PRNKIM002), Dr Fierdoz Omar, Dr Yaseen Joolay (Supervisor)

Background:

Neonatal sepsis contributes significantly to the under-5 mortality rate. Laboratory septic markers alongside risk factors and clinical signs and symptoms are important in diagnosing neonatal sepsis. The currently available diagnostic tests for sepsis often provide results more than 6 to 48 hours later. A bedside C-reactive protein (CRP) test may be able to exclude or diagnose sepsis within minutes. This may rationalise the use of antibiotics to reduce antibiotic adverse events, organism resistance to antimicrobial agents and to prevent infections and their spread.

Objectives:

The objectives were to validate the Alere Afinion™ point of care test CRP in a tertiary neonatal unit against the Roche Cobas 6000 in use by the National Health Laboratory service and to determine the difference in time to obtaining a result between the two systems.

Methods:

A prospective observational and diagnostic test evaluation was performed from February 2015 to June 2015. Patient recruitment and sampling was performed during normal working hours. Neonates were excluded from the study if parental informed consent was not obtained or the point of care and laboratory analysers failed to produce a result. The main outcome was to determine the sensitivities, specificities and predictive values for the point of care test, with the laboratory test as the reference test. The secondary outcome was to compare the median, mean and range of the time to the point of care test result against the time to the laboratory results.

Results:

There were 139 measured CRP sample pairs. Of these samples 44% had suspected early onset neonatal sepsis and 56% had suspected late onset neonatal sepsis. 7.1 % had positive blood culture results or CSF results. Using 10 mg/L as the cutoff value for both the point of care test and laboratory test, the sensitivity, specificity, positive predictive value and negative predictive value were 97.4%, 99%, 97.4% and 99% respectively. The area under the receiver operating characteristic curve was 0.99 (p<0.001). The time to point of care result was 4 minutes. The time to registering the laboratory result was a mean of 4.7 hours and range of 0.5 to 31.2 hours. The time to checking the laboratory result was a mean of 6.8 hours and range of 1.5 to 31 hours.

Conclusions:

The point of care CRP test and laboratory CRP test have excellent correlation in neonates. The point of care test may be a useful, quick, reliable method to obtain a CRP result to commence or discontinue antibiotics, reduce costs and allow for earlier patient discharge.

Title: SYMPTOMATIC CONGENITAL SYPHILIS IN A TERTIARY NEONATAL UNIT: A RETROSPECTIVE DESCRIPTIVE STUDY

Authors: Shakti Pillay, Lloyd Tooke

Background:

Syphilis is a disease that was first described in the 1300's and now 700 years later, despite preventive measures and effective treatment, continues to impact on a global scale, with the burden falling largely on the developing world. We could find no recent published literature looking at predictors of outcomes in neonates born with symptomatic congenital syphilis, especially in the context of a tertiary neonatal setting.

Methodology:

The study design was a retrospective descriptive folder review of neonates born with symptomatic congenital syphilis at Groote Schuur Hospital (GSH) from January 2011 to December 2013. One of the primary objectives was to address the outcomes of these neonates as well as look at modifiable preventable factors. The case definition of congenital syphilis was all neonates who tested serologically positive for syphilis together with characteristic signs of syphilis in the above time period. Data was obtained from the NHLS database, as well as the notification and death books at GSH nursery. All data was collected in a Microsoft spread sheet and analysed using Microsoft StatPlus.

Results:

Fifty neonates (62.5%) with positive syphilis serology as well as clinical signs of congenital syphilis were included together with their fifty mothers. The majority (98%) of mothers were untreated. Nineteen neonates demised. There were no statistically significant differences between the deaths and survivors in terms of gestational age ($p = 0.15$), birth weight ($p = 0.08$) or maternal age ($p = 0.51$). A low one minute Apgar score of less than five was associated with an increased risk of mortality. ([RR], 95% CI 1.6-7.7). Hydropic neonates, tended to be sicker at birth, requiring intubation and inotropes, which was associated with a poorer outcome.

Conclusion:

Despite the introduction of a National Syphilis Screening programme more than twenty years ago together with a large proportion of pregnant women having access to antenatal care, congenital syphilis is still prevalent in South Africa. Deficient antenatal care, poor partner tracing and a number of modifiable health system failures contribute to poor maternal diagnosis and treatment. Many neonates with congenital syphilis require aggressive interventions. Certain categories of neonates have a lower survival rate and guidelines about limitation of care may need to be considered in order to optimise resource allocation. Further research is required to elaborate how best to develop protocols in these neonates.

Ethical approval: HREC 263/2014

Title: IDENTIFICATION OF GENETIC FEATURES UNDERLYING A RARE CHILDHOOD CANCER SYNDROME: CONSTITUTIONAL MISMATCH REPAIR DEFICIENCY (CMMR-D) SYNDROME

Authors: Lindiwe Lamola¹, Alvera Vorster¹, Morne du Plessis¹, Emile Chimusa¹, Ursula Algar², Paul Goldberg², Karen Fieggen¹, Helen Wainwright³, Raj Ramesar¹

Affiliation: ¹MRC Human Genetics Research Unit, Division of Human Genetics, Institute of Infectious Disease and Molecular Medicine, ²Surgical Gastroenterology Unit, Department of Surgery, ³Division of Anatomical Pathology, University of Cape Town and Affiliated Hospitals, Cape Town, South Africa

Introduction:

Childhood cancers account for ~10% of all reported cancers worldwide. In developing countries, childhood cancers have low survival rate attributed to ineffective diagnosis, treatment and presence of co-morbid diseases. In addition, the factors associated with initiation and progression of these cancers is not well understood, which also impacts on the survival. This report focuses on a rare cancer disorder, Constitutional Mismatch Repair Deficiency (CMMR-D) syndrome, which develops due to inherited germline DNA mismatch repair gene mutations. The presence of these mutations affects the functioning of the mismatch repair (MMR) activity, resulting in an increased predisposition to a range of cancers, most commonly brain and hematological tumours in early childhood. The proband in this study is a four-year-old diagnosed with CMMR-D syndrome, who had subsequently demised due to a grade IV astrocytoma in the brainstem. The aim of this study is to identify the genetic factors underlying the development of cancers of the MMR deficiency syndrome.

Methods and Results:

Whole exome sequencing was performed on the CMMR-D case as well as the immediate family. The sequencing analysis was performed and functional annotation of all variants was determined. There were about 26000 variants observed for each individual, ~ 900 unique variants were found in the CMMR-D case versus ~700 in the related sibling. Preliminary data does not indicate any hotspots in terms of mutation accumulation. However, there is an observable difference in the type of variants accumulated by the CMMR-D case compared to the control.

Discussion:

Difference in the number of unique variants between the case and control makes for an interesting observation in contrast with a recent report. The results hint that the type of primary mutation and the MMR gene affected may have an observable impression on the rate of mutation. The ongoing part of the study plans to characterize these variants, genes and biological pathways they are involved in. Since this syndrome has a diverse presentation, there are difficulties in developing guidelines to manage individuals at risk. This study will add to the understanding of disease and contribute to improving surveillance by determining biological markers, which may be used to monitor the cancer initiation and progression for both inherited and sporadic childhood cancers.

Title: INVESTIGATING THE PREVALENCE OF A NOVEL MUTATION IN A NOVEL GENE OF HEARING LOSS (*GRXCR2*) AMONGST SUB-SAHARAN AFRICAN PATIENTS

Authors: Tshepiso Masekoameng¹, Noluthando Manyisa¹, Kamogelo Lebeko¹, Collet Dandara¹, Ambroise Wonkam^{1,2}

Affiliation: ¹Division of Human Genetics, Department of Pathology, ²Department of Medicine, Faculty of Health Sciences, University of Cape Town, Cape Town, South Africa

Background:

Congenital hearing loss occurs in approximately 3-6/1000 birth in Africa, half of which are of potentially of genetic origin. The most prevalent genes, *GJB2* and *GJB6*, amongst patients of European and Asian descents, have not been found to be relevant in patients of African descent. In order to resolve Autosomal Recessive Non Syndromic Hearing Loss (ARNSHL) in 10 multiplex African families, a next generation sequencing (NGS) diagnostic panel named OtoSCOPE®, that investigated 110 hearing loss genes, led to the identification of pathogenic variants in 7/9 families. Probands from the two families negative for mutations' screening with OtoSCOPE® were further investigated using Whole Exome Sequencing; in one of the two families, we identified a homozygous 1bp frameshift deletion in the *GRXCR2* gene (chr5:145252279; TC/T-; R84frameshift), a gene previously associated with ARNSHL only once.

Objective:

We aimed to investigate this specific *GRXCR2* TC/T- ; R84frameshift mutation in an African cohort with ARNSHL.

Methods:

Patients and controls: a previously well described group of 100 patients affected with ARNSHL together with 100 ethnically-matched normal hearing control samples.

Molecular methods: genetic screening was performed using direct Sanger Sequencing.

Bioinformatic analysis: Statistical analysis of the data was performed using SHEsis analysis; Bioinformatic analyses to determine the pathogenicity of the mutation was performed using PolyPhen and SIFT.

Results:

Genotyping of control samples did not detect any *GRXCR2* TC/T- R84 frameshift mutation. Genotyping of the patients' group is ongoing.

Conclusion / perspectives:

The absence of mutation among controls supports the pathogenicity of the *GRXCR2* TC/T-. Genotyping results from patients group will establish if this novel deletion is a private mutation or could deserve routine investigations in patients with hearing loss. This study will contribute to emphasize the need to use Whole Exome Sequencing to explore novel mutations and genes of ARNSHL in Africa.

Title: **DIAGNOSING COMPLEX MITOCHONDRIAL DISORDERS IN A GENETICALLY UNDERSTUDIED POPULATION – LESSONS FROM SOUTH AFRICAN MITOCHONDRIAL NEUROHEPATOPATHY**

Authors: S Meldau*, G Riordan, R De Lacey, K Pillay, K Fieggen, G van der Watt

Objectives:

Mitochondrial diseases comprise a group of clinically heterogeneous disorders affecting the mitochondrial respiratory chain. Diagnosis can be extremely complex and often relies on the identification of a pathogenic variant in either the mitochondrial or nuclear genomes of an affected patient. In a country where access to critical enzyme testing and respirometry is problematic, clinicians rely heavily on a limited number of available genetic tests, which fail to provide answers in most suspected cases. It is not uncommon for a number of sequential molecular tests (including common mutations, full mtDNA sequencing and complete nuclear gene sequencing for a number of genes) to be employed in an attempt to make a diagnosis. This process is often expensive and time consuming, placing excessive strain on a resource constrained genetic diagnostic service.

Here we describe the identification of a novel MPV17 founder mutation using a targeted exome data analysis approach.

Methods:

DNA from two patients with suspected mitochondrial hepatopathy, in whom all other obvious causes of liver disease had been excluded, were extracted from peripheral blood. Both patients presented with strikingly similar phenotypes, including early onset liver disease, prolonged jaundice, raised lactate, hypotonia, hyporeflexia, hypoglycaemia and failure to thrive. Diagnostic consent was obtained from the parents of the affected patients.

Following Sanger sequencing of *POLG* and *C10ORF2*, exome sequencing was performed on DNA from both patients at Stellenbosch University's Central Analytical Facility. Complete exomic data were temporarily stored in a secure environment and variation call files of only a predetermined group of candidate genes were manually analysed for any obvious mutations. The DGUOK, MPV17 and C10ORF2 genes were given top priority based on the clinical presentation seen in these patients.

Results:

Manual analysis of .VCF files generated by exome sequencing revealed a single homozygous, novel nonsense mutation in the MPV17 gene in exomes of both patients. The mutation c.C106T (p.Q36X), introduces a stop codon in exon 3, and is predicted to result in a severely truncated protein. Results were confirmed with Sanger sequencing of exon 3 of the MPV17 gene.

Conclusions:

Exome sequencing has become cost effective over the past few years and is routinely used in overseas settings. Access to exome sequencing services is easily obtainable and affordable. However, the data analysis infrastructure, bioinformatics support and access to appropriate genetic counselling regarding incidental findings is not. Especially in the resource strained public health laboratory environments of developing countries like South Africa.

Using a gene panel analysis approach of exome data rather than expensively sequencing each gene sequentially by Sanger sequencing, we successfully and quickly diagnosed two patients with suspected mitochondrial neurohepatopathy with the same, novel nonsense mutation in exon 3 of the MPV17 gene. Further diagnosis of 11 more patients followed in the space of about 8 months.

This approach to exome data analysis can be valuable as a cost and time efficient first line screening method in complex rare disorders like mitochondrial disease.

Title: INVESTIGATING THE PREVALENCE OF SELECTED *MYO7A* MUTATIONS AMONGST A GROUP OF SUB-SAHARAN AFRICAN PATIENTS WITH NON-SYNDROMIC HEARING LOSS

Authors: Noluthando Manyisa¹, Kamogelo Lebeko¹, Jean Jacques Noubiap Nzeale², Collet Dandara¹ and Ambroise Wonkam¹

Affiliation: ¹Division of Human Genetics, Department of Clinical Laboratory Sciences, ²Department of Medicine, Faculty of Health Sciences, University of Cape Town, Cape Town, South Africa

Address Correspondence to: A/Professor Ambroise Wonkam, Division of Human Genetics, Faculty of Health Sciences, University of Cape Town, Observatory, 7925, Cape Town, South Africa

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Background:

Congenital hearing loss occurs in approximately 5.5/1000 birth in South Africa. Mutations in *GJB2* and *GJB6*, that explain most of autosomal recessive non-syndromic hearing loss (ARNSHL) in people of European and Asian descent, have been shown to be insignificant in African populations. In order to resolve ARNSHL amongst African patients, next generation sequencing (NGS) was employed through the use of OtoSCOPE®, a diagnostic platform for hearing loss, that investigated 66 genes of hearing loss. Compound heterozygous causative mutations (c.5806_5808delCTC and c.5880_5882delCTT) were identified in the *MYO7A* gene in one family. These mutations may have relevance in some cases of non-syndromic hearing loss among Africans.

Aim:

The aim of this project was to investigate two specific *MYO7A* deleterious mutations, in an African cohort with ARNSHL.

Methods:

Patients and controls: A previously well described group of 100 patients affected with ARNSHL together with 200 ethnically-matched normal hearing control samples.

Molecular Methods: Genetic screening will be performed using direct Sanger Sequencing.

Bioinformatics analysis: Pathogenicity of the mutation and influence of secondary variants were analysed using SHEsis program.

Preliminary Results:

The presence of c.5806_5808delCTC was detected, in heterozygosity, in 1 of the 100 patients and in none of the 100 controls population.

Similarly c.5880_5882delCTT was not detected in control populations; its detection among isolated case of hearing loss is ongoing.

Conclusions:

This study is a proof of concept of the use of NGS in resolving cases of ARNSHL amongst patients of African descent. The absence of the mutation in other cases of non-familial hearing loss could indicate that these are private mutations specific to the families' studied and could not deserve routine investigation in isolated patient with hearing loss. The single patient carrier could carry a second *MYO7A* undiscovered mutation which affects the second allele that will need further investigations.

Title: PERCUTANEOUS ENDOSCOPIC GASTROSTOMY OUTCOMES IN CHILDREN WITH NEUROLOGICAL IMPAIRMENT

Authors: Penelope Rose, Ronalda de Lacy, Rob Brown, Elizabeth Goddard

Affiliation: Gastroenterology

Objective:

The objective of this study was to evaluate the outcomes following PEG tube placement in neurologically impaired children, including major and minor complications, and to determine risk factors for complications at Red Cross War Memorial Children's Hospital (RCWMCH).

Methods:

A retrospective record review was conducted of all children aged <13years with neurological impairment (NI) who had a PEG tube inserted between 2009 and 2015 at RCWMCH. Children who had a gastrostomy tube surgically placed or who had a PEG inserted for indications other than NI were excluded. Children were identified from the gastroenterology database and clinical records reviewed. Data was collected for analysis from the time of PEG tube insertion until the PEG was changed to a gastrostomy tube, the PEG was permanently removed or the child died.

Results:

137 folders were reviewed with 98 children having a PEG tube inserted for NI. 57 (58%) were male and the median age was 2.5 years (IQR: 0.8-6.4). The PEG tube was changed to a gastrostomy in 76 (88%), removed in 5 (5%), 5 patients (5%) died and 11 (9%) were lost to follow up. A total of 38 (39%) children experienced any major adverse event (AE), of which 13 were definitely and 16 possibly PEG-related. Prophylactic intravenous antibiotics were documented as administered in 69 (70%) of children. The number of attempts were documented in 60 (61%); 52 had a single attempt, 6 had two, 1 had three and 1 had four attempts. 16 (16%) patients experienced minor complications including 3 peristomal infections requiring oral antibiotics, 5 obstructed PEGs and 8 dislodged PEGs. In multivariate Cox regression analysis, risk factors for related AEs included number of PEG insertion attempts (HR=5.71, [95% CI=1.40-23.3]) and use of intraoperative prophylactic antibiotics (HR=0.08,[95% CI=0.01-0.78]).

Conclusions:

These results indicate that the outcomes of PEG tube insertion in children with NI at RCWMCH compare favourably with outcomes reported in the literature. Limiting the number of attempts at insertion to no more than two and administering prophylactic intravenous antibiotics are likely to reduce the complication rate further.

Ethics approval number HREC REF 017/2016

Title: **RADIOLOGICAL DIFFERENCES BETWEEN HIV-POSITIVE AND HIV-NEGATIVE CHILDREN WITH CHOLESTEATOMA**

Authors: J.McGuire, J.Fagan, T.Harris

Affiliation: Division of Otolaryngology, University of Cape Town

Introduction:

Chronic inflammation of the middle ear cleft may be more common in patients with HIV and this may predispose the children to developing cholesteatoma. However, there are no studies available that describe the radiological morphology of the middle ear cleft in HIV-positive compared to HIV-negative children with cholesteatoma.

Aim:

Compare the radiological differences of the middle ear cleft in HIV-positive and HIV-negative children with cholesteatoma.

Method:

A retrospective, cross-sectional, observational analytical review of patients with cholesteatoma at Red Cross War Memorial Children's Hospital over a 6 year period, comparing the radiological findings of children with HIV infection to those without.

Results:

Forty patients were included in the study, 11 of whom had bilateral cholesteatoma and therefore 51 ears were eligible for our evaluation. There was a male to female predominance (7:3) and 11 patients (27.5%) were HIV-positive. The age range in the HIV-positive and negative groups were similar.

Relatively more HIV-positive patients had poorly pneumatized or sclerotic mastoids ($p < 0.02$). Significantly more HIV-positive patients had bilateral middle ear disease ($p < 0.02$), bilateral cholesteatoma ($p < 0.02$) and Eustachian tube obstruction ($p = 0.04$). There was no significant difference between the 2 groups with regards to aeration of the middle ear cleft or to the number of patients who had bony erosion of middle ear structures.

Conclusion:

HIV-positive pediatric patients with cholesteatoma are more likely to have poorly pneumatized or sclerotic mastoids compared to HIV-negative patients. This has implications in terms of recurrence and an approach to management and follow-up. This group of patients are more likely to have bilateral middle ear disease and HIV infection should be flagged as a risk factor for developing cholesteatoma. A high index of suspicion should be maintained when examining an HIV-positive child with chronic otorrhoea.

Title: FAECAL CARRIAGE OF EXTENDED-SPECTRUM BETA-LACTAMASE- AND CARBAPENEMASE-PRODUCING ENTEROBACTERIACEAE IN HEALTHY INFANTS AND THEIR MOTHERS, SOUTH AFRICA

Authors: R. I. Manenzhe¹, C. Moodley¹, S. Africa¹, H. J. Zar¹, M. P. Nicol¹, M. Kaba¹

Affiliation: ¹University of Cape Town, Faculty of Health Sciences, Cape Town, South Africa

Objectives:

The prevalence of extended-spectrum beta-lactamase (ESBL)- and carbapenemase-producing Enterobacteriaceae in healthy humans in the community is largely unknown. We aimed to determine the prevalence and genetic characteristics of ESBL- and carbapenemase-producing Enterobacteriaceae in stools from healthy infants and their mothers, and to determine the risk factors associated with their acquisition.

Methods:

Maternal faecal samples (n= 90) and infants meconium (n= 90) were collected at birth from participants in the Drakenstein Child Health Study, a birth cohort in a semi-rural region of Western Cape, South Africa. Samples were screened using ChromID ESBL and ChromID CARBA media. Identification of suspect ESBL/carbapenemase-producing isolates and antibiotic susceptibility were determined using the Vitek 2 system. ESBL production was confirmed using the combination disc test, and that of carbapenemase using the modified hodge test. Selected ESBL and carbapenemase genes were evaluated by PCR and Sanger sequencing. Risk factors were assessed using univariate analysis.

Results:

Carriage of ESBL-producing organisms was found in 4.4% (95% CI: 1.2% - 11%) of both mothers and infants. ESBL genes were detected in four *E. cloacae* (*bla*_{SHV-12/5}), three *K. pneumoniae* (*bla*_{CTX-M-15}) and one *E. coli* (*bla*_{CTX-M-14}) isolates. Carbapenemase-producing isolates were not detected in this study. One mother-infant pair was ESBL-positive at birth with SHV-12- producing *E. cloacae*. Being born to HIV-positive mother, being born via elective caesarean section and administration of medication before discharge were positively associated with infant ESBL faecal carriage at birth. In contrast, breastfeeding prior to discharge was negatively associated with infant ESBL faecal carriage.

Conclusions:

This is the first study to detect ESBL-producing bacteria in human meconium samples and raises questions on source of such isolates and implications for community transmission.

The study was approved by the Faculty of Health Sciences (FHS) Human Research Ethics Committee (HREC) of the University of Cape Town, South Africa (HREC reference number: 738/2013).

Title: RESOLVED LOWER LIMB MUSCLE TONE ABNORMALITIES IN CHILDREN WITH HIV ENCEPHALOPATHY RECEIVING STANDARD ANTIRETROVIRAL THERAPY

Authors: Theresa N. Mann^{1,2}, Kirsten A. Donald³, Kathleen G. Walker⁴, Nelleke G. Langerak¹

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Objective:

This short report describes clinical observations that arose during a follow-up examination of children previously diagnosed with Human Immunodeficiency Virus (HIV) encephalopathy and increased lower limb muscle tone. It is among the first to describe that increased lower limb muscle tone in children with a confirmed HIV encephalopathy diagnosis may resolve over time in some cases.

Methods:

Children potentially eligible for a study investigating the natural history of spastic diplegia in children with HIV encephalopathy were identified using a database of patients seen at the Red Cross War Memorial Children's Hospital HIV Neurology clinic between 2008 and 2014. The database included each child's medical history and the findings of a physical examination. Children diagnosed with HIV encephalopathy and recorded as having increased lower limb muscle tone were invited to the hospital for further screening, including a follow-up physical exam. During screening, it was found that lower limb muscle tone abnormalities had resolved in some children. Possible explanations for this unexpected finding including i) age and follow up time, ii) severity of the initial neurological findings and iii) age at the start of anti-retroviral treatment were subsequently investigated.

Results:

Of 19 children previously diagnosed with HIV encephalopathy and increased lower limb muscle tone, some were found to have resolved muscle tone abnormalities during a follow-up physical examination (Resolved group, $n=13$, median age 9y7mo [interquartile range 7y3mo-10y9mo]) whereas others continued to show increased lower limb muscle tone at follow-up (Unresolved group, $n=6$ median age 8y6mo [interquartile range 7y9mo-9y7mo]). A review of clinical records showed no significant differences in age or follow-up time between the Resolved and Unresolved groups. However, children in the Resolved group had less severe neurological signs at the initial assessment and tended to commence antiretroviral treatment later compared to children in the Unresolved group (median age at start of treatment 2y3mo [interquartile range 7mo-5y3mo] vs. 8mo [interquartile range 6mo-12mo], $p=0.08$).

Conclusions:

It is anticipated that this information may be of immediate value to those involved in the treatment of children with HIV encephalopathy and increased lower limb muscle tone whilst awaiting the outcome of future controlled clinical trials.

HREC REF 447/2012

This is new research (only previously presented in part at the 6th International HIV Pediatrics Workshop, Melbourne, Australia, 18-19 July 2014)

Title: REVIEW OF LIVER INJURIES IN YOUNG CHILDREN

Authors: Van As AB, Fester A, Banderker E, Millar AJ, Numanoglu A

Affiliation: Trauma Unit, Department of Paediatric Surgery, Red Cross War Memorial Children's Hospital in Cape Town, University of Cape Town

Purpose:

This study on the management of blunt liver injury in children is based on the authors' experience of 409 patients over a 32-year period.

Materials and Methods:

All children presenting to our institution with confirmed blunt liver trauma were studied retrospectively. Hospital folders of 409 patients were analysed. Information was gathered about the clinical presentation, associated injuries, grade of injury, transfusion requirements and haemodynamic stability to examine factors influencing outcome.

Results:

The age of patients ranged between 3 weeks and 13 years (mean of 7 years). Overall, most injuries were motor vehicle related, 303 pedestrian and 47 passenger, followed by 26 falls, 17 non-accidental injury cases, 3 bicycle injuries, 3 crush injuries and 1 unknown cause. One-hundred-and-sixty-three (163) patients sustained an isolated hepatic injury and 246 had multiple injuries. Associated injuries included 160 head injuries, 163 fractures, 102 thoracic and 191 intra-abdominal (96 spleen, 70 renal, 5 pancreatic and 5 hollow viscus). A total of 368 patients were managed non-operatively, while 30 underwent laparotomy and 2 died very briefly after arrival. The total number of fatalities was three, one due to severe head injury and two due to injuries sustained by the liver. A total of 146 patients required a transfusion, 31% of the non-operative group (mean 17ml/kg) and 100% of the operative group (mean 30.4ml/kg). There were 13 complications in the non-operative group and in addition to the aforementioned avulsion include 2 ruptured subcapsular haematomas, 7 abscesses, 1 pancreatic pseudocyst and one fat embolism syndrome.

Conclusion:

The vast majority (93%) was successfully treated non-operatively with only 4% coming to liver related laparotomy, complications were lower, transfusions less and the in-hospital occupancy was shorter. Complication rate was 8% and mortality was 1%. We confirm the success selective non-operative management of blunt liver trauma as adopted by our institution 32 years ago.

Title: **THE SPATIAL DISTRIBUTION OF INJURY MORTALITY OF CHILDREN IN THE WESTERN GEOGRAPHIC SERVICE AREA, CITY OF CAPE TOWN (2011-2015)**

Authors: Zulfah Albertyn¹, David Coetzee², Shanaaz Mathews¹

Affiliation: ¹University of Cape Town, Children's Institute, Cape Town, South Africa. ²University of Cape Town, Department of Public Health and Family Medicine, Cape Town, South Africa.

Child mortality is a global public health burden, and child deaths under the age of five far exceed deaths in the older age groups. The pattern of cause of death for children differ somewhat by age. The leading cause of death in children is still due to natural causes with; communicable diseases namely, lower respiratory track infection (LRTI), diarrheal disease commonly afflicting children under-five while older children are more likely to die as a result of injury deaths such as homicide or road traffic injury, yet both are preventable. Resources to prevent child deaths are primarily focused on the under-five age group, even though the injury burden of children increases with age. It is therefore important to strengthen the monitoring and tracking of child mortality in South Africa for all age groups over time to inform preventative measures. In addition, geographic information system (GIS) tools can describe and visualize patterns of disease burden relative to the socioeconomic and community (including environmental) proximate determinants of health. This PhD study aims to retrospectively facilitate the monitoring and tracking of injury mortality in children using mortuary data over the period of 2011 to 2015 across the western geographic service area of the City of Cape Town; by investigating the pattern of injury burden of children followed by developing a spatial analytical model to highlight where the high- and low-areas of risk (clusters) and when RTIs have taken place, as well as, potential exposures that influence these clusters.

Title: THE ONGOING NEED FOR EDUCATION ON RISK FACTORS FOR SUDDEN UNEXPECTED DEATH OF INFANTS

Authors: Mia M. Kruger¹, Kate Megan Reid^{1,2} & Laura Jane Heathfield^{1,2}

Affiliation: ¹ Division of Forensic Medicine and Toxicology, Department of Pathology, Faculty of Health Sciences, University of Cape Town, Anzio Road, Observatory, 7925, South Africa
² Division of Human Genetics, Department of Pathology, Faculty of Health Science, University of Cape Town, Anzio Road, Observatory, Cape Town, South Africa

Background:

In developed countries, sudden infant death syndrome (SIDS) is the leading cause of infant death. In South Africa, cases of sudden unexpected death of infants (SUDI) are mandated to undergo medico-legal autopsy under the Inquests Act (Act 58 of 1959) which has revealed that the majority of SUDI is attributed to *infection*. The paucity of literature published on SUDI in South Africa prompted a retrospective review of infant death at Salt River Mortuary to determine risk factors associated with the cause of death.

Aim and objectives:

The aim of this study was to investigate infant death at Salt River Mortuary. To this end the objective was to retrospectively analyse data for infant deaths in order to understand the contribution of risk factors toward SUDI.

Methods:

Case files pertaining to SUDI cases at Salt River Mortuary between 1 January 2013 and 30 June 2016 (three and a half years) were reviewed to collect information about the death scene, clinical history and risk factors. For 1 January 2013 to 31 December 2014, specific information pertaining to infection related deaths was also obtained. Data were then analysed with Microsoft Excel and STATA version 14.0.

Results:

During the three and a half year period, a total of 1205 infant deaths (≤ 1 years old) were admitted to Salt River Mortuary, of which 915 (75.9%) were sudden and unexpected (SUDI). The majority of these cases ($n=530$, 58%) occurred in infants younger than three months old. Approximately 75% of SUDI cases were attributed to infectious causes. Of these cases, at least 23% were not up to date with vaccinations, at least 20% were exposed to HIV and ~95% co-slept with one or more family member(s). The extent of autopsy categorised as full autopsy, partial autopsy and external examination, was ~29%, ~5% and ~66% respectively, and the causative pathogen was identified in ~11% of cases. In addition 11-14% of mothers reported having had a previous infant who also died suddenly and unexpectedly. While commonly recognised risk factors for SUDI were also observed in this study (e.g. sleep environment, tobacco exposure and prematurity), the majority of infants were reported to sleep on their *side* which is inconsistent with *prone* sleeping as the widely-accepted risk factor.

Conclusions:

Risk factors for SUDI included co-sleeping, side sleeping, tobacco exposure, prematurity and age (<3 months). Whilst most of these factors are well-recognised internationally, this data showed that many South African infants still sleep in suboptimal conditions, putting them at increased risk of SUDI. Caregivers should be educated on modifiable risk factors in the hope to prevent SUDI and reduce the devastating burden of infant death.

Ethics: This study obtained ethics approval by the University of Cape Town, Faculty of Health Science, Human Research Ethics Committee. HREC: 445/2015 and HREC: 102/2016.

Title: **ARTICULATING THE PAEDIATRIC NURSING PRACTICE MODEL OF CARE AT A UGANDAN HOSPITAL - CHALLENGING CURRENT THOUGHT WITH EMERGING EVIDENCE**

Authors: Angela Leonard¹, Lydia Ssengyonga², Minette Coetzee¹

Affiliation: ¹Department of Paediatrics and Child Health, University of Cape Town
²CURE Children's Hospital of Uganda (CCHU)

Objective:

To articulate the clinical practice model of care at CURE Children's Hospital of Uganda (CCHU) by describing the care pathway from admission until discharge. To gain a detailed understanding of who provides care and what care is provided at CCHU. This specialist paediatric neurosurgical teaching hospital provides treatment, support and care for children with hydrocephalus, neural tube defects and brain tumours.

Methods:

The intentionally participative methodology used the lens of appreciative inquiry approach and qualitative methods. Data was collected through focus groups, interviews, participant observations, unit and bed space layout. It included how a child moves through the hospital; who they see; what happens along each part of the neurosurgical pathway; communication and how parents are involved in care. Graphic facilitation, a visual tracking method captured multidisciplinary staff discussion and contributions to the neurosurgical pathway during the focus groups.

Results:

Tracking and exploring the pathway allowed staff and researchers to articulate the paediatric neurosurgical nursing practice model of care. Core to this care is that mothers are admitted as the primary patient. The mother maintains the fundamental care of her child throughout her stay. The pathway showed that all staff direct their care of the child through the mother.

Conclusions:

While this approach may seem like a necessity in the scarce nursing resources of Uganda and other resource constraint countries, the emerging neuroscience evidence confirms that the presence of the mother determines physiological stability of the child.

Title: **HOW TRACKING A PATH OF CARE ASSISTED IN MAKING UNSEEN CLINICAL PRACTICE VISIBLE AT CURE CHILDREN’S HOSPITAL OF UGANDA**

Authors: Angela Leonard¹, Lydia Ssengyonga², Minette Coetzee¹

Affiliation: ¹Department of Paediatrics and Child Health, University of Cape Town
²CURE Children’s Hospital of Uganda (CCHU)

Objectives:

What clinicians and mothers do every day can easily become hidden in habitual norms of practice. The assistant nurse manager at CURE Children’s Hospital of Uganda (CCHU), a specialist paediatric neurosurgical teaching hospital, expressed an interest to involve the hospital team in a facility wide practice development process to make current practice visible and find opportunities to develop and improve practice. The Child Nurse Practice Development Initiative accepted the invitation to facilitate the process by tracking the path of care through the hospital articulating roles of both health care workers and parents and finding the opportunities for improvement.

Methods:

The methodology was intentionally participative and data was collected using focus groups, interviews and observation. Graphic facilitation, a visual tracking method, facilitated data gathering from multidisciplinary teams (nurses, doctors, social workers, physios and pastoral workers) on: the path of care from arrival until discharge, along this path details were captured around what happens, who provides care, how parents are included and communication.

Results:

The outcome of the site visit to CCHU is a bold graphic harvest which captures staff discussion and contributions to unpacking the path of care. Visual outcomes clarified the team’s triumphs, ongoing social, physical and occupational challenges and more surprisingly, factors enabling family involvement.

Conclusions:

Insights gained have provided clarity on best practice models in a Ugandan paediatric context related to family involvement. The visual graphic harvesting helped to make practice visible and motivated practice change around the following key learnings: Staff identified opportunities for refining current practice which included triage and a clinical nurse co-ordinator; aligning systems with mother’s needs; implementing daily time schedules aligned with mothers /child needs; simplifying documentation and finally, clarifying roles.

Title: THE EFFECT OF BODY POSITION ON REGIONAL DISTRIBUTION OF VENTILATION AND MUSCLE ACTIVITY IN MECHANICALLY VENTILATED INFANTS AND CHILDREN

Authors: Lupton-Smith AR; Argent AC; Rimensberger PC; Morrow BM

Affiliation: School of Child and Adolescent Health, University of Cape Town; Paediatric Intensive Care Unit, Red Cross War Memorial Children's Hospital; University Hospital of Geneva, Switzerland

Introduction:

Recent studies have questioned the pattern of ventilation distribution (VD) in the paediatric population. There are no recent studies examining the effect of body position in older mechanically ventilated children. In addition, there are few studies reporting muscle activity in relation to body position in this population.

Aim:

To determine the effect of body positions on regional VD and respiratory muscle activity in mechanically ventilated children.

Methods:

Thoracic electrical impedance tomography (EIT) and surface electromyography (sEMG) measurements were taken in left and right side lying, supine and prone positions in mechanically ventilated infants and children. Functional EIT images were produced and regional relative tidal impedance (ΔZ) in the left, right, ventral and dorsal lungs was calculated. Activity (μV) of the left, right, ventral and dorsal hemidiaphragms was examined in each position.

Results:

Twenty-one children (11 (50%) male) aged six months to 6 years are presented. Majority (11, 53%) of children consistently showed greater ventilation in the right lung (11, 53%) in side lying and dorsal lung (6, 46%) in supine and prone positions. No significant differences in ΔZ , regional filling and diaphragm activity were found between left and right lungs in side lying. Regional filling was significantly greater in the dorsal lung in the prone position ($p=0.007$). Significantly greater activity was seen in the ventral hemidiaphragm in supine and prone positions ($p=0.04$).

Conclusions:

The paediatric pattern of ventilation is not predictable in mechanically ventilated infants and children, as previously described. Muscle activity is variably affected by body position.

A Lupton-Smith is registered as PhD student in the department and was involved in the study design, data collection, data collection, preparation of the abstract.

UCT HREC Ref: 126/2012

Title: GYRIFICATION DIFFERENCES IN 7 YEAR OLD HIV-INFECTED CHILDREN STARTING ART BEFORE OR AFTER 12 WEEKS OF AGE

Authors: Emmanuel C. Nwosu¹, Frances C. Robertson¹, Martha J. Holmes¹, Mark F. Cotton², Els Dobbels², Francesca Little⁵, Barbara Laughton², Andre van der Kouwe^{3,4}, Ernesta M. Meintjes¹

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Objective:

Early antiretroviral therapy (ART) has been found to improve initial outcomes for HIV-infected infants, however, long-term effects on brain development are not known. The objective of this study is to investigate effects of early ART on magnetic resonance imaging (MRI) brain morphometry in perinatally HIV-infected children at 7 years of age.

Methods:

MRI scans were performed on sixty-one HIV-infected isiXhosa children (28 boys, age 7.21 ± 0.12 years) and 23 HIV-unexposed (HU) controls (13 boys, age 7.24 ± 0.18 years) - from the follow-on study of the Children with HIV early Anti-retroviral (CHER) trial. Scans were done without sedation according to protocols approved by the Human Research Ethics Committee of the University of Cape Town (HREC ref. no: 688/2013). 46 HIV-infected children started ART before 12 weeks of age (Early-ART; 28 interrupted) while 15 started ART after 12 weeks (Late-ART). FreeSurfer software v5.1.0 was used for automated brain segmentation and reconstruction. Whole-brain cortical thickness and gyrification (a measure of cortical folding) and regional brain volumes were compared between Early-ART, Late-ART children and HU control children using a linear regression model controlling for sex and duration of ART interruption.

Results:

There were no cortical thickness or volume differences between Late-ART and Early-ART children. Late-ART children had significantly greater gyrification than Early-ART children in a large bilateral medial frontal region ($p < 0.05$), where there was also a positive association between age at ART initiation and gyrification. Early-ART children had less gyrification than HU controls in an overlapping right frontal region ($p < 0.05$) but there was no difference between Late-ART children and HU controls in this region at the same significance level.

Conclusions:

Gyrification in childhood may be sensitive to ART initiation timing. ART started before 12 weeks, irrespective of interruption, may impact the development of cortical folding during an early critical period compared to delayed ART.

This work has not been presented at a UCT research day.

Title: MORTALITY AMONG 5-17 YEAR OLD CHILDREN IN KENYA

Authors: Osano, B.O.^{1, 2*} Were, F.N.¹ Mathews, S.²

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Background:

Global mortality trends have changed over time and are expected to continue changing with a reduction in communicable diseases and an increase of non-communicable disease. Increased survival of children beyond five years may change mortality patterns for these children. There are few studies in Africa that explore the causes of mortality in children over five years.

Objective:

Was to determine the mortality rate and clinical profiles of children aged 5-17 years who died in six Kenyan hospitals in 2013.

Methods:

Retrospective review of patients' medical records to abstract data on diagnosis for those who died in year 2013. Data was analysed to provide descriptive statistics and explored differences in mortality rates between age groups and gender.

Results:

We retrieved 4,520 patient records. The in-hospital mortality rate was 3.5% (95%CI 3.0-4.1) with variations in deaths between the ages and gender. Among the deaths, 60% suffered from communicable diseases, maternal and nutritional causes; 41.3% suffered from non-communicable diseases. A further 11.9% succumbed to traumatic injuries. The predominant clinical diagnoses among patients who died were HIV/AIDS, respiratory tract infections and malaria.

Conclusion:

Infectious causes had the highest proportion of diagnoses among children aged 5-17 years who died.

Keywords: Kenya, mortality, teenage, adolescent

Title: PAEDIATRIC CARDIAC CRITICAL CARE ADMISSIONS TO A TERTIARY PAEDIATRIC INTENSIVE CARE UNIT

Authors: Rossouw B*, Wege M, Argent AC, Morrow BM. Division of Critical Care and Children's Heart Diseases, Red Cross War Memorial Children's Hospital, University of Cape Town

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Background:

Paediatric Cardiac Critical Care (PCCC) in South Africa is not well described.

Objectives:

This is the first study describing the patient profiles and treatment of PCCC admissions to a South African tertiary mixed medical and surgical PICU.

Methods:

A prospective review of consecutive patients admitted to Red Cross PICU with a cardiac discharge diagnosis from January 2015 to December 2015.

Results:

472 PCCC PICU admissions of 409 patients were included. 274 admissions followed elective cardiac surgery, 37 were post elective general surgery and 161 admissions were unplanned emergency admissions. Indications for emergency admission included: shock (28%), respiratory support required (22%), cyanosis (18%), decompensated cardiac failure (18%), post cardiac arrest (8%) and life threatening arrhythmias (3%). Comparing elective admissions to emergency admissions the median age of admission was 24 vs 5 months ($p < 0.0001$), length of PICU stay 3 vs 6 days ($p < 0.0001$), length of ventilation 1 vs 2 days ($p = 0.13$), length of inotrope use 1 vs 2 days ($p = 0.08$) and median maximum inotrope score was 1 vs 9 ($p = 0.46$). A cardiac diagnosis was made for the first time on PICU in 57 patients. 85 emergency theatre procedures (32 cardiac surgical) were undertaken from PICU. 81 patients needed PICU readmissions and 19 needed redo cardiac surgery during this study period. PICU complications in the elective admission group versus the emergency admission group included failed extubation in 5.7% vs 13% ($p = 0.006$), chest infection on admission in 20.6% vs 45% ($p < 0.0001$), blood stream infection in 3.8% vs 17.4% ($p < 0.0001$), AKI in 17.4% vs 32.9% ($p = 0.001$), liver impairment in 3.5% vs 19.3% ($p < 0.0001$), neurological sequelae in 1.9% vs 14.9% ($p < 0.0001$) and PICU readmission in 10.3% vs 30.4% ($p < 0.0001$). Both 4.1% of elective and emergency admission group suffered a cardiac arrest during PICU stay ($p < 0.0001$). PICU mortality for the elective versus emergency admission group was 1.6% vs 12.4% ($p < 0.0001$) and standardized mortality 0.25 vs 0.8.

Conclusions:

Overall 34.9% of all PICU admissions during 2015 were PCCC admissions. Emergency PCCC admissions have a higher morbidity and mortality in our setting.

Title: THE IMPACT OF ECHOCARDIOGRAPHY IN A PAEDIATRIC INTENSIVE CARE UNIT

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Background:

Echocardiography has become an important tool to assess critical ill adults. The influence of echocardiography on the management of critical ill children is not well described.

Objectives:

To review the impact of echocardiography in a single center tertiary PICU.

Methods:

Prospective review of all echocardiographic studies done in a combined 22-bed medical and surgical tertiary PICU between February 2015 to January 2016.

Results:

During this one year study period 15% of the total PICU population received an echocardiographic assessment during PICU stay. 379 Echocardiograms were done on 211 PICU patients of which 88 patients were known with a cardiac condition prior to PICU admission. Sixty three percent (n=238) of the echocardiograms were done by the cardiology department and thirty seven percent (n=141) by ICU staff formally trained in echocardiography. Indication for echocardiograms were for assessment of cardiac function, anatomy, pulmonary pressure, infective endocarditis and pericardial effusion in 146, 101, 54, 19 and 5 studies respectively. Post cardiac surgery echocardiograms were performed to assess cardiac function, residual lesions and pulmonary pressure in 118, 137 and 21 studies respectively. New congenital heart lesions were diagnosed in 47 PICU patients for the first time in PICU. The newly diagnosed congenital heart lesions included right ventricular outflow tract obstructions in 12 patients, 6 left ventricular outflow tract obstructions and 27 patients with shunt lesions. Newly acquired heart lesions were diagnosed in 10 patients of which 5 were dilated cardiomyopathy and 5 infective endocarditis. Normal hearts were confirmed in 14% and 26% of the echocardiograms confirmed new pathology that did not require PICU treatment change. 39% of the echocardiograms identified new anatomical or functional pathology that subsequently altered PICU management. Treatment modification included surgical intervention (41), change in inotropes (47), pulmonary hypertension treatment (21), anti-failure treatment (22), fluid management (13), prostaglandin (6) and infective endocarditis treatment change (5). 4 patients were found to have inoperable cardiac lesions and were palliated.

Conclusions:

Echocardiography is a valuable diagnostic tool in PICU and often contributes to treatment modification.

Title: **ROLE OF FOCUSED ABDOMINAL SONOGRAPHY IN TRAUMA (FAST) AS A SCREENING TOOL FOR BLUNT ABDOMINAL TRAUMA (BAT) IN YOUNG CHILDREN INVOLVED IN HIGH VELOCITY TRAUMA**

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Affiliation: Trauma Unit, Department of Paediatric Surgery, Red Cross War Memorial Children's Hospital in Cape Town, University of Cape Town

Purpose:

To review the utility of Focussed Abdominal Sonography in Trauma (FAST) as screening tool for blunt abdominal trauma on young children after sustaining high velocity trauma. The objectives were to determine whether FAST added value after physical examination in the detection of intra-abdominal injury and to determine the added value of FAST with reference to treatment.

Materials and methods:

Patients who presented in the Trauma Unit of RXH after high velocity trauma underwent both physical examination and FAST. With FAST, possible free fluid in abdomen and pelvis was assessed. Sensitivity, specificity, positive, and negative predicting values for identifying intra-abdominal injury were calculated for physical examination and FAST individually, or combined when used together.

Results:

Seventy-five (75) patients were included, n=46 were motor vehicle crash pedestrian, n=14 assault, n=9 fall from height, n=4 motor vehicle crash passenger, n=1 child hit by falling table, n=1 child hit by falling TV. Ages ranged from 3 months to 13 years. On physical examination the sensitivity was 0.80, specificity 0.83, PPV 0.42, and NPV 0.96. On FAST the sensitivity 0.50, specificity 1.00, PPV 1.00, and NPV 0.93. Combined the sensitivity raised to 0.90. Regarding management, 73 patients were treated with non-operative management and two were operated.

Conclusion:

Based on the results we suggest FAST is performed in combination with physical examination on every paediatric patient involved in a high velocity trauma suspected of BAT. When both are negative, non-operative management can be used without fear of missing clinically significant injury. Lastly, FAST can be accurately performed by relatively inexperienced doctors after a proper training for this purpose.