Department
of
Paediatrics & Child Health

ANNUAL RESEARCH DAYS 2018

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Programme and Abstract Book

**30th & 31st October
D3 Lecture Theatre, D Floor
Red Cross War Memorial Children's Hospital**

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Title: **GENETIC MEDICINE IN AFRICA: CHALLENGES, PROSPECT AND CALL FOR ACTION**

Keynote Speaker: Ambroise Wonkam, MD, DMedSc, PhD

Affiliation: Professor of Medical Genetics, Division of Human Genetics, Faculty of Health Sciences, University of Cape Town, South Africa.

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Remarkable progress has been made in using genomic information to determine how genes are regulated, and how they interact with each other and with the environment to control complex biochemical functions of living organisms in health and disease. This information will have major benefits for the prevention, diagnosis and management of many diseases, including communicable and genetic diseases. The prospects for genomic medicine research in Africa have been enhanced by major initiatives that are led by international funding agencies and academics, such as the Malaria Genomic Epidemiology Network (www.malariagen.net/) and the Human Heredity and Health in Africa program (h3africa.org/). There is a need for African societies to prepare for the genomics era and its consequences through education at all levels.

Simple clinical applications of DNA technology could provide immediate benefit for healthcare in many African countries such as application of Genetic in prenatal diagnosis and for personalised medicine in prevalent condition such as Down syndrome or Sickle cell Disease (SCD). Although there is sporadic evidence of participation of Africans in researching the genomics of rare monogenic and multifactorial conditions, there is little evidence that this improved contribution of African researchers to research has an impact on genomic medicine Practice in Africa. There is therefore an urgent call to map specific mutations and variations for monogenic conditions among Africans and susceptibility to infectious and non-communicable diseases in order to fast tract their implementation in practices. For instance a research on congenital hearing loss among Cameroonians has revealed nearly 50% of mutations were novel and 30% of families did not have detectable mutations, auguring possibility of new genes discovery.

Improved capabilities of African institutions to undertake research with: 1) the development of academic public research and partnerships among African countries themselves; 2) the development of a critical mass of expertise in bioinformatics in order to utilize the vast quantities of genomic data that are being generated; 3) Finally, all African countries need to evolve appropriate national frameworks to consider the ethical implications of genomics research and its applications in their own unique social, cultural, economic and religious context.

Title: INSIGHT INTO THE THE MOLECULAR PATHWAYS OF INFLAMMATION AND INJURY IN PATIENTS WITH TUBERCULOUS MENINGITIS

Authors: Ursula Rohlwink[1], Anthony Figaji[1], Katalin A Wilkinson[2,3], Brian Eley[4], Robert J Wilkinson[2,3,5], Rachel Lai[2]

Affiliation: [1]Neuroscience Institute, Division of Neurosurgery, University of Cape Town, [2]Francis Crick Institute, NW1 1AT, London, [3]Wellcome Centre for Infectious Diseases Research in Africa, IDM, University of Cape Town, [4]Department of Paediatrics, University of Cape Town, [5]Imperial College London, UK

Objective:

Tuberculous meningitis (TBM) is the most fatal form of TB leading to death and disability in many of the affected children. The immune response is a key factor leading to poor outcome but it is poorly understood and brain injury continues in patients on standard anti-TB treatment, including steroids. Further characterisation of the immune response and mechanisms of brain injury are needed, and may elucidate novel opportunities for host-directed therapies.

Methods:

We conducted whole genome RNA sequencing on lumbar and ventricular cerebrospinal fluid, and blood of paediatric patients treated for TBM at Red Cross War Memorial Children's Hospital. We compared their gene epression profile with 1) healthy controls and 2) control patients who had a cerebral infection that was not of TB origin. Sequencing was performed on the Illumina Hi-Seq 4000, analysis of data was performed using an established pipeline, and pathway analysis was conducted using the Reactome biological pathway database and IPA Ingenuity (QIAGEN).

Results:

Twenty TBM cases were enrolled with a median age of 3 years (min-max: 0.3 - 12), the culture positivity rate was 44%, HIV co-infection rate 5% (n=1) and the mortality rate was 15% (n=3). Twenty-three IGRA negative healthy controls with a median age of 5 years (min-max: 0.3 – 12.9), and 7 non-TB infection controls with a median age of 1.1 years (min-max: 0.1 – 12.1) were recruited. The blood RNA-seq demonstrated a strong inflammatory signature, with a higher abundance of RNA transcripts associated with the inflammasome pathway detected in cases relative to controls. Ventricular CSF RNA-seq analysis demonstrated an enrichment of genes and pathways associated with neuronal excitotoxicity and cell damage in TBM cases. A comparison of the transcriptomic profile between the ventricular and lumbar CSF in TBM cases demonstrated that the ventricular profile represented brain injury whereas the lumbar profile represented protein transcription and cytokine signalling.

Conclusion:

Transcriptomic analysis provides valuable insights into the molecular basis of the initial immune response and the consequent injury mechanisms set in motion. Disease processes differ between the periphery and the central nervous system, and across compartments in the brain. These data offer novel insight into TBM pathophysiology, which could reveal avenues for developing new host-directed therapies.

Title: STRUCTURAL AND FUNCTIONAL BRAIN NETWORK CONNECTIVITY IN PRENATAL ALCOHOL EXPOSED NEONATES AS ASSESSED BY MULTIMODAL BRAIN IMAGING

Authors: A Roos[1], JP Fouche[2], JC Ipser[2], KL Narr[3], RP Woods[3], HJ Zar[4], DJ Stein[2], KA Donald[4]

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Objective:

Prenatal exposure to alcohol (PEA) compromises the development of brain networks underlying core behavioural functions in neonates, but studies have not attempted to integrate structural and functional data after PEA. The aim of this study was to apply graph theoretical analysis (GAT) to multimodal MRI data, allowing the simultaneous characterization of disruptions in structural and functional brain network organization after PEA.

Methods:

A sample of 11 neonates prenatally exposed to alcohol (ALC) and 14 healthy controls (CON) from the Drakenstein Child Health Study, aged 2-4 weeks, were included in this analysis. Resting state functional and diffusion weighted structural MRI data were acquired during natural sleep. GAT was applied to create covariance networks for each of the two data sets, controlling for variance in age and sex. Hubs in regionals brain networks were operationalized as clusters with connectivity two standard deviations above that of the mean for that network. Nonparametric permutation tests were employed to identify group differences in the connectivity of global network hubs.

Results:

Functional network hubs in ALC were the amygdala, pallidum and superior temporal lobe; while functional hubs in CON included the posterior cingulate and precuneus. ALC and CON had similar hubs in their structural networks including middle cingulate, parahippocampal and fusiform gyri.

Conclusions:

In the functional network analysis, we observed early signs of functional disruption that suggest suboptimal integration of functional networks even at this early age. Larger apparent group differences in functional compared to structural brain organization suggests that structural differences may only become evident with further maturation of neural development and as functional demand increases.

Ethics approval reference number: 401/2009

This research was presented at the Annual Academic Day of Stellenbosch University (29 August 2018).

Title: **INVESTIGATING INFLAMMATORY MEDIATORS IN THE BRAIN EXTRACELLULAR FLUID OF PAEDIATRIC PATIENTS WITH TUBERCULOUS MENINGITIS USING BRAIN MICRODIALYSIS MONITORING**

Authors: Nicholas Loxton[1], Ursula Rohlwink[1,2], Muki Shey[3], Anthony Figaji[1,2]

Affiliation: [1]Division of Neurosurgery, Department of Surgery, University of Cape Town, [2]Neuroscience Institute, University of Cape Town, [3]Wellcome Centre for Infectious Disease Research in Africa (CIDRI-Africa) & Department of Medicine, University of Cape Town

Objective:

Tuberculous meningitis is the most severe form of extra-pulmonary tuberculosis. In addition to causing hydrocephalus, the thick exudate created by the inflammatory response of the brain also causes brain ischemia due to inflammation and occlusion of important vessels. Understanding the immune response at the site of disease, therefore, is needed to develop new therapies. In this study we aimed to generate pilot data on inflammatory mediators in the brain extracellular fluid (ECF) of children with TBM. This is the first study to examine direct site-of-disease samples in TBM.

Methods:

We examined patients treated for probable or definite TBM who underwent microdialysis (MD) brain monitoring at Red Cross War Memorial Children's Hospital between 2013 and 2018. All patients had severe disease; all were ventilated and underwent emergency ventricular drainage of CSF and invasive brain monitoring. Brain chemistry was analysed hourly at the bedside to assist clinical management. Remnant fluid samples were frozen. For analysis, MD samples were pooled over 4-5 hours to ensure sufficient volume for multiplex analysis. Ventricular CSF samples were also collected where possible. We examined cytokine concentrations up to 5 days post-admission. This study was approved by UCT Ethics Committee (HREC 564/2012).

Results:

Seven patients with a median age of 2.3 (0.7-12) years were included. Definite TBM was confirmed in 71% (n=5). The median GCS at presentation was 7 (3-9) and 86% (n=6) of patients had documented neurological fall-out. Infarction was already present on the admission head CT scan in 86% (n=6) of the patients. The mortality rate was 43% (n=3). Median admission cytokine concentrations detected in the ECF were: IFN-γ (1.92pg/ml), IL-1β (0.23 pg/ml), IL-6 (4.39 pg/ml), IP-10 (30.67 pg/ml), MCP1 (513.54 pg/ml). Anti-inflammatory cytokines increased between admission and day 4 (for example, IL-1RA, 0 - 103.54pg/ml). Pro-inflammatory cytokines like IL-1β, IL-6, IL-8 and MCP-1 decreased over time. Some cytokines, including TNF-α, MIP-1α, IL-10 and IL-12p40, were below the limit of detection. In general, concentrations in the ECF were lower than in ventricular CSF, except for IL-1β.

Conclusion:

Inflammatory data collected through microdialysis provides a unique opportunity to examine the profile of inflammatory mediators at high temporal resolution and directly from the brain. These preliminary data provide novel insight into brain pathophysiology and suggest an early pro-inflammatory monocyte-driven immune response, which subsides with treatment. However, currently only the most severely affected patients are considered for MD monitoring, and the small volumes of obtainable ECF may limit protein measurement and require high sensitivity testing platforms.

Title: **RISK AND PROTECTIVE FACTORS FOR CHILD DEVELOPMENT IN THE FIRST 2 YEARS OF LIFE IN A SOUTH AFRICAN BIRTH COHORT**

Authors: <u>Kirsten A Donald</u>[1], Catherine J Wedderburn[1,2], Whitney Barnett[1,3], Raymond T Nhapi[1], Nadia Hoffman, Nastassja Koen, Attie Stadler[3], Shunmay Yeung[2], Diana Gibb[4], Heather J Zar[1,3], Dan J Stein[5,6]

Affiliation: [1]Department of Paediatrics and Child Health, Red Cross War Memorial Children's Hospital and University of Cape Town (UCT), SA; [2]Department of Clinical Research, London School of Hygiene & Tropical Medicine (LSHTM), UK; [3]South African Medical Research Council (SAMRC), Unit on Child & Adolescent Health, SA; [4]Department of Infectious Disease Epidemiology, LSHTM, UK; [5]MRC Clinical Trials Unit, University College London, UK; [6]Department of Psychiatry & Mental Health, UCT, SA; [7]SAMRC, Unit on Risk and Resilience in Mental Disorders, SA

Background:

Approximately 250 million (43%) of children under the age of 5 years in Low and Middle-income countries (LMICs) are failing to meet their developmental potential (Black et al, 2017). An array of risk factors are recognised to contribute to this loss of human potential and expanding understanding of which risks lead to poor outcomes and which protective factors build resilience is critical to improving disparities. Few population based cohorts have reported early child development outcomes in a Sub-Saharan African setting using approaches that inform further understanding of the effects of multiple risk and mitigating factors on child development in LMICs.

Methods:

The Drakenstein Child Health Study is a population-based birth-cohort in the Western Cape, South Africa. Women were enrolled antenatally from two clinics between 2012-2015 where detailed information about their background (including medical, socioeconomic and psychosocial influences). Mothers and children from these two communities were followed up through birth until 2 years of age. Developmental assessments were conducted by trained assessors blinded to background, using the Bayley-III Scales of Infant and Toddler Development (BSID-III) at 24 months.

Results:

A total of 734 children completed BSID-III forms at 2 years of age between June 2014 and August 2016 and were included in this analysis. A total of 369 children (50%) were categorized as having cognitive delay, 402 children (56%) with receptive language delay, 389 children (55%) with expressive language delay, 169 children (23%) with fine motor delay, and 267 children (38%) with gross motor delay. Bivariate and multivariate analysis revealed a spectrum of factors which appeared to be associated with risk for or protection from poor developmental outcomes in our cohort. Some of these factors impacted boys and girls differently with respect to their developmental outcomes at 2 years.

Conclusions:

This study provides well-measured developmental data from a low-middle income context in a deeply characterized sample of mother-child dyads. Our findings, highlight not only the important protective effects of maternal education and socioeconomic status for developmental outcomes, even in the face of other significant environmental risk factors, but also how male and female children appear to be more sensitive to the effects of different types of risk factors in their environment.

Ethics approval number: HREC ref: 401/2009

This is new research that has not been presented at previous research days

Title: **BREATHING IS LIFE! INSPIRATORY MUSCLE TRAINING IN CHILDREN AND ADOLESCENTS LIVING WITH NEUROMUSCULAR DISEASES**

Authors: Anri Human[1,2], MPhysT; Jennifer Jelsma[2], PhD; Brenda Morrow[3], PhD

Affiliation: [1]School of Health Care Sciences (Physiotherapy department), Sefako Makgatho Health Sciences University; [2]Department of Health and Rehabilitation Sciences (Division of Physiotherapy), University of Cape Town; [3]Department of Paediatrics and Child Health, University of Cape Town

Background:
People with neuromuscular diseases (NMD) have a high risk of morbidity and mortality caused by underlying respiratory muscle weakness and an ineffective cough. Inspiratory muscle training (IMT) aims to preserve or improve respiratory muscle strength; reduce morbidity; optimise ventilation and ultimately improve health-related quality of life (HRQoL). Inspiratory muscle training among children and adolescents with NMD is controversial, owing to differences in pathophysiology and potential risk of muscle damage in some conditions. Despite reports of potential benefits, there is insufficient evidence to guide clinical practice regarding the use of IMT in this sub-population.

Objectives:
To describe the effect of a six week IMT programme on pulmonary function, upper limb function and coordination, HRQoL and adverse events in children and adolescents with NMD.

Methods:
A pre-experimental, observational pre-test post-test study design was used to determine changes in measures of spirometry, peak expiratory cough flow (PECF), inspiratory muscle strength, upper limb function and coordination (using the Motor Function Measurement (MFM) scale), HRQoL (using PedsQL tool) and adverse events. Training consisted of 30 breaths, twice daily, five days a week, for six weeks with an electronic threshold device (Powerbreathe K3, HaB International Ltd, Southam, UK). Appropriate parametric and non-parametric descriptive and inferential statistical tests were conducted.

Results:
Eight participants (4 boys & 4 girls; mean age 12.71 ± 3.53 years) with a variety of NMD were included. There were no significant changes in spirometry measures, PECF or HRQoL. Upper limb function and coordination (MFM score) improved from pre-to post-intervention ($p=0.03$). Measures of inspiratory muscle strength also improved significantly: maximal inspiratory mouth pressure (Pimax) ($p=0.01$), strength-index ($p=0.02$) and peak inspiratory flow ($p=0.02$). No adverse events occurred during the intervention period. Overall patient satisfaction with the IMT programme, on a 10-point visual analogue scale, was extremely high, with a median (IQR) of 9 (9-10).

Conclusions:
Preliminary findings suggest that short-term IMT may be a safe and effective adjunct intervention for children and adolescents with NMD. This requires confirmation in larger, longer-term randomised controlled trials.

Ethics approval: Human Research Ethics Committee (UCT): 513/2015

Title: **A DESCRIPTION OF PREMATURE AND EX-PREMATURE INFANTS ADMITTED TO THE PAEDIATRIC INTENSIVE CARE UNIT IN THE FIRST SIX MONTHS OF LIFE**

Presenting author: Dr Grace Mathew

Affiliation: Faculty of Health Sciences, University of Cape Town

Background:
Prematurity is a major risk factor for morbidity and mortality in children. Rehospitalisation with paediatric intensive care unit (PICU) admission constitutes significant morbidity. There is a paucity of literature regarding rehospitalisations of premature infants in South Africa.

Objective:
To describe the outcomes, clinical course and characteristics of premature infants admitted to a South African PICU, and to identify any predictors of mortality.

Methods:
This prospective observational study analysed unplanned PICU admissions in the first six months of life, over a six-month period. The primary and secondary outcomes were mortality and length of PICU stay, respectively. Data were analysed using standard descriptive and inferential statistics.

Results:
29 infants (65% male; median (IQR) birth weight (BW) and gestational age (GA) 1715 (1130 - 2340) g and 32 (29 - 34) weeks respectively) in 33 admissions were included. Five (17.2%) infants died in PICU. Apnoea (39.4%), respiratory failure (24.2%) and shock (24.2%) were the commonest reasons for PICU admission, secondary to pneumonia (33.3%), sepsis (27.3%) and meningitis (12.1%). 72.4% of infants were mechanically ventilated and 48.3% received blood transfusions.
Higher revised Paediatric Risk of Mortality (PIM2) score ($p = 0.03$), inotrope use ($p < 0.0001$), longer duration of mechanical ventilation ($p = 0.03$), and cardiac arrest in PICU ($p < 0.0001$) were associated with mortality on univariate analysis with no independent predictors of mortality.

Conclusion:
Infections leading to apnoea, respiratory failure and shock are common indications for PICU readmission in premature infants. Mechanical ventilation and blood transfusion were frequently required.

Title: A REVIEW OF THE USE OF INHALED NITRIC OXIDE IN THE PICU AT RED CROSS CHILDREN'S HOSPITAL, 2011-2015: A RETROSPECTIVE COHORT STUDY

Authors: Dr S Padayachee[1], Dr S Salie

Affiliation: [1]Department of Paediatrics, University of Cape Town

Background:

Inhaled Nitric Oxide(iNO) functions as a selective pulmonary vasodilator. It is often employed in our setting as rescue therapy for refractory hypoxaemia in acute respiratory distress syndrome(ARDS) and pulmonary hypertension(PHT) following cardiac surgery.

It is an expensive treatment costing the ICU R1 441 376 between 2011 and 2015. Although its use is validated in the treatment of persistent pulmonary hypertension of the newborn(PPHN), it has not been shown to have a beneficial effect on morbidity and mortality in other conditions.

Objectives:

To describe the response to therapy with iNO. Secondary observations were deaths, characteristics of the patients treated, lengths of treatment and admission, and the cost of treatment. These were looked at in the cohort as a whole as well as in subgroups of patients with different underlying conditions.

Methods:

A retrospective descriptive study of all patients treated with iNO in the Paediatric ICU at Red Cross War Memorial Children's Hospital from 2011-2015 was performed.

Results:

A total of 140 patients were treated with iNO during this time period. 81 were treated for PHT following cardiac surgery, 54 for ARDS and 5 for PPHN. A response to treatment was observed in 65% in the cohort as a whole, 80% of patients treated for PPHN, and in 63% of those for PHT post cardiac surgery and for ARDS. The group with ARDS demonstrated higher in hospital mortality(52%) compared to patients treated for PHT(19%) and for PPHN(25%), as well as longer duration of ICU and hospital admission. Mortality in patients with ARDS secondary to adenovirus infection was particularly high(63%).

There are no protocols in place guiding the use of iNO in our unit. It was found that response to treatment was not being objectively measured and documented and that practice varied between clinicians.

Conclusions:

Continued use of this expensive treatment should be reconsidered and the indications for commencing, weaning and discontinuation of treatment with iNO in our setting should be protocol driven in order to prevent injudicious use.

Title: **MORTALITY OUTCOMES FOLLOWING ADMISSION TO PAEDIATRIC INTENSIVE CARE: A SYSTEMATIC REVIEW**

Authors: Claire Procter[1], Andrew Argent, Brenda Morrow, Genee Pienaar, Mary Shelton

Affiliation: [1]Pediatric Critical Care, Red Cross War Memorial Children's Hospital

Objectives:

To describe the short and long-term mortality outcomes of children following admission to a paediatric intensive care unit (PICU).

Methods:

A systematic literature search was conducted using predefined search strategies in PubMed/MEDLINE, Scopus (including EMBASE), Web of Science, EBSCO, ProQuest, Google Scholar and CENTRAL. The reference lists of all identified articles were also screened to potentially eligible studies. All studies reporting mortality outcomes of children under 18 years old admitted to a PICU were eligible for inclusion, regardless of study design. Outcomes measured were: short-term (<30 days) and long-term (<3 months, <6 months, <1year, <5 years and >5 year) mortality following PICU discharge. Studies were excluded if they focused on Neonatal Intensive Care Admission or if no English translation was available. Data were extracted from the studies and presented in a narrative synthesis, with graphical presentation of data wherever possible. Pooling of results was not possible owing to substantial heterogeneity amongst the studies.

Results:

The search identified more than 20,000 articles of which 50 were ultimately included. In ICU mortality rates were extremely variable, ranging from 1.3-50% in different settings. PICU mortality was found to have reduced over time in high income countries, whereas this was not evident in low and middle income countries despite some suggestion of improvements in specific units or regions. High income countries had lower Standardised Mortality Rates (SMR) which correct mortality for severity of illness compared to low and middle income countries. Studies from high income countries consistently reported SMR <1, indicating mortality rates below that which would be predicted based on admission risk of mortality scores whereas SMR in low and middle income countries were more variable and frequently >1 (ie. Higher than expected mortality rates). This review was not designed to identify predictors of mortality. Of the 13 studies which reported mortality after PICU discharge, the majority reported cumulative mortality rates that continue to rise up to 10 years post discharge. Children admitted to PICU continue to be at increased risk of death compared to children not admitted to PICU for many years following discharge.

Conclusion:

Mortality in PICU is extremely variable and outcomes appear worse in poorer resourced environments. Children admitted to PICU are at risk of death during and after their admission. Further research is recommended to determine functional, psychosocial and health related quality of life outcomes of PICU admission.

Title: **WHY, HOW AND WHEN DO CHILDREN DIE IN A PAEDIATRIC INTENSIVE CARE UNIT (PICU) IN SOUTH AFRICA?**

Authors: Martie Wege[1,2]; Beyra Rossouw[1,2]; Brenda Morrow[1]; Andrew Argent[1,2]

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

Introduction:
Modern medical therapies and technology have advanced rapidly over the last decade. Unfortunately they can be used beyond a point where they improve outcome or preserve quality of life.
Availability of paediatric intensive care (PICU) beds is a scarce resource in South Africa. Therefor this resource must be used to care for children that will have the best chance of survival with minimal morbidity. Difficult decisions such as admission triage, limitation of life- support and withdrawal of life-sustaining therapy, are inevitable to optimize the use of PICU beds. These end of life decisions are often made within a context of no hope of survival, or survival with severe disability.
This is the first study to describe the characteristics and outcome patterns of children dying in the PICU at Red Cross War Memorial Children's Hospital (RCWMCH).

Methods:
Data from the Child Healthcare Problem identification programme (Child PIP) and the PICU Summary system (admission and death records) were used to identify and collect data on children of any age who died in the PICU at RCWMCH over a 5-year period between 01 January 2013 and 31 December 2017. Mode of death was categorized as follows: death after limitation of life sustaining treatment, death after withdrawal of life sustaining treatment, failed cardiopulmonary resuscitation or brain death.

Results:
There were 451 deaths reviewed (54% male), with the median (IQR) age of 7 (1-30) 25 months. The median (IQR) length of PICU stay prior to death was 3 (1 – 7) days. The mode of death in 23.7% (n=107) was withdrawal of life sustaining therapies; 22.0% (n=99) died after failed resuscitation; 21.1% (n=95) died after a do-not-resuscitate order; 17.3% (n=78) were diagnosed brain dead and 15.1% (n=68) died after limiting other life sustaining therapies. Ultimately, 60% (n=270) of children died after the decision was made to limit or withdraw life sustaining therapies.
Two-hundred and forty-five patients (54%) died after hours (weeknights and weekends) compared to 205 (45.5%) during weekdays (p = 0.07).
Almost a third (32.4%) of the deaths were admitted into PICU from other hospitals or clinics; 20.4% (n=92) from medical emergencies, 12.6% (n=57) from the medical wards, 11.1% (n=50) from theatre, and 7.1% (n=32/) from Trauma unit.
Septicaemia (20.4%) was the most common cause of death, followed by cardiac disease (18.6%) and pneumonia (12%); 8.4 % of deaths were accident related and 7.0% died from bowel-related surgical problems.
Ninety four (20.8%) patients had been previously admitted to the PICU within the same year.
Of the patients that died, 60.5% (n=273) had complex chronic disorders and 30.0% of the children were premature or ex-premature. Only 8.9% (n=40) of the deaths followed elective admission into PICU and 22.8% (n=103) had a cardiac arrest prior to PICU admission. During the end of life, 75.0% (n=342) of children were on inotropes, 95.9% (n=428) were ventilated, 12.0% (n=45) were on inhaled nitric oxide and 10.8% (n=46) received renal replacement therapy. During the study period, only 1.5% (n=7) became organ donors. Post mortems were done in 47.2% (n=213) of the patients.

Conclusions:
This study describes the characteristics of children that died in PICU over a 5-year period. Most children died after a decision to limit or withdraw life-sustaining therapy; although our PICU also has a relatively high rate of failed resuscitations. A third of children who died in our unit were referred from other hospitals or clinics directly into the PICU.

Title:	**DETERMINANTS OF INFANT FEEDING PRACTICES PRIOR TO, DURING AND AFTER HOSPITALISATION TO RED CROSS WAR MEMORIAL CHILDREN'S HOSPITAL (RCWMCH)**

Presenting Author: Dr Michelle Rina Alisio

Affiliation: Department of Paediatrics and Child Health, University of Cape Town

Introduction:
Breastfeeding improves child survival, health and development. Investment in promotion of breastfeeding (BF) is the most cost-effective measure to reduce infant mortality in low resource settings. In South Africa only 23.7% of infants exclusively breastfeed at six months and under-5 mortality remains high.

Aim:
To compare infant feeding practices before, during and after hospitalisation.

Methods:
Prospective cross sectional descriptive study of infants under six months of age admitted to general paediatric wards at RCWMCH from January to April 2018. Medical, demographic and feeding practice data were collected from primary caregivers and biological mothers through semi-structured interviews before and during hospitalisation. Telephonic follow up interviews (at infant median age of 6.25 months) occurred at a median time of 5.5 months after hospitalisation.

Results:
Prior to admission 46 (38.6%) of 119 mothers (of infants aged 3 weeks to 5 months) exclusively breastfed (EBF). The median age of the sample size was 2 months. 41 (34.4%) infants were premature (as defined by a gestational age of less than 37 completed weeks) and 33 (27.7%) mothers were HIV positive.
The main reasons for non-exclusive breastfeeding practices were perceptions of insufficient breastmilk (15, 21%) or reluctance of baby to breastfeed (8, 10.9%) and the need to return to work (12, 16.4%). Some mothers (17, 12.5%) expressed ambiguity about the benefits of EBF compared to breastmilk substitutes (BMS) or assumed that breastmilk was the same as BMS, or they were advised to abandon exclusive breastfeeding practices by health care workers (HCW) (13, 9.6%). Complementary solids were introduced early, before 6 months in 13 infants (17.8%).
Of 33 (27.7%) HIV positive mothers, 25 (75.7%) chose not to breastfeed because of the need to return to work (7, 28%), HCW advice (5, 20%), perceptions of insufficient breastmilk (3, 12%) or reluctance of baby to breastfeed (2, 8%), fear of transmission (4, 14.8%) and illness (1, 4.2%).
During admission 57 (47.8%) mothers EBF. All EBF mothers used in hospital sleeping facilities and 36 (63.1%) expressed breastmilk. Comments surrounding inadequate BF support and suboptimal environments for expressing were noted.
At telephonic follow-up of 92 mothers (77.3%), only 17 (18.4%) EBF their infants to six months. Complementary solids were introduced early in 38 (52.7%).

Conclusion:
The already low pre-admission exclusive breastfeeding rate is halved at six months. Key strategies to increase EBF rates are better implementation of the Baby Friendly Hospital Initiative, better regulated protection of breastfeeding in the workplace and improved monitoring and enforcement of Regulation 991 to ensure compliance with the International Code on Marketing of BMS. Post-discharge referral to community-based services to support EBF and extended BF should be standard.

UCT HREC ref: 839/2016

Title: **EXTREMELY LOW BIRTH WEIGHT INFANT OUTCOMES AT GROOTE SCHUUR HOSPITAL**

Authors: <u>Dr Mish-Al Barday</u>, Dr Lloyd Tooke, Dr Clare Thompson

Affiliation: Division of Neonatal Medicine, Department of Paediatrics, University of Cape Town, Groote Schuur Hospital

Background:

Prematurity is the leading cause of under 5-year child mortality. There is limited data on outcomes of extremely low birth weight infants in resource limited settings. A retrospective cohort study was conducted to document the in hospital morbidity and mortality as well as the post discharge mortality and neurodevelopmental outcomes of the survivors.

Methods:

The study included all the extremely low birth weight infants (ELBW) <1000g admitted to Groote Schuur Hospital (GSH) Neonatal Intensive Care Unit (NICU) between 1 July 2014 and 31 June 2015. Morbidity and mortality information was sourced from the Vermont Oxford Network (VON) Database, Salt River mortuary, and individual phone calls to the families of those who were lost to follow up. Neurodevelopmental outcomes were obtained from the High-Risk Clinic database. Defaulters were searched for on Clinicom, the NHLS lab system, ECM database, Red Cross War Memorial Hospital and folders at other hospitals.

Results:

The cohort included one hundred and seven one (171) babies of which 63% were discharged home. As expected there was an increased incidence of early neonatal deaths in the 500-649g babies (71%) versus 800-1000g babies (55%) with increased in hospital morbidity in the smaller survivors. In hospital morbidity free survival in the larger babies compared favourably with international figures. Of the 107 babies discharged home, 37(35%) were lost to follow up, 6(6%) died, 59(55%) attended the neurodevelopmental follow up clinic and 5(5%) were reported to be well in telephonic interview. Of the babies whose outcome is known, 81% were normal and 14% had concerns. Only one infant had been diagnosed as having cerebral palsy.

Conclusion:

In this cohort the mortality rate was 40 %, with a small number of infants dying after discharge. In the survivors cerebral palsy was rare. In this is retrospective study, there is a high loss to follow up. There is a need to improve follow up rates and improve data capturing.

HREC ref: 040/2013

Title: **BOVINE OR PORCINE: DOES THE TYPE OF SURFACTANT MATTER?**

Authors: Dr Lize Boshoff Coyles, Dr Yaseen Joolay, Dr Lloyd Tooke

Affiliation: Division of Neonatal Medicine, Department of Paediatrics, University of Cape Town
Groote Schuur Hospital

Background:

Hyaline membrane disease is the most common complication of prematurity, occurring in approximately 50% of infants born before 30 weeks of gestation and is caused by insufficient production of surfactant. The availability of animal derived exogenous surfactant has been one of the major advances in neonatology over the last 40 years. The two main surfactants available in South Africa are beractant (bovine derived) and poractant-alfa (porcine derived). Differences in phospholipid concentration result in different pricing and dosages for these products (4ml/kg for beractant and 1,5-3ml/kg for poractant-alpha). At equivalent dosages there is little evidence of superiority of either product although there is little data from the developing world.

Although both types of surfactant have been available for use at Groote Schuur Hospital (GSH), due to an administrative decision, poractant-alpha was no longer available from November 2014. This provided an opportunity to determine if there was a difference in mortality or morbidity between two groups of infants who received different types of surfactant.

Methods:

Data from two study periods were collected. The first was between October 2013 and October 2014 when either surfactant type was available, but predominantly poractant-alpha was used, and the second from November 2014 to November 2015 when only beractant was available.

Infants were recruited by identifying them from the surfactant register (all infants who receive surfactant are recorded in this). Folder reviews of the babies were then performed. Additional data were obtained from the Vermont Oxford Network database of which GSH is a member.

Data fields included infant weight and gestation, type of surfactant used, respiratory support needed, neonatal morbidities and mortality.

Results:

208 infants were included. 107 received poractant-alpha and 101 beractant. The mean birth weight was 1030g and gestational age 28 weeks with no statistical significance between the two groups. 79% of the infants received surfactant via the INSURE (intubation, surfactant, extubation) method. There were 67(32%) deaths: 32(32%) in the beractant group and 35(33%) in the poractant-alpha group. The number of infants with chronic lung disease (CLD) (oxygen at 36 weeks corrected age) were 8(7.9%) for beractant and 3(2.8%) for poractant-alpha (p=0.11). All secondary outcomes such as differences in neonatal morbidities or length of ventilation were non-significant.

Conclusion:

There were no significant differences in outcomes between the two groups of infants who received different surfactants.

HREC ref: 047/2016

Title: **IMPROVING LOSS TO FOLLOW-UP USING MOBILE TECHNOLOGY FOR RETINOPATHY OF PREMATURITY SCREENING**

Authors: Dr SN Bovula, Dr LJ Tooke, Dr Y Joolay

Affiliation: Division of Neonatal Medicine, Department of Paediatrics, University of Cape Town, Groote Schuur Hospital

Background:

Loss to follow-up remains a major challenge in the developing world context for various reasons. The uptake of personal cellular telephones in the developing world have created opportunities for improving communication with a mobile population. We introduced a system using mobile technology at Groote Schuur Hospital Neonatal Unit as a tool for communicating with parents of very low birthweight infants being screened for retinopathy of prematurity (ROP) to attempt to improve follow-up.

Method:

A system using SMS (Short Messaging Service) and USSD (Unstructured Supplementary Service Data) was implemented to interact with parents of preterm babies in the ROP screening programme. Follow up adherence data was retrospectively collated in two intervals; 12 months before and 12 months after institution of the system. Data was analysed using the chi-square test to determine statistical significance.

Results:

In the pre-intervention period, 1166 episodes (350 patients) logged compared to 895 (320 patients) episodes in the second period. The number of patients lost to follow-up reduced from 57 (16.3%) to 36 (11.3%) in the second period (P=0.06)

Conclusion:

There was an improvement in the number of patients who completed ROP screening in the time-period after the communication system was put in place with a trend towards significance. Further research can be done to test the applicability of these systems to improve follow-up rates in different contexts and in combination with other methods.

HREC ref: 040/2013

Title: CO-DESIGNING WITH MOTHERS OF PRETERM INFANTS AND STAFF TO EXPLORE HOW TECHNOLOGY CAN IMPROVE COMMUNICATION IN THE NEONATAL INTENSIVE CARE UNIT

Authors: Christine Mburu[1], Yaseen Joolay, Melissa Densmore

Affiliation: [1]Department of Computer Science, University of Cape Town

Objective:
To assess the barriers of communication between mothers of preterm infants and Neonatal Intensive Care Unit (NICU) staff by involving both parties in a co-design process to explore how technology can be used to enhance communication to support mothers cope with stress related to premature birth

Methods:
This is an ongoing study and we are using co-design approach to ensure participants are involved throughout the design process. Phased approach is being used to understand user needs and generate design ideas iteratively to ensure the final design meets the users' needs. In the first phase, we focused on understanding the NICU workflow and assessing the needs of mothers of premature infants. We conducted observations for four months to familiarize with the NICU environment. Semi-structured interviews were used to elicit the experience of mothers and staff in the NICU and their perceptions of the use of technology to enhance communication in the unit. We used Nvivo software to analyze phase one data and presented the findings to participants in the second phase. In the second phase, we held separate focus group sessions with doctors, nurses and mothers and presented the findings of phase one to clarify on the unique concept that arose in this context as well as to generate design ideas for the possible communication intervention. The design suggestions of each group were later discussed in a joint focus group that allowed all stakeholders to narrow down their ideas to the most viable intervention that would address communication challenges in low-income context. Study subject were NICU staff and mothers of infants who had been discharged from the hospital for at least three months to avoid the risk of aggravating their emotional stress. The study was approved by the University of Cape town faculty of health science research Ethics Committee.

Results:
We involved 15 mothers and 10 NICU staff in this study. In the first phase, we identified that there is minimal communication between mothers and NICU staff which is partly due to language barrier and heavy workload of NICU staff. Mothers fear to interact with staff due to several factors such as language barrier, sociocultural factors, power imbalance and limited understanding of medical terms. Consequently, they feel loss of maternal role and left out in the decision making of their infants. The staff mentioned they have a heavy workload in the NICU and they mainly focus on infants' health thus neglecting mothers' emotional needs. To overcome these communication barriers both mothers and NICU staff agreed that technology could be used to share breastfeeding and neonatal information. They collaborated in the generating design ideas and eventually developed a workflow of a motivation system that would educate mothers on the importance of breastfeeding their infants. In addition, they proposed the use of digital video which could be displayed in the unit to educate mothers on common medical terms and health conditions that are related to prematurity.

Conclusion:
Co-design positions mothers and NICU staff as equal partners in the design process. This empowers them to voice their design ideas despite their limited design skills and exposure to technology thus allowing them to take control of the design process and shape a technological solution that fits their needs.

Title: ASSOCIATION BETWEEN MATERNAL PRENATAL PSYCHOLOGICAL ADVERSITIES AND THE EARLY INFANT GUT BACTERIAL PROFILE

Authors: Pieter J.W. Naudé[1*], Shantelle Claassen-Weitz[2*], Sugnet Gardner-Lubbe[3], Mamadou Kaba[2,4], Heather J. Zar[5,6], Mark P. Nicol[2,4,7], Dan J. Stein[1,8]

Affiliation: [1]Department of Psychiatry and Mental Health, Brain Behaviour Unit, University of Cape Town, Cape Town, South Africa; [2]Division of Medical Microbiology, Department of Pathology, Faculty of Health Sciences, University of Cape Town, Cape Town, South Africa; [3]Department of Statistics and Actuarial Science, Stellenbosch University, Stellenbosch, South Africa; [4]Institute of Infectious Disease and Molecular Medicine, Faculty of Health Sciences, University of Cape Town, Cape Town, South Africa; [5]Department of Paediatrics and Child Health, Red Cross War Memorial Children's Hospital, Cape Town, South Africa; [6]MRC Unit on Child & Adolescent Health, University of Cape Town, Cape Town, South Africa; [7]National Health Laboratory Service of South Africa, Groote Schuur Hospital, Cape Town, South Africa; [8]SU/UCT MRC Unit on Risk and Resilience in Mental Disorders and Department of Psychiatry and Mental Health, University of Cape Town, Cape Town, South Africa.

Objective:

An aberrant gut microbiome is a potential mechanism linking maternal prenatal psychological adversities with lifelong health trajectories in the offspring. However, clinical studies are scarce and the association on profiles of maternal prenatal psychological adversities with the infant gut microbiome is still unknown. The aim of this study was to investigate the associations of maternal prenatal stressors and distress with infant faecal bacterial profiles over time in a South African birth cohort study.

Methods:

Associations between measures for maternal prenatal stressors and distress and changes in gut bacteria was evaluated in meconium and subsequent stool specimens from 84 mothers and 101 infants at birth, and longitudinally from a subset of 69 and 36 infants at 4–12 and 20–28 weeks of age, respectively.

Results:

Infants born from mothers with intimate partner violence (IPV) had significantly higher proportions of unclassified genera within the family Enterobacteriaceae in meconium at birth, higher proportions of the genus Weissella in stool at 4-12 weeks and had increased proportions of the class Coriobacteriia measured over time. Higher scores for psychological distress were significantly associated with lower abundance in the family Veillonellaceae at 20–28 weeks of age. IPV during pregnancy was significantly associated with higher proportions of the family Lactobacillaceae and lower proportions of Peptostreptococcaceae measured from maternal faecal specimens at the time of delivery.

Conclusion:

Maternal prenatal stressors and distress are associated with altered diversity in infants' gut bacteria. Further work is needed to delineate the relevant underlying mechanisms.

Title: *PSEUDOMONAS AERUGINOSA* **BLOODSTREAM INFECTION IN CHILDREN HOSPITALISED AT A CHILDREN'S TERTIARY HOSPITAL IN CAPE TOWN**

Authors: Joycelyn Assimeng Dame[1], Natalie Beylis[2], James Nuttall[1], Brian Eley[1]

Affiliation: [1]Paediatric Infectious Diseases Unit, Red Cross War Memorial Children's Hospital, and the Department of Paediatrics and Child Health, University of Cape Town; [2]Division of Medical Microbiology, University of Cape Town and the National Health Laboratory Service, Groote Schuur Hospital, Cape Town

Background:

The clinical diagnosis and management of Pseudomonas aeruginosa (PA) infections, particularly Pseudomonas aeruginosa bloodstream infection (PA-BSI) is challenging and severe. Fatal infection may occur if it is not diagnosed early and managed with appropriate antibiotic therapy. Despite this, there is minimal data on PA-BSI in children in South Africa.

Objective:

To determine the disease burden, clinical characteristics and outcome of Pseudomonas aeruginosa blood stream infection among children admitted to Red Cross War Memorial Children's Hospital (RCWMCH) in Cape Town.

Methods:

A retrospective review of all PA-BSI occurring in children admitted at RCWMCH between January 2009 and December 2017. The National Health Laboratory Services microbiology database at Groote Schuur Hospital and the Central Data Warehouse in Johannesburg were used to identify children with a positive blood culture for PA from January 2016 - December 2017, and from January 2009 - December 2015 respectively. The antibiotic susceptibility profile of the initial blood culture isolate from each episode was recorded. Medical records were retrospectively reviewed to extract demographic and clinical information. Positive cultures for PA taken on the day of admission (calendar day 1), 2 days before admission or the calendar day after admission were considered as infections present on admission (POA). Health care-associated (HCA) PA BSI were defined as positive cultures for PA taken on or after the 3rd calendar day after admission. The incidence risk for each year was determined. Risk factors for 14-day mortality were explored using univariate and multivariate analyses.

Results:

There were 105 episodes of PA-BSI, 35 (33.3%) were POA and 70 (66.7%) were HCA infections. The median age was 7.05 years (IQR 3.2-13.8) and 52.4% of all infections occurred in females. The overall incidence risk per 10,000 hospital admissions was 4.95. There were 32.1% of PA-BSI resistant to anti-pseudomonal antibiotics. The commonest foci of infection of all PA-BSI were pneumonia (45.8%) and skin and soft tissue infection (22.9%). The 2 most common complications were renal failure (13.8%) and disseminated intravascular coagulopathy (12.9%). The 14-day mortality was 21.0%, with 31.8% of the deaths caused by isolates resistant to anti-pseudomonal antibiotics. In univariate analysis, those who died within 14 days were more likely to have received initial inappropriate antibiotics (p=0.007), have had a skin and soft tissue infection (p=0.028), be malnourished (p=0.003) or have had burns (p=0.037) compared with those who survived. The susceptibility rates to piperacillin/tazobactam and amikacin, the hospital's currently recommended empiric antibiotic regimen for HCA infections, was 61.0% and 83.8% respectively. The anti-pseudomonal antibiotic with the highest sensitivity was ceftazidime, 85.7%.

Conclusion:

PA-BSI is associated with high mortality. Early introduction of effective antibiotic therapy is required to improve the outcome.

HREC ref: 107/2018

Title: **THE VIABILITY OF PERCUTANEOUS BONE-ANCHORED HEARING SYSTEMS IN THE HIV POPULATION**

Authors: <u>Silva Kuschke</u>[1], Simon Honnet[2], Alex J. Scott[3], Estie Meyer[4]

Affiliation: [1]Red Cross War Memorial Children's Hospital; [2]New Somerset Hospital; [3]Faculty of Health Sciences, University of Cape Town; [4]Groote Schuur Hospital, Cape Town, South Africa

Objective:

To determine the viability of percutaneous bone-anchored hearing systems (BAHS), in terms of local soft tissue complications, in the HIV population.

Methods:

Retrospective folder review. Setting: Two tertiary-level academic state hospitals in Cape Town, South Africa. Patients: Twenty patients, of which six (30%) were HIV-positive. All HIV-positive patients had CD4 counts greater than 200, and were on highly-active antiretroviral therapy (HAART). Intervention: Percutaneous BAHS implantation surgery was performed on all patients.

Main Outcome Measure:

Comparisons were made between HIV-positive and HIV-negative patients in terms of incidence of local soft tissue complications post-implantation.

Results:

Soft tissue complications occurred in 50% of patients, and most were easily managed with topical treatment. No significant differences were found when comparing incidence of local soft tissue complications between HIV-positive and HIV-negative patients (p = 0.314). Similarly, surgical technique did not influence soft tissue complication incidence (p = 0.143).

Conclusions:

No significant differences in incidence of local soft tissue complications after percutaneous BAHS implantation were found between HIV-positive and HIV-negative patients. In a resource-constrained country like South Africa, where cost and time management are vital, these results indicate that the use of percutaneous BAHS implantation is a viable option, even in HIV-positive patients.

Title: GROWTH PATTERNS OF HIV-EXPOSED UNINFECTED VERSUS HIV-UNEXPOSED CHILDREN IN THE CONTEXT OF BREASTFEEDING AND UNIVERSAL MATERNAL ANTIRETROVIRAL THERAPY: A PROSPECTIVE STUDY

Authors: <u>Stanzi le Roux</u>[1], Kirsten A Donald[2,3], Kirsty Brittain[1,4], Tamsin K Phillips[1,4], Allison Zerbe[5], Max Kroon[2,6], Elaine J Abrams[5,7] and Landon Myer[1,4]

Affiliation: [1]Division of Epidemiology & Biostatistics, School of Public Health & Family Medicine, University of Cape Town, South Africa; [2]Department of Paediatrics & Child Health, University of Cape Town, South Africa; [3]Division of Developmental Paediatrics, Red Cross War Memorial Children's Hospital, Cape Town South Africa; [4]Centre for Infectious Disease Epidemiology and Research (CIDER), School of Public Health & Family Medicine, University of Cape Town, South Africa; [5]ICAP at Columbia, Mailman School of Public Health, Columbia University, New York, NY; [6]Neonatal service, Mowbray Maternity Hospital, Cape Town South Africa; [7]College of Physicians & Surgeons, Columbia University, New York, NY

Objective:

HIV-exposed uninfected (HEU) children comprise a growing proportion of child populations across sub-Saharan Africa, but little is known about the comparative growth of HEU children with breastfeeding in the context of universal maternal antiretroviral therapy (ART). We investigated the growth patterns of breastfed HEU and HIV-unexposed (HU) children in the first year of life.

Methods:

HIV-uninfected, and HIV-infected pregnant women initiating ART (TDF+FTC+3TC), were enrolled at first antenatal visit for follow-up through delivery and until 12-18 months postpartum with their breastfed, HIV-uninfected children in Cape Town, South Africa. Weight-for-age (WAZ), length-for-age (LAZ), weight-for-length (WLZ) and head circumference-for-age (HCAZ) Z-scores (6 weeks; 3, 6, 9 and 12 months, m) were compared over time with mixed effects linear regression; at 12m, proportions with moderate/severe malnutrition were compared using logistic regression.

Results:

Mother-infant pairs [HEU, n=461; HIV-unexposed (HU), n=412] attended 4517 anthropometry visits. All HIV-infected women received ART (median pre-ART log10 HIV-viral load, 4.0 copies/mL; CD4, 354 cells/mm3). Median gestation at birth was 39 (IQR 38-40) weeks; proportions preterm delivery (<37 weeks) and small-for-gestational-age (<10th centile) were similar (HEU vs HU: 12% vs 9%, p=0.20; 11% vs 10%, p=0.44, respectively). Median duration of breastfeeding was shorter among HEU than HU children (9 vs 4 months, p=0.0001). WAZ increased over time in both groups; HEU had consistently lower WAZ than HU children [β-0.34 (95% CI -0.47; -0.21]. LAZ decreased in both groups after weaning; by 12 months, HEU (vs. HU) had lower average LAZ [β-0.43 (95% CI -0.61; -0.25)] with a higher proportion stunted [LAZ<-2SD, HEU 10% vs HU 4%, OR 2.68 (95% CI 1.41; 5.07)]. By 12m, overweight (WLZ>2) was common (HEU, 17%; HU, 19%). HCAZ was within normal range but lower among HEU than HU children throughout [β -0.30 (95% CI -0.43; -0.16)]. Inferences were unchanged when adjusted for infant and maternal confounders.

Conclusions:

Compared to otherwise similar HU, HEU children have small deficits in early growth trajectories. A concerningly large proportion of all children were overweight by 12 months.

This research has not been presented at previous research days

Title: **EVALUATION OF BURNOUT, COPING STRATEGIES AND RESILIENCE IN PAEDIATRIC ONCOLOGY HEALTH CARE WORKERS IN CAPE TOWN**

Authors: Azeezat Jimoh (student)[1], Jawaya Shea (supervisor) and Rene Albertyn (co-supervisor)

Affiliation: Department of Paediatrics and Child Health, University of Cape Town

Objectives:
To determine the prevalence of burnout, coping strategies and resilience among health care workers (HCWs) in paediatric oncology unit (POU) as well as establishing association between these variables.

Methodology:
A mixed method approach (quantitative and qualitative) was used to conduct a survey at the POU, Red Cross War Memorial Children's Hospital. Data was collected using validated instruments (Maslach Burnout Inventory- Human Services Survey [MBI- HSS], Brief Resilience Scale [BRS], brief COPE and researcher-designed questionnaire). Depending on preference, electronic or paper based questionnaire was distributed to POU staff. Data analysis was performed using Microsoft EXCEL (2010 version). Measures of association between variables were performed with Kruskal Wallis and Pearson product moment coefficient tests.

Results:
The response rate was 50 percent (n= 25). Twenty results were analysed. Majority of the respondents were females (95 percent) and nurses (80 percent). Eighty-five percent of the respondents had worked in the POU for more than a year. Burnout prevalence was 15 - 45 percent across the three dimensions of burnout - high Emotional Exhaustion [EE] (20 percent), high Depersonalization [DP] (15 percent), and reduced Personal Accomplishment [PA] (45 percent). Majority (70 percent) of the respondents exhibited normal levels of resilience. The coping styles mostly used by the respondents were positive reframing, religion, acceptance, planning, self-distraction and active coping. The least used coping styles were substance use, denial and behavioural disengagement. There was no statistically significant association between burnout and demographic characteristics. However, with a high prevalence of 45 percent, reduced personal accomplishment was associated with most of the demographic characteristics. Respondents with low resilience experienced average levels of EE and DP, while those with normal resilience experienced low levels of EE and DP (p<0.05). EE and DP (combined) correlated positively with denial, substance use, behavioural disengagement, venting and self-blame. PA correlated positively with emotional support, positive reframing and religion but negatively correlated with active coping. The respondents generally felt there should be better goal-focused teamwork as well as implementation of effective intervention strategies.

Conclusion:
This study demonstrates high prevalence of reduced Personal Accomplishment (45 percent) that cuts across most demographic features. This is suggestive of the possible presence of situation specific factors, common to all respondents, contributing to burnout. While majority of the respondents exhibited normal levels of resilience and mainly used emotion focused coping strategies (positive reframing, religion), there is the need and desire for active effective group and institutional intervention programmes for burnout in the POU staff.

HREC REF: 051/2017

Title: **LOW GRADE GLIOMAS TREATED AT THE UCT ACADEMIC HOSPITAL COMPLEX: 2011-2017**

Authors: Gisela Kahl[1], Alan Davidson[1], Anthony Figaji[2], Komala Pillay[3], Tracy Kilborn[4], Marc Hendricks[1], Ann van Eyssen[1], Jeannette Parkes[5], Thurandrie Naiker[5]

Affiliation: [1]Haematology-Oncology Service, Department of Paediatrics and Child Health, Red Cross Children's Hospital and the University of Cape Town, South Africa; [2]Paediatric Neurosurgery, Red Cross Children's Hospital and the University of Cape Town, South Africa; [3]Paediatric Pathology, Red Cross Children's Hospital and the University of Cape Town, South Africa; [4]Paediatric Radiology, Red Cross Children's Hospital and the University of Cape Town, South Africa; [5]Department of Radiation Oncology, Groote Schuur Hospital and the University of Cape Town, South Africa

Introduction:

The majority of central nervous system tumours in children are low grade gliomas (LGG). Long-term survival rates are high with a slow, progressive course. Children with LGG have a good overall prognosis, although tumour location and extent of resection affect outcome. Although complete tumour resection is the goal in the management of these tumours, this is not always possible. Adjuvant therapy thus has an important role. This study evaluated the characteristics of LGG in our setting, the role of adjuvant therapy including more targeted, novel biologic therapy such as BRAF/MEK inhibitors, and the outcome of children with LGG in our institution.

Methods:

A retrospective analysis was performed on all children diagnosed with LGG at Red Cross War Memorial Children's Hospital (RCWMCH) between 2001 and 2017. Data were collected from patient hospital folders, as well as Paediatric Oncology records and Groote Schuur Hospital Radiotherapy records.

Results:

Eighty-five children (40 boys and 45 girls) aged 0.10-13.76 years (median 4.74 years) were diagnosed with LGG between 2001 and 2017 at RCWMCH. Sixty-five patients (76%) were WHO Grade I, 18 patients were WHO Grade II (21%), and 2 patients' histology were indeterminate. Six patients had metastatic disease at presentation. The most common sites were the cerebellum (27%), followed by the hypothalamus (17%), optic nerves and cerebrum (11% each). Forty-three patients had surgery upfront (51%), of which 21 patients had a complete resection, and 22 patients had debulking surgery. Thirty patients had a biopsy only (35%), where definitive surgery was not feasible. Twenty-three patients (27%) received chemotherapy. All but two patients were treated with Vincristine/Carboplatin upfront. The most common second line agent was Vinblastine. Twenty-two patients received radiotherapy (26%), of which 3 patients progressed. The estimated 5-year Overall Survival (OS) for the whole group was 86.8% and the estimated 5-year Progression Free Survival (PFS) was 42.8%. Estimated 5-year OS and EFS for those receiving chemotherapy was 95.6% and 35.8%. The crude PFS for those receiving radiotherapy was 86.4%. BRAF status was determined in 3 patients, all of which were negative.

Conclusion:

Our outcomes are similar to those achieved in developed countries. Chemotherapy and radiotherapy are valuable adjuncts to treatment. BRAF status should be tested where possible to determine whether biologic therapies can be used.

Title: **ONE NURSE AT A TIME. A MIXED METHODS STUDY OF THE CHILDREN'S NURSING WORKFORCE IN KENYA, MALAWI, SOUTH AFRICA, UGANDA AND ZAMBIA**

Authors: Natasha North[1], Maylene Shung-King[2] and Minette Coetzee[1]

Affiliation: [1]Child Nurse Practice Development Initiative, Department of Paediatrics and Child Health, University of Cape Town; [2]Department of Public Health & Family Medicine, University of Cape Town

Objective:
The goal of this study was to identify, as far as possible, the capacity of the children's nursing workforce in five selected countries in the sub-Saharan African region, as a first step towards identifying what would represent a viable and sustainable children's nursing workforce for the future. The aim was to establish the numbers of specialist children's nurses: i) on the professional register; ii) in clinical practice; iii) being produced through training.

Methods. Design:
This study used a convergent parallel mixed methods design, incorporating quantitative (three questionnaire surveys) and qualitative components (key informant interviews) and a scoping review of documentation, collected independently and then integrated during analysis and interpretation. The methodology was selected in order to access both subjective and objective knowledge and enable corroboration between sources where existing factual information was known to be scarce. Study population: The study extended to all five countries in the sub-Saharan African region with extant children's nurse training programmes. Sampling: Recruitment to surveys and interviews used purposive expert sampling to identify, for each country, individuals who a) hold a national leadership position in respect of children's nursing, paediatrics or child health; b) lead the national nursing regulatory body; c) lead children's nurse education institutions (NEIs). The scoping review of documentation aimed to place the information gathered through surveys and interviews in context through systematic searching and appraisal of peer-reviewed research publication databases, grey literature databases and targeted websites conducted according to JBI guidelines.

Results. Response:
Participation was secured from 12 individuals. Response rates were 100% for groups a and c. There was a zero response from group b. In depth interviews were conducted with three key informants from group b (3/5, 80%). Data were supplemented by combining information from the record of the Child Nursing Educator Forum Nov. 2017 to extract data relating to training activity at the seven relevant NEIs in South Africa. Data were therefore analysed for all NEIs (7/7 RSA and 4/4 SADC) for the year 2015. There are approximately 4 000 children's nurses in South Africa, Uganda, Zambia, Malawi and Kenya. The majority (8/10) are in South Africa. National governments are prioritising child health, and are committed to building the specialist nursing workforce. Six new children's nursing training programmes have been established since 2006. None of the five nations that train children's nurses currently have functioning systems for monitoring the children's nursing workforce.

Conclusions:
The children's nursing workforce is growing, with 260 additional children's nurses trained across these five nations each year. Recommendations: Governments need access to accurate information about the children's nursing workforce to inform workforce planning and training strategies. Professional regulatory bodies should record children's nurses as a clearly identifiable cadre. Further research: Assessment of the desired contribution of children's nurses within national health systems is advocated, in order to inform the development of evidence-based workforce planning and training plans.

Title: **PREVALENCE AND PREDICTORS OF BONE MINERAL DENSITY AMONG PERINATALLY HIV-INFECTED ADOLESCENTS ON ANTIRETROVIRAL THERAPY (ART) IN THE CAPE TOWN ADOLESCENT ANTIRETROVIRAL COHORT (CTAAC)**

Authors: Sana Mahtab[1], Chris Scott, Takwanisa Machemedze, Nana Akua Asafu-Agyei, Lisa Frigati, Landon Myer, Heather Zar

Affiliation: [1]Research Centre for Adolescent and Child Health (REACH), Department of Paediatrics and Child Health, University of Cape Town

Background:

Access to ART has reduced morbidity and mortality in perinatally HIV-infected adolescents (PHIVA), but long-term complications including low bone mineral density (BMD) remains a concern. In high income countries, low BMD has been reported in 10-54% of HIV-infected adolescents. We studied the prevalence and predictors of low BMD among South African PHIVA on ART.

Method:

We evaluated calcaneus stiffness index (SI) in a cross-sectional analysis using Quantitative Ultrasonography (QUS), a reliable and non-invasive method to screen BMD. Adolescents 11-17 years old were included. SI was considered low if z-score < -2 SD using age and sex matched HIV-uninfected controls (HIV-) as a reference. Multiple logistic regression was used to examine the adjusted association between low SI and both HIV-related and traditional risk factors in PHIVA.

Result:

Overall 407 PHIVA (median age: 14 years; 50% female; median age at ART initiation: 4.2 years) and 92 HIV- (median age: 14 years; 54% female) were included. Median duration on ART was 9.8 years (IQR 6.8-11.5) with 38% initiating ART at ≤2 years of age. PHIV+ had low mean SI and BMI z-score compared to HIV- (99 vs 105, p=<0.001) and (-0.19 vs 0.43, p=<0.001) respectively.

At Tanner Stage I, the mean SI between PHIVA and HIV- were similar (93 vs 94, p=0.832). During puberty, mean SI increased with Tanner Stage in both PHIVA and HIV- but there was more significant increase among HIV- controls; Tanner Stage II-III (96 vs 101, p=0.009) and Tanner Stage IV-V (104 vs 112, p=0.001).

Among PHIVA on ART, 52 (13%) had low SI. After adjusting for age, gender and Tanner stage, exposure to Lopinavir/Ritonavir (LPV/r) (OR=2.31, p=0.012) and viral load >50 copies/ml (OR=2.06, p=0.023) were associated with increased risk of low SI. However, exposure to Efavirenz (EFV) (OR=0.41, p=0.009) was associated with decreased risk of low SI.

Conclusion:

In South African PHIVA, SI appears significantly different from HIV- controls especially in late puberty. LPV/r exposure and high viral load are risk factors for low SI and exposure to EFV seems to be associated with better SI. Longitudinal study of BMD is needed to evaluate long term effects.

Table 1: Logistic regression models for key predictors of low stiffness index amongst perinatally HIV-infected adolescents (PHIVA) on antiretroviral therapy (ART) in the Cape Town Adolescent Antiretroviral Cohort (CTAAC).

Model	Multivariate *	
	OR (95% CI)	P value
Viral load (copies/ml)		
<50	Ref	
≥50	2.06 (1.11-3.83)	0.023
CD4 count (cells/ul)		
≤499	Ref	
≥500	0.53 (0.27-1.05)	0.067
WHO HIV staging		
Stage I-II	Ref	
Stage III-IV	1.84 (0.67-5.04)	0.234
Age at initiation of ART		
0-5 years	Ref	
6-14 years	0.52 (0.24-1.10)	0.089
Current ART regimen		
2 X NRTI + NNRTI	Ref	
2 X NRTI + PI	1.62 (0.83-3.16)	0.162
Ever on TDF		
Not exposed	Ref	
Exposed	0.53 (0.18-1.52)	0.237
Ever on EFV		
Not exposed	Ref	
Exposed	0.41 (0.21-0.80)	0.009
Ever on LPV/r		
Not Exposed	Ref	
Exposed	2.31 (1.20-4.47)	0.012

Adjusted for age, gender and tanner-stage
ART-antiretroviral therapy; NRTI-nucleoside reverse transcriptase; NNRTI-non-nucleoside reverse transcriptase; PI-protease inhibitor; TDF-tenofovir disoproxil fumarate; EFV-Efavirenz; LPV/r-Lopinavir/Ritonavir

Mean Stiffness Index in HIV- and PHIV+ by Tanner Stage

Whole Study Population

Male Participants

Female Participants
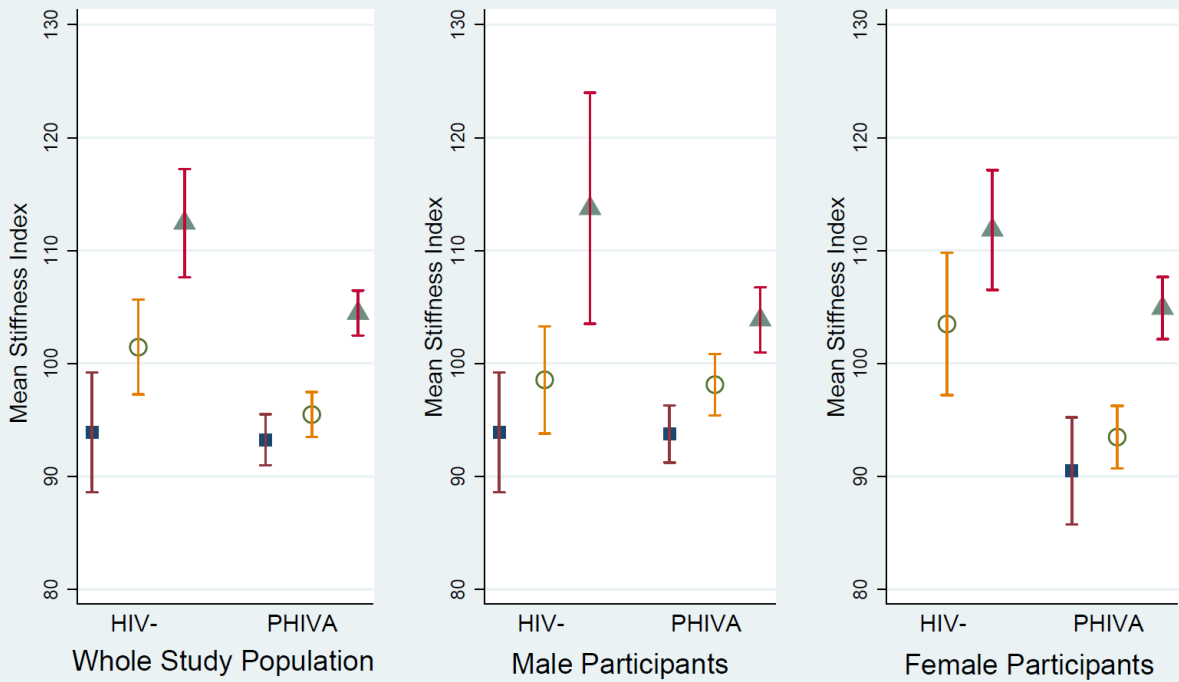
Tanner Stage I   Tanner Stage II-III   Tanner Stage IV-V

Title: JUVENILE ARTHRITIS MANAGEMENT IN LESS RESOURCED COUNTRIES (JAMLESS): CONSENSUS RECOMMENDATIONS FROM THE CRADLE OF HUMANKIND

Authors: Chris Scott[1], Mercedes Chan[2] Waheba Slamang[3], Lawrence Okong´o[4], Ross Petty[5], Ronald M. Laxer[6], María-Martha Katsicas[7], Francis Fredrick[8], James Chipeta[9], Gail Faller[10], Gecilmara Pileggi[11], Claudia Saad-Magalhaes[12], Carine Wouters[13], Helen E Foster[14], Raju Kubchandani[15], Nicolino Ruperto[16], Ricardo Russo[17]

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Conflict of Interest Statement:
The authors declare they have no conflicts of interest

Introduction:
Juvenile Idiopathic Arthritis (JIA) is the most prevalent chronic rheumatic disease in childhood and a major cause of pain and disability. Worldwide, the majority of children and their families live less resourced countries (LRC) and face significant socio-economic and healthcare challenges. Current recommendations for standards of care and treatment for JIA do not consider children living in LRC.

Objectives:
To develop recommendations for the care of children with JIA in less resourced countries.

Methods:
A group of experienced paediatric rheumatologists from less resourced countries was convened with additional inputs from a steering group of international paediatric rheumatologists with experience developing recommendations and standards of care for JIA. Following a needs assessment survey of healthcare workers caring for children with JIA in LMICs, a literature review was carried out and management recommendations formulated using Delphi technique and a final consensus conference.

The degree of consensus, level of agreement and level of evidence for these recommendations are reported.

Results:
Management recommendations arrived at by consensus for JIA in less resourced countries cover 5 themes: 1) Diagnosis 2) Referral and monitoring 3) Education 4) Advocacy and Networks and 5) Research. Thirty-five statements were drafted. All but one statement achieved 100% consensus and levels of agreement were high. The general amount of available evidence for critical appraisal was low, reflecting a shortage of research specifically focused on less resourced countries.

Conclusion:
Our recommendations offer novel insight and present consensus-based strategies for the management of JIA in less resourced countries. Its emphasis on communicable and endemic diseases influencing the diagnosis and treatment of JIA serves as a valuable addition to existing recommendations on the management of JIA. With increasing globalization, these recommendations - as a whole – provide educational and clinical utility for clinicians worldwide. The low evidence base for our recommendations is an impetus for further inquiry towards optimizing care for children with JIA in developing nations and around the world.

Title: THE SPECTRUM OF NON-INFECTIOUS UVEITIS IN CHILDREN MANAGED AT A TERTIARY PAEDIATRIC RHEUMATOLOGY SERVICE IN CAPE TOWN

Authors: *Waheba Slamang[1], Christopher Tinley[2] and Chris Scott[1]

Affiliation: Department of Paediatric Rheumatology[1] and Department of Paediatric Ophthalmology[2], Red Cross War Memorial Children's Hospital, University of Cape Town

Introduction:
Non-infectious uveitis is a leading cause of blindness in the developed world and juvenile idiopathic arthritis associated uveitis (JIA-U), one of the most commonly reported immune mediated cause in this group. However, as in other developing countries, infectious uveitis is more common in Africa and there is subsequently a paucity of data on the epidemiology of non-infectious uveitis in children in this setting. To our knowledge, this is the first description of non-infectious uveitis managed at a tertiary paediatric rheumatology service from sub-Saharan Africa.

Aim:
To describe the disease characteristics and treatment of children with non-infectious uveitis at a tertiary paediatric rheumatology service in Cape Town

Methods:
A retrospective analysis of children managed by the paediatric rheumatology and ophthalmology service for uveitis from 1 January 2010 to 31 December 2017, was conducted. Ethics approval was obtained and relevant data extracted from patient medical rheumatology and ophthalmology case files. Descriptive statistics were employed and comparisons between JIA-U and idiopathic uveitis groups were made, with p-values < 0.05 considered significant.

Results:
Thirty-three children (59 eyes) were reviewed - 17 boys and 16 girls with a median age at first visit of 72 months (age range 25 to 156 months).
Chronic anterior uveitis predominated in 23 (69%), acute anterior uveitis occurred in 3 (9%), panuveitis in 4 (12%), followed by 2 (6%) posterior, and 1 (3%) intermediate uveitis.
Fourteen (43%) were associated with juvenile idiopathic arthritis (JIA), 12 (36.3%) were considered idiopathic, while 2 (6%) were due to sarcoidosis, 1 (3%) to Behcet's, 2 (6%) to human immune deficiency virus (HIV), and 2 (6%) with post streptococcal syndrome.
The JIA-U group were characterised by a female preponderance, median age of onset of 56 months and chronic anterior uveitis. Further review according to the International League of Association for Rheumatology (ILAR) classification showed 10 (71,4%) to be oligo-persistent antinuclear antibody (ANA) positive while 3 (21,4%) were poly-articular rheumatoid factor negative and 1 (7,1%) had psoriatic-JIA.
9 (64.2%) of the JIA-U group and 8 (73%) of the idiopathic group presented with complications, predominantly cataracts, followed by band keratopathy and posterior synechiae. There was no significant difference in age and complications at presentation, between the two groups, p-values 0.4 and 0.62 respectively, though a male preponderance was evident in the idiopathic group.
All children were treated with standard initial therapy which included steroids (topical, oral and/ or intravenous) and methotrexate, of which 21 (61.7%) achieved remission. Thirteen children required the addition of a tumour necrosis factor (TNF) inhibitor, due to failure of Mycophenolate Mofetil in 2 and Azathioprine in 7 after standard uveitis treatment failure - Eight (61.5%) achieved remission.

Conclusion:
The current JIA-U screening practice effectively detects children with potentially sight threatening disease, though the low proportion of children with JIA-U and the high rate of complications at presentation warrants further investigation. Access to TNF inhibitors have improved outcomes for children with a poor response to standard uveitis treatment. Optimum management of non-infectious uveitis therefore necessitates a close relationship between paediatric rheumatologists and ophthalmologists.

Title: **PAEDIATRIC SYSTEMIC LUPUS ERYTHEMATOSUS PATIENTS IN SOUTH AFRICA HAVE HIGH PREVALENCE AND SEVERITY OF CARDIOVASCULAR MANIFESTATIONS**

Authors: Michael Harrison[1], Laura Lewandowski, Liesl Zuhlke, Chris Scott

Affiliation: [1]Faculty of Health Sciences, University of Cape Town (undergraduate student)

Introduction:
Paediatric onset of systemic lupus erythematosus (SLE) is associated with a high rate of major organ involvement, and African patients tend to develop more aggressive disease than those of Caucasian descent. However, very few studies of paediatric SLE have been conducted in Africa. The only recent study of paediatric SLE to come from Africa described a severe disease phenotype in this multi-ethnic cohort of children with SLE in Cape Town. Cardiovascular involvement appears to be common in paediatric SLE, however there are few published reports on the subject and none have been conducted in a predominantly African population.

Objectives:
This study aimed to describe the frequency and characteristics of cardiovascular manifestations of paediatric SLE in a multi-ethnic South African cohort.

Methods:
A retrospective chart review was conducted at Red Cross War Memorial Children's Hospital and Groote Schuur Hospital. Participants were included based on a diagnosis of SLE consistent with the Systemic Lupus International Collaborating Clinics (SLICC) or 1997 American College of Rheumatology (ACR) criteria, made prior to age 19 years. Participants were divided into two groups based on the presence or absence of cardiovascular involvement, which was defined as pericardial effusion; cardiac failure; myocarditis; cardiomyopathy; myocardial infarction; stroke; deep vein thrombosis; pulmonary embolism; arrhythmia; venous sinus thrombosis; peripheral vascular disease; and cerebral or systemic vasculitis. Demographic, clinical, laboratory, radiological, and outcome data were compared between paediatric SLE patients with and without cardiovascular involvement. Existing echocardiographic reports for all paediatric SLE patients were reviewed by a paediatric cardiologist. Statistical analysis was performed with R software package version 3.4.1. The study was approved by the Human Research Ethics Committee of the University of Cape Town.

Results:
In this cohort of 93 children with SLE, the prevalence of cardiovascular involvement was 48.4%. This rate is much higher than previously published reports of 5-30%. The average age at SLE diagnosis was 11.4 years, and 83% of patients were female. There were no demographic differences between patients with and without cardiovascular involvement, however serological and clinical differences existed. The most common cardiovascular manifestations were pericardial effusion (n=24), cardiac failure (n=8), cerebral vasculitis (n=9), stroke (n=7) and pulmonary embolism (n=7). Cardiovascular manifestations were frequently severe, with a third of patients with pericardial effusion requiring intervention and three patients presenting with cardiac tamponade. Echocardiographic data were available for 23 patients. Cardiac remodelling was common, with left ventricular hypertrophy and left ventricular dilation observed in 39.1% and 17.4%, respectively. Ejection fraction of less than 50% was reported in 25.0% of cases. Although no valvular vegetations were observed, valve status abnormalities were common (43.5%). High mortality was described in patients with cardiovascular involvement, at a rate of 28.9% compared to 10.4% in patients without cardiovascular involvement.

Conclusion:
Cardiovascular involvement was common and appeared to contribute to the high mortality rate previously described in this multi-ethnic paediatric SLE cohort in Cape Town. Severe manifestations, such as cerebral vasculitis, stroke and cardiac failure, were observed frequently. This study builds on the available literature concerning paediatric SLE in Africa. Further prospective research is needed to improve knowledge of paediatric SLE in an African context, to inform practice and improve outcomes for this high-risk population.

Title: **THE ELEMENTS INCLUDED IN DEATH SCENE INVESTIGATION PRACTICES PERFORMED FOR SUDDEN AND UNEXPECTED DEATH OF INFANT (SUDI) CASES**

Authors: Tracy Bennett and Laura Heathfield[1]

Affiliation: Division of Forensic Medicine and Toxicology, Department of Pathology, Faculty of Health Sciences, University of Cape Town, Anzio Road, Observatory, 7925; South Africa

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Sudden unexpected death of infants (SUDI) is the rapid and unexpected death of an infant aged less than 1 year old. These deaths are referred for a medico-legal post-mortem investigation to establish cause of death. National and regional protocols for the investigation of SUDI cases have been established in some countries, but not in South Africa (SA). These typically include a death scene investigation (DSI) component; however, it is unclear if the nature and extent of DSI protocols is standardised between countries or within.

Objective:
Systematically review the elements incorporated in a DSI of SUDI cases worldwide.

Methods:
Four literature databases and three discipline-specific journals, were searched using specific phrases to identify original research articles. Inclusion/exclusion criteria were implemented to assess relevance of articles. References of included articles were also searched. Elements included in DSI were documented from included articles and descriptive statistics were applied using Microsoft Excel.

Results:
A total of seventy-four articles were systematically included. A DSI always included scene observations and documentation. Thirty-five articles (47%) mentioned the use data gathering methods other than scene observation and documentation, such as interviews or doll re-enactment. Fifty-nine articles (80%) made mention of the specific variables documented in the DSI, including sleeping environment. The remaining studies performed DSI without making mention of what elements were assessed. It appeared that inclusion of all DSI elements and documentation of all variables was not routinely performed in SA, but rather on case-by-case basis.

Conclusions:
The same elements appear to be assessed worldwide with varying subsets being documented in different locations. This may be attributed to the socio-economic standing of the country, and the resources available, among other issues. However, since all elements in the medico-legal investigation of SUDI cases are inter-linked, these findings suggest that comprehensive DSI has value in guiding subsequent investigations needed to determine the cause of death.

A section of this research has been presented as part of a previous conference (SaVI conference, 15-16 October 2018).

HREC ref: 218/2018

Title: **MONITORING AND MAPPING CHILD PROTECTION IN SOUTH AFRICA**

Author: Aislinn Delany, Jenna Marco-Lee and Shanaaz Mathews

Affiliation: Children's Institute, University of Cape Town

Background:
Levels of violence against children in South Africa remain high, with the country's first national prevalence study in 2016 estimating that 26% of adolescents aged 15 to 17 have experienced some form of sexual abuse and a similar proportion have experienced physical abuse. There is a lack of child-focused surveillance data for monitoring the situation in South Africa, and this in turn results in a gap in information required for evidence-based service provision.

Objectives:
To identify and analyse a set of indicators drawing on existing data sources as a basis for monitoring child abuse and neglect; to collect data on the nature and location of child protection services; and to pilot the spatial mapping of both the indicator and services data, individually and in combination.

Methods:
A literature review and data scoping exercise was undertaken to identify and subsequently analyse appropriate indicators. The study also consisted of a situational analysis involving interviews with government officials and child protection organisations nationally; site visits to four districts to map the availability of services, and further engagement with government departments at provincial and national level regarding information on services and the findings of the study.

Results:
A set of 13 indicators were identified and analysed, covering sexual, physical and emotional abuse, and neglect. In the absence of data from the child protection register, several of the indicators rely on a child-centred analysis of the annual crime statistics. But crime data are an under-estimate of the prevalence of violence against children as they reflect only those incidents that are defined as crimes and are reported to (and recorded by) the police. For example, child murder is the most extreme outcome of violence against children. The study estimated a national child murder rate of 4.3 per 100 000 children in 2016/17 based on SAPS crime data. This is lower than the rate of 5.5 per 100,000 children found in a 2009 national child homicide study based on mortuary data. The child murder rate in the Western Cape (9.5 per 100,000 in 2016/17) was notably higher than in other provinces, and overall was highest among boys and adolescents aged 13 to 17 years.
A key output of the study is a website, linked to the existing child rights monitoring website Children Count, which presents the prevalence indicators and services data in an interactive format. The site includes maps of services such as social development offices, police stations and health facilities, and shows that there is a mismatch between where services are located and where children reside.

Conclusion:
This study highlights the importance of strengthening the routine data sources available to monitor child protection. The mapping of services at district level is possible and, when combined with other data such as prevalence or child population data, has the potential to improve service delivery. A better understanding of the challenge through data visualisation can match services to needs.

This is new research that has not been presented at previous research days.

HREC ref: 433/2016

Title: SHE'S GONE NOW." A MIXED METHODS ANALYSIS OF THE EXPERIENCES AND PERCEPTIONS AROUND THE DEATHS OF CHILDREN WHO DIED UNEXPECTEDLY IN HEALTH CARE FACILITIES IN CAPE TOWN, SOUTH AFRICA

Authors: Peter Hodkinson*[1][¶][*], Jessica Price[2][¶], Caroline Croxton[2], Lee Wallis[1], Alison Ward[2], Andrew Argent[3][&] Stephen Reid[4][&]

Affiliation: *Division of Emergency Medicine, Dept of Surgery, UCT

Objective:

The sudden death of a child is a catastrophic event not only for the family, but also for the healthcare workers involved. Confidential enquiries provide a biomedical depiction of the processes and quality of care delivered and drives improvements in care. However, these rarely include an assessment of the patient experience which is increasingly regarded as a key measure of quality of care.

Methods:

A parallel convergent mixed methods design was used to contrast and compare medically-assessed clinical quality of care with caregiver perceptions of quality and care in a cohort of sudden childhood deaths in emergency facilities in Cape Town, South Africa.

Results:

Amongst the 29 sudden childhood deaths, clinical quality of care was assessed as poor in 11 (38%) and the death was considered avoidable or potentially avoidable in 16 (55%). The main themes identified from the caregivers were their perception of the quality of care delivered (driven by perceived healthcare worker effort, empathy and promptness), the way the family was dealt with during the final resuscitation, and communications at the time of and after the death. Just 10 (35%) of caregivers were predominantly negative about the care delivered, of whom four received fair clinical quality of care, 13 (49%) of caregivers had predominantly positive experiences, one of who received poor clinical quality of care.

Conclusions:

Caregivers' experiences of the healthcare service around their child's death are influenced largely by the way healthcare workers communicate with them, as well as the perceived clinical effort. This is not always concordant with the clinically assessed quality of care Simple interventions such as protocols and education of healthcare workers in dealing with families of a dying or deceased child could improve families' experiences at a time when they are most vulnerable.

This is a secondary analysis from the Pathways to Care research project that has been previously presented (some time ago) but now specifically looking at children who died, who were not the focus of prior presentations.

Title: FORENSIC GENETIC RESEARCH ON SUDDEN UNEXPECTED DEATH IN AN INFANT (SUDI) AT SALT RIVER MORTUARY: EXPERIENCES AND PERCEPTIONS OF PARENTS

Presenting Author: Susan Louw

Affiliation: Department of Human Genetics, University of Cape Town

Background:
The sudden unexpected death of infants (SUDI) occurs when an infant less than one year old dies suddenly, without warning. Molecular autopsies have the potential to determine the presence of genetic variants which may have contributed to death; and consequently may lead to positive health interventions for at-risk family members. Obtaining informed consent for such research from grieving family members needs to be strongly justified, and the assessment of the participants' experiences in this process should evaluated and used to inform ongoing practices. This study explored the experiences and perceptions of family members who recently participated in an ongoing study at Salt River Mortuary (Cape Town) pertaining to molecular autopsy research for their deceased infant.

Methods:
Mothers from all SUDI cases who consented to follow-up studies were contacted (n=52), of which six agreed to participate in this study. For five families, a second family member joined this study, making eleven participants in total. In order to explore the experiences and perceptions of next-of-kin, a qualitative approach was used and semi-structured interviews were conducted. The interviews were transcribed verbatim and analysed through thematic analysis. The principal researcher in the original study, who recruited the participants, was also interviewed to holistically explore the setting in which the research took place.

Results:
Four major themes were identified; namely (i) old wounds, (ii) my booboo, (iii) the sudden death and (iv) afterthought. Their main reasons for participating in the research were to find answers and to be of value in future cases of SUDI. Grief seemed to play a significant role in their understanding of the research as well as with a low motivation to engage further with meaningful genetic results.

Conclusion:
The experiences and perceptions of next-of-kin who participated in genetics research have not yet been explored in a forensic setting, nor in South Africa. This study found that grief during the consent process, and therefore understanding of the research, hindered the willingness of family members to receive genetic results which would be meaningful for their families. This is important, as the value of molecular genetics results relies on family engagement in the follow-up process. These findings may potentially be extrapolated to families' experiences pertaining to genetic research or genetic diagnosis in other paediatric settings. Overall, these findings provide new information for both researchers and professionals to better understand patients' or research participants' experiences and expectations, and consequently contribute to better future management.

HREC ref: 627/2017

Title: FOOD INSECURE PREGNANT WOMEN IN SOUTH AFRICA: MATERNAL DEPRESSION MEDIATES VIOLENCE AND TRAUMA RISK FACTORS

Authors: <u>Whitney Barnett</u>[1], Jennifer Pellowski[2], Caroline Kuo[3,4], Nastassja Koen[4,5], Kirsty A Donald[6], Heather J. Zar[1], Dan J. Stein[4,5]

Affiliation: [1]Department of Paediatrics and Child Health, Red Cross War Memorial Children's Hospital, and Medical Research Council Unit on Child & Adolescent Health, University of Cape Town, South Africa; [2]Department of Behavioural and Social Sciences and International Health Institute, Brown University School of Public Health, Providence, Rhode Island, USA; [3]Department of Behavioural and Social Sciences and Center for Alcohol and Addiction Studies, Brown University, Providence Rhode Island, USA; [4]Department of Psychiatry and Mental Health, University of Cape Town, South Africa; [5]South African Medical Research Council Unit on Risk and Resilience in Mental Disorders, Cape Town, South Africa; [6]Division of Developmental Paediatrics, Department of Paediatrics & Child Health, Red Cross War Memorial Children's Hospital, University of Cape Town, Cape Town, South Africa

Objective:

Food insecurity during pregnancy is associated with lower infant birthweight and children from food insecure households have increased rates of developmental delay and poorer general health. Better understanding of psychological risk factors for food insecurity, and how they interact is crucial, given the long-term health implications for maternal and child wellbeing. This study investigated the association between psychological risk factors and food insecurity among pregnant women in a South African birth cohort, the Drakenstein Child Health Study (DCHS) and whether maternal depression mediates these relationships.

Methods:

We investigated psychosocial predictors of food insecurity using multivariate regression. Mediation analyses were conducted to explore whether depression mediated the relationship between intimate partner violence (IPV) and food insecurity as well as between childhood trauma and food insecurity including disaggregation by two study communities. Food security was assessed using an adapted version of the US Department of Agriculture food security scale; where two of five affirmative responses were recorded, households were coded as food insecure.

Results:

Among 992 pregnant women (median age 26 years), there were high rates of IPV (emotional IPV, 27%; physical IPV, 22%; sexual IPV, 7%), depression (24%), and childhood trauma (34%). In multivariate cross sectional analysis, emotional IPV (AOR 1.597; p-value<0.05), depression (AOR 1.047; p-value<0.01) and childhood trauma (AOR 1.520; p-value<0.05) predicted food insecurity. In mediation models including both communities, depression partially mediated the relationship between emotional IPV and food insecurity as well as physical IPV and food insecurity; depression partially mediated the relationship between childhood trauma and food insecurity. Differing degrees of mediation were found when applied to communities separately.

Conclusions:

Antenatal maternal mental health problems were highly prevalent and associated with food insecurity. These results highlight the importance of addressing maternal depression, childhood trauma and IPV in relation to food security; screening services during antenatal care may offer an opportunity to identify and intervene in these issues. Community level differences in risk and in mediation analyses indicate that contextual tailoring of interventions may be an important consideration.

Title: AN AUDIT OF HAEMODIALYSIS IN INFANTS AND SMALL CHILDREN (< 20 KG) IN AN AFRICAN PAEDIATRIC NEPHROLOGY UNIT

Authors: Werner Keenswijk[1] [2], Gina Sinclair[1], Marian Benetton[1], Mandi du Plessis[1], Peter Nourse[1], Deveshni Reddy[1], Mignon McCulloch[1]

Affiliation: [1]Red Cross War Memorial Children's Hospital, Cape Town, South Africa; [2]Ghent University Hospital, Ghent, Belgium

Background:

Peritoneal dialysis and renal transplantation remain the preferred choices of renal replacement therapy (RRT) in infants and small children. These therapeutic options however are not always feasible and haemodialysis (HD) is an accepted alternative. In small children presenting with end stage renal disease (ESRD), haemodialysis presents many technical challenges often resulting in HD being perceived as not possible or unavailable for children in a lower and middle income countries(LMIC).

Objectives:

 To assess challenges and outcome of performing chronic haemodialysis in children weighing less than 20 kg in an African Paediatric Nephrology Unit.

Methods:

We performed an audit of all children below 20 kg presenting with ESRD and receiving haemodialysis ≥ 4 weeks from 1st January 2008 to 30th June 2016 at the renal unit of Red Cross War Memorial Children's Hospital, located in Cape Town, South Africa.

Results:

We identified 15 children weighing 6.8-18.5 kg (mean 12.9 kg) and aged 11.5-105 months (mean 52.2 months) at HD initiation. Mean duration of HD was 11.8 months (range 1-61.5 months). From this group 7 children underwent successful transplantation, 2 patients died and 4 are currently still on haemodialysis. Two patients while on HD relocated to other centres.
An average 2.6(range 1-5) different vascular accesses were required per patient. Mechanical difficulties (haemodialysis catheter obstruction either due to positional issues or catheter thrombosis) were the most common cause of central-line removal(81%) while catheter-associated bacteraemia was incredibly low at 1.1/1000 catheter days.
Frequent problems were intradialytic hypotension, growth stunting and malnutrition.

Conclusions:

Haemodialysis is a feasible option in the small child presenting with ESRD and awaiting transplantation in a low resource setting but presents certain challenges.
Advocacy with lobbying for funding and development of child-friendly dialysis equipment and specialised centres with highly skilled and motivated personnel are the cornerstones of successfully performing HD in small children in LMIC.

Ethics number: 665/2016

Title: **SEVERE ALLERGIC REACTIONS AT A TERTIARY PAEDIATRIC SERVICE (2014 – 2016)**

Authors: Dr Sa-eeda Chippendale and Prof Michael Levin

Affiliation: Department of Paediatrics and Child Health, University of Cape Town

Objective:
Anaphylaxis is a severe, life-threatening generalized hypersensitivity reaction. The European Anaphylaxis Registry was established to review and improve medical management of these patients, facilitate accurate comparisons between centres, highlight public health implications, and examine trends in treatment over time. This is replicated here in a South African setting.

Methods:
Participants comprised patients treated at Red Cross War Memorial Children's Hospital (RCWMCH) for severe allergic reactions between January 2014 and August 2016. Recruitment was by applying relevant ICD-10 coding to the hospital's clinical summary system of admissions and discharges, pharmacy's records of adrenaline autoinjector dispensing, and referrals from the allergy department's clinical staff. Participants who were screened but did not meet inclusion criteria after preliminary questioning and/or folder review were excluded. 156 episodes were analyzed. A local web-based registry was established, and used to capture data collected with a questionnaire via interviews at the RCWMCH Allergy Clinic.

Results:
Males, younger children, and participants of coloured ethnicity were more frequently affected. Skin and mucosa were most commonly involved, followed by respiratory and gastrointestinal upset, with cardiovascular and other systemic involvement occurring infrequently. More than 40% of episodes were graded as severe. The most frequently requested testing was specific IgE. Nearly two-thirds of patients were seen with a recurrent episode. Food-related triggers predominated and decreased with age: particularly peanut, hen's egg, fish, cashew nuts and cow's milk. There was a strong correlation with atopic conditions, in excess of international trends. Adrenaline was rarely used, by both laypersons when previously prescribed, and by professional attenders. Hospital admissions were infrequent, and no deaths were recorded. Prophylactic measures were almost universally instituted, but the success thereof could be improved.

Conclusion:
This is the first local comprehensive description of anaphylactic trends. Further areas of research are suggested: to investigate the propensity for allergic reactions in the coloured population, the much higher rate of association with other atopic disorders compared to international patterns, comparison of our baseline comorbid conditions for contextual analysis, and a review of barriers to care. Ongoing education and training to patients, parents, teachers, and health care workers is a major area requiring intensification.

This is new research. HREC Approval: 510/2015

Title: **PARTNERSHIPS FOR CONGENITAL HEART DISEASE IN AFRICA (THE PROTEA STUDY) - THE FIRST 800 PATIENTS REVEAL KEY INSIGHTS INTO OUR CHD COHORT**

Authors: Thomas Aldersley[1], Inge Smit[1], John Lawrenson[2], Paul Human[3], Blanche Cupido[4], Rik De Decker[1], Gasnat Shaboodien[5], George Comitis[1], Barend Fourie[2], Raj Ramaesar[6], Bongani M Mayosi[7, #], Bernard Keavney[8], Liesl Zühlke[1, 4], for the PROTEA Investigators

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Contact details: liesl.zuhlke@uct.ac.za, 021 650 2373, Room 2.17, ICH Building, Red Cross War Memorial Hospital, Rondebosch

Background:
Congenital heart disease (CHD) is the most common birth defect world-wide, affecting 8/1000 live births. Yet, the reported prevalence of CHD in Africa is significantly lower than in developed economies, likely reflecting missed diagnoses and the poor early prognosis in resource-limited environments. Partnerships for Congenital Heart Disease in Africa (The PROTEA Study) aims to address these gaps in evidence in CHD epidemiology.

Objectives:
To establish a comprehensive phenotype and genotype registry, to develop a biobank for DNA extraction and genetic analysis; and to utilise computational fluid dynamics to potentially develop new treatment modalities for CHD.

Methods:
PROTEA is a collaborative multi-disciplinary prospective registry that plans to enroll 1200 participants from three tertiary hospitals: Tygerberg (TBH), Groote Schuur (GSH) and Red Cross War Memorial Children's Hospitals (RCH) following funding from MRC-UK.

Results:
As of 29/05/2018 there are 806 patients enrolled in the database, 727 paediatric patients from RCH and TBH, 65 from the Adult Congenital Heart Service and 14 from the Cardio-Obstetric Combined Clinic. The median age of the participants is 3.8 years and are born to mothers with a median age of 32 years, 51% of which had not completed secondary school, 59% unemployed and 37% of those that were employed, earned under R2500/month. A third were current smokers. Collectively these patients have 974 recorded diagnoses, 3261 echocardiograms, 271 catheterisations and 322 electrocardiograms. In total, 161 blood samples have been stored in the DNA biobank and whole exome sequencing has been performed on the first 85 specimens. Of these 50 have undergone primary analysis. A further 24 samples have been assessed for copy number variations using the CytoScan TM gene chip probe array.

Conclusion:
We present the first findings of the PROTEA Study, which provides comprehensive, contemporary data on patients with CHD. This has provided a unique platform for genetic analysis and collaborative partnerships. We anticipate that these data will add to the development of strategies to prevent and manage CHD in the African context.

Title: LONGITUDINAL CHANGES IN TRANSFER FACTOR OF CARBON MONOXIDE AND ALVEOLAR VOLUME IN HIV-INFECTED ADOLESCENTS ON ANTIRETROVIRAL THERAPY

Authors: Githinji L[1], Gray D[1], Hlengwa S[1], Zar HJ[1]

Affiliation: [1]Department of Paediatrics and Child Health, Red Cross War Memorial Children's Hospital and SA-MRC Unit on Child and Adolescent Health, University of Cape Town

Background:

Chronic lung disease is common in perinatally HIV-infected adolescents, with reduced lung function reported. Diffusion capacity is a measure of the rate at which oxygen is transferred across the alveolar-capillary surface, but there is scarce data on longitudinal changes of this measurement in HIV-infected adolescents on highly active antiretroviral therapy (HAART).

Objective:

To investigate longitudinal changes in transfer factor of carbon monoxide and alveolar volume over two years in HIV-infected adolescents in the Cape Town Adolescent Antiretroviral cohort (CTAAC).

Methods:

HIV-infected adolescents, 9-14 years, on HAART, underwent single breath carbon monoxide diffusion test at enrolment and annually for two years. Healthy HIV-uninfected, matched controls were also tested. Global lung initiative equation for transfer factor for carbon monoxide (TLCO) was used to compute the lower limit of normal and z-scores. Mixed-effects linear modelling was used to determine associations of TLCO.

Results:

Four hundred and sixty-five HIV-infected and 100 HIV-uninfected adolescents were tested at baseline, 381 (81.9%) HIV-infected adolescents and 96 (96%) HIV-uninfected at 12 months and 392 (84.3%) HIV-infected and 90 (90%) HIV-uninfected at 24 months. At enrolment, mean (SD) age was 12.0 (1.6) years, mean (SD) duration of HAART was 7.0 (3.0) years, 53% were male, 24% had viral load> 10000 copies/ml, and median (IQR) CD4 count was 716 (566-972) cells/mm^3. TLCO and alveolar volume increased over the two years in both groups, however, HIV-infected adolescents tracked lower at all time points. Absolute alveolar volumes were 2.8l vs 3.2l at baseline; 3.1l vs 3.4l at 12 months and 3.5l vs 3.8l at 24 months, p<0.05 for all time points. TLCO at baseline was 5.5 vs 6.1 mmol/kPa/l in the HIV-infected and uninfected, respectively, p<0.001. Male sex, age, height, previous hospitalization for a lower respiratory tract infection or time were significant predictors of TLCO, p<0.05 for all.

Conclusion:

HIV-infected adolescents, well controlled on HAART, had lower transfer factor for carbon monoxide and alveolar volume compared to HIV-uninfected controls which remained lower over two years, suggestive of impaired lung growth that is established in early life.

Title: CYSTIC FIBROSIS IN CHILDREN WITH AFRICAN ETHNICITY: A CASE CONTROL STUDY

Authors: [1]Dr. Sandra Kwarteng Owusu, [3] Prof Brenda Morrow [2]Dr. Debbie White, [2]Dr. Susan Klugman, [1]Dr. Aneesa Vanker, [1]Dr. Diane Gray, [1]Dr. Marco Zampoli

Affiliation: [1]Division of Paediatric Pulmonology, Department of Paediatrics and Child Health, Red Cross War Memorial Children's Hospital, University of Cape Town; [2]Department of Paediatric Pulmonology, Charlotte Maxeke Johannesburg Academic Hospital, Faculty of Health Sciences, University of the Witwatersrand; [3]Division of Paediatric Critical Care and Children's Heart Disease, Department of Paediatrics and Child Health, University of Cape Town

Background:
Cystic fibrosis (CF) is a severe life-limiting genetic disorder that is described more commonly in Caucasian populations in whom p.Phe508del is the most common mutation. There is however a paucity of data on genotype and clinical features of CF in children of African ethnicity. The aim of this study was to describe and compare the presentation and outcomes of CF in children with African ethnicity and compare this to children with CF in South Africa with p.Phe508del genotype.

Methods:
A retrospective case-controlled study was conducted in children with CF attending Red Cross War Memorial Children's Hospital (RCWMCH), Cape Town and Charlotte Maxeke Academic Hospital (CMAH), Johannesburg from January 2000 - August 2018. Presentation and genotype characteristics, and nutrition and pulmonary function outcomes of children with African ethnicity were compared with age, gender and date-of-diagnosis matched controls who were homozygous (or heterozygous) with the p.Phe508del mutation.

Results:
Thirty-four children of African ethnicity (cases), 15 at RCWMCH and 19 at CMAH, were matched to 34 controls. Median age of diagnosis (5.5 months, IQR 2.0-15.0), gender (38 males, 59%) and pancreatic insufficiency status (n=59, 92%) was similar in cases and controls. The most common CFTR mutation identified in cases was 3120+1G>A, identified in either homozygous or heterozygous state in 22 (64.7%) and 7 (20.5%) cases respectively; five cases (14.7%) had either *other* or *no mutations* identified. Compared to controls, cases at diagnosis were significantly more malnourished [Weight-for-age z score (WAZ) -4.3 vs.-2.6 (p< 0.01); height-for-age z score (HAZ) -3.5 vs. -2.1 (p=0.01); weight-for-height z-score (WFHZ) -2.2 vs, -1.4 (p=0.01)] and less likely to present with neonatal bowel obstruction [cases n =2 (5.9%) vs. controls n=10 (29.4%); p = 0.03]. Median age (15.0 months, IQR 7.0-32.0) of first documented *Pseudomonas aeruginosa* infection and prevalence (n=11, 16%) of chronic *p.aeruginosa* infection was similar in cases and controls. Nutrition and pulmonary function (FEV1 % predicted in children ≥ 6 years) outcomes and changes in these over time from ages 3-16 years were similar in both groups; median FEV1 z-score at age 6, 10 and 14 years was -0.9 (±1.5), -1.8 (±2.0) and -1.8 (±1.9) respectively. There were three early (8.8%) deaths among cases (two with shock and respiratory failure, and one of unknown cause) and one (2.9%) early death in the control group, due to severe malnutrition and sepsis at the time of diagnosis.

Conclusion:
Ethnic African children with CF were more malnourished at the time of diagnosis, and fewer presented with neonatal bowel obstruction compared to children with p.Phe508del genotype. Cases and controls had a similar course of CF disease during childhood with comparable nutritional, pulmonary function and early mortality outcomes.

Title: **IMPACT OF HIV AND ANTIRETROVIRAL DRUG EXPOSURE ON LUNG GROWTH AND FUNCTION OVER 2 YEARS IN AN AFRICAN BIRTH COHORT**

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Affiliation: [1]Department of Paediatrics and Child Health, Red Cross War Memorial Children's Hospital and MRC Unit on Child and Adolescent Health, University of Cape Town, Cape Town, South Africa; [2]Department of Clinical Research, London School of Hygiene & Tropical Medicine, London, UK; [3]Telethon Kids Institute, School of Physiotherapy and Exercise Science, Curtin University, and Centre for Child Health Research, University of Western Australia, Perth, Australia

Background:
HIV exposed uninfected (HEU) infants have poorer health outcomes compared to HIV unexposed (HU) infants, including increased risk for respiratory disease. Previously we found that lung function soon after birth was altered in HEU infants, but the longer-term impacts of HIV and/or antiretroviral (ARV) drug exposure on lung function are not known.

Objectives:
We aimed to assess the impact of HIV and ARV exposure on lung growth and function over the first 2 years of life.

Methods:
Infants enrolled antenatally in the Drakenstein Child Health study between 2012-2015 had lung function measured using tidal breathing and multiple breath washout at 6 weeks and 2 years. Maternal HIV diagnosis was established during pregnancy using routine testing and HIV-infected women received ARV therapy as per Western Cape Prevention of Mother To Child Transmission guidelines at the time, CD4 counts were collected. Infants were tested for HIV using PCR and antibody testing. The association between HIV and ARV exposure and lung function during 2 years was assessed using linear regression, adjusted for BMI for age Z-score, sex, ethnicity, socioeconomic status (SES) quartile at enrolment and pre and postnatal smoke exposure (based on urine cotinine).

Results:
1036 infants had at least one lung function measure and were followed over 2 years, 226 (22%) were HEU; 535 (52%) male, 560 (54%) black African ancestry, 330 (33%) mothers smoked during pregnancy, 775 (71%) household tobacco smoke exposure. 910 (88%) infants had lung function tested at 6 weeks; and 743 (72%) children at 2 years. The majority of HEU infants were black African (93% vs. 43% HU, p<0.001), HEU infants had less household smoke exposure (69% vs. 81%, p=0.01), lower SES (p=0.001) and had higher BMI z-score at 2 years (p=0.001) compared to HU; other demographics were similar.
At 6 weeks HEU had higher tidal volume compared to HU (1.1mL, CI 0.02; 2.2, p=0.045). Infants whose mothers had triple therapy ARVs had lower expiratory flow ratios, t_{PTEF}/t_E compared to those whose mothers had zidovudine (AZT) only (-0.26, CI -0.4; -0.1, p<0.001). At 2 years tidal volume differences were no longer seen, but HEU had a higher lung clearance index compared to HU (0.12, CI 0.02; 0.23, p=0.019). Low antenatal maternal CD4 count was associated with an average 6.5mL lower tidal volume at 2 years compared to infants whose mothers had CD4 counts>500 cells/ mm^3 (CI 1.0, 12.1; p=0.02).

Conclusion:
HIV exposure affects lung function at birth and is associated with mild lung function impairment at 2 years of age. More severe maternal immune compromise contributes to lower lung function. The impact of ARVs on lung growth warrants further investigation. Ongoing surveillance of respiratory health is important in HEU.

HREC: 423/2012

Title: THE PERCEPTIONS OF HIGH SCHOOL HOCKEY PLAYERS AND THEIR COACHES REGARDING VARIOUS TYPES OF MOUTH GUARDS AVAILABLE IN SOUTH AFRICA

Presenting Author: Samer Abdelrahman

Affiliation: Paediatric Dentistry, University of the Western Cape

Background:
Dental trauma in a young age can have negative lifetime consequences. It can be largely prevented by using mouth guards during organized sports and recreational activities. Generally, compliance with mouth guards is poor and the type of mouth guard used seems to influence the compliance. Although a lab study was conducted to determine the differences between the various mouth guards available on the South African market, it was not supported qualitatively by athletes' perceptions. Moreover, coaches seem to influence athletes' use of mouth guards. Coaches should also be able to manage traumatic injuries that occur during organized sports.

Aim:
To investigate the perceptions of young athletes and their coaches regarding different types of mouth guards available in South Africa.

Methods:
Mixed quantitative and qualitative methods were used. A high school hockey team and their coaches were the subjects of this study. First, a questionnaire was completed by the athletes regarding their previous experience with mouth guards. Thereafter, various types of mouth guards were distributed before every training session to assess the perception of athletes towards each type. A questionnaire was completed by each athlete after the use of each type of mouth guard. Coaches were required to complete an open ended questionnaire sent by email regarding their knowledge of mouth guards and the management of acute dental trauma. The use of the email survey eliminated any possible intra-interviewer bias and the Hawthorne effect.
Upon completion of the study, it was clear that additional information would need to be sourced to increase the validity of the results and improve our understanding of the problem.
Triangulation was made to explore the current information provided to the public, it included an internet survey, mouth guard brochures available in the market and a dentist mini-survey. Regarding the internet survey, the following search terms were entered into the Google search engine: "Best mouth guard in South Africa", "Mouth guards", "gum guards", "mouth protector" and "South Africa". The search was conducted until saturation point was reached. The saturation point was defined by Magunacelaya and Glendor (2011) as "the point at which great overlap exists between websites". The overlap was determined when repetition was largely noticed. To ensure reliability, the search was conducted four separate times. Each online search was separated from the next one by a period of one month. Moreover, a brief survey was done among ten general dentists enrolled for the Diploma in Paediatric Dentistry to get an idea of their knowledge on the subject. An online Socrative survey was used, ensuring anonymity of participants and their responses. However, caution should be taken when interpreting the results of this mini-survey as it represents only a snapshot of responses that cannot be generalized to the greater dentistry fraternity. Lastly, available mouth guards' brochures were carefully examined.

Results:
The use of mouth guards were influenced by previous history of dental trauma as well as the coaches' attitude and preference. Mouth guards were not used by athletes during training sessions and recreational activities. Also, mouth guards were neither recommended by coaches

in those activities nor made compulsory in order to participate in matches. Furthermore, coaches were not competent in managing dental trauma.

The perception of stock and boil-and-bite mouth guards were generally poor. Custom made mouth guards were associated with better perception and compliance. Pressure laminate mouth guards were perceived to offer the best comfort and protection.

Coaches motivate their athletes to wear mouth guards for safety purposes. Also, they use stories about previous dental trauma experiences to persuade athletes to use mouth guards. These two reasons used for motivation are naturally acquired by experience and common sense. Moreover, the high cost of treating a traumatised tooth and avoidance of brain concussion were the other prominent codes extracted from coaches' motivation to athletes. These last two codes seem to be influenced by knowledge. Further investigation was needed to conclude the source of this information. It was found that these two reasons given by coaches closely match the themes extracted from studying mouth guards' brochures.

Mouth guards are not as widely used as they should be, and the reason for this could be possibly attributed to dentists' lack of knowledge and negative attitudes towards the promotion of mouth guards. Moreover, no South African online website provides enough information to educate the public in this regards.

Conclusion:

Only custom made mouth guards should be recommended for use in organized sporting activities. The current situation deduced from the study is summarised in figure (1). As the knowledge of coaches regarding mouth guards and management of acute dental trauma is deficient, programmes and information sessions should be offered to address this gap in knowledge.
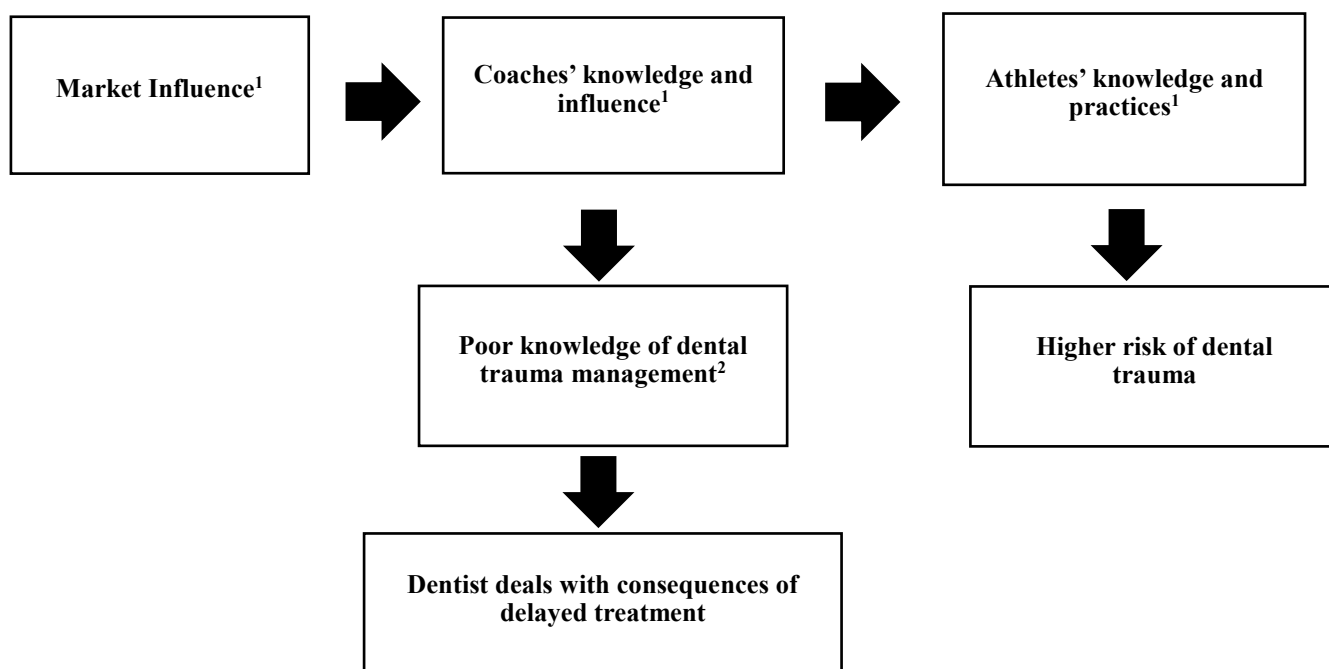
*1 refers primary prevention of dental trauma
*2 refers secondary prevention of dental trauma

Title: **UNDERSTANDING BARRIERS AND DRIVERS THROUGH HEALTHCARE FOCUS GROUPS TO GUIDE THE DEVELOPMENT OF MUSCULOSKELETAL MODELS OF CARE FOR CHILDREN/ADOLESCENT IN A MIDDLE- INCOME COUNTRY**

Authors: H. Kunzmann[*1], T. Woolf[2], J. Erwin[3], H. Foster[4], C. Scott[1]

Affiliation: [1]Paediatric Rheumatology, University of Cape Town, Cape Town, South Africa; [2]Bone and Joint Research Group; [3]Bone & Joint Research Office, Royal Cornwall Hospital, Truro; [4]Paediatric Rheumatology, Newcastle University,Newcastle, United Kingdom

Introduction:
Diseases of poverty remain the dominating health priority in South Africa and other Low- and Middle Income Countries (LMIC). Recent efforts towards strategic planning on the prevention and control of non-communicable diseases (NCDs) reflect the growing relevance of NCD's in LMIC's where infectious diseases burden is on the decline.

Objectives:
We set out to identify barriers and drivers that influence access for children and adolescents presenting with musculoskeletal (MSK) symptoms with the aim to use this information to improve MSK care outcomes trough the development of models of care and deliver appropriate and applicable service improvement strategies. In doing so we hope to develop a model that can be replicated in other NCD's and in other LMIC healthcare systems.

Methods:
Five focus group interviews were done over a period of two weeks. The focus group participants consisted of Community Service Medical Officers (COSMO's), Medical Officers (MO's), Family Physician Consultants and Registered Nurses in the Eden and Central Karoo districts within the Western Cape Province of South Africa. There were forty-one participants. 25 of the 41 participants completed the questionnaire exploring their training with regard to the MSK system and their own perceived confidence in identifying and treating children with a MSK presentation.

Results:
Twenty of the 25 participants were general practitioners, two where specialist family physicians (consultants) and 3 participants did not specify. The average level of experience was 8.8 years. Eighteight percent (n=22) had undergraduate training in the examination of the paediatric MSK. 8% (n=2) had training in the paediatric gait, arms, legs and spine (pGALS), but did not use it in day-to-day practice. Paediatricians and paediatric orthopaedic surgeons predominantly delivered teaching of the paediatric MSK system in children. 84% of the participants felt confident in some, but not all aspects of the MSK examination. Using short case studies the participants had to rate their confidence on a scale of 0-10. The confidence score for the MSK cases had a mean of 4.16-5.52 (SD 1.93-2.63), compared to communicable disease case that had a mean of 7.2 (SD 1.68).

Table 1: How comfortable are you managing this case?

	Mean	SD
Case 1 (Limp)	5,52	1,93
Case 2 (Delayed Walking)	4,72	2,26
Case 3 (Shortness of breath and difficulty breathing)	7,2	1,68
Case 4 (Fever and arthritis)	4,52	2,63
Case 5 (Swollen joint)	4,16	2,26

Good relationship fostered by the secondary hospital paediatricians was identified as the biggest driver. Other drivers were, electronic platform for note keeping, communication via certain social media applications and gained knowledge of system and disease by an intern first working in a secondary hospital prior working in a peripheral hospital. Barriers were the healthcare providers own perceived limitation and exposure/knowledge to MSK diseases, poor history given by the person accompanying the patient, limitations in after hour investigations, unpredictable availability of ambulance services and socioeconomic factors of the patient population.

Conclusion:
The focus groups identified barriers and drivers that play a role in whether children and adolescents presenting with MSK symptoms receive the "right care, delivered at the right time, by the right team, in the right place, with the right resources" these insights will direct further investigation into the drivers and barriers in the other districts of South Africa and other LMICs. The results could give direction in developing policies and Models of Care to improve MSK care outcomes for children and adolescents.

Title: **MUSCULOSKELETAL CONDITIONS AMONG PERINATALLY HIV-INFECTED ADOLESCENTS IN THE CAPE TOWN ADOLESCENT ANTIRETROVIRAL COHORT**

Authors: Sana Mahtab, Chris Scott, Takwanisa Machemedze, Susan Joubert, Nana Akua Asafu-Agyei, Landon Myer, Heather Zar

Affiliation: Department of Paediatrics and Child Health- Research Centre for Adolescent and Child Health (REACH), University of Cape Town

Introduction:
Perinatally HIV-infected adolescents (PHIVA) have been shown to have a higher risk of developing musculoskeletal diseases. Increasing access to antiretroviral therapy (ART) has dramatically improved life expectancy but little is known about musculoskeletal disease in PHIVA who are on ART in African.

Objective:
To study the prevalence and spectrum of musculoskeletal abnormalities in PHIVA on ART using the paediatric Gait, Arms, Legs, Spine (pGALS) screening tool.

Methods:
HIV-infected and matched HIV-uninfected adolescents (HIV-) enrolled in the Cape Town adolescent antiretroviral cohort (CTAAC) had pGALS examination and screening musculoskeletal questionnaires completed by trained study clinicians. Childhood Health Assessment Questionnaires (CHAQ) were used to assess participants' musculoskeletal health status; participants with abnormal pGALS examinations were referred to rheumatology.

Results:
pGALS was performed on 473 PHIVA (median age: 13.1 years; 49% female; median age at ART initiation: 4.3 years) and 101 HIV negative adolescents (median age: 12.8 years; 54% female). Median duration on ART was 8.8 years (IQR 5.8-10.5) with 38% initiating ART at ≤2 years of age. Twenty-three percent of PHIVA were WHO HIV stage 4 at time of HIV diagnosis. At the time of pGALS screening, 60% were on two nucleoside reverse transcriptase inhibitors and a non-nucleoside reverse transcriptase inhibitor and 36% were on two nucleoside reverse transcriptase inhibitors and a protease inhibitor. Eighty percent of the PHIVA had viral load ≤100 copies/ml and the median CD4 count was 711cells/uL.
Of the 23 (4%) participants with abnormal pGALS screening, 21 (4.4%) were PHIVA and 2 (2%) were HIV negative adolescents, p=0.25. 45% of those with abnormal pGALS had abnormal CHAQ, or a positive musculoskeletal screening question. Ten (44%) of participants with abnormal pGALS screening reported physical symptoms (4 had joint pain, 3 had difficulty in getting dressed and 2 had difficulty in both getting dressed and taking stairs, 1 had joint pain along with difficulty in getting dressed and taking stairs).
Fifty percent of the PHIVA with abnormal pGALS were WHO HIV stage 4 while 22% of those with a normal pGALS were WHO stage 4, p=0.02. An abnormal pGALS was associated with longer duration of ART (median duration: 9.9 years vs 8.7 years with normal pGALS, p=0.01).
Amongst the 23 participants with abnormal pGALS, 2 PHIVA were diagnosed with Osgood-Schlatter Disease, 6 (4 PHIVA and 2 controls) with orthopaedic conditions including scoliosis or osteochondroma, 9 PHIVA had underlying neurological conditions including cerebral palsy or a prior stroke and 6 PHIVA had mechanical joint conditions.

Conclusion: There was a low prevalence of musculoskeletal abnormalities in this group of PHIVA established on ART. Advanced HIV stage and longer exposure to ART were associated with musculoskeletal abnormalities. Screening for musculoskeletal abnormalities may target these subgroups of PHIVA.

Title: **SINGLE CENTRE IN-HOSPITAL MORTALITY AND TERMINAL CARE OF PAEDIATRIC CARDIAC PATIENTS IN A MIDDLE-INCOME COUNTRY**

Authors: B Rossouw[1], B Morrow[1], L Zühlke [1], M Meiring[2], AC Argent[1]

Affiliation: Division of Critical Care and Children's Heart Diseases, Paediatrics and Child Health, Red Cross War Memorial Children's Hospital, University of Cape Town[1]; Paedspal and Department of Paediatrics and Child Health, University of Cape Town[2]

Background:
Modern paediatric cardiac treatment have been so successful that children with congenital heart disease (CHD) are now expected to survive to adulthood. With reduced mortality rates Paediatric Palliative Care teams (PC) have had limited involvement in paediatric cardiology.

In developing countries, modern cardiac treatment are not readily available and mortality rates are higher. According to South Africa government statistics, cardiac disease ranked as the 8th -9th most common cause of childhood mortality during the 2000's. During 2015, 335 children died of HIV and 318 of cardiac disease. There is a need for PC involvement in children with complex cardiac conditions similar to PC involvement in HIV.

Aim:
An audit of in- hospital terminal care of children with a diagnosed heart conditions at the largest tertiary cardiac referral center in South Africa.

Method:
4-year single center retrospective folder review of in-hospital mortality and terminal care of children with cardiac conditions. 159 children were identified from the hospital death notification book.

Results:
Cardiac diagnosis of 159 childhood deaths included cardiomyopathy (23%), left sided obstructive lesions (10%), hypoplastic left heart (6%), right sided obstructive lesions (21%), shunts (19.2%), truncus arteriosus (4.5%), univentricular heart (11.5%), ALCAPA (2.5%) and TAPVD (2.5%). 13% had inoperable CHD, 27% were waiting for corrective cardiac surgery and 60% died post-surgery. 7 CHD children died of complicated infective endocarditis post-surgery. The median age at death was 7 months.

95% required ICU treatment. 60% died in ICU, 32% in the ward, 6.9% in the emergency department and 1 patient died on the operating table. The mode of death included failed resuscitation in 40%, withdrawal of life sustaining treatment in 17% and non-escalation of life sustaining treatment in 43%.

PC was consulted for 18.8% (n=30) of the patients at median time of 18.5 days before death.

Conclusion:
WHO describes PC as early intervention to improve quality of life for children with life threatening and life limiting conditions. In the developing world, a large group of cardiac children will fulfil WHO criteria for PC involvement yet in our setting only a small number received PC support. Majority of complex heart conditions are diagnosed soon after birth. This leaves ample time for PC quality of life improvement strategies and bereavement support before the child dies.

Title: STANDARD ECHOCARDIOGRAPHY VERSUS HANDHELD ECHOCARDIOGRAPHY FOR THE DETECTION OF SUBCLINICAL RHEUMATIC HEART DISEASE: A SYSTEMATIC REVIEW AND META-ANALYSIS OF DIAGNOSTIC ACCURACY

Authors: <u>Lisa H Telford</u>[*], Leila H Abdullahi, Eleanor A Ochodo, Liesl J Zühlke, Mark E Engel

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Objective:
Handheld echocardiography presents an opportunity to address the need for more cost-effective methods of detecting rheumatic heart disease (RHD) in resource-limited and remote settings. This review sought to summarise the accuracy of handheld echocardiography which, if shown to be sufficiently similar to that of the current gold standard, could usher in a new age of RHD screening in endemic areas.

Methods:
The review protocol was registered on PROSPERO (CRD42016051261). A search of the electronic sources; PubMed, Scopus, Web of Science and EBSCOhost without language restriction was performed to identify studies conducted from 2012 onwards. Two authors independently assessed the methodological quality of included studies against review specific QUADAS-2 criteria and extracted information on metrics of diagnostic accuracy. A meta-analysis was conducted to produce summary results of sensitivity and specificity for three disease categories (any RHD, definite RHD and borderline RHD) using the Hierarchical Summary Receiver Operating Characteristic method. Forest plots and scatter plots in Receiver Operating Characteristic space in combination with subgroup and sensitivity analyses were used to investigate heterogeneity. Publication bias was not investigated.

Results:
Six studies (N = 4208) were included in the analysis. For any RHD detection, the pooled results from six studies were; sensitivity: 81.6% (95% CI: 76.5% – 86.6%) and specificity: 89.8% (84.5% – 95.0%). Meta-analytical results from five of the six included studies were; sensitivity: 91.1% (80.5% – 100%) and specificity: 92.0% (85.6% – 98.4%) for the detection of definite RHD only and sensitivity: 62.0% (31.8% – 92.2%) and specificity: 82.3% (65.2% – 99.5%) for the detection of borderline RHD only.

Conclusion:
Handheld echocardiography displayed good accuracy for detecting definite RHD only and modest accuracy for detecting any RHD but demonstrated poor accuracy for the detection of borderline RHD alone. Findings from this review provide some evidence for the potential of handheld echocardiography to increase access to echocardiographic screening for RHD in resource limited and remote settings.

Title: **INTERFERENCE OF N-ACETYLCYSTEINE IN PARACETAMOL MEASUREMENT AT GSH NHLS**

Authors: DJ van der Westhuizen[1], R Dalmacio[1], CR Stephen[2], GF van der Watt[1]

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Background:
Paracetamol (Acetaminophen; ACETA) is commonly measured enzymatically on automated analysers for determination of serum concentrations in presumed or confirmed overdose cases. N-acetylcysteine (NAC) is the mainstay treatment for ACETA overdose, thus these two analytes often occur together in these patients' serum.

Objective:
The question at hand, is whether at therapeutic plasma concentrations of NAC, there is significant negative interference in the measurement of ACETA at Groote Schuur Hospital NHLS.

Methods:
Two experiments were performed to assess the interference of NAC on the measurement of ACETA. NAC concentrations used in vitro were related to therapeutic NAC concentrations.

Results:
In the first experiment, negative interference of 14 – 23 % was found when samples were spiked with 1000 ug/ml of NAC. In the second experiment, negative interference of 7 – 11 % was found at various NAC spiking concentrations, resembling NAC therapeutic serum levels.

Conclusions:
Significant negative interference was found in the enzymatic measurement method of ACETA when samples are spiked with NAC. This study illustrates the importance of confirming the ACETA measurement method of each laboratory and that in-house studies per laboratory need to be done to determine whether NAC significantly interferes with the specific analyser.

Title: **HIV-EXPOSURE WITHOUT INFECTION IMPACTS EARLY LANGUAGE DEVELOPMENT: OUTCOMES FROM A SOUTH AFRICAN BIRTH COHORT STUDY**

Authors: Catherine J Wedderburn[1,2], Shunmay Yeung[2], Whitney Barnett[1,3], Raymond T Nhapi[1], Andrea M Rehman[4], Diana Gibb[5], Heather J Zar[1,3], Dan J Stein[6,7], <u>Kirsten A Donald[1]</u>

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Background:
Sub-Saharan Africa, where HIV is most prevalent, has the highest proportion of children at risk of not reaching their neurodevelopmental potential. Whereas HIV infection is a known risk factor for developmental delay, effects of HIV and antiretroviral therapy (ART) in exposed HIVuninfected (HEU) children remain unclear.

Objective:
We aimed to compare neurodevelopmental outcomes in HEU and HIV-unexposed uninfected (HUU) children during their first 2 years.

Methods:
The Drakenstein Child Health Study is a population-based birth-cohort in the Western Cape, South Africa. Women were enrolled antenatally from two clinics between 2012-2015. Mothers and children from these two communities received HIV testing and treatment as per the Western Cape prevention of mother-to-child transmission guidelines at the time. Developmental assessments were conducted by trained assessors blinded to HIV/ART status, using the Bayley-III Scales of Infant and Toddler Development (BSID-III) at 6 and 24 months.

Results:
A subgroup of 260 children (61 HEU, 199 HUU) had a BSID-III assessment at 6 months and 732 children (168 HEU, 564 HUU) at 24 months. Mean scaled scores of all subscales were within normal range (BSID-III standardised mean 10, SD 3) at 6 months with no differences between HEU and HUU (p>0.1). However, at 24 months, HEU scores were significantly lower than HUU in cognitive mean (SD) [6.80(1.88)vs.7.14(1.84), p=0.049]; receptive [6.62(1.82)vs.7.25(1.97), p=0.001] and expressive language [6.94(2.29)vs.7.57(2.30), p=0.028]; in contrast, fine and gross motor domains were similar (p=0.93 and p=0.53 respectively). HEU had higher risk of delay (>2 SD below the mean) than HUU children in receptive (13.9%vs.7.2%, odds ratio[OR] 2.09, 95%CI 1.21-3.61) and expressive language (11.4%vs.5.7%, OR 2.12, 95%CI 1.15-3.90) but not in the cognitive scale (10.8%vs.9.3%, OR 1.18, 95%CI 0.67-2.09). After adjusting for age, sex, clinic and maternal education, the effect remained for receptive (OR 2.23, 95%CI 1.16-4.30) but not expressive language (OR 1.74, 95%CI 0.86-3.54).

Conclusions:
These initial analyses suggest receptive language is impaired in HEU children. Ongoing analyses will focus on disaggregating effects of in-utero exposure to HIV and ART. Given the global focus on child development and the critical importance of language in society, further work is needed to monitor and address the long-term clinical outcomes of HEU children.

Ethics approval number: HREC 044/2017
This is new research that has not been presented at previous research day

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