Abstract Detail

THE EFFECT OF MUSIC ON PAIN AND DISCOMFORT IN THE SHOULDER GIRDLE DURING LUMBAR SPINE SPECT SCINTIGRAPHY

Introduction: Single photon emission computed tomography (SPECT) imaging forms part of the bone scintigraphy examination in order to significantly improve the detection of skeletal lesions. It has been observed that patients undergoing lumbar spine SPECT scintigraphy, frequently complain of general discomfort and pain in the shoulder girdle. Music has been used as an intervention during medical procedures or imaging examinations in an attempt to relieve discomfort and anxiety. The aim of this study is to determine the effect of music, as an intervention, on the perceived pain and discomfort in the shoulder girdle during lumbar spine SPECT scintigraphy.

Research Design and Method: A pre-test and post-test experimental design with two groups was used to conduct this study. Ninety-six consecutive patients routinely referred for lumbar spine SPECT scintigraphy were recruited from two private nuclear medicine practices in Gauteng. Patients were systematically assigned to the control or intervention group. Patients were asked to rate their pain and discomfort at various time points.

Results: The results suggest that the group exposed to music as an intervention more frequently reported a decrease in pain and discomfort as compared to the control group. The experimental group reported less percentage increase in pain and discomfort. The mean pain scores differed between the control and experimental group, but the differences were not significant. However, there were statistically significant differences in discomfort scores 10 minutes into the SPECT and after the SPECT. Pain and discomfort scores of the control group had a noticeable increase after the SPECT had started.

Conclusion: Music as an intervention is more of a distraction than an analgesic and can be used as an intervention to increase patient comfort and the patients’ experience. It is recommended that further research should be performed to find other non-pharmacological interventions to decrease pain experienced during lumbar spine SPECT imaging.
Presenting Author: A van der Wath (UP)

Authors: A van der Wath (UP), S Mataboge (UP)

Abstract Detail

SUPPORT NEEDED BY NURSES POST EXPOSURE TO VIOLENCE INFlicted BY MENTAL HEALTH CARE USERS IN A PUBLIC PSYCHIATRIC HOSPITAL

**Background:** Nurses working in psychiatric hospitals are at times exposed to mental health care users who act in violent ways. The nurses often under-report the incidents resulting in inadequate support provision from management. The study aimed to explore and describe the support needed by nurses who were exposed to violence inflicted by mental health care users in a public psychiatric hospital in South Africa.

**Method:** A qualitative appreciative inquiry design was used. The purposively selected sample consisted of five professional nurses, three staff nurses and one auxiliary nurse. Three of the participants were both victims and witnesses to violence inflicted by mental health care users, one was a victim only and three were witnesses only. Data were collected through a nominal group technique and analysed using framework and thematic analysis.

**Results:** Participants received most support from their colleagues. While they agreed that they under-reported incidents of violence, they were not satisfied with the institutional support. Participants attributed the situation to a lack of security services and inefficient occupational health service. They wished to have training for all staff to effectively manage patient violence, a user-friendly reporting system, compensation for working in an unsafe environment, psychological support and protection of their rights as humans and as nurses.

**Discussion and Conclusion:** All forms of violence by mental health care users should be reported to management who should ensure that nurses receive appropriate protection, support and training. Nurses who are supported may experience improved personal job satisfaction and deliver high quality patient care.
Presenting Author: AE van der Wath (Nursing Science)

Authors: AE van der Wath (Nursing Science), Mrs Mnisi (UP) R Rikhotso (Nursing Science)

Abstract Detail

SUPPORT NEEDS OF MENTAL HEALTH CARE USERS WITH DEPRESSION ATTENDING A PSYCHIATRIC OUTPATIENT DEPARTMENT IN TSHWANE DISTRICT

Background: Depression is one of the most commonly diagnosed mental disorders among adults. With depression there is an ever-present risk of relapse and recurrence which generally reduce the quality of life of individuals. Recovery from depression is a process which depends greatly on social and professional support. The aim of this study was to explore and describe support needs of mental health care users with depression attending a psychiatric outpatient department in Tshwane district.

Methods: A qualitative approach was applied to answer the research question, “What are the support needs of mental health care users with depression after discharge from a psychiatric hospital in Tshwane District? Participants with depression attending the outpatient department were recruited and consent to be interviewed was obtained. Semi-structured interviews were conducted with 10 participants aged between 28 and 63 years between July 2017 and April 2018. The audio-recorded interviews were transcribed verbatim and analysed using thematic qualitative data analysis.

Results: Participants described the difficulties they experienced coping with depression and the fear of being readmitted to hospital. They experienced insufficient social support related to family members’ and work colleagues’ lack of understanding of mental illness. While some participants experienced the support from mental health care practitioners as ineffective, others appreciated the positive support they received from practitioners, friends and family. Some participants were unable to attend support groups due to logistical problems. Participants reported how they used self-motivation and self-help activities to cope with depression.

Discussion and Conclusion: The study highlights the support needs of mental health care users with depression. They value mental health care practitioners who take time to listen to their problems and needs with empathy. Participants expressed a need to have access to support groups and regular counselling sessions. They also wished that their families and people at their workplace could be educated about depression. Recommendations were formulated to meet the support needs of mental health care users with depression after discharge.
THE CHALLENGES FACED BY MENTAL HEALTH CARE USERS IN A PRIMARY CARE SETTING. A QUALITATIVE STUDY

**Background and Aims:** In South Africa, three out of every four individuals with a mental disorder remain without any form of treatment. Due to the significant burden of these disorders, the availability and accessibility of mental health care services in a wide range of settings have become essential. Studies have aimed at investigating barriers that prevent individuals from receiving mental health care services at primary care level but challenges experienced from mental health care users’ perspectives are unknown.

**Method:** A qualitative study was implemented at a primary health care clinic in Pretoria, South Africa between July and October 2017. Fifteen semi-structured interviews were conducted with mental health care users attending the clinic. Information regarding the mental health care users’ experience of receiving mental health care services at their primary care clinic, advantages and disadvantages of receiving mental health care services at their clinic as well as perceived challenges at their clinic were explored. Interview material was systematically coded and grouped into overarching categories from which specific themes emerged.

**Results:** Identified challenges included a lack of infrastructure, organisation, medication, services in local communities, allied mental health care services and communication at the clinic, as well as long waiting times. Respondents reported staff shortages and a lack of training and skills at the clinic, as well as that clinic staff were overworked, under pressure and stressed. Respondents reported not feeling cared for and respected, while clinic visits were described as stressful and frustrating.

**Conclusion:** Mental health care users suffer as a result of a dysfunctional mental health care system, yet their concerns and views often remain unheard. This research opens up avenues for further investigation into finding solutions for the identified challenges and supports policy changes that will improve the quality of care for individuals living with mental illness.
Presenting Author: S Seedat (UP)

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Abstract Detail

CORRELATION BETWEEN INDEPENDENCE IN ACTIVITIES OF DAILY LIVING AND FITNESS LEVELS IN ELDERLY INDIVIDUALS RESIDING IN GAUTENG

Introduction: Physical fitness has been promoted in the elderly to prolong independence and improve quality of life.

Method: The primary aim of this study was to assess whether the five components of physical fitness (muscular strength and endurance, flexibility, power and cardiovascular endurance) as measured by the Senior Fitness Test (SFT) developed by Rikli and Jones (2009) have an impact on the elderly’s ability to perform activities of daily living independently as measured by the Katz Activities of Daily Living Scale questionnaire (KATZ ADL) and the Lawton Instrumental Activities of Daily Living questionnaire (IADL)

Participants were recruited from six retirement villages in Pretoria and completed the KATZ ADL and the IADL as well as the SFT battery. The Spearman’s rho ranked Correlation Coefficient was used to determine significant correlations (p < 0.05) between the SFT (various components or tests) and KATZ ADL or the IADL as well as between the two questionnaires.

Results: Results of Fifty-seven participants were analysed, age (mean ± SD) 76.1 ± 6.9 years. A statistically significant moderate correlation (r = 0.43; p < 0.05) between the ADLs questionnaires was found. Only the Back Scratch test (left) and Chair Sit and Reach Test (left and right) showed statistically significant weak correlations with the IADL (r = 0.31, p < 0.05 and r = 0.30 (L), 0.31 (R), p < 0.05, respectively). There was a statistically significant weak correlation between the KATZ ADL and the Back Scratch Test (left) (r = 0.28, p < 0.05).

Conclusion: Independence of ADLs as measured by the KATZ ADL and IADL did not correlate strongly with fitness measured by the SFT. However, the IADL appears to be a more sensitive instrument and correlates better with fitness in the elderly.

Keywords: Elderly, Physical fitness, Activities of daily living, Senior fitness test, Katz Activities of Daily Living Scale Questionnaire, Lawton Instrumental Activities of Daily Living Questionnaire.
DNA VARIATIONS FOUND IN SOUTH AFRICAN CASES OF SUDDEN UNEXPLAINED DEATH. HOW RELEVANT IS POST MORTEM GENETIC TESTING?

Introduction: Sudden death of an individual in South Africa is classified as an unnatural death according to the Regulations Regarding the Rendering of Forensic Pathology Service R636 and is thus mandated by the Inquest Act 58 of 1959 to undergo a full medico-legal investigation into the cause of death. If no cause of death is found it is better known as Sudden Unexplained Death. DNA variations of several genes including the RyR2, CALM1, KCNH2, KCNQ1, SCN5A and others can cause cardioarrhythmic disorders that may cause death in healthy young individuals. This study aimed to optimized 22 exons of the RyR2 gene and to investigate and amplify and analyse those exons in a South African sample size as well as a South African reference group.

Materials and Methods: The Pretoria Medico-Legal Laboratory (PMLL) performed medicolegal investigations and those that fitted the set-out criteria were included in this study. Post mortem blood samples were drawn, and DNA was extracted from these samples. Twenty-two primer pairs were designed for the RyR2 gene and systematically the qPCR reactions were optimised. Thereafter, the optimised protocols were used to amplify the selected exons in 33 case samples. The samples were analysed using High Resolution Melting (HRM) to type the samples. After DNA typing, selected amplicons were sent to Inqaba Biotech for sequencing. All sequencing results were analysed using CLC Main Workbench.

Results and Discussion: Eight DNA variations were found in this population group in 22 exons. The typing method used correlated well with the results obtained from sequencing. Six of the DNA variations are known variations whereas two variations were novel. One of the DNA variations were found were classified as “probably damaging” with a PolyPhen score of 0.923.

Conclusion: Post mortem DNA testing is a very relevant and useful way of diagnosing fatal cardiac arrhythmias. The clinical conditions associated with DNA variations of the aforementioned genes are highly treatable conditions. Therefore, detection of possibly harmful DNA variations in the deceased is highly relevant, because the family members will be informed and offered genetic testing for the same genetic variations.
Abstract Detail

METRIC ASSESSMENT OF ANCESTRY AND SEX VARIATION IN THE ZYGOMA

Introduction: Skeletal remains exposed to an outdoor context are prone to post mortem damage and fragmentation, making the analysis of remains more difficult. Physical anthropologists are frequently faced with fragmentary remains; therefore, research on ancestry and sex from isolated cranial fragments has become more important. Previous studies assessing the variation of the zygoma have used non-metric and geometric morphometric techniques, but the use of standard linear measurements and their potential forensic application have been overlooked.

Methods: The sample included 120 crania of black and white South Africans from the Pretoria Bone Collection with equal sex and ancestry distribution. Sixteen measurements (four existing and 12 novel) were taken from ten landmarks previously described in the literature. All of the measurements were repeatable except one (superior orbital length).

Results: Significant differences were noted between the sexes and between ancestry groups for the majority of the measurements (twelve and thirteen measurements, respectively). Linear discriminant functions employing the most discriminatory variables were created for both sex and ancestry, and yielded accuracies of 89.2% and 88.7%, respectively. The function accuracies demonstrate the potential of the zygoma for classification according to sex and ancestry in anthropological analyses.

Conclusion: While the results demonstrate sex and ancestry variation in the size of the zygoma, further research on possible shape variation using geometric morphometrics is needed to further improve the estimation of sex and ancestry in anthropological analyses using the zygoma.
INVESTIGATING THE USE OF MEDIAL AND LATERAL ANTEBRACHIAL CUTANEOUS SENSORY NERVE CONDUCTION STUDIES IN PATIENTS WITH PERIPHERAL NEUROPATHY

**Background and aim:** Electrophysiological parameters of the median, ulnar and radial nerves are routinely used to diagnose neuropathies. Case studies suggest that measurements from the medial antebrachial cutaneous (MAC) and lateral antebrachial cutaneous (LAC) sensory nerves could provide additional value in the diagnosis of neuropathies. These nerves arise more proximally and might be spared even in severe disease. However, no systematic studies evaluating the use of these conductions are available.

The aim of this study is thus to measure the neurophysiological parameters of the MAC and LAC sensory nerves in clinical practice, with emphasis on patients with confirmed peripheral neuropathies.

**Methods:** Patients with electro-diagnostically confirmed peripheral neuropathies were identified at the Steve Biko Academic Hospital’s neurophysiology clinic. Patients were examined neurologically and onset latency, peak amplitude and nerve conduction velocity of bilateral median, ulnar and radial sensory nerves, as well as bilateral MAC and LAC nerves were obtained. A standardized electrodiagnostic protocol for the measurement of MAC and LAC conductions was used; normal values for MAC and LAC were obtained from a previous study at the Neurophysiology Unit. The ethics committee of the Faculty of Health Sciences of the University of Pretoria approved the study; all patients signed informed consent.

**Results:** Thirty patients (60 values for every nerve) were assessed. Ten patients had very severe peripheral neuropathy with all nerves showing abnormal or absent responses. In these patients, the type of neuropathy could only be classified as mixed axonal and demyelinating when using median, ulnar and radial responses. When adding MAC and LAC responses in the analysis, 9/10 patients showed only abnormalities in latencies and velocity in these two responses, thus favouring a diagnosis of a demyelinating peripheral neuropathy.

**Conclusion:** Measuring MAC and LAC responses may assist with the diagnosis of neuropathies. The nerve responses of these nerves may be retained in patients with severe peripheral neuropathies and could assist in grading the severity of disease and classifying the type of neuropathy when other sensory conductions are absent. More patients need to be evaluated to confirm the findings.
HIV AND STROKE: A CHANGING LANDSCAPE

Background and aim: The World Health Organization states that most HIV infected people reside in sub-Saharan Africa where stroke prevalence has increased. Causes of stroke in HIV infected patients include opportunistic infections, tumors and direct infection of the arterial wall, as well as traditional risk factors such as atherosclerosis, diabetes, hypertension, autoimmunity, coagulopathies and cardiovascular disease. Despite the apparent association of stroke and HIV infection, few prospective studies have assessed the effect of HIV infection on the etiology of stroke; the aim of this study is thus to compare the risk factors for stroke between HIV-positive and HIV-negative patients.

Methods: This prospective observational comparative study, conducted at Kalafong Hospital, was approved by the ethics committee of the Faculty of Health Sciences (University of Pretoria). Consecutive adult patients with new onset stroke (ischemic and hemorrhagic) were included from February 2018 to November 2018. The patients were evaluated clinically, radiologically and with special laboratory investigations.

Results: 141 patients were recruited; 23% were HIV-positive. Of the total group 80% had ischemic strokes and 20% hemorrhagic. In the HIV-positive group, ischemic strokes occurred in 85%, and 75% in the HIV-negative patients. Hypertension occurred in 36% and 80% of HIV-positive and HIV-negative patients respectively, dyslipidemia in 41% and 66% and smoking in 22% and 37%. Age distributions showed 67% of HIV-positive patients below the age of 50 years (20% in uninfected group) and of all young strokes, 50% were HIV-positive. A linear relationship to stroke development and increasing viral loads was seen; lacunar strokes occurred more commonly in HIV-positive patients. A statistically significant relationship between anti-phospholipid antibodies and strokes as well as infections and strokes in the HIV-positive vs the HIV-negative group was found (p=0.001). Intracerebral hemorrhages occurred more in patients with low cholesterol levels (p=0.001).

Conclusion: HIV infection may be a risk factor for stroke, especially in younger patients. The prevalence of HIV among young strokes exceeds our national statistics for HIV in the general population, possibly indicating a causal relationship of HIV to stroke. Classical risk factors for stroke occurred more commonly in HIV-negative patients, whereas anti-phospholipid antibodies and opportunistic infections occurred more in HIV-positive patients. The association between low cholesterol levels and hemorrhages needs further investigation.
CONFLICT AS EXPERIENCED BY PATIENTS DIAGNOSED WITH DISSOCIATIVE IDENTITY DISORDER: A COLLECTIVE CASE STUDY

Background: Dissociative Identity Disorder (DID) is a severe and chronic dissociative disorder. DID is characterised by memory disturbances and identity fragmentation alongside the presence of two or more distinct identities, or possession experience. Its aetiology is typically associated with chronic, early childhood relational trauma. Dissociative identities provide a solution to both the presence of unbearable trauma and irreconcilable conflict in the mental, physical, social and cultural life of an individual with DID. The role and nature of conflict in DID is underexplored beyond theoretical deduction.

Purpose: The present study explored the subjective experience of conflict, and the nature of this conflict of adult psychiatric patients diagnosed with DID.

Methodology: Qualitative methods were used for this study. First-hand accounts in the form of secondary data were explored i.e. typed transcriptions of previously recorded in-depth interviews. A collective case study design was used, and the data analysed using methods of grounded theory.

Findings: Three main themes emerged from the data, viz.: 1) participants’ levels of separateness and unity of the self, 2) participants’ experience of having one or more incompatible and conflicting worldviews about their DID, and 3) the type and nature of conflict that arises between dissociative identities, i.e., conflicting goals, conflicting actions or behaviours, conflicting ways of feeling, conflict of information in awareness, conflicting values, and battle of wills or conflict of control.

Conclusion: DID patients experienced distinct and separate parts or identities and these identities were experienced as separate to a lesser or greater extent. The participants’ understanding/s of the origin of their DID is contextually situated and varied and may at times conflict with one another. The conflict between one’s various belief systems may contribute to further dissociation. The study also revealed the nature of the different types of conflict that may be present between participants’ dissociative identities. Conflict between dissociative identities was pervasive and multifaceted. Insight into the complexities of the conflict might promote the integration of the dissociative states.

Key terms: Dissociative identity disorder, participant experiences, the nature of conflict, psychiatric patients, case study, grounded theory.
STATE PATIENTS WHO COMMITTED VIOLENT CRIMES ADMITTED TO WESKOPPIES HOSPITAL FROM 2005 TO 2014: PROFILES AND TRENDS

Background and aim: South Africa is currently viewed as one of the most violent countries in the world. Characteristics of offenders in the general population and in those who may be mentally ill, are well documented. Literature shows trends of crime patterns in the general population but similar features in the population of those who may be mentally ill are not always known. The aim of the current study was to describe profiles and trends of mentally ill persons who committed violent crimes prior and leading to referral to Weskoppies hospital as state patients.

Method: A retrospective record review of state patients, admitted to Weskoppies hospital between 2005 and 2014 was conducted. The study described the demographic, clinical, forensic and victim profiles of these patients and changes over time in the profiles were also assessed.

Results: One hundred and seventy state patient files were reviewed. The majority were males (91.43%), single (73.6%), unemployed (46.4%), had substance use history (55.0%) and a highest level of education of grade 8-11 (35.7%). Psychotic disorders (82.1%) were the most common diagnoses and 46.4% of the study population had psychiatric treatment prior to admission. The most common criminal charges were sexual offences (39.3%). In the current study there seemed to be changes over time in terms of crime patterns related to referred state patient who committed sexual assault crimes and murder. The 10 year trend showed that the crime of murder was the leading charge at admission until 2007 where it was surpassed by the category of sexual assault crimes rendering it as the second most common charge at admission.

Conclusion: The profile of the study sample is similar to that found in other literature. In the current study there seemed to be some changes over time in terms of the crime patterns related to referred state patients who committed murder and sexual assault crimes. This may be an indication that populations made up of state patients may have different criminal pattern profiles as opposed to the general public. This indication cannot be confirmed however as the sample size was too small.
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Abstract Detail

IMMUNOHISTOCHEMICAL EXPRESSION OF TE-7 IN HUMAN DENTAL PULP CELLS

**Introduction:** The TE-7 antibody was proposed to be a specific marker for fibroblasts. As positive identification of fibroblasts remains challenging, this research aimed to test the TE-7 expression in fibroblasts of the human dental pulp.

**Materials and Methods:** This study was carried out with the approval of the Ethics Committee of the Faculty of Health Sciences, University of Pretoria (215/2018). Twenty-four teeth collected after routine dental extraction were prepared for immunohistochemical analysis using the TE-7 antibody.

**Results:** Positive staining for the TE-7 antibody was observed in fibroblasts as well as the collagenous stroma of the dental pulp. The odontoblasts lining the pulp periphery were negative for TE-7 expression and the blood vessel walls displayed distinct and intense TE-7 staining. In conjunction with other immunohistochemical markers (SMA and CD34), pericytes were found to be positive for TE-7 while the endothelial cells were not.

**Conclusion:** Although TE-7 is a sensitive marker for the identification of dental pulp fibroblasts, it is not specific in their identification. TE-7 can be used as a marker for pericytes of the dental pulp blood vessel walls.
DENTAL PULP STROMAL/STEM CELLS – ISOLATION, EXPANSION, GROWTH KINETICS AND PHENOTYPE

**Introduction:** Dental pulp stem cells (DPSCs) are mesenchymal stem cells of neural crest origin. These cells have a high self-renewal potential as well as the ability to differentiate into different cell types including odontoblasts, osteoblasts, adipocytes and chondrocytes. The multipotent characteristics of DPSCs renders these cells a promising cell therapy tool for regeneration of lost dental pulp tissue following pulp necrosis or for bone in reconstructive procedures.

**Aim:** This study aimed to isolate and expand dental pulp stem cells in culture medium and determine the growth kinetics and phenotypic profile of these cells.

**Methods:** Teeth were obtained from two patients undergoing routine extraction procedures of impacted third molars (Ethics approval number: 438/2018). Freshly isolated dental pulp cells were plated in 12-well plates and expanded ex vivo. For growth kinetic and immunophenotyping experiments, the cells were cultured in DMEM (Dulbecco’s Modified Eagle Medium) at a density of 5 000 cells/cm². Cell counts and phenotypic expression of stem cell markers were done using flow cytometry.

**Results:** Dental pulp stem cells were successfully isolated and expanded in DMEM. The population doubling time (PDT) was calculated to be 23.4 hours when the cells are in the exponential growth phase. The cells were negative for CD45 (a common white blood cell marker) and CD31 (a marker for endothelial cells) and highly positive for CD73, CD90 and CD44 expression. CD73, CD90 and CD44 are routinely used as positive phenotypic markers for mesenchymal stem/stromal cells (MSCs). Positivity was also observed for CD105 and CD36. Two distinct populations could be identified at passage 2, namely CD105+/CD36++ and CD105+/CD36+. The difference between CD36+/CD105++ cells and CD36+/CD105+ is the expression intensity of the respective proteins on the cell surface, with CD36+/CD105++ cells having more binding sites (epitopes) available per cell than the CD36+/CD105+ cells. Preliminary data suggest that the ratio of these two sub-populations changes with increased passaging.

**Conclusion:** The dental pulp stem cells we have isolated have a high proliferation rate making them a promising source for stem cell therapy and regenerative tissue engineering. The phenotypic profile and changes observed require further elucidation.
KNOWLEDGE AND ATTITUDES OF MULTIDISCIPLINARY TEAM MEMBERS ABOUT SUBSTANCES AND THEIR CAPACITY TO CARE FOR SUBSTANCE USERS AT WESKOPPIES HOSPITAL

**Background:** The diverse knowledge and attitudes of health professionals about substances and their capacity to care for substance users need to be continuously evaluated as they have been found to have an impact on the diagnosis and treatment of substance use disorders.1-3 Our study aimed to evaluate the knowledge and attitude of multidisciplinary team members towards substance users. Also, to explore whether demographic factors affects such attitudes, as well as to ascertain whether there is a difference in the knowledge and attitudes about substances and capacity to care for substance users amongst multidisciplinary members from various clinical units.

**Method:** Our cross sectional study used a questionnaire that contained two parts. The first part measured demographic factors while the second part of the questionnaire consisted of the Drug and Drug Problem Perception Questionnaire (DDPPQ).4

**Results:** Multidisciplinary team members generally have a positive attitude but motivation and esteem was diminished across all demographic factors. Significant difference in attitude prevailed amongst psychiatrists, nurses and social workers.

**Conclusion:** The diminished motivation and self esteem of multidisciplinary team members regarding their capacity to care for substance users needs be further explored before other therapeutic attitude factors like role adequacy, role support, role legitimacy and job satisfaction are negatively impacted resulting in suboptimal care of substance users.
HUMAN RIGHTS IN THE CONTEXT OF SEXUAL OFFENDING AND FORENSIC MENTAL HEALTH IN SOUTH AFRICA

Introduction: This is a component of findings from a mixed research methods study based at the Forensic Mental Health Unit of Weskoppies Psychiatric Hospital, Department of Psychiatry, University of Pretoria. Records of individuals accused of sexual offences were explored and in-depth interviews with individuals accused of sexual offending and / or other types of charges referred for observation in terms of the Criminal Procedure Act, 51, 1977 were conducted to explore psychiatric and psychosocial features and perspectives on sexual offending in general. Data collection was done over a 12-month period from the end of 2014 to the end of 2015 and yielded 40 in-depth interviews with 16 participants that were thematically analysed as 62 records that underwent a cross-sectional analysis.

Findings: The majority of those referred were mentally capable, were known to the victims and lived in close proximity or with them. Boys and girls, elderly women and socially isolated individuals seemed the most vulnerable. Deficient socio-economic determinants of wellbeing including adverse childhood events, poverty, unemployment and inequality seemed to expose potential perpetrators to vulnerability to violence. Lived life experiences during and after arrest may have revealed the possibility of human rights deficits and worsened stigma even in the hands of law-enforcement systems.

Discussion: Collective violence inherited from South Africa’s past, patriarchy and other theories on interpersonal and individual factors seem to play a role in individuals that may make contact with forensic mental health systems on a short or long-term basis. The ‘vulnerability theory’ in the context of the so-called ‘village’ from which victims / survivors and potential perpetrators emerge is proposed.

Multisystem prevention approaches involving those perceived to be at risk of becoming perpetrators seem to be the next frontier at research and intervention levels in terms of sexual and other forms of violence prevention. The study reveals insights that may contribute to the body of knowledge in the field of sexual violence prevention in general and within forensic mental health practice specifically in local and other similar settings.

Keywords: sexual offending, forensic mental health observation, law enforcement, human rights, mental illness
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Abstract Detail

TOWARDS GMP COMPLIANT CELL THERAPY PRODUCTS: HUMAN ALTERNATIVES TO FOETAL BOVINE SERUM IN IN VITRO HUMAN ADIPOSE-DERIVED STROMAL/STEM CELL EXPANSION

Introduction: Human adipose-derived stromal cells (hASCs) have gained increasing attention in the past decade as a potential cell therapeutic product. hASCs are adult stem cells classified as multipotent, fibroblast-like and plastic-adherent that can easily be expanded in vitro and can differentiate into multiple cell lineages. A distinct advantage of hASCs is that large numbers of cells can be extracted with minor donor site morbidity. This has sparked the worldwide growth of a new research field and industry.

Consideration of the maintenance and proliferation of isolated cells in vitro is required for the use of hASCs in a clinical setting, since ex vivo expansion of hASCs may be necessary to obtain clinically relevant cell numbers. The current gold standard for cell maintenance and expansion ex vivo is foetal bovine serum (FBS). The goal to produce a GMP compliant cell therapeutic product using hASCs has resulted in many research groups looking for alternatives to FBS-supplemented culture medium. Human blood alternatives are considered to be viable replacements for FBS to more accurately resemble the human in vivo environment (1). The current suggested human alternatives include human serum (HS), platelet-rich plasma (PRP), platelet-poor plasma (PPP), fresh frozen plasma (FFP), and human platelet lysate (PL).

Methods: This study included all the suggested human alternatives in a head to head comparison and investigated the potential effect that the various human blood products had on the viability, morphology, immunophenotype, and proliferation capabilities of hASCs.

Results: The results revealed that all the human alternatives to FBS were able to sustain the in vitro maintenance and proliferation of hASCs with no effect on the viability or immunophenotypic profile of the cells. The results also indicated that pooled PL and PRP provided a significant increase in hASC proliferation rate. The increase in proliferation rate is an advantage since it reduces the time needed for cell expansion in vitro and allows for a cell therapy product to be transplanted to a patient in a clinical setting as quickly as possible.

Key words: Adipose-derived stromal cells, Cell therapy, Ex vivo expansion, Human alternatives, Foetal bovine serum
THE ROLE OF LEGAL STATUS IN DIGNITY-RELATED COMPLAINTS BY PSYCHIATRIC IN-PATIENTS: A CROSS-SECTIONAL ANALYTICAL STUDY

Background: Over the past two decades there has been a shift internationally towards a patient-centered approach in mental health care. There is also a growing interest and concern about the rights of mentally ill patients. Two core elements of patients’ rights, are the rights to be treated in a dignified manner and to give feedback about the services they receive. South Africa has a long history of violation of human rights of those who are mentally ill. Patient’s rights are ensured by various pieces of legislature such as the Constitution of South Africa, Patients Health Charter and the Mental Health Care Act (MHCA). Psychiatric patients are more likely to have their dignity violated especially during an involuntary admission to a psychiatric hospital. The aim of the study was to explore the relationship between psychiatric inpatients’ legal status under the MHCA and dignity-related complaints received by their admitting hospital.

Methods: This cross-sectional analytical study, was conducted at Weskoppies Psychiatric Hospital. Data were obtained from the complaints register and patients’ clinical files. 70 complaints were analyzed. A Fisher’s exact test was used to test the relationship between legal status and dignity-related complaints. Logistic regression analyses were done and adjusted for potential covariates.

Results: The typical complainant was a single, literate man, aged 30-39 years, with a mood disorder. The majority of complainants were admitted involuntarily (60%). There were 41 dignity related complaints (58%) and 29 complaints that were not dignity related (41%). The percentage of dignity-related complaints was higher in assisted (60%) and involuntary patients (64%) than in voluntary patients (44%). However the association between dignity related complaints and legal status was not statistically significant (p=0.38). The odds ratio for involuntary patients to complain about dignity-related complaints was 2.25.

Conclusion: The study indicates that there is an increased risk for involuntary patients to complain about dignity related matters. The maintenance and promotion of dignity in psychiatric settings is of great importance for psychiatric patients. It is essential to be aware of the impact that dignity has on our patients, especially when making the decision which legal status to assign to patients.
Abstract Detail

THE INDEPENDENT AND COMBINATORIAL EFFECTS OF CAG AND GGN REPEAT LENGTH POLYMORPHISMS ON HORMONAL, SEMINAL AND ANTHROPOMETRIC MEASUREMENTS IN YOUNG SOUTH AFRICAN MEN

Introduction: The androgen receptor (AR) activates upon binding to testosterone and is involved in regulating androgen-related gene expression. The AR presents two polymorphic sites in exon 1, characterised by a different number of CAG and GGN triplet repeats. We tested the hypothesis that CAG and GGN lengths had independent and combinatorial effects on hormonal, seminal and anthropometric measurements in young men from a malaria area, non-occupationally exposed to DDT.

Methods: An analysis was conducted on 528 Venda men (18−44 years; mean age=22) for CAG and GGN repeat characterization. Of these men, 291 were exposed to DDT through indoor residual spraying (IRS). Associations between anthropometric measurements, semen parameters and testosterone, with both the discrete and dichotomous number of CAG and GGN repeats, were evaluated by multiple linear and logistic regression, respectively. Models were run controlling for age, smoking, and DDT exposure. Transformation of dependent variables was applied when required to normalize their distribution.

Results/Discussion: Weight showed significant and positive associations to long CAG and short GGN repeats analyzed separately, but not with the combined variable; i.e. men with long CAG repeats have a mean weight approximately 3 kg more than men with short CAG repeats (>25 vs. ≤25), and the mean weight of men with short GGN repeats is approximately 2 kg less than the mean weight of men with long GGN repeats (<13 vs ≥13). Mean total testosterone levels are almost two units lower in men with GGN<16, compared to men with GGN≥16. GGN repeats were significant as a weight predictor only when <13, while it was a significant predictor of testosterone levels only when <16, suggests that weight and hormones have different thresholds for an effect. Regarding sperm motility, significant associations were seen with CAG repeats pointing to a decrease in progressive motility and a 2.5-fold increased risk of asthenozoospermia. Likewise, having both a long CAG and a shorter GGN (>20 and <16) showed an increased risk by 1.7 times of presenting with oligozoospermia. The hypothesis was confirmed and warrants further investigation into the combinatorial impact of CAG and GGN repeats on body composition, and seminal parameters.
ADOLESCENT PSYCHIATRIC OUTPATIENTS AND THEIR CAREGIVERS: COMPARING THE STRENGTHS AND DIFFICULTIES QUESTIONNAIRE

Background: Clinicians need to monitor ongoing emotional-behavioural problems in adolescent psychiatric outpatients. The Strengths and Difficulties Questionnaire (SDQ) is a short screening tool comprised of 25 questions with an additional impact supplement for self-report and parental report.

Aim: To examine the level of agreement between self-report and parental-report SDQs for adolescent psychiatric outpatients.


Methods: A two-group cross-sectional comparative study which compared agreement on the SDQ between parents and adolescents, aged between 11 and 18 years. The adolescents had received psychiatric diagnoses and were known to the clinic. Differences between adolescent and parent rating scores were compared using a paired sample T-Test, and patterns of agreement were measured using Pearson’s correlation coefficient and Cohen’s Kappa.

Results: Overall, caregivers reported more difficulties than adolescents, though differences were non-significant (p > 0.58). Caregivers and adolescents agreed on the conduct domain, and on emotional symptoms (0.21 ≤ Kappa ≤ 0.40, p < 0.05). Caregivers and adolescents agreed on the presentation of internalising and externalising disorders (R = 0.48, p < 0.001).

Discussion: In this study, we assessed the level of agreement between SDQs completed by adolescent outpatients receiving psychiatric treatment, and SDQs completed by their parents. We did not find any differences between adolescent and caregiver SDQ scores. Adolescent and caregiver scores for the prosocial domain were correlated, and various aspects in the conduct and emotional symptoms domain showed strong agreement. The strong agreement between adolescent and parent reports may be due to the fact that most of the adolescents were being treated at the clinic, and most of the adolescent caregiver pairs reported improved mental health.

Conclusions: Given the fair agreement between caregiver and adolescent SDQ results, the preferred, best-practice approach to evaluating psychological problems in adolescents is a multi-informant approach. Discrepant information should be integrated into adolescent mental health assessments and formulations.
BACKGROUND: Mobile genetic elements such as plasmids play a major role in the acquisition and dissemination of antimicrobial resistance determinants in carbapenem-resistant Klebsiella pneumoniae (CRKP). This study aims to determine the frequency of plasmids replicon groups and characterize plasmids mediating carbapenem resistance in K. pneumoniae isolates in Gauteng, South Africa.

METHODS: A total of 56 K. pneumoniae isolates already identified by the national referral laboratory in Pretoria using the VITEK 2® (Biomerieux, France) automated system. Antimicrobial susceptibility testing was performed using the MicroScan Gram-negative MIC 44 panel (Beckman Coulter, United States). All K. pneumoniae resistant to one or more carbapenem(s) were screened for carbapenemase-encoding genes (blaOXA-48, blaNDM-1, blaKPC, blaVIM, and blaIMP) using multiplex-PCR. These isolates were genotyped by Repetitive Element Palindromic-Polymerase Chain Reaction (REP-PCR). Plasmid extraction was performed on all isolates and electrophoresis was used to determine their number and size. The PCR-based replicon typing (PBRT) scheme was used to determine the incompatibility/replicon groups of all the extracted plasmids.

RESULTS: The isolates showed reduced susceptibility to almost all tested antibiotics including ertapenem (98.2%), imipenem (66.1%), doripenem (50%), meropenem (44.3%) and colistin (41.1%). Multiplex-PCR analysis showed that 55 isolates harboured at least one of the detected carbapenemase genes, with 41 (73.2%) harbouring blaOXA-48 and 18 (32%) harbouring blaNDM-1. Co-expression of two carbapenemase genes were observed in four isolates with reduced susceptibility to all carbapenems, two of which were also colistin-resistant. The isolates were resolved into four major strains/genotypes by the REP-PCR. Electrophoresis revealed that the isolates carried between one and five plasmids, with the majority carrying 2 or 3 plasmids; the plasmid sizes ranged between 1.6-kb to >48.5-kb. IncF (FII, FIB, FIC), IncL, IncM, and IncA/C plasmid replicons were the most detected. The IncA/C, IncL and IncFIB were associated with both blaNDM-1 and blaOXA-18-producers while the IncM was mostly associated with only blaOXA-48-producers. Almost 90% of the isolates showed multi-replicon carriage.

CONCLUSION: This study shows an ongoing plasmid-mediated endemicity/dissemination of CRKP in the Gauteng province, with blaOXA-48 and blaNDM-1-producing CRKP being predominant in 2018. Rigorous infection prevention and control, including contact precautions, should be adopted in all Gauteng hospitals to curtail further escalation of CRKP.
Faculty Day 2019 Abstract 2019021

Short Presentation in the Clinical Category

Presenting Author:  L Maré (Psychiatry)

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Abstract Detail

PERSPECTIVES OF PRIMARY CAREGIVERS ON THE DISRUPTIVE BEHAVIOUR OF CHILDREN WHO ATTEND AS OUTPATIENTS AT WESKOPPIES PSYCHIATRIC HOSPITAL

Background and aim: Although practitioners may engage caregivers on their understanding of the disruptive behavioural disorders of their children, their perspectives are yet to be examined in a qualitative study. In response to limited research in this regard, this study aimed to explored perspectives of primary caregivers on the disruptive behaviour of children who attended as outpatients at the child and adolescent unit of Weskoppies Psychiatric Hospital.

Methods: Qualitative methods were used in a case study design. Nineteen participants were purposively sampled. The participants were interviewed using individual in-depth, semi-structured interviews. Data were analysed by deploying typological and bracketed grounded theory methods.

Findings: Both analytic methods revealed themes or subthemes of confusion elicited by the behaviour of the children; emotional build-up within the child towards a meltdown; loss and rejection of others; spiritual connection and cultural disconnection; the behaviour of others towards the children; something wrong medically; behavioural difficulties when “I want my way”; the emotional turmoil of the caregivers; and corrective responses of caregivers to disruptive behaviours. Differences yielded by the analytic methods were that a yearning for a better future for the child featured stronger in the bracketed grounded analysis, and trauma that had impacted behaviour negatively featured stronger in the typological analysis.

Conclusion: The study revealed how caregivers who brought their children to the out-patient department of Weskoppies Psychiatric Hospital perceived the disruptive behaviour of their children. This knowledge may help practitioners in similar contexts to bridge the gap between their understanding and the understanding of the caregivers regarding the disruptive behaviour of the children. Accordingly, the findings suggest that practitioners may anticipate and support caregivers in their experiences of emotional turmoil, uncertainty and confusion. Caregivers may, further, be informed regarding emotional dysregulation and how they may aid their children to remain in, or attain, control of their emotions. Therapeutic interventions focused on addressing trauma experienced by the children to aid in ameliorating behavioural difficulties are also indicated by the findings. The findings, furthermore, suggest that a potential therapeutic resource may be found in the hope that caregivers hold for a better future for their children.
INTRODUCTION TO THE MEGA PROJECT: TOWARDS IMPROVED PRIMARY CARE MENTAL HEALTH SCREENING AND SERVICES FOR CHILDREN AND ADOLESCENTS IN SOUTH-AFRICA AND ZAMBIA

Introduction: Literature shows a high burden of mental illness in children and adolescents world-wide. Many low- and middle-income countries experience a lack of public health care personnel, which negatively affects screening for mental illness. A lack of knowledge with reference to mental illness amongst primary health care (PHC) practitioners could mean that mental illness is not screened for, diagnosed and treated optimally.

Aim/objective: The principal objectives of the MEGA project is to provide children and adolescents with improved access to mental health services and appropriate care, by mapping mental health care training; developing a mobile health screening tool to be used at point-of-care in PHC settings; and to provide additional mental health care training to PHC practitioners.

Design and methods: The study will employ a mixed methods, multi-center study design, with both quantitative and qualitative elements. It will be conducted in the Free State, Gauteng and Western Cape Provinces of South Africa and in Lusaka, Zambia. The research population will be PHC practitioners. The study will be implemented in four phases. During phase 1 the mental health literacy of PHC practitioners will be gauged and their mental health-related training needs identified. Phase 2: Based on the needs identified by the survey a mobile health (m-health) application to screen for common child and adolescent mental health problems will be developed. Phase 3: A tiered education and training program in the use of the m-health application and related mental health content will be developed, implemented and evaluated. Phase 4: The acceptability and feasibility of the m-health application will be evaluated. Data collection for the first phase will commence in January 2019.

Findings/results: The findings of the background questionnaire as well as the Mental Health Literacy Scale (MHLS) of the clinics participating in the University of Pretoria’s sites are demonstrated. The background questionnaire captured information on the biographic and education background of the participating nurses. The MHLS data highlights particular findings of knowledge and perceptions of the participants.

Conclusion/recommendations: The sample of PHC nurses expressed a need for CPD training on child and adolescent mental health care. Mental health screening tools are useful if they are available and accessible. Mental health training should address stigma and psychoeducation.
Abstract Detail

HOW CAN A SIX-WEEK TRAINING COURSE SHAPE PARTICIPANTS' UNDERSTANDING OF MINDFULNESS?
EXPERIENCES AT WESKOPPIES PSYCHIATRIC HOSPITAL

Introduction: Mindfulness, a Buddhist belief system originally adapted into a Mindfulness Based Stress Reduction program by Professor Jon Kabat-Zinn, has gained progressive attention in the mental health community over the last four decades. However, despite the significant amount of evidence regarding the benefits of these practices, there remains limited research regarding the understanding of mindfulness amongst healthcare professionals, particularly amongst mental healthcare providers, who may be seen by many as the first points of contact for such teachings. This poses the question: how much do many mental healthcare workers really know about mindfulness? And can this be shaped or expanded through experiencing it for themselves?

Aims & Methods: This descriptive/explorative case study aimed to explore the understanding of mindfulness amongst fifteen mental healthcare workers employed at Weskoppies Psychiatric Hospital, following a six-week training course in which the participants were taught mindfulness-based practices and techniques. The study also explored the following: (1) the healthcare workers’ experiences, benefits and challenges regarding the consistent practice of mindfulness, and (2) their confidence to explain the concept of mindfulness, and the practices learned, to other colleagues and patients.

Exploration of participants’ experiences, and understanding of what mindfulness meant to them, was performed via clinical interviews following the training course, and resulting data analysed via thematic analysis.

Findings & Discussion: The following major themes were revealed: (1) Understanding of mindfulness expanded with practice, (2) Unexpected experiences during mindfulness course, and (3) Experience caused partial gains in confidence & skills.

The findings correlated in part with available related literature; including the development of self compassion through mindfulness practice, changes in self-awareness and behaviour, and the realization that in learning to practice mindfulness comes a degree of frustration. A deeper degree of understanding was attained by participants: regarding mindfulness as a lifestyle or mind-set rather than techniques; this holistic understanding of mindfulness has been emphasized in other literature.

Conclusion: Overall, the study concluded that through the training and practice of mindfulness, one’s understanding of mindfulness can be enhanced and deepened. More research needs to be done into how various methods and durations of training/practice can impact such understanding further.
Abstract Detail

THE EFFECT OF PLATE CHARACTERISTICS ON UNIVERSITY STUDENTS ESTIMATION ACCURACY OF A FIXED VOLUME BEANBAG

Introduction: Portion size estimation is critical in quantitative dietary assessment. Plates are popular portion size estimation aids, yet plate characteristics may influence clients’ ability to estimate the (food) quantity displayed on the plate.

Aim: To determine the effect of four plate characteristics (size, colour, pattern, and presence of a rim) on the accuracy of portion size estimation of a fixed volume beanbag (as standardised proxy for amorphous food) by university students.

Methods: In a quasi-experimental study a convenience sample of students was recruited. Participants recorded their response to the stimulus “What is the size of the beanbag on the plate?” at 13 randomly presented stations each displaying a 250mL beige-coloured bean bag on plates with different characteristics (Size: 6 plate pairs: 20 vs 25cm diameter; Colour: 4 plate pairs: white vs navy; Pattern: 2 plate pairs: navy ornaments on white; Rim: 4 plate pairs: presence or absence of rim). Five distractor bean bag volumes (125-500mL; also beige) were randomly added, as well as a test-retest station for reliability assessment.

Results: A total of 184 students (age: 20±1.69 years; 95 [52%] female) participated. Size resulted in correct estimations ranging from 43% (small, white, non-rimmed plate) to 74% (large, navy, rimmed plate). In terms of colour, the correct estimations ranged from 43% (for small, white, non-rimmed plate) to 74% (for large, navy, rimmed plate). In relation to pattern the correct estimations ranged from 55% (large, fully-patterned plate) to 66% (large, rim-patterned plate). For the presence of a rim, correct estimations ranged from 43% (small, white, non-rimmed plate) to 74% (large, navy, rimmed plate).

Conclusion: The size of the presentation plate affected university students’ accuracy of portion size estimations of a fixed volume beanbag: Large plates yielded more accurate estimations of this volume. There was no obvious effect of the other characteristics on portion size estimation. Statistical analysis for interactions and significance is recommended, since the findings may have implications for dietitians’ choice of plates as part of their portion size estimation aid kits.
Introduction: Medical education empowers students to transform theoretical knowledge into practice, by aligning content knowledge and appropriate teaching methods. Assessment drives learning, thus alignment between outcomes, assessment and teaching should be well defined and meticulously planned. Knowledge, skills, and attitudes must be thoroughly assessed to determine students’ competency to practice prior to graduation. Assessment methods have been adapted, but not evaluated, to accommodate new educational challenges.

This study evaluated whether the assessment criteria for final year Obstetrics students align with the expected learning outcomes.

Methods: We conducted a correlational multi-methods study that included document review of outcomes and assessments in 2018, questionnaires and nominal group discussions with Obstetric experts on agreement of appropriate learning outcomes and analysing the assessments for 2018. Learning outcomes for the final Obstetric module were constructed using Bloom’s taxonomy. Clinical competencies were defined according to Miller’s pyramid. Bigg’s Model of Constructive Alignment was used to evaluate the alignment of assessment and outcomes. Data was captured and analysed with Microsoft Excel and tick-sheets, as per levels and knowledge dimensions of Bloom’s taxonomy.

Results: There are two independent 3.5-week modules in Obstetrics for final year students, with a 75% overlap in learning outcomes and assessments. 95% of the learning outcomes were poorly defined, and 11-22% of learning outcomes were inappropriately assessed.

Summative assessments were comprehensive, but continuous assessments were rudimentary without a clear educational benefit. There is a deficiency in the assessment of clinical skills and competencies as assessments have been adapted to accommodate patient confidentiality and increasing student numbers. The lack of rubrics, blueprinting and moderation decreases the validity of assessments. As a result, assessment did not focus appropriately on the higher levels of thinking and doing.

Conclusion: There was poor alignment between assessment and outcomes. Alignment between learning outcomes and assessment is essential to ensure a good quality-teaching programme. The Obstetrics modules should be combined and learning outcomes and assessments (summative and continuous) reviewed as a single entity. The employment of good educational practice will improve the authenticity of assessments.
MOLECULAR EVOLUTION OF THE GROUP-SPECIFIC ANTIGEN GENE DURING EARLY AND CHRONIC HIV-1 INFECTION IN PARTICIPANTS FROM TSHWANE PRELIMINARY DATA

Introduction: Since its discovery 35 years ago, human immunodeficiency virus (HIV) has become the world's largest pandemic. In 2017 there were 36.9 million HIV infected people globally. South Africa (SA) has the highest number of HIV infections worldwide. Currently available antiretroviral therapy (ART) does not cure HIV; therefore, there is a need for developing an effective HIV vaccine. The group-specific antigen (gag) gene of HIV is conserved and harbours immunodominant epitopes. These epitopes elicit cytotoxic T lymphocytes (CTL) that are able to control HIV viraemia to the set-point during early infection. The aim of this study was to characterize the HIV gag in participants with early or chronic HIV-1 infection.

Methods: In this retrospective study, stored sample pairs from HIV infected participants were used to characterize the gag gene. Total nucleic acid extraction was done in all samples obtained from HIV-infected participants. Published nested PCR was performed to amplify the complete gag gene of HIV and PCR products were visualized on gel electrophoresis. PCR-positive samples were sent for Sanger sequencing. Editing and analyses of sequences will be done on CLC Main Workbench programme and phylogenetic tree construction will be done on Mega programme. Amino acid sequences will be compared in sample pairs in order to assess the evolution of the gene during early and chronic infection.

Results: Sequencing data is available for the baseline samples. Characterization of the gag gene in follow-up samples is underway. The gag gene has been successfully amplified in 38 out of 45 follow-up samples. The first 21 amplicons from follow-up samples have been successfully sequenced; analysis is still in progress. By the end of July all follow-up samples will have been amplified, sequenced and analyzed.

Conclusion: From this analysis we should be able to detect the extent of gag gene variation during early and chronic infection, thus identify the epitopes that are likely targeted by CTL responses during early HIV infection. This could provide insights for future HIV-1 vaccine design.
Presenting Author: PM Joubert (Psychiatry)

Authors: PM Joubert (Psychiatry)

Abstract Detail

BEHAVIOUR THAT UNDERPINS NON-PATHOLOGICAL CRIMINAL INCAPACITY AND AUTOMATISM: TOWARD CLARITY FOR PSYCHIATRIC TESTIMONY

Introduction: Giving expert psychiatric testimony in criminal cases related to violent crimes is challenging when the defence submits automatism as an excuse for the alleged criminal violent behaviour. This gist of such a defence is that the accused person was so overwhelmed by emotions that had been triggered by an upsetting event that the consequent violent behaviour was uncontrollable. The automatism is such cases is then usually presented in terms of an automatism that cannot attributed to a mental disorder, because, if accepted by a court, it is a complete defence: From the point of view of accountability the accused is acquitted with no further need for being declared a State Patient that needs psychiatric treatment (which would be a form of involuntary psychiatric treatment). This defence is often called a "sane automatism", as contrasted to "insane automatism" where the automatism is due to a mental disorder. Sane automatism is also referred to a non-pathological criminal incapacity (NPCI).

However both automatism and mental disorder are conceptualised in various ways by psychiatrists and law practitioners, which may account for misunderstanding between the two disciplines and even within each discipline. To avert this confusion we propose that psychiatrists focus in their assessment and testimony particularly on the behaviour: to evaluate behaviour as being distinct from the jurisprudential concerns regarding whether that behaviour constitutes an automatism and whether it is (not) attributed to a mental disorder.

By focusing on the behaviour the properties of the behaviour may be examined theoretically and clinically in terms of behaviour modification theory, namely antecedents, consequences, topography, intensity, latency, duration, frequency, and quality. Accordingly, the behaviour that underpins NPCI (and automatism) is described here as emotionally triggered involuntary violent behaviour about which testimony may be given that is distinct from whether the behaviour is causally attributed to a mental disorder, and also from jurisprudential concerns with accountability.
Presenting Author: MT Lamola (NICD, SAFETP)

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Abstract Detail
THE PREVALENCE OF MALARIA IN THE FIVE DISTRICTS OF LIMPOPO PROVINCE, SOUTH AFRICA, 2015 – 2017

Background: Despite the availability and usage of long-lasting insecticidal nets (LLINs) and indoor residual spraying (IRS), malaria remains an important public health problem. Limpopo province (LP) is among the three malaria endemic provinces in South Africa (SA). Information on the prevalence of malaria in the five districts of LP for recent years is limited.

Objectives: To estimate the prevalence of malaria, proportions of imported malaria cases and determine malaria risk factors in the five districts of LP, from January 2015 to December 2017.

Methods: A retrospective review of routinely collected data obtained from Malaria Information System (MIS) and Laboratory Information System (LIS) of the National Health Laboratory Services (NHLS) from 2015 to 2017 was done. Data analysis was performed using Excel Microsoft and Stata 15. Bivariable and multivariable logistic regression analysis were done to identify risk factors associated with malaria infection with Adjusted Odds Ratio (aOR), 95%CI and p-values <0.05.

Results: In total, 43 199 malaria cases were reported from 2015 to 2017. Median age of malaria cases was 25 years and interquartile range (IQR; 12-40 years). Among the malaria cases, males were 50.9% (22 028/43 199), females 49.1% (21 171/43 199) and 48.8% (21 079/43 199) were from Vhembe district. The age group with the highest proportion of malaria cases was 25-29 years 10.5 % (4 521/43 199). Vhembe district had the highest malaria prevalence in 2015(155), 2016(53) and 2017(158) per 100 000 population. LP had the highest malaria prevalence in 2017(331 per 100 000 population). Waterberg district had the highest imported malaria cases with 28.5% (437/1 532). On multivariate analysis, factors significantly associated with increased malaria infection were ages 25-29 years [aOR 1.70; 95% CI 1.56-1.85; p=<0.001] and 40-44 years [aOR 1.70; 95% CI 1.55-1.86; p=<0.001]; other factors such as sex and district were not significantly associated with the likelihood of malaria infection.

Conclusion: These findings demonstrate the need for routine awareness campaigns to reinforce malaria case finding and treatment in the general population of LP and strengthening cross-border collaborative initiatives to tackle imported malaria infections especially in Vhembe district, which borders three countries (Botswana, Zimbabwe and Mozambique).

Keywords: Prevalence, Limpopo province, Imported malaria cases, Long-lasting insecticidal nets, Indoor residual spraying
TIME COURSE CONVERGENCE OF HEPATOCYTOPLASMIC PROTEOMIC PHENOTYPES SEEN IN HEPG2 SPHEROID CULTURES

**Background:** Standardizing in vitro pre-clinical hepatotoxicity screening is confounded by diverse cellular origins, most of which lack representative hepatocellular function. Dedifferentiation and loss of cellular polarity are inherent limitations introduced by long term cell culture. HepG2 cells have been extensively used as a hepatotoxicity screening platform despite their poor metabolic competence. Three dimensional (3D) culture techniques may serve to better preserve the cellular phenotype. However, the 3D culture system in general is poorly standardised and as a result reproducibility is limited. One strategy for investigating hepatic phenotypes is assessing the proteome. Here we present the dynamic alterations to the cellular phenotype of HepG2 cells cultured as spheroids over an extended time course.

**Methods:** Replicates of HepG2 cells (as monolayers and 3D spheroids) were collected as whole cell lysates. Seventy-five micrograms of sample protein were reduced, alkylated, precipitated, digested with trypsin and labelled using isobaric tags. Samples were analysed using a Dionex Ultimate 3000 RSLCnano LC system coupled to a Thermo Scientific Fusion Orbitrap Mass Spectrometer. Peak lists were searched against a UniProtKB/Swiss-Prot human database using SearchGUI with X!Tandem, MS-GF+ and Comet search engines. Post-processing for protein identification and quantification used Peptide Shaker and Reporter software respectively.

**Results:** Once processed, 7354, 7593, 7337 and 7427 proteins were identified and quantified across replicates 1 to 4 with a protein overlap of 2769. While distinct hepatic marker profiles varied between samples, several notable proteins were up-regulated. Among these were hallmark hepatic proteins albumin, alpha-fetoprotein and various apolipoprotein fragments. Additionally, canalicular specific marker proteins such as dipeptidyl peptidase 4 were identified with a 2-fold up-regulation. Hepatic structural markers such as hepatocyte cell adhesion molecule, vitronectin, collagen, laminin and fibronectin were also up-regulated by more than 2-fold in 3D spheroids. Several phase I metabolizing enzymes and membrane transporter proteins showed variable up-regulation.

**Conclusion:** Hallmark hepatic proteins were largely up-regulated, demonstrating alterations in the hepatic phenotype, when cultured in 3D spheroids free from synthetic surfaces. Quantitation of large protein cohorts demonstrated the ability of 3D spheroids to induce changes in the HepG2 cell proteome with some of these changes potentially being advantageous in promoting maintenance of a stable hepatic phenotype.
Abstract Detail

ALTERNATIVE DIAGNOSIS AND INCIDENTAL FINDINGS ON COMPUTED TOMOGRAPHY FOR SUSPECTED RENAL COLIC

Objectives: The aim of the study was to determine the prevalence of ureteric stones (Urs), alternative diagnosis (AD) and important incidental findings (IF) discovered by uncontrasted abdominal Computed Tomography (CT) in patients referred to our emergency department (ED) and to evaluate the efficacy/or correct application of screening criteria for such referrals. We aimed to identify patients in our setting who has a low probability of renal stones, who could safely be evaluated by alternative imaging, i.e. Ultrasound (US), to reduce the radiation burden on the community.

Methods: We retrospectively reviewed 105 adult patients that had an uncontrasted abdominal CT scan for renal colic at our ED between February 2017 and August 2017. All CTs were divided into αœno cause of symptoms seen on CT, αœureteric stone as cause of symptoms, or αœalternative diagnosis as cause of symptoms. αœImportant incidental findings were also noted separately. The prevalence of Urs in our setting was compared to the prevalence in a large international study to evaluate the appropriateness of referrals from our ED. AD was categorized under known alternative causes and IF under organ systems. Demographic information pertaining to sex, ethnicity and age was extracted for all scans to identify high risk groups.

Results: Of 105 CT scans reviewed, Urs was found in 41.0% of CTs, with a negative scan found in 31.4%. AD was found in 27.6% of all CTs, and IF in 49.5%. A statistically significant difference in the Urs prevalence was found between our study and the benchmark international study signifying that there are potential flaws in our referral criteria for uncontrasted renal colic CT’s. Black females were found to have the highest probability for a completely negative scan and Indian race has a very high probability for Urs.

Conclusions: Referrals for uncontrasted CT scans for renal colic from our ED needs to follow stricter clinical guidelines and consider alternative methods like US to evaluate black females to reduce the radiation exposure of the community. The high prevalence of Urs among Indian patients needs further evaluation to confirm this finding, and find possible risk factors.
Abstract

THE EFFECT OF PSYCHOLOGICAL RESILIENCE AND VULNERABILITY ON THE IMPACT OF ADVERSE LIFE EVENTS ON FATIGUE, MOTOR DYSFUNCTION AND PARAESTHESIAE IN PEOPLE WITH MULTIPLE SCLEROSIS

Background and aim: Adverse life events have been associated with exacerbating multiple sclerosis (MS) symptoms, but results have been variable, raising the question on the role of other psychological factors. This study examined the role of psychological resilience and vulnerability in the association between adverse life events on MS symptoms.

Methods: The study recruited 1,239 participants (N = 1,239) with multiple sclerosis, from around the world, who completed an online e-questionnaire. The participants were aged 18 to 81 years (mean = 45.6; SD = 10.4), and 84.5% were female. The questionnaire included two measures each for MS-symptoms measured. Fatigue is measured by the Modified Fatigue Severity Scale and the Modified Fatigue Assessment Scale; Motor Dysfunction is measured by the newly developed Motor Dysfunction Assessment Scale; Paraesthesiae was also measured by a newly developed scales, Paraesthesiae Spell Duration Scale; and the Paraesthesiae Cumulative Duration Scale. Psychological measures included measuring Resilience with the Connor-Davidson Resilience Scale and the Resilience Scale for Adults; Vulnerability were measured by Psychological Vulnerability Scale and the vulnerability section of the Defence Style Questionnaire. Finally Adverse Life Events were measured by the newly developed Adverse Life Events Assessment Scale. Regression analyses and structural equation modelling were performed.

Results: Adverse life events during the preceding 60 days were associated with fatigue, motor dysfunction and paraesthesiae, but with small effect sizes (β from .07 to .152; p<.014). This was also the finding for all three sub-categories of adverse life events (viz: serious threat to life of physical integrity, adversarial relationships events, and challenging circumstances), which predicts each of the multiple sclerosis symptoms (viz: fatigue, motor dysfunction and paraesthesiae). The Structural Equation Model (SEM) showed that resilience had a moderating and vulnerability a worsening contribution to the association between adverse life events and multiple sclerosis symptoms, and furthermore showed a statistically significant fit with the data of a moderate to good degree (p < .001; GFI = .725; RMSAE = .047). The effect of vulnerability in the model played a markedly larger role than resilience.

Conclusion: The results suggest that psychological resilience and vulnerability play modifying roles in the association between adverse life events and MS symptoms, but other psychological factors also need to be investigated.
THE EFFECT OF DROSPIRENONE IN COMBINATION WITH ETHINYLESTRADIOL ON WHOLE BLOOD CLOT VISCOELASTICITY AS WELL AS THE BIOPHYSICAL AND BIOCHEMICAL CHARACTERISTICS OF RED BLOOD CELLS

**Introduction:** Combined oral contraceptive (COC) use is associated with increased risk of venous thromboembolism (VTE), deep vein thrombosis (DVT), and pulmonary embolism (PE) for the female user. Drospirenone (DRSP) in combination with Ethinylestradiol (EE) is among the 10 most commonly used COC formulations and poses the greatest risk of venous thrombosis (VT) in this group. Since venous thrombi consist mainly of red blood cells (RBCs) and fibrin they are termed “red clots”.

**Methods:** We evaluated the effect of two DRSP and EE containing COCs (3 mg DRSP combined with 30 µg EE and 3 µg DRSP combined with 20 µg EE, form hereon referred to as DRSP/30EE and DRSP/20EE respectively) on the viscoelasticity of whole blood clots as well as the biophysical properties of RBCs. For viscoelastic measurement thromboelastography (TEG) was employed while light microscopy (LM), scanning electron microscopy (SEM) and laser scanning confocal microscopy (LSCM) was used to assess the RBCs’ biophysical and biochemical characteristics.

**Results:** Viscoelastic measurements revealed a prothrombotic profile for both COCs groups when compared to the control group, which was more pronounced for DRSP/30EE. LM and SEM analysis showed rouleaux formation of the RBCs and RBC shape changes for both COC groups when compared to the control group, which could be attributed to membrane damage. Spontaneous fibrin formation and platelet activation in the COC groups were evident from the SEM investigation, accompanied by interactions between erythrocytes and platelets and/or fibrin. The compromised membrane integrity in the COC groups were confirmed with LSCM.

**Conclusion:** In conclusion, DRSP/EE use influences both RBCs’ physiognomies as well as biochemical properties to initiate a haemostatic shift resulting in a prothrombotic profile for the female user. While these effects are mostly subclinical the long-standing effects along with the risks involved with the use of these formulations should be taken into careful consideration for each female before these COCs are prescribed.
HIGH RATES OF RESISTANCE IN NEISSERIA GONORRHOEAE INFECTION IN MEN: IS SOUTH AFRICA ON ITS WAY TO UNTREATABLE GONORRHOEA?

Introduction: Neisseria gonorrhoeae drug resistance has emerged worldwide. However, little is known about gonococcal populations in South Africa where syndromic management is used for sexually transmitted infections. We investigated the occurrence of antimicrobial resistance in Neisseria gonorrhoeae infections in high-risk men in Johannesburg, South Africa.

Materials/methods: We conducted a cross-sectional study at three primary healthcare (PHC) facilities in Johannesburg, South Africa. We recruited: a) men with persistent or recurrent discharge following recent treatment, and b) men-who-have sex with men (MSM) presenting with urethral discharge. Urethral swabs and urine were obtained for culture of Neisseria gonorrhoeae on New York city medium followed by drug susceptibility testing using E-test with minimum inhibitory concentration (MIC) as per EUCAST guidelines. Molecular diagnostics for STIs were performed using the TIB MOLBIOL Lightmix Kit 480 HT CT/NG assay and real-time PCR assays for Trichomonas vaginalis and Mycoplasma genitalium. Whole genome sequencing (WGS) on gonococcal isolates to produce a phylogeny, allocate multilocus sequence types (MLST), multiantigen sequence types (NG-MAST), and identify molecular markers of antimicrobial resistance.

Results: We recruited 51 men of which 31 (61%) had persistent or recurrent discharge and 20 (39%) were MSM. Urine PCR was positive for Neisseria gonorrhoeae in 42 men (82%); Chlamydia trachomatis was detected in 10 (20%), Mycoplasma genitalium in eight (16%) and Trichomonas vaginalis in four (8%). Gonococcal cultures were positive for 27/42 men (64%) with Neisseria gonorrhoeae detected molecularly. Isolates showed resistance to ciprofloxacin in 74%, penicillin 33% and tetracycline 67%. Reduced susceptibility to azithromycin was identified in 11/27 (41%) isolates: 6 were resistant (minimum inhibitory concentration (MIC) range 1-8 µg/ml) and 5 showed intermediate resistance. The MIC values for the cephalosporins and spectinomycin were within the susceptible range in all isolates. Phylogenetic analysis revealed diverse strains which are phylogenetically distinct from strains found elsewhere.

Conclusions: We observed high rates of resistance in Neisseria gonorrhoeae to various antimicrobial drugs, including azithromycin, limiting the therapeutic options. These findings impact on the future choice of drug regimen for syndromic management and highlight the urgency to implement diagnostics for STI care in South Africa.
Faculty Day 2019 Abstract 2019035  Oral

Presenting Author: GV Ndlovu (UP)

Authors: GV Ndlovu (UP)

Abstract Detail

TOWARDS THE ACCREDITATION OF FORENSIC MEDICO-LEGAL MORTUARIES IN GAUTENG &#8211; A CRITICAL APPRAISAL OF PERSONNEL, FACILITIES AND OPERATIONS

Accreditation plays a crucial role in ensuring the presentation of reliable results and maintaining ethical integrity and impartiality of the judicial process. Accreditation is a peer-reviewed process. The quality of results is obtained from adhering to prescribed standardised procedures.

The present reluctance of South Africa Forensic Pathology Services (FPS) to fully adopt the principles of accreditation into its mortuaries is preventing the realisation of all that it portends.

The goal of this research is to provide a roadmap to the practical implementation of an accreditation and regulation program for medico-legal mortuaries in South Africa.

This study will assess perceptions and attitudes of FPS personnel, with regard to the concept of ‘accreditation’ in its broadest and narrowest sense.

Using the NAME accreditation checklist as a starting point, this research will critically assess personnel, facilities and operations, with respect to day-to-day quality assurance.
Presenting Author:  S Nel (Human Nutrition)

Authors:  S Nel (Human Nutrition) FAM Wenhold (Human Nutrition), UD Feucht (Paediatrics)

Abstract Detail

CAN WEIGHT-FOR-AGE (WFA) GROWTH PATTERNS PREDICT SEVERE ACUTE MALNUTRITION (SAM)? SOUTH AFRICAN EXPERTS DISAGREE...

**Introduction:** Infant and child weight gain is routinely assessed in primary health care as indicator of protein-energy undernutrition, particularly as risk factor of incipient SAM. Since growth faltering is not clearly defined, interpretation of growth patterns is challenging.

**Aim:** To determine experts’ judgement of the risk of SAM from WFA growth charts with different growth patterns.

**Methods:** One of two online surveys (50 WFA growth charts each) was sent to 69 clinicians/researchers working with child growth and nutrition. Respondents rated each chart as low, moderate or high risk of SAM. Three charts were repeated per survey to assess intra-rater reliability.

**Results:** Thirty experts (43%) responded (21 dietitians; 9 medical doctors). Most were employed at public health facilities (n=17; 57%) or universities (n=12; 40%), had qualifications beyond a bachelor’s degree (n=28; 93%) and had worked in child health and nutrition for ≥8 years (n=21; 70%).

Across three risk categories, all respondents agreed on the rating of only 10 of 100 charts, while 41/100 charts were simultaneously rated as low, moderate or high risk by different respondents. For the 90 charts with disagreement, agreement ranged from 75-100% for 30/100 charts, to 50-74% for 45/100 charts and <50% for 15/100 charts. Pooled intra-rater reliability was 84% (range 71-100% per chart).

When the moderate- and high-risk categories were combined, 100% agreement was reached for 34/100 charts, and 75-100% agreement for 37/100 of charts. Agreement was <75% for the remaining 29 charts. Agreement was highest for charts showing weight loss (100% agreement on 8/14 charts, and >75% agreement on remainder), and poorest for charts of low birth weight infants (100% agreement on only one chart; <75% agreement on 6/9 charts).

**Conclusion and recommendations:** Experts do not agree on WFA growth patterns representing a risk of SAM. Statistical analysis of inter-rater agreement is awaited. The usefulness of WFA growth assessment by clinicians as predictor of SAM requires clarification. Furthermore, real-life agreement between WFA growth and SAM (i.e. validation) is needed. Applying technology in the assessment should be investigated.
INFANT-FEEDING EXPERIENCES OF MOTHERS LIVING IN AN INFORMAL SETTLEMENT IN TSHWANE

Background: Informal settlements near cities such as Tshwane are growing at a fast pace. The infant-feeding choices and practices of mothers living in informal settlements are affected by poor socio-economic status, food insecurity and the separation of mother and infant related to work demands.

Aim: To explore and describe the infant-feeding experiences of mothers of children between the ages of 3-24 months, who were living in two selected informal settlements in Tshwane. Study design: An explorative and descriptive qualitative study. Sampling technique: Purposive sampling aided by community health workers (CHWs) living in the areas. Sample: Mothers of infants and young children aged 3-24 months (n=28) living in the selected informal settlements.

Methods: Six focus group discussions consisting of 3-8 mothers were conducted. The two main questions with probes pertaining to their feeding experience and related support received between ages 0-6 months and 7-12 months were asked. The ethics committee, from the faculty of health sciences, University of Pretoria (Ref 293/2018) approved the study.

Results: Three themes with six sub-themes were identified. Firstly, mothers held interpretations regarding breast-milk as an adequate sole source of nutrition in the first six months. Early introduction of complementary foods was due to baby-led and care-giver related factors. Secondly, mothers received support in the form of advice from their elders based on beliefs about discarding breast-milk produced during mother-infant separation and the early introduction of complementary foods. Thirdly was the effect of household food insecurity affecting adequate food intake by breastfeeding mothers and access to nutritious complementary food for infants.

Conclusion: Mothers were generally unable to feed their infants as recommended as according to them breastmilk alone is not enough to nourish an infant below six months of age. Secondly it was used to manage the crying infants and out of concern for available caregivers. Environmental and resource constraints related to living in the informal settlement were experienced as barriers outside the mothers’ control.

Recommendations: There is a need to strengthen community-based infant-feeding education by CHWs and to also increase community support by educating elders and creche caregivers about infant-feeding.

Key terms: Infant-feeding, informal-settlement, mothers, experiences, support
Presenting Author: MJ Thambura (UP)

Authors: MJ Thambura (UP), J C du Plessisa (School of Health Technology, Central University of Technology), CME McCrindle (SHSPH)

Abstract Detail

DEVELOPMENT OF AN ADULT CHEST IMAGING PROTOCOL FOR LODOX SYSTEM AT TRAUMA UNITS

Background: The Lodox (Lodox® Systems (Pty) Ltd, South Africa) digital x-ray system was initially developed to assist in the detection of diamonds smuggled by employees in mines but was later adopted as a screening tool in the trauma unit.

Although previous studies have shown that the Lodox system can produce chest images of superior quality, 30% undergoes additional images. In some radiology departments, it is a routine to perform conventional chest x-ray following a full-body Lodox scan. Although Lodox system produces 10 times less ionising radiation dose than conventional x-ray system, requesting additional images defeats the intent of lowering the radiation dose. The problem that is being addressed in this study is the absence of an imaging protocol for adult chest imaging using a Lodox system in a trauma unit. There is no published information on the use of the Lodox system for adult chest imaging since it was originally adopted as a screening tool in a trauma unit. Additionally, there are no referral pathway and guidelines for patients undergoing Lodox imaging in trauma units.

Aim and objectives: This study aims at developing a protocol for adult chest imaging using the Lodox system in trauma units. This will be achieved by assessing the use of Lodox statscan imaging systems in trauma units across South Africa, then a comparison between the diagnostic quality of images obtained using Lodox imaging system versus images obtained using conventional x-ray system.

Methodology: This is a quantitative study. The Researcher has used a descriptive-correlational design, e-Delphi and nominal group technique. The pilot study presented in this research has ethics approval reference number 486/2017

Results: Ninety per cent of the twenty-eight hospitals in South Africa were receiving patients referred for additional images acquired with conventional x-ray system after Lodox scanning. Commonly referred radiological examinations are; Chest 27.77%, Abdomen 16.67%, spine 13.89% and extremities 11.11%.

Conclusion: Developing this protocol will decrease the number of radiological examinations on patients, lower medical bills and enhance multidisciplinary collaboration, hence improving quality of patient care through a better workflow in trauma and emergency units.
Abstract Detail

EFFECT OF PICTORIAL INFORMATION ON DOSING PROFICIENCY OF 500 MG PARACETAMOL-ONLY TABLETS

**Background:** Paracetamol is the cause of most drug overdoses globally. Lack of dosing proficiency appears to be the leading contributing factor for this phenomenon. The aim was to assess the effect of pictorial information for 500 mg paracetamol-only tablets on dosing proficiency.

**Methods:** Closed-ended questionnaires together with four options of a pharmaceutical packaging representations were administered to 1000 participants in the Tshwane area. Questions were based on each of the four packaging versions: box A (standard written information without pictorials), box B (standard written information + version one pictorials), box C (standard written information + version two pictorials) and box D (version one pictorials without writing). Proficiency scores were calculated based on responses to questions regarding the interpretation and application of dosing instructions (6 questions; correct dose, calculating maximum daily dose and four pertaining to the calculation of subsequent doses) and warnings (3 questions; simultaneous alcohol intake, duration of administration, access to children). Proficiency in warnings was regarded only if a full score was obtained, whereas proficiency in dosing required a score of ≥ 5.

**Results:** Regarding warning information, boxes B and C resulted in ~13% greater proficiency than box A. With regard to dosing information, only box B resulted in significant improvement in proficiency (11.6%). When dosing and warning results were combined, greatest proficiency was achieved where boxes contained both writing and pictorials. Of these, box B scored 12.6% and box C 19.6% greater proficiency than box A.

**Conclusion:** Participants did not score significantly differently when only writing and only pictorial boxes were compared. However, when both pictorials and standard writing appeared on a box, there was a ~20% increase in paracetamol administration proficiency. Extrapolated to the South African population, 11.4 million people could be less likely to unintentionally overdose on 500 mg paracetamol-only tablets with this change.
Presenting Author: CT Viljoen (Physiotherapy)

Authors: CT Viljoen (Physiotherapy), N Sewry (SEMLI), M Schwellnus (SEMLI and Section Sports Medicine), S Swanevelder (Biostatistics Unit, SAMRC), E Jordaan (Biostatistics Unit, SAMRC)

Abstract

RUNNERS PARTICIPATING IN MASS COMMUNITY-BASED TRAIL RUNNING EVENTS SUSTAIN >3 TIMES MORE ACUTE INJURY-RELATED MES COMPARED TO ILLNESS-RELATED MES

**Purpose:** To describe the epidemiology of race-day injury- and illness-related MES, of the 2012-2014 Two Oceans Trail Runs.

**Methods:** A retrospective clinical audit of race-day MES was performed on 2428 runners participating in the 2012-2014 Two Oceans Trail Runs (10km and 22km). Medical staff recorded all injury- and illness-related MES using the latest consensus statement. All MES were rated as at least of moderate severity. A crude incidence rate (IR: per 1000 starters) of MES and the IR of the specific injuries and illnesses were calculated as main outcome variables.

**Results:** Among the 2428 race starters, 44 MES were recorded resulting in an IR of 18.1 (95%CI; 12.8-23.5). An IR of 3.7 (95%CI; 1.3-6.1) was shown specifically for illness-related MES and compared to an IR of 14.4 (95%CI; 9.6-19.2) for injury-related MES. The cardiovascular system (all were exercise associated postural hypotension) shown the highest IR (1.6; 0.0-3.3) among the illness-related MES. For injury-related MES, the anatomical site with the highest IR (IR; 95%CI) was the knee (4.5; 1.9-7.2), followed by injuries involving multiple anatomical sites (3.3; 1.0-5.6), and the ankle (2.1; 0.3-3.9). The highest IR by injury type was lacerations/abrasions (8.2, 95%CI; 4.6-11.8), followed by ligament sprains (2.1; 0.3-3.9).

**Summary and conclusion:** In trail running events, acute injury-related MES are >3 times more common than illness-related MES which is in contrast to road running events. Acute ankle sprains showed a particular high IR. The overall IR of MES is also higher in the Two Oceans trail runs compared to the 21.1km (IR=5.1) and 56km (IR=13.0) Two Oceans road runs. Race organisers and medical teams can benefit from these results as it helps to plan medical coverage on race-day and design specific prevention strategies for the MES.
Presenting Author: CT Viljoen (Physiotherapy)

Authors: CT Viljoen (Physiotherapy)  N Sewry (SEMLI), M Schwellnus (SEMLI and Section Sports Medicine),  S Swanevelder (Biostatistics Unit, SAMRC),  E Jordaan (Biostatistics Unit, SAMRC)

Abstract

IN A 12-MONTH PERIOD, ABOUT 1 IN 7 TRAIL RUNNERS REPORT AN OVERUSE INJURY, MOSTLY OF THE KNEE AND ANTERIOR THIGH: A SAFER STUDY IN 2827 TRAIL RUN RACE ENTRANTS

**Purpose:** To determine the epidemiology (annual incidence) and nature of self-reported overuse/chronic injuries among trail runners (10km and 22km) participating in a mass community-based trail running event over a 4-year period.

**Methods:** During the 2012-2015 Two Oceans Trail Runs, 2827 runners (79.61% of all participants) gave consent to participate in a cross-sectional study. Data collected focused specifically on overuse injuries recorded during a pre-race medical screening questionnaire entry process. The overuse injury history included: anatomical site, tissue type, side of injury and injury severity grade. Retrospective annual incidence (% runners: 95% CI) and frequency of injury characteristics (% of injuries) for anatomical site, tissue type, and injury severity grade were used as main outcome variables.

**Results:** Of the 406 overuse injuries reported, 12 participants reported 2 injuries. The retrospective annual incidence of injury was 14.4% (95% CI; 13.0 â€“ 15.8). The knee (25.2%), anterior thigh (10.0%), shin/lower leg (8.4%) and ankle (8.4%) were reported as the most commonly injured anatomical sites. Muscle (30.3%) and tendon (28.9%) were the most common tissue types affected by injury. Among the common running-related injuries (RRIs), Iliotibial band syndrome (ITBs) accounted for 20.0% followed by Achilles tendon (8.6%) and hamstring injuries (7.9%). The severity of injury (Grades 3 and 4) in over 50% of the injuries were high enough to interfere with training or racing.

**Conclusion:** In a 12-month period, overuse injuries (most commonly the knee and quadriceps muscle) were reported by 14.4% of trail runners. Of these injuries, over 50% of injuries were severe enough to affect training or racing. Future risk factors associated with these injuries need to be investigated to guide future injury prevention strategies.
Faculty Day 2019 Abstract 2019042

Presenting Author: K Kallmeyer (ICMM)

Authors: K Kallmeyer (Plastic, Reconstructive & Aesthetic Surgery), D André-Lévigne (Plastic, Reconstructive & Aesthetic Surgery), B Pittet-Cuénod (Plastic, Reconstructive & Aesthetic Surgery), A Modarressi, (Plastic, Reconstructive & Aesthetic Surgery), MS Pepper (Immunology)

Abstract Detail

ADIPOSE-DERIVED STROMAL CELLS ENHANCE WOUND REPAIR UNDER PATHOLOGICAL CONDITIONS OF HYPERGLYCEMIA AND ISCHEMIA

Introduction: There is increasing interest in the use of adipose-derived stromal cells (ASCs) for the management of chronic wounds. We set out to investigate whether the local injection of ASCs could enhance wound repair under pathological conditions of hyperglycaemia and ischemia.

Methods: Transduction of ASCs to express firefly luciferase and green fluorescent protein (GFP) was done to allow for their detection by bioluminescence imaging (BLI) and histological analysis. Ischemia was induced unilaterally by resection of the femoral artery in hyperglycaemic rats before full-thickness bilateral wounds were created. Around each wound, 2x10^5 ASCs or NaCl (control group) were injected. Animals were followed by digital photography and sacrificed for histology and immunohistochemistry (IHC) at 72h, on days 7, 10, 15, 21 and at complete wound closure. Haematoxylin/eosin staining (to detect wound cellularity) as well as Masson’s trichrome staining (to detect collagen deposition) and IHC for alpha-smooth muscle actin (to detect myofibroblasts and vascularisation), ionised calcium binding adaptor molecule 1 (to detect macrophages) and GFP (to detect ASCs) were performed on sample sections. Wound closure time and the contraction/epithelialisation ratio was assessed.

Results: BLI confirmed the location of ASCs at the injection sites. GFP positive ASCs remained detectable not only at the injection sites but were also found migrating into the wound bed at 72h, days 7 and 10. ASCs significantly enhanced wound closure in non-ischemic and ischemic wounds by 9 days compared to control wounds. Semi-quantitative analysis revealed that ASCs led to enhanced cellularity in the wound. No changes in collagen deposition, vascularisation or macrophage infiltration were observed between treatment groups. However, myofibroblasts were detected earlier and remained elevated at wound closure in the ASC treated group without modifying the contraction/epithelialisation ratio.

Conclusion: ASCs enhanced wound closure under pathological conditions. A significant increase in wound cellularity was observed, possibly through a mechanism of paracrine signalling that recruited more immune regulating and tissue repair cells into the granulation tissue. Administration of ASCs for chronic wounds shows promise as a cell-based treatment for enhancing wound repair.
Presenting Author: F Adam (Physiology)

Authors: F Adam (Physiology) L Jansen van Vuuren (Physiology), T Louw (Physiology), PS Wood (Physiology)

Abstract Detail

THE INFLUENCE OF WAIST-CIRCUMFERENCE ON THE RELIABILITY AND VALIDITY OF A CHAIR-SIT-AND-REACH TEST AS A MEASURE OF POSTERIOR KINETIC-CHAIN FLEXIBILITY IN OLDER ADULTS

Background: The chair-sit-and-reach (CSR) test has been validated for flexibility in the elderly, however, concerns about the validity and reliability of the CSR remain in elderly with large waist circumference (WC).

Objectives: To determine if the CSR test may be used as a valid and reliable measurement of posterior kinetic chain flexibility in the elderly with a large WC.

Methods: A descriptive-correlational study design recruited elderly participants ≥ 65 years with a large WC (women > 88 cm, men > 102 cm) no lower limb amputation, no walking assistance, sub-acute-acute or chronic posterior kinetic chain injury, no history of lumbar postural deviations and/ or lumbar spinal fusion surgery, BP ≤ 160/100 mmHg and HR ≤ 100 bpm following ethical approval. Anthropometric measures, resting heart rate and blood pressure were measured at pre-screening and flexibility by the CSR test and passive straight leg raise (PSLR) test were measured. Alpha was set at p ≤ 0.05 and Pearson correlation analysis identified low (r =0.1-0.2), moderate (r =0.3-0.4) and strong (r = 0.5-1.0) correlation.

Results: A total of 37 women (mean: age; 76.5 ± 6.9 years, BMI: 29.4 ± 5.3 kg/m2 , WC: 99 ± 9.9 cm, CSR: -4 ± 10.5 cm, SLR: 71.8 ±12.5) and 9 men (mean: age:75.1 ± 7.1, BMI: 30 ± 2.8 kg/m2 , WC: 109.3 ± 5 cm, CSR: -8.2 ± 11.9 cm, SLR: 65 ± 15.5 degrees) met the inclusion criteria of the study. Inter-rater reliability for women and men respectively (24% and 11%). Correlation of CSR and WC (r = .02 and -.58) and criterion measure (SLR) and WC (r = .17 and -.48) for women and men respectively.

Conclusion: Outliers with a very large WC showed poor CSR scores in contrast to an above average SLR score, indicating that the SLR test should be the preferred posterior kinetic chain measurement in the elderly with very large WC. Future recommendations would be to have a larger sample size.

Key words: posterior kinetic chain, chair-sit-and-reach, waist circumference, criterion measure, elderly
Comparing Muscle Strength, Balance, and Fear of Falling Between Elderly Fallers and Non-Fallers

Background: Falls amongst the elderly are one of the most prevalent causal factors for injury, potential disability and accidental death in the elderly population. Falling in the elderly is complex in nature as a number of factors can act alone or interact to bring about its occurrence. Understanding differences between fallers and non-fallers may guide practitioners in aspects which require interventions to reduce falls in the elderly.

Objectives: To compare the lower body strength, balance, and psychological fear of falling (FoF) of elderly fallers and non-fallers living in elderly homes in the Pretoria area.

Methods: A comparative, descriptive cross-sectional study design was used. Participants (N = 102) were divided into a Fall group (FG) (n = 24) and Non-fall group (NFG) (n = 78) group based on if they had fallen in the last 12 months. Falling was defined as the unintentional change in position, causing an individual to land on some other level, lower level, not as a result of overwhelming external force. Lower body strength was measured by using the 30 seconds sit-to-stand test, static balance with the unipedal stance test, dynamic balance with the 8 foot up-and-go and the FES-I Questionnaire assessed FoF. Results from of the FG and NFG were then examined for differences (alpha p ≤ 0.05).

Results: Participants in the NFG were significantly (p=0.027) taller (1.65±0.09 m) than the FG (1.62±0.07 m). The FG exhibited a greater FoF (p=0.0018) compared to the NFG, whereas no significant difference was found for lower body strength (p=0.870), static balance (p=0.215) and dynamic balance (p=0.236) between the two groups.

Conclusion: The FoF factor is higher in those having experienced a fall in the last 12 months. This FoF may influence the performance of activities of daily living and quality of life. Interventions in reducing the FoF amongst elderly fallers should form part of the rehabilitation processes following a fall.

Keywords: elderly, geriatrics, fall risk, strength, fear of falling, balance
Abstract Detail

THE PREVALENCE OF EIGHT SINGLE NUCLEOTIDE VARIATIONS IN OVERWEIGHT AND OBESE PARTICIPANTS

**Background:** Obesity is a growing epidemic not just nationally but worldwide and is responsible for a substantial economic burden in both developed and developing countries. Obesity is a major risk factor for type 2 diabetes, cardiovascular disease, some types of cancer and premature death. It has long been known that there is a genetic link to the complex nature of obesity that has both an environmental and psychological link to it. Neurotransmitters in the brain’s reward cascade regulate the feeling of satiety and food cravings, which are associated with behaviours such as overeating and binge eating. The aim of the study was to investigate the prevalence of eight single nucleotide variations (SNVs) associated with the regulation of the brain’s reward system and have been linked to addictive behaviour and food cravings in an attempt to assess a causal relationship with overweight and obese individuals.

**Methods:** The TaqMan® OpenArray™ Genotyping platform was utilised to genotype the 223 samples across eight SNVs, namely; SLC6A4 (rs25531), HTR2C (rs3813926), OPRM1 (rs1799971), GABRA6 (rs3219151), DRD2 (rs1800497), DRD4 (rs1800955), COMT (rs4680) and LEPR (rs1137101).

**Results:** The AA genotype for LEPR was more prominent in the normal weight participants (0.41), while the AG genotype was more prominent in the overweight and obese participants (0.67). The G allele has been associated with an increased risk of obesity and type 2. None of the remaining seven SNVs showed any significant association.

**Conclusion:** The small sample size and limited ethnic diversity decreased the statistical power of the analysis. Obesity is a complex disease, with both genetic and environmental factors need to be taken into account. Understanding the active genetics is as important as the inherited genetics. The lack of environmental and/or lifestyle information of participants narrowed the interpretation of the results. Obtaining the medical history and lifestyle information of participants for future studies could be beneficial at presenting daily challenges or stressor that participant may experience that could affect their weight management.
INVESTIGATIONS ON ORALLY DIGESTED HONEY AS A POTENTIAL THERAPEUTIC AGENT AGAINST CANDIDA ALBICANS: AN ANTIOXIDANT STUDY.

Introduction: Candida albicans (C. albicans) is a common fungus found in the oral cavity of humans that can result in an oral infection known as Candidiasis; especially in immune-compromised patients. Honey is a known antimicrobial, therefore a potential antifungal therapy that could reduce oxidative damage and retard the growth of C. albicans in these oral cavity infections.

Methods: This study investigated the ability of four Fynbos honeys to retain chemical (ChAA) and cellular antioxidant activities (CAA) after oral in vitro digestion in comparison with a medical-grade Manuka (MAN) UMF10+ honey. ChAA was determined using: total polyphenolic content (TPC), trolox equivalents antioxidant capacity (TEAC), oxygen radical absorbance capacity (ORAC) and anti-glycation (AGEs) assays. CAA was determined using the dichlorofluorescein diacetate (DCFH-DA) assay. Cytotoxicity was determined using the crystal violet and the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl-2H tetrazolium bromide assays. Cellular assays were done on both the mouse fibroblast (L929) and the human colon adenocarcinoma (Caco-2) cell lines.

Results: A dose-dependent increase in antioxidant content/activity of honeys was observed for the TPC, TEAC and ORAC assays, which were maintained post oral digestion. With the AGE assay it was observed that both honey types in the presence of a protein formed less than 40% of AGEs; and in the absence of a protein no AGEs were formed. Digestion did not increase or decrease the formation of AGEs. With CAA, the honey samples were able to protect the cells from oxidative damage by as much as 80%. Honey samples, undigested and digested, did not show any cytotoxicity. As an antifungal agent, the honeys showed a significant inhibition of growth of C. albicans biofilms by as much as 70% when low concentrations (between 5% and 9%) of the honeys were used as compared to higher concentrations of the honeys (between 25% and 45%) where C. albicans grew over 100%. It is still to be determined how concentration and sugar affect the growth of the fungus. Fynbos and MAN UMF10+ honeys both had bioactivity post-digestion.
HEALTH-RELATED QUALITY OF LIFE (HRQOL) OF PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

**Background:** COPD is a common, preventable, progressive and controllable non-communicable respiratory disorder. In 2020, COPD is expected to be the third leading cause of mortality worldwide and the fifth leading source in terms of the burden of a disease. It has a major effect on the Health-Related Quality of Life (HRQoL) of an individual. Various questionnaires have been developed to assess the impact of COPD on the HRQoL, but this area of research is greatly overlooked by most physiotherapists.

**Aim:** The purpose of this study was to determine the HRQoL of patients with COPD, consulting at Steve Biko Academic hospital (SBAH).

**Methodology:** The study was conducted in the outpatient pulmonology clinic at SBAH. A quantitative descriptive cross-sectional survey was undertaken using the St George’s Respiratory Questionnaire for COPD (SGRQ-C). A total of 36 participants with COPD were recruited using purposive sampling and only 34 participants met the inclusion criteria. A data collection sheet was used to collect data pertaining to demographic characteristics. SPSS version 17 was used to analyse data. Descriptive statistics was used to analyse categorical and sociodemographic data. Pearson’s correlation coefficient was used to determine the relationship between the SGRQ-C scores and the FEV1 values.

**Results:** There were more females than males (22 females and 12 males), with mean age of 45 years (Range=18 to 67 years). The scores of the domains of the SGRQ-C were calculated and compared against the scores of FEV1 values of the same patient. A weak negative linear relationship between the SGRQ domain scores and the FEV1% values was observed. Also these findings showed that as the scores of the SGRQ-C increased, the FEV1 values decreased.

**Conclusion:** This study showed that as symptoms of COPD worsened, the HRQoL decreased. It can be concluded that patients with high FEV1 values are likely to have a better HRQoL, whereas patients with low FEV1 values would have a poorer HRQoL.
PROTEOMIC CHARACTERISATION OF TROPHOZOITES PROTEOME ON INFECTED ERYTHROCYTES

Background: The severity of malaria is linked to the rate of the complex intraerythrocytic reproductive cycle of Plasmodium falciparum. The parasite’s virulence during intraerythrocytic stage depends on the expression of highly variant proteins at the surface of the infected erythrocytes. These proteins are critical for the parasite’s survival during immune mediated clearance and they have been identified as targets for antimalarial vaccine development. However knowledge of the parasite’s expressed proteome is limited at this stage. The aim of this study was to apply the mass spectrometry based proteomics approach to characterise specific trophozoite expressed proteome.

Methods: P. falciparum infected erythrocytes were isolated by Percoll gradient centrifugation and trophozoite stages were enriched using magnetic cell sorting. Harvested cells were lysed to form erythrocyte ghosts then processed with Laemmli buffer and the proteins separated by SDS gel electrophoresis. Electrophoretic bands stained with Coomassie blue were excised, in-gel trypsinated and the tryptic digest characterised using reverse phase nanoflow-liquid chromatography coupled to time-of-flight mass spectrometer. Spectral matching of peptides was done using Progenesis Qi for proteomics searching against the P. falciparum database.

Results: Several P falciparum proteins were identified, 60% of the identified proteins were shown to have transmembrane regions. At least 20% of the identified proteins were variants of the key antigenic PfEMP1 protein. Each identified PfEMP1 protein was found to have at least 10 unique peptides covering both the conserved and variable regions of the molecule.

Conclusion: In this study mass spectrometry based proteomics approach was to characterise trophozoite proteome. This approach will be used for further characterisation of PFEMP1 proteins including truncation analysis and to confirm known molecule sequences using targeted proteomics.
THE GRAND CANNABIS DEBATE: STIMULATING GRADUATE ATTRIBUTE DEVELOPMENT VIA ASYNCHRONOUS DISCUSSIONS

**Introduction:** Higher education institutions wish to instil graduates with attributes needed to function in the workplace, such as critical thinking, research-mindedness and communication. However, traditional didactic andragogy is often critiqued as inadequate to promote such attributes. The study implemented an innovative asynchronous, team-based, peer-reviewed debating assignment in a third-year undergraduate pharmacology module to stimulate attribute development, of which preliminary feedback will be presented.

**Methods:** Anonymous feedback was obtained from students during 2017 (N = 120) and 2018 (N = 98) via an online mixed-methods survey. Questions probed the relevance of the assignment to critical thinking, research-mindedness and feedback. Qualitative data was analysed using Atlas.ti v8.0.

**Results:** Quantitative and qualitative data highlight that most students enjoyed the assignment (~67%), finding it challenging (~87%) and beneficial to research skills (~80%), critical thinking (~84%) and feedback (~81%). Contributing factors to enjoyment included the relevance and controversial nature of the topic, as well as the assignment’s perceived novelty. Critical thinking was evident as students needed to synthesise opinions and arguments from contradictory literature or viewpoints of the opposing team. Team work was beneficial or detrimental depending on peer-interaction, however, discussion and learning was achieved through it. Students enjoyed peer-feedback, though unprofessional instances were referenced. Some students opined that the assignment was their first real research exposure, which excited them. Negative factors included mixed opinions about recording their debate, difficulty in obtaining supportive literature, and some felt more guidance was needed. Recommendations were to continue with the assignment, alter its weighting, allow more time and to decrease the size of teams.

**Conclusion:** The Grand Cannabis Debate promoted the development of graduate attributes through cooperative learning using an enjoyable real-world relevant topic, which will benefit them in their careers. Although the general structure functions well, further refinement is needed to streamline achievement of high quality learning.
Abstract Detail

FREQUENCY OF INTENTIONAL AND ACCIDENTAL DRUG OVERDOSE AT A PRIVATE EMERGENCY DEPARTMENT IN GAUTENG

Introduction: There is sparse data on the frequency and nature of overdose events seen at emergency units in South Africa. This study proposed to add to the knowledge of the profile of patients presenting with accidental or intentional overdose involving any drug at one emergency unit affiliated with a private hospital in the east of Pretoria (Gauteng).

Methods: A retrospective, cross-sectional review of records for patients seen at the emergency unit was performed for the period of one year, between October 2016 and September 2017. The date, day of the week, age and gender of patients, the nature (intentional/accidental or medication/chemical/recreational) and severity (using the World Health Organization’s Poison Severity Score) of the overdose, the drugs used in overdose and the outcome in terms of admission were recorded. Descriptive statistics were compiled comparing these characteristics.

Results: Between October 2016 and September 2017 1.41% of patients seen at the emergency unit were due to an overdose of some kind. Accidental overdose accounted for 22.22% of all overdoses, with a near-equal gender distribution and a median age of 4 years. Female patients accounted for 68.86% of the 167 patients who presented with intentional overdose (excluding alcohol-only ingestion). Male patients accounted for the majority (59.1%) of intentional recreational drug ingestions (including alcohol-only ingestion). The median age for intentional overdose was 29 years. Alcohol intoxication in isolation, accounted for 31.39% of overdoses (or 0.44% of all patients seen in the emergency unit that year). Gastric decontamination was applied in 17.5% of overdose patients and considered appropriate in terms of method and timing for 71.43% of these instances. The vast majority of events were mild in nature, with 76.67% of overdoses presenting either with mild or no symptoms. The drugs most commonly implicated were ethanol (45.56%), anxiolytics (19.44%), analgesics (18.89%) and recreational drugs excluding ethanol (14.4%). A large percentage of patients were admitted, 41.67% overall and more than half of the children.

The use of alcohol in overdose was prominent in this study. These patients presented mainly with injuries or brought in with acute behavioural abnormalities. In other respects the results resemble that of previous South African studies.
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Abstract Detail

PREDISPOSING FACTORS FOR INJURY: A STUDY ON SOUTH AFRICAN ELITE MALE YOUTH FOOTBALL PLAYERS

**Background:** Research in South African adult professional football demonstrates that our injury incidence landscape differs to European professional football. The eccentric hamstring strength and functional ankle stability (FAI) status of elite male youth footballers in South Africa is not yet known.

**Purpose:** This study aims to determine the eccentric hamstring strength and prevalence of FAI, and how they may correlate to injury incidence over one season in a South Africa youth football academy.

**Methods:** Sixty-three male youth footballers, ages 14 to 19 years selected for the 2017 squad of an elite South African academy are included. Preseason baseline testing was conducted to establish baseline demographics, eccentric hamstring strength and FAI. Injuries sustained in the 2017 season were recorded using the FIFA F-MARC ‘Injury Report Form’.

**Results:** All participants present with at least one of the components of FAI. The mean eccentric hamstring strength was 328.5N. Overall injury incidence was 32.4 injuries per 1 000 exposure-hours. Training injury incidence was 28.4 injuries per 1 000 exposure-hours and 39.6 per 1 000 exposure-hours for matches. The Under15’s recorded the weakest eccentric hamstring strength and best objective/physical FAI results. The Under17’s recorded the strongest eccentric hamstring strength and ‘self-reported’ FAI results. Player position results showed the Midfielders recorded the strongest eccentric hamstring strength, with Goalkeepers recording the best objective/physical FAI results. Defenders had the weakest eccentric hamstring strength and the worst objective/physical FAI results.

**Conclusions:** All participants present with at least one of the components of FAI. A strong positive correlation between objective/physical FAI and injury incidence was calculated. When performing preseason testing on youth footballers, assessments should be analysed in terms of both age group and player position to effectively identify at-risk players.

**Study Implications:** This study is an opportunity to develop a preseason assessment protocol that is objective and reliable in detecting and preventing potential injury in youth footballers. The assessment protocol provides an economically viable method of health promotion and injury prevention for youth footballing communities in Africa, who are without access to equipped testing facilities or financial support.
Abstract Detail

A CLINICAL COMPARISON BETWEEN THE LOOP-DESIGN FIBRE-REINFORCED COMPOSITE AND BAND-AND-LOOP SPACE MAINTAINERS.

Objectives: The fibre-reinforced composite space maintainer (FRCSM) has been suggested as an alternative to the band-and-loop space maintainer (BLSM). The objectives of this study were to compare the in vivo failures, the reasons for failure and plaque accumulation of a novel loop-design FRCSM with the BLSM.

Methods: A total of 20 space maintainers were placed in cases with premature loss of a first primary molar 10 BLSMs and 10 loop-design FRCSMs. For each BLSM, an orthodontic band was fitted around the anchor tooth and an alginate impression was taken. This impression, with the band in position, was sent to the dental laboratory for fabrication of the device. At a second appointment, the BLSM was fitted and cemented with glass ionomer cement. For each FRCSM, a unidirectional glass fibre bundle was positioned in a continuous loop extending from the buccal to the lingual surface of the anchor tooth. The fibre was secured in position with a flowable composite. Monthly follow-up appointments were scheduled over a six-month period.

Results: There was no statistically significant difference between the failure rates of the two types of space maintainers (p=0.53). Of the failed FRCSMs, 30% could be repaired chairside whilst all the failed BLSMs had to be refabricated in the laboratory. The main reason for BLSM failure was bending of the wire and subsequent impingement on the soft tissue. The main reasons for FRCSM failure were debonding at the enamel-composite interface and fracture of the loop. Both types exhibited an increase in plaque accumulation.

Conclusion: The FRCSM shows promise, with the advantage of repairability. However, it cannot yet be recommended as a reliable alternative to the BLSM. Further research is recommended on the effectiveness of the loop-design FRCSM when bonded to permanent teeth, and whether the longevity would improve with added mechanical retention when bonding the device to deciduous teeth.
Faculty Day 2019 Abstract 2019053

Oral in the Basic Category

Presenting Author: HC Steel (Immunology)

Authors: HC Steel (Immunology)

Abstract Detail

NOVEL ANTI-INFLAMMATORY ACTIVITY OF ART VIA ATTENUATION OF PLATELET-DERIVED SCD40L AND SCD62P.

Introduction: Human immunodeficiency virus-1 (HIV-1) infection is associated with an increased prevalence of non-communicable diseases (NICDs), including cardiovascular (CV) and neurodegenerative disorders, which may progress, even in the face of virally-suppressive anti-retroviral therapy (ART). With respect to etiology, HIV-1.

Methods: Mediated platelet activation, specifically the release of the α-granule-derived, pro-inflammatory mediators, soluble CD40 ligand (sCD40L), soluble CD62P-selectin (sCD62P) and platelet-derived growth factor (PDGF-BB), has been linked to the immunopathogenesis of these NICDs. However, supporting evidence in this context is somewhat limited and occasionally conflicting, especially with respect to the role of ART, as well as the possible role of tobacco usage, which is common among those infected with HIV-1. Given the uncertainty surrounding this important issue, the current study was undertaken with the primary objectives of identifying the effects of ART and tobacco usage individually and in combination on the plasma concentrations of sCD40L, sCD62P and PDGF-BB in ART-naïve and virally-suppressed HIV-1-infected persons.

Results: The results obtained from this study have demonstrated a novel anti-inflammatory, potentially cardio-protective activity of ART mediated via attenuation of the plasma concentrations of the potent, predominantly platelet-derived, pro-inflammatory factors, sCD40L and sCD62P. The observed lack of effect of ART on plasma levels of PDGF-BB is possibly indicative of an ongoing, anti-inflammatory, neuro-protective effect of this growth factor, which must, however, be viewed in the context of pro-atherogenic potential.
TARGETING TUMOUR SURVIVAL AND NEOVASCULARIZATION IN AN IN VITRO BONE METASTASIS MODEL USING A NOVEL 2-METHOXYESTRADIOL ANALOGUE

Introduction: Prostate- and breast cancer frequently metastasize to bone forming osteoblastic- and osteolytic lesions respectively. Targeting the distant tumour and its microenvironment whilst preserving bone density is important in improving patient outcomes. 2-Ethyl-3-O-sulphamoyl-estra-1,3,5(10)16-tetraene (ESE-16) is a novel in silico-designed 2-methoxyestradiol (2ME2) analogue intended to improve the efficacy of the parent compound. The potential radiosensitizing effects of ESE-16 in an in vitro bone metastasis model comprised of representative components namely prostate (DU 145) and breast (MDA-MB-231) cancer cells, osteoblastic (MC3T3-E1) and osteoclastic (RAW 264.7) bone cells and human umbilical vein endothelial cells (HUVECs) were investigated in this study.

Methods: Cytotoxicity studies were performed and the lowest ESE-16 and radiation doses to induce mitotic arrest and apoptosis were determined. DU 145- and MDA-MB-231 cells were pre-sensitized with 0.235 µM- and 0.176 µM ESE-16 respectively for 24 hours followed by a single dose of 4 Gy radiation. Non-tumourigenic cell lines were exposed to the same doses as DU 145 cells. Termination proceeded 2-, 24- or 48 hours after radiation. Experiments on the cancer cell-component included investigation of mitosis, cell death signalling, DNA damage and expression of metastatic signalling proteins. Tartrate-resistant acid phosphatase activity and actin ring formation were investigated in osteoclasts. Cell cycle progression, reactive oxygen species generation, cell invasion and migration, cytoskeletal morphology and expression of angiogenic proteins were investigated in HUVECs.

Results: Radiosensitizing effects were evident in cancer- and endothelial cells whilst bone cells were spared. Increased mitotic indices with metaphase accumulation, DNA damage with retarded repair and reduced metastatic signalling were observed in cancer cells. RAW 264.7 macrophages retained their ability to differentiate into osteoclasts. Anti-angiogenic effects were observed in HUVECs, including decreased cell invasion and migration, disrupted cytoskeletal morphology and reduced angiogenic signalling.

Conclusion: Through preferentially inducing tumour cell death and potentially inhibiting neovascularization whilst preserving bone integrity, this low-dose combination treatment strategy shows promise in the treatment of bone metastases. 3-Dimensional in vitro- and murine in vivo models are envisaged in future studies.

Keywords: cancer, bone metastasis, angiogenesis, ESE-16, radiosensitization, apoptosis, DNA damage, cell invasion and migration, cytoskeleton
Abstract Detail

64Cu-GluCAB: AN IN VIVO ALBUMIN-BINDING RADIOPHARMACEUTICAL FOR TUMOUR TARGETING AND CANCER DIAGNOSIS

**Introduction:** A new radiopharmaceutical, 64Cu-GluCAB (1), developed by Necsa for targeted cancer diagnosis comprises a copper-64 radiolabeled, glucose-functionalised macrocycle with a maleimide moiety that binds in vivo to circulating albumin(2). Binding to albumin increases the compounds biological half-life and allows for tumour targeting through the EPR effect (3). The aim of this investigation was therefore to determine the in vivo binding of two slightly different macrocyclic 64Cu-GluCAB precursors (64Cu-GluCAB-1 and 64Cu-GluCAB-2) to albumin and to determine their tumour targeting capabilities through microPET/CT imaging.

**Methods:** The two GluCAB precursor compounds with a maleimide moiety and a control compound without a maleimide were radiolabeled with 64Cu in an aqueous buffer. The percentage labeling efficiency was determined by radio-HPLC to be around 97%. The compounds were administered intravenously to E0771 breast cancer allograft C57/BL6 mice (n=5) and imaged using microPET/CT at 1, 2, 6 and 24 h post-injection (p.i). The final biodistribution of the compounds was determined ex vivo after 24h.

**Results:** High levels of radioactivity were detected in the liver, intestines and bladder indicating hepatobiliary and renal excretion. After 24 h, the control compound was completely excreted while the 64Cu-GluCAB precursors showed high levels of retained radioactivity in the heart from 1-6 p.i and after 24h a high %ID/g remained in the plasma. No tumour uptake of 64Cu-GluCAB-1 was visible while the uptake of 64Cu-GluCAB-2 in the E0771 tumours was clearly visible from 1-6 p.i and after 24h the radioactivity in the tumour was approx. 3 x higher than in the control group.

**Conclusion:** Both 64Cu-GluCAB precursors bind to circulating albumin as indicated by higher radioactivity presenting in the plasma. However, the tumour uptake of 64Cu-GluCAB-2 is much more significant than 64Cu-GluCAB-1 as seen from the microPET/CT images and biodistribution data. 64Cu-GluCAB-2 therefore shows potential as a new cancer diagnostic agent.
DENTAL AND ORAL HYGIENE STUDENTS’ SELF-PERCEIVED COMPETENCY, ACCESS AND USAGE OF THE INTERNET FOR STUDY PURPOSES

Introduction: A teacher’s role is to impart knowledge using the most effective teaching strategies for each purpose. More lecturers are now using the Internet (Int) as a medium for communication. In addition to its social uses it also provides quick and easy access to information for education and research purposes, and a channel for communication and information exchange. The presumption is that all students have unrestricted and equal access to the Int, however there has been no formal investigation into this.

Aims: This project aimed to investigate students’ perceptions about their own competence using the Int, their access to it, and problems they experience with usage.

Materials and method: An anonymous, structured questionnaire was given to all dental and oral hygiene students from the first to the fifth year of study. It consisted of four parts related to demographics, self-perceived internet competency, requirement to use Int for learning and study purposes, and their use of and preferences for learning.

Results: Results were analysed to determine the statistical association of demographic information to information obtained from the remainder of the questionnaire as well as to relate the answers of different questions to each other. Highest scores were achieved for general use of search engines, downloading pictures, learning from printed material, networking, using messaging applications, identification and downloading of relevant videos. The lowest confidence ratings were for reading scientific papers related to lecture material and the conducting of self-directed learning on recent information and the latest developments received.

Conclusions: Educators need to assess if their Int usage for teaching purposes is being accessed by students and whether this medium is achieving the desired outcomes.
EVALUATION OF SPECIALIST OUT-PATIENT CLINIC VISITS BY CHRONIC DISEASE PATIENTS ATTENDING A TERTIARY HOSPITAL IN THE GREATER TSHWANE METROPOLITAN AREA

**Background:** Tertiary hospitals have multiple specialist out-patient clinics which are mostly attended by patients suffering from various co-morbid diseases. This results in individuals attending more than one clinic per month, since dedicated clinic days are seldom on the same day. As patients attend discrete clinics, they have separate encounters with numerous prescribers, increasing the potential for irrational drug use. In addition multiple clinic visits have a negative socio-economic impact on health care users from poorer communities where financial resources are limited due to transport expenses and days of work missed. The aim of this study was to determine the extent of multiple specialist out-patient clinic visits by a single patient in a period of four months at the Steve Biko Academic Hospital (SBAH).

**Methodology:** A retrospective descriptive cross-sectional study was carried out to determine the extent of patients with co-morbid diseases having to attend two or more specialist clinics at SBAH between 1 February 2018 and 31 May 2018. Hospital records of patients attending the most frequently visited clinics as reported by the SBAH Pharmacy and Therapeutics committee (PTC) were evaluated. These clinics included out-patient departments of diabetes, haematology, internal medicine, neurology, oncology and psychiatry.

**Results:** A total of 106 patients were found to be attending two or more clinics during the study period. The clinic involvement was found to be diabetes 26 (12.21%), haematology 6 (2.82%), internal medicine 58 (27.23%), neurology 61 (28.64%), oncology 23 (10.80%) and psychiatry 39 (18.31%).

**Conclusion:** The results from this study is supported by findings from similar studies at different institutions. Multiple clinic visits are more prevalent in the medical disciplines, often prescribing drugs from the same class. Clinical implications from these frequent and separate encounters may result in irrational prescribing, adverse events, drug interactions and polypharmacy.
IDENTIFICATION OF INACTIVATING G PROTEIN-COUPLED RECEPTOR MUTATIONS IN HYPOGONADAL PATIENTS

Introduction: G protein-coupled receptors (GPCRs) constitute the largest cell surface protein family involved in signal transduction. Activation of these receptors initiates signalling via an array of intracellular pathways. Defective GPCR signalling in the hypothalamic-pituitary-gonadal (HPG) axis underlies various pathological conditions such as congenital hypogonadotropic hypogonadism (CHH) which is characterized by pubertal failure and infertility. Several clinical and hormonal markers have been described for CHH, but many cases remain of unknown aetiology, because the genetic network underlying the regulation of the HPG-axis has yet to be fully described. To this end, this project aims to identify potential inactivating GPCR mutations found in patients suffering from CHH that are causative of the phenotype. The findings of this project will contribute to the development of a more comprehensive diagnostic platform for CHH. Identification of novel GPCRs in hypogonadal patients will also reveal new regulatory inputs to the HPG-axis that could be targeted by therapeutics as a treatment for reproductive disorders.

Methods: The exome sequence data of CHH patients (>300) were compared to the genomic sequence data of reproductively normal individuals (n=191), to identify rare GPCR sequence variants. Seven missense mutations in three different GPCRs, namely, purinergic receptors 4 and 14 (P2RY4 and P2RY14), luteinizing hormone receptor (LHR/LHCGR), and leucine-rich repeat containing G protein-coupled receptor 5 (LGR5) were selected for investigation based on their genotype in patients suffering from CHH. Expression vectors encoding these point mutations were constructed, sequence verified, and cell surface and total expression levels compared to wild-type receptors via Western Blot and Enzyme Linked Immunosorbent Assay (ELISA).

Results: Receptor ELISA assays showed varied cell surface expression with some of the mutant receptors, indicating that these mutations might affect nascent receptor folding and/or trafficking to the cell surface.

Conclusion: Mutant receptors were differentially retained. The functionality of mutant receptors should be further examined, as missense mutations may affect receptor-mediated signalling and binding affinity.
Abstract Detail

Investigation into the potential biased signalling of the neurokinin 3 receptor.

**Introduction:** G protein-coupled receptors (GPCRs) are responsible for majority of the signalling in the neuroendocrine system which makes them valuable targets for drug discovery and design. A member of this superfamily of receptors is the Neurokinin 3 receptor (NK-3R). NK3R is a tachykinin receptor that signals in response to its cognate ligand, neurokinin b (NKB), but is also activated at lower potency by other tachykinin peptides. NK3R and NKB are widely expressed in the central nervous system and in the periphery. A phenomenon in GPCR biology is the concept of biased signalling in which the intracellular signalling response can differ depending on the ligand used to stimulate the receptor, or the cellular context in which the receptor is expressed. The discovery and design of biased agonists and antagonists provides more effective therapeutics, with fewer side effects, as only the desired signalling pathway is activated in response to stimulation. The aim of this study is to determine if there is biased signalling at the NK3R.

**Methods:** Ligand bias was assessed by stimulating NK3R with a panel of selected endogenous and synthetic NK3R agonists and antagonists, whilst tissue bias was tested by stimulating NK3R in three different cell lines.

**Results and Discussion:** An inositol phosphate accumulation assay showed that four of the six tested ligands can activate the receptor, with differing potencies of activation. Western blots were performed to look at the activation of downstream kinases. It was observed that NK3R has a biphasic ERK phosphorylation pattern in response to NKB, and that M8, an NK-3R antagonist only partially inhibits this signalling pathway, implying that M8 may be a biased antagonist. RT-PCR was performed to determine the endogenous levels of all three tachykinin receptors within the selected cell lines and tissue bias experiments are currently in progress.
Detection of macrolide resistance in Mycoplasma genitalium positive samples obtained from a private diagnostic laboratory in Pretoria, South Africa

Introduction: Mycoplasma genitalium is one of the causative agents of acute and chronic non-gonococcal urethritis (NGU), primarily in patients without Chlamydia trachomatis infection. It is also associated with female cervicitis and endometritis. Macrolides such as azithromycin have been used as first line treatment for M. genitalium in South Africa and drug resistance has been reported. The resistance of M. genitalium to macrolides is primarily associated with mutations in domain V of the 23S rRNA, mutations are frequently observed at position A2058 and A2059. The aim of this study was to identify macrolide resistance of M. genitalium samples obtained from a private laboratory in Pretoria, South Africa.

Methods: Positive M. genitalium DNA samples were obtained from a diagnostic laboratory providing services to the private healthcare sector. These samples were analysed using an automated molecular system, which tested for Chlamydia trachomatis, M. genitalium, Neisseria gonorrhoeae, Trichomonas vaginalis, Ureaplasma parvum and U. urealyticum. A fluorescence resonance energy transfer (FRET) real-time PCR assay coupled with melting curve analysis was used to determine if the M. genitalium DNA samples harboured macrolide resistance.

Results and discussion: Preliminary data analysis of selected positive DNA samples showed that 80% of the samples had a Tm in the same range as the wild type (Tm=69.09), 20% of the samples had a lower Tm (Tm=63.36 and 64.76), indicating a change in the base pairing of DNA and possible mutations in the 23S rRNA. Fifty percent of the samples had a co-infection; U. urealyticum was the most frequently detected co-infection followed by M. hominis, U. parvum and C. trachomatis respectively. Sanger sequencing will be used to confirm the PCR identified resistance.

Conclusion: Macrolides are the first line drugs of choice for the treatment of infections with M. genitalium, therefore macrolide resistance is a major concern as it may lead to treatment failure and the spread of resistant strains in the community. There is a need for the use of molecular diagnostics for sexually transmitted diseases and a change in the current syndromic South African treatment guidelines may have to be considered.

Keywords: Mycoplasma genitalium, 23S rRNA, Macrolide, A2058, A2059
MOLECULAR DETECTION OF EXTRAINTESTINAL PATHOGENIC ESCHERICHIA COLI ST131 OBTAINED FROM HOSPITALS SUBCLONES FROM HOSPITALS IN THE TSHWANE REGION

Background: Extraintestinal pathogenic Escherichia coli (ExPEC) can cause life-threatening infections, such as neonatal meningitis, septicaemia and is a common cause of urinary tract infections worldwide. The pandemic clone, sequence type (ST)131 ExPEC is prevalent in many areas of the world and is frequently associated with increased morbidity and mortality. Amongst ExPEC ST131, the H30 and H30-Rx subclones are of importance due to multiple antibiotic resistance mechanisms and its ability to produce distinct virulence factors. The H30 and the H30-Rx subclones are linked to fluoroquinolone and cephalosporins resistance. Limited information is available on the prevalence of ST131 ExPEC in South Africa. The aim of this study was to determine the prevalence of the pandemic ST131 clone in the Tshwane region, South Africa.

Methods: Deoxyribonucleic acid was extracted from 300 ExPEC isolates (non-duplicates) obtained from urine samples and blood cultures originating from hospitals served by the Tshwane Academic Division microbiology laboratory. A multiplex polymerase chain reaction assay was performed on these isolates followed by gel electrophoresis to identify if the ExPEC isolates were ST131 clones.

Results: Preliminary results indicate that 36% of the analysed isolates belonged to the ST131 clone. Ninety-four percent of isolates were from urine samples and six percent were from blood cultures.

Discussion and conclusion: The spread of antimicrobial resistance in E. coli is driven by successful clones like ST131 ExPEC; a clone known to be multidrug resistant and virulent. Understanding the molecular epidemiology of the ExPEC in our clinical setting can enhance treatment and prevention strategies.

KEY WORDS: ST131, ExPEC
Presenting Author: CR De Beer (UP)

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Abstract Detail

MUSCLE STRENGTH AND ENDURANCE AS POTENTIAL PREDICTORS OF SUCCESSFUL EXTUBATION IN MECHANICALLY VENTILATED PATIENTS: A PILOT STUDY

Background: Since the inception of mechanical ventilators, it has been acknowledged that successful weaning is not always predictable. Due to the complexity of successful extubation, no single test in isolation has demonstrated to accurately predict the extubation outcome. Earlier studies have shown an association between peripheral and respiratory muscle weakness. To our knowledge no study has explored the association between muscle strength (deltoid, sternocleidomastoid and trapezius), endurance and the readiness for extubation.

Aim: To ascertain whether muscle strength and endurance may be used as possible predictors of successful extubation in mechanically ventilated patients.

Method: Thirty patients were recruited in a prospective study conducted at a tertiary academic hospital. Deltoid, sternocleidomastoid and trapezius muscle strength were evaluated with the Oxford grading scale. Respiratory muscle strength was adjudged with the maximum inspiratory and expiratory pressures. Muscle endurance was determined by subjecting the patients to ride the MOTOmed® letto2 cycle ergometer for five minutes with the upper limbs. Ethical approval was obtained from the Research Ethics committee, University of Pretoria.

Results: Patients ventilated for more than three days with grade three muscle strength of deltoid and sternocleidomastoid muscles respectively had a 100% chance of successful extubation (p = 0.038). Trapezius muscle strength (p = 0.366) was not associated with successful extubation. Patients unable to ride the MOTOmed® letto2 cycle ergometer actively with the upper limbs for 4.5 minutes and covering a distance of 0.5 km demonstrated a linear trend (p = 0.006) to fail extubation.

Conclusion: Muscle strength and endurance testing may contribute to the array of predictors of successful extubation. Successful extubation may decrease the ICU and hospital length of stay, total cost involved and it will increase the patient’s functional ability and quality of life post hospital discharge.
DISCOVERY OF A NEW RABIES-RELATED LYSSAVIRUS IN SOUTH AFRICA

**Introduction:** Lyssaviruses are bullet shaped negative-sense RNA viruses, that are all able to cause the fatal encephalitic disease known as rabies. The genus currently consists of 16 formally recognised viral species with two tentative species awaiting classification. The prototype virus for the Lyssavirus genus is the well-known rabies virus (RABV), while all other species in the genus are classified as rabies-related viruses. In South Africa specifically, RABV, Lagos bat virus (LBV), Duvenhage virus (DUVV), and Mokola virus (MOKV) have all been isolated with RABV and DUVV causing human deaths. The overall public health burden of lyssaviruses is often underestimated due to several of these viruses occurring in developing countries where surveillance and diagnosis are limited to RABV. Active surveillance on rabies-related lyssaviruses is either very sporadic or non-existing, providing an inaccurate overall representation of the actual impact.

**Aim:** As bats are considered the reservoir host for all but two of the classified lyssavirus species, we aimed to conduct viral nucleic acid surveillance for lyssaviruses in different insectivorous bat species in South Africa.

**Methods:** These samples were collected during routine field surveillance from bats that were found dead, appeared to be displaying signs of disease or taken as vouchers specimens (i.e. healthy bats). Viral nucleic acid surveillance for lyssaviruses was performed using a quantitative real-time polymerase chain reaction on brain material from 324 insectivorous bats.

**Results:** A brain of the Natal long-fingered bat (Miniopterus natalensis) tested positive and this was further characterized by additional conventional PCR of the nucleoprotein gene, DNA sequencing and phylogenetic analysis. The nucleoprotein gene sequence grouped closest to West Caucasian bat virus (WCBV), isolated in Eastern Europe. However, it demonstrated more than 20% nucleotide divergence, constituting a potential new lyssavirus species. The identification of a putative new lyssavirus highlights the importance of routine lyssavirus surveillance to understand the epidemiology. Further investigation is required to determine the possible reservoir species since the Natal long-fingered bats are known to co-roost with different bat species in caves. Potential spillover to humans and other animals are unknown but people often enter these bat roosts, caves, for traditional purposes. Since the virus is very diverse, commercial rabies vaccines based on a RABV backbone will not provide protection and contact with rabid bats should be avoided.
INFLUENCE OF VISUAL SKILLS TRAINING TECHNIQUES ON THE COGNITIVE SKILLS OF SCHOOL CHILDREN.

Introduction: Vision is an essential sense and reading and writing during formal studies require a basic level of visual skills. Training of visual skills to students may lead to visual skill-, motor- and cognitive performance enhancement. Cognitive development in children and young teens is proposed to be one of the most important factors to focus on in child development. The visual system uses ‘hardware’-skills (physical, mechanical properties) and the more trainable ‘software’-skills (perceptual, cognitive abilities) for information processing.

The efficiency of a visual skills training programmes will be tested in school children (aged 11-18 years), during a 12-week training period. During training a vision laboratory executed battery of repeated visual skills will be used which comprised of ‘hardware’ and ‘software’ skills, and include: visual acuity, focusing, tracking, vergence, sequencing, eye-hand coordination and visualisation.

Materials and Methods: A pre-test, post-test experimental design will be used in order to test the ‘hardware’ and ‘software’ skills of the school children. Pre-intervention visual skills assessment will be done to determine a baseline. Brain performance and the six drivers influencing brain performance will also be assessed. Interventions will then start after the pre-test for 12 weeks. After the intervention period a post-test has to be done to see whether the interventions improved the cognitive skills and brain performance. During each training session school children will repeat all the visual skill tests used in the pre-test/post-test evaluations.

Potential Results: The project output will be to potentially demonstrate whether visual skills training will positively impact school children’s overall improvement in the school environment and their school marks. We predict that the visuals skills training will improve on their school marks after the intervention sessions.

Potential Discussion and Conclusion: Potentially we can conclude that visual skills training will improve children’s cognitive skills and school performance.
MOLECULAR CHARACTERISTICS OF HOSPITAL-ASSOCIATED KLEBSIELLA PNEUMONIAE INFECTIONS IN TSHWANE, GAUTENG

Background: Klebsiella pneumoniae infections place a burden on healthcare settings. Acquisition of virulence factors via plasmid mediated transfer and production of extended spectrum beta-lactamases (ESBLs) makes antibiotic therapy of these infections difficult. Extended spectrum beta-lactamase producing K. pneumoniae are often part of the clonal group (CG) 307 consisting of high-risk clones including sequence type (ST) 307. Patients at high risk of obtaining hospital-acquired infections include neonatal and paediatric patients, especially those in intensive care units.

Methods: Non-repetitive K. pneumoniae isolates collected from tertiary hospitals around the Tshwane area were identified as ESBL producers using the Vitek® 2 automated system. The isolates were confirmed as ESBL producers using a phenotypic combined disk diffusion test. The isolates were also screened for three selected beta-lactamase genes using a multiplex polymerase chain reaction (M-PCR) assay. Pulsed-field gel electrophoresis (PFGE) was performed on representative isolates from neonatal and paediatric patients and wards and a dendrogram was constructed to assess genetic relatedness. A representative isolate of the most common cluster in the dendrogram was analysed using multilocus sequence typing.

Results: One hundred and four ESBL producing K. pneumoniae isolates were collected. Ninety-seven isolates were positive for ESBL production using the phenotypic disk diffusion test. Two isolates displayed in vitro heteroresistance. The most prevalent beta-lactamase gene amongst the isolates was sulfhydryl variable (SHV) enzymes (101/104), followed by cefotaximase-Munich (CTX-M) (99/104) and Temoneira (TEM) (96/104). Thirty isolates originated from neonatal-paediatric wards. Analysis of the dendrogram showed two major pulsortypes. A representative isolate of the largest pulsortype (9/30) was identified as a novel double locus variant of the high-risk ST307 clone. This novel sequence type was spread across four different hospitals in the Tshwane area and across many different neonatal and paediatric wards.

Conclusion: The prevalence of CG307 ESBL producing K. pneumoniae circulating in many paediatric and neonatal hospital wards is a cause for concern. Effective methods for continuous monitoring of the dissemination of high-risk clones and ESBL production in K. pneumoniae in Tshwane hospitals is critical in preventing dissemination of these clones as well as antimicrobial resistance genes.
Presenting Author: V Mandiwana (North West University and CSIR)

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Abstract Detail

IN VIVO EVALUATION OF ACUTE INTRAVENOUS TOXICITY OF A MICROEMULSION

**Introduction:** Microemulsions (MEs) are reported to improve the efficacy of a drug, minimise side effects and toxicity of the encapsulated compound. MEs are hypothesized to aid in making the encapsulated compound, which has been incorporated within the ME, safe in vivo due to reduced side effects and toxicity to the kidneys and other non-target organs.

**Aim:** This study aimed to contribute to knowledge on the toxicity of the ME delivery system and ME containing [68Ga]Ga-PSMA-11 with specific reference to intravenous administration.

**Methods:** Two treatment groups of ME and [68Ga]Ga-PSMA-11-ME were synthesized by homogenisation under high temperature and administered intravenously in healthy male BALB/c mice (Mandiwana et al., 2019). The mice were monitored and evaluated for 14 days for clinical signs, mortality, body weights, and gross necropsy findings. Mice were euthanized after a 14-day period followed by isolation of selected organs and blood samples. Blood testing included the assessment of alanine transaminase, aspartate transaminase, total protein, urea, creatinine and serum lipid levels. Animals showed no abnormal changes concerning body weight, coat condition, respiration, mobility and behaviour of any of the mice during the study. The survival rate was 10/10 mice (100%) after 14 days. None of the treatment groups showed any treatment related toxicity to either ME or [68Ga]Ga-PSMA-11-ME. Blood testing showed that liver and kidney function was in the normal range in both mice groups.

**Results:** This treatment regimen of different ME and [68Ga]Ga-PSMA-11-ME concentration caused no acute toxicity to small rodents but further investigations are required in larger animal models to justify the safety of [68Ga]Ga-PSMA-11-ME injections into humans.

**Keywords:** [68Ga]Ga-PSMA-11-ME, In vivo, Microemulsion, Toxicity
Presenting Author: KM Rapholo (Public Health Medicine)

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Abstract Detail

ADHERENCE OF TERTIARY HOSPITAL DOCTORS IN SOUTH AFRICA TO THE WHO “MY FIVE MOMENTS OF HAND WASHING

Background: Hospital acquired infections (HAIs) are of major concern worldwide. Hand hygiene has been proven to be the most effective measure against HAIs. Improper hand hygiene practices of health care workers (HCWs) account for up to 40% of HAIs. Compliance amongst HCWs has been reported to be as low as 40% globally.

Objectives: To determine the hand hygiene practices of doctors in a provincial tertiary hospital using the amended World Health Organisation’s (WHO) "My five moments of hand washing" concept.

Methodology: This cross sectional, descriptive study was carried out amongst doctors in a provincial tertiary hospital in Gauteng, South Africa. Data was collected through observations using an amended WHO observation form, captured using Epidata 3.1 and analysed using Stata 14. Frequency tables, proportions and percentages were used to illustrate the results.

Preliminary results: 107 doctors from six departments namely: paediatrics, internal medicine, surgery, family medicine, orthopaedics, obstetrics and gynaecology were observed. The participants included 54.2% (n=58) females and 50.5% (n=54) were aged between 20-29 years. The total number of hand hygiene opportunities was 994; the overall compliance of hand hygiene was 14.4% (n=143) and out of these who used gloves, was 10.5% (15 of 143). The medical specialists in training (registrars) had the highest compliance of hand hygiene with 19.3% (27 of 140 opportunities). Family Medicine is the department with the highest compliance, 40.9% (18 of 44 opportunities). The compliance was highest in doctors who saw one patient in the period of observation with 34.9% (44 of 126 opportunities). The majority of the doctors (65.4%) (n=70) worked in departments with soap, hand rub and towel available.

Conclusion: The study revealed that there is a generally very low overall hand hygiene compliance for doctors. The low compliance is despite majority of doctors working in departments with hand hygiene products. The results show that less patients and being a registrar yields higher compliance to hand hygiene. There is a need for a stringent policy for hand hygiene as the low overall compliance could lead to HAIs.

Key words: Hospital acquired infections, hand hygiene, handwashing, hand rubbing, compliance
Presenting Author: RNP Ramphisa (UP)

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Abstract Detail

SCHOOLS AS SITES FOR SOCIAL CHANGE

**Introduction:** The number of children being malnourished, overweight and obese is constantly rising; and physical inactivity is a threat now more than it has ever been. Consequently, education about physical fitness is a necessity and the implementation of ways to bring awareness about physical fitness may be a way to bring about a change in the communities. The youth make up most of the communities and to have a radical change in a community, the youth needs to be involved. The aim of the study is to use schools as vehicles to facilitate adjusted behavior in communities, using interventions to encourage the youth to lead healthier lives.

**Materials and Methods:** All of the tests will be conducted under the same terms and conditions. The physical fitness assessments will be partitioned into two categories, namely health-related and skill-related. The health-related components of complete physical fitness are cardio-respiratory endurance, muscular strength, muscular endurance, flexibility and body composition. The skill-related components include speed, power, agility, balance, reaction time and coordination.

**Potential Results:** The project output will be to potentially demonstrate whether health related and skill related fitness intervention training does or does not have a significant impact on the physical wellness of the school children. We predict that the health related and skill related fitness will improve after the intervention.

**Potential Discussion and Conclusion:** Potentially we can conclude that health related and skill related fitness intervention training will improve overall performance of learners.
OPTIMISATION OF DECELLULARISATION METHODS FOR THE PRODUCTION OF ACELLULAR DERMAL SCAFFOLDS

Background: Human skin is a complex multi-layered organ, which hosts a variety of cells embedded in a complex extracellular matrix (ECM). Skin injuries may heal by either primary intent, where minimal tissue is lost (lacerations) or by secondary intent where extensive tissue loss must be replaced to aid the healing processes (burn wounds). Acellular dermal scaffolds (ADS) are an alternative treatment to skin transplants in secondary intent wounds. However, the antigenicity of an ADS is highly dependent on the preparation method. In this study the effects of detergent, supercritical carbon dioxide (SCO2) and combined (detergent followed by SCO2) extraction methods to produce ASD products from porcine skin were compared.

Methods: Fresh porcine skin, donated by the University of Witwatersrand Central Animal Service (Ethics number: h010-17(A1)), was cleaned and subjected to extraction via either a detergent method (1% cetylpyridinium chloride and 2% Triton X-100) for 48 h or placed in a SCO2 device for 24 h or prepared using a combined method (detergent method followed by SCO2 method). Scaffold samples produced by each method were fixed in formaldehyde, paraffin wax embedded, sectioned and stained with Haematoxylin/Eosin (H&E) or picrosirius red (PSR) and visualised using light microscopy with and without a polarising filter.

Results: Qualitative analysis using H&E and PSR images indicated that the detergent method removed most cells while retaining the ECM structure. Although the SCO2 method resulted in greater cell removal, the ECM structure became condensed and layered, which may cause complications downstream. The combined method produced an ADS in which the ECM structure was retained, in addition to the majority of cells being removed.

Conclusion: A method was successfully developed to optimally decellularise porcine skin. The method will now be tested in a full thickness porcine wound model to assess its efficacy in wound healing.
SHAPE ANALYSIS OF THE EAR OF SOUTH AFRICAN POPULATIONS USING CONE-BEAM COMPUTED TOMOGRAPHY (CBCT)

Introduction: The ear is a complex structure of soft tissue, yet very little information exists on how the reliable estimation of ear shape, size and prominence is influenced by factors such as sex and ancestry. With the recent advent of using computerised facial approximations in the SAPS, a need for 3D databases on facial characteristics of South African groups is required so as to aid in the automatic rendering of facial approximations, which are considered to be more objective and efficient than manual approximations.

Purpose of the study: The purpose of this study was to assess the influence of shape and ancestry on the shape of the ear among a South African sample using Cone Beam Computed Tomography (CBCT) scans.

Methods: Scans of 61 South Africans between the ages of 18 and 40 years were selected from the Oral and Dental Hospital at the University of Pretoria, South Africa and were imported into MeVisLab 2.7.1 in DICOM format for segmentation and 3D surface mesh generation. Fifteen bilateral capulometric landmarks defining the shape of the pinna, lobule and concha were indicated through manual selection placement on all 3D surfaces. Evaluation and quantification of shape differences attributed to the known factors of sex and ancestry were performed through geometric morphometric analysis.

Results: Significant variation ($p < 0.01$) in the shape of the ear was found between black and white South Africans. The shape of the ear between male and female, however, was not found to be significant in both black and white South Africans. The application of this data will not only aid in the development of the a computerised database for craniofacial reconstruction in South Africa, increasing objectivity and the possibility for standardisation; but will also be applicable in the diagnosis of congenital malformations or trauma to the ear, treatment planning and reconstructive surgery, as well as biometric identification, prosthetics or ergonomic manufacturing of ear products.
Faculty Day 2019 Abstract 2019072

Oral in the Basic Category

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Abstract Detail

A REVIEW OF SUDDEN, UNEXPECTED AND UNEXPLAINED DEATHS IN ADULTS FROM 2012-2018 AT THE PRETORIA MEDICO-LEGAL LABORATORY

Introduction: Sudden unexpected death (SUD) is a major public health concern globally. SUD poses a risk, which could be minimised by having a greater understanding of the underlying diseases processes. In South Africa (SA) SUD is considered to be an unnatural death and requires a full medico-legal investigation. SUD can be as a result of several underlying pathologies of which cardiac causes are most prevalent. There is however a paucity of information pertaining to the incidence and aetiology of sudden unexpected death in adults (SUDA) in the SA population. This study aims to establish a profile of sudden, unexpected and unexplained deaths in adults in Pretoria using standard autopsy procedures.

Methods: Cases of SUDA between the ages of 18 and 45 that met the inclusion criteria were retrospectively reviewed for the period of 2012 - 2018. The number of cases were noted for each year and the epidemiological information as well as circumstances surrounding death, apparent manner of death, primary medical cause of death and results of available ancillary investigations reported.

Results: Approximately 120 cases met the inclusion criteria for each year reviewed, with males constituting approximately 70% of all SUDA cases. Cardiac causes of death accounted for more than 50% of the cases reviewed. The highest number of deaths occurred in the age group of 30-39 years. As the study is ongoing, preliminary results will be presented at Faculty day 2019.

Discussion: The results of this study will assist in creating a profile of SUDA in Pretoria and highlight specific trends regarding not only epidemiological information, but also primary medical causes of death. Further studies are required to establish a profile of SUDA in South Africa and assist with better understanding and investigating these deaths.
CURRICULUM TRANSFORMATION IN DENTISTRY: STUDENT FEEDBACK AND SUGGESTIONS ABOUT THE FIRST TWO YEARS OF STUDY.

**Background:** The joint basic science curriculum with Medicine was discontinued by the School of Dentistry, University of Pretoria in 2013 and a dedicated dental curriculum implemented in 2014.

**Objective:** We aimed to gauge dental students’ perceptions of the first two years of the new split curriculum and compare these to a previous study captured by Postma et al. Consultation with students is essential to ensure continuous improvement in curriculum reform.

**Methods:** We qualitatively analysed narrative essays of second to fourth year students’ experiences of the new first two years of study (2015-2017) using a thematic approach (with percentage distributions). Themes were deductively identified according to the themes of a previous similar study (Postma, et al) and inductively to include new emerging themes. Ethical clearance was granted by the University of Pretoria (Clearance number: 543/2017) and the protocol was approved by ResCom.

**Results:** Positive feedback included: an enjoyable experience (28%); praise of an earlier exposure to dentistry (28%); a good/useful experience (17%); relevance (15%); gaining numerous friends (14%); personal growth (12%); a professional advantage (11%); knowledgeable and helpful lecturers (11%); good organisation (3%); and head and neck Anatomy (2%). Negative feedback included: too much irrelevant information (18%); a difficult and stressful experience (15%); challenging with an intense scope (13%); a waste of time (8%); overwhelming (6%); disorganised (5%); rude and unfriendly lecturers (4%); too much information (2%); a negative experience (2%); and a lack of meaningful study (2%). Students suggested a promotion system like Medicine (4%) and asked for more early exposure to dentistry (2%). No perception of prejudice or marginalization was expressed (0%).

**Conclusion:** This study confirms that a split basic science curriculum is an effective means of ending the perception of marginalization and prejudice experienced by dental students in a joint curriculum. Furthermore, dental students maintain a more positive perception on their studies when participating in a dedicated split basic science dental curriculum. Emerging themes should be further investigated to assist in current curricular reform. Negative comments may suggest curriculum overload.
THYROID DISRUPTING ACTIVITY FROM A WATER TREATMENT FACILITY IN GAUTENG, SOUTH AFRICA, USING THE GH3-TRE-LUC BIOASSAY.

Introduction: Humans and animals are vulnerable to endocrine disruption by ingesting water that is polluted by endocrine disrupting chemicals (EDCs). The thyroid gland is particularly sensitive to EDCs known as thyroid disrupting chemicals (TDCs). In South Africa limited research is available on thyroid disrupting activity (TDA). The Vaal Dam situated on the border of Gauteng and Free State serves as a water source for Gauteng, Free State, North West and the Mpumalanga province.

Methods: In this study the GH3-TRE-Luc bioassay used for screening TDA was used to detect activity in water and sediment samples from a water treatment facility. Water (n=21) and sediment (n=35) samples were collected over a period of one year. These samples were subjected to solid a phase extraction (SPE). Extracts were analyzed using the GH3-TRE-Luc bioassay.

Results: The results showed that five sediment samples had thyroid disrupting activity above the detection limit but not quantifiable. Only one of 21 water samples had agonistic activity (0.026 ± 0.046 ng/l) thyroid equivalent and no antagonistic activity. All treated water samples were below the detection limit for TDA. In conclusion post treatment water sourced from the Vaal dam is of good quality, however the low unquantifiable TDCs may still pose a potential public health risk to people who source untreated water directly from the dam.

Discussion: Further studies using more chemical specific SPE and sensitive bioassays are necessary for analyses of South African water sources intended for human consumption. Even though water samples had very low or no TDA, estrogen and androgen disrupting activity may be present but were not included in the scope of this study, which may still pose an environmental and public health risk.

Keywords: Endocrine disrupting chemicals, thyroid disrupting chemicals, bioassay, GH3-TRE-Luc, Vaal dam, sediment, water
Abstract Detail

ORTHOPAEDIC SURGEONS’ KNOWLEDGE, AWARENESS AND PRACTICES REGARDING RADIATION SAFETY IN AN ACADEMIC HOSPITAL.

Background & Introduction: The use of fluoroscopy in orthopaedic theatres is not without risk to the orthopaedic surgeon. While deterministic effects are unlikely to occur below the recommended dose limits, stochastic effects may still occur, according to the linear no-threshold model.

Objectives: Objectives included the evaluation of orthopaedic surgeons’ knowledge, awareness and everyday practices regarding radiation safety in an academic hospital. This was done to determine the need for the implementation of an annual radiation safety training program for orthopaedic surgeons.

Methods: A 14-item questionnaire with closed-ended multiple choice type questions was developed by a multi-modal panel of experts and used to conduct a quantitative survey analysis.

Results: Orthopaedic surgeons have become dependent on the use of fluoroscopic imaging, with 80% of participants indicating they use fluoroscopy in over 50% of their daily operations. Most participants have inadequate knowledge on radiation safety however, with the majority failing to accurately identify basic methods of dose reduction.

91% of participants do not wear a personnel dosimeter, despite 89% believing that they are at risk of developing adverse effects secondary to ionising radiation exposure. Of the surveyed orthopaedic surgeons, 73% felt that they have not received adequate training on radiation safety, while all indicated that orthopaedic surgeons should be classified as radiation workers.

Conclusion: The majority of orthopaedic surgeons regularly use fluoroscopic imaging in theatre, yet lack the detailed knowledge and awareness regarding radiation safety associated with this imaging modality.

Orthopaedic surgeons would thus benefit from the implementation of an annual radiation safety training program.
THE OUTCOME OF THE LATERAL APPROACH TO DISTAL FEMORAL TUMOUR RESECTIONS- A RETROSPECTIVE CLINICAL AUDIT AT A PRIVATE PRACTICE IN PRETORIA

Background: In most European countries distal femoral tumor resections are traditionally performed through a medial or anteromedial approach. The medial approach identifies and protects the femoral artery in Hunter’s canal and therefore limits intra operative vascular complications. An alternative procedure that has been described in the literature involves the use of a lateral approach to the distal femur. Currently, there is limited research available with regards to this approach and the safety thereof. This study aimed to assess the intra-operative and immediate post-operative vascular complications when using the lateral approach during the resection of distal femoral tumors.

Methods: We performed a retrospective clinical audit at a private practice in Pretoria. We identified all distal femoral tumor resections followed by prosthetic replacements between 2012 and 2019. These surgeries were performed via the lateral approach by a single surgeon. We assessed the files of the patients to determine if there were any intra-operative or immediate post-operative vascular complications.

Results: We identified 30 patients who underwent resection of their distal femoral tumours via the lateral approach. Two vascular complications were recorded during this period. Both complications occurred intra-operatively and were immediately repaired. There were no subsequent post-operative complications secondary to these injuries. In our study group we found a low intra-operative risk of vascular injury when performing distal femur tumor resections using the lateral approach.

Conclusion: The findings of this retrospective study suggest that an overall positive outcome with a low risk of vascular complications can be expected when resecting distal femoral tumors through a lateral approach.
THE EFFECT OF STEMREGENIN-1 ON GENE EXPRESSION IN UMBILICAL CORD BLOOD-DERIVED HEMATOPOIETIC STEM CELL AND PROGENITOR CELLS

**Introduction:** Umbilical cord blood (UCB) is a rich source of hematopoietic stem and progenitor cells (HSPCs). There are however limitations to using UCB as a regular source for hematopoietic stem cell transplantation (HSCT). A single UCB unit often does not contain sufficient numbers of HSPCs for adult transplantation and is often associated with delayed hematopoietic reconstitution. One way to overcome these limitations is through the ex vivo expansion of UCB-derived HSPCs using an aryl hydrocarbon receptor antagonist, StemRegenin-1 (SR1), which promotes the ex vivo expansion of HSPCs. This study aimed to determine the effect of SR1 on the transcriptome of expanded CD34+ and CD34- cells from UCB, and to establish to what extent the transcriptome differs between seven-day expanded and non-expanded CD34+ cells.

**Materials and methods:** RNA was isolated from non-expanded UCB CD34+ HSPCs and seven-day expanded CD34+ and CD34- cells (SR1-treated and non-treated). Affymetrix GeneChip® Human Gene 2.0 ST arrays were used for gene expression analysis. The criteria for selecting differentially expressed genes (DEGs), were a fold change > 2.5 and < -2.5 and a p-value of 0.05. The PANTHER Gene Ontology (GO) enrichment analysis tool was used to classify the DEGs into biological processes/pathways.

**Results:** The most significantly down-regulated genes in both SR1-treated CD34+ and CD34- cells, were cytochrome P450, family 1, subfamily B, polypeptide 1 (CYP1B1) and erythrocyte membrane protein band 4.1-like 3 (EPB1L3). 391 genes were significantly up-regulated, while 456 genes were significantly down-regulated, in expanded vs. non-expanded CD34+ HSPCs.

GO classification revealed up-regulated genes were enriched for processes such as the regulation of cell cycle, cholesterol biosynthesis, and macrophage activation. Down-regulated genes were enriched for processes such as chromatin silencing, nucleosome assembly, and regulation of myeloid cell differentiation.

**Conclusion:** SR1 had surprisingly little effect on the transcriptome of CD34+ and CD34- cells following expansion. Gene expression changes observed on expanded CD34+ cells, based on GO, are in support of cell differentiation and proliferation processes. The use of CD34+ HSPCs exclusively expanded with SR1 would be beneficial in cases where the HSPC cell dose of the initial harvested cell therapy product is suboptimal and therefore not a feasible option for HSCT on its own.
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Abstract Detail
EVALUATION OF STATIC EXPOSURE LEVELS OF STYRENE AND METHYL ETHYL KETONE PEROXIDE AT STEVE BIKO ACADEMIC HOSPITAL'S ORTHOTICS AND PROSTHETICS DEPARTMENT DURING THE LAMINATION PROCESS

Introduction: Little research has been done in the orthotics and prosthetics environment, despite the various stressors found in this environment. During the lamination when prostheses are created, hazardous chemicals exist which include styrene and methyl ethyl ketone peroxide (MEKP). Both of these chemicals have several short- and long-term health effects, targeting various organ systems. Both chemicals are classified as genotoxic with several short- and long-term health-compromising effects which may include a fatal occupational disease, obliterative bronchiolitis.

Currently, limited control measures have been implemented at the Steve Biko Academic Hospital (SBAH) orthotics and prosthetics department, and worker education on the long-term health effects of stressors are lacking.

Aim: The project aimed to determine the concentrations of styrene and methyl ethyl ketone peroxide at the SBAH orthotics and prosthetics department, specifically in the lamination room. A cross-sectional study was done on a technician and three assistants in the lamination room, where standard lamination procedure was followed.

Results: The values measured for styrene on Day 1, STEL and the longer interval were 13.01 and 1.34 mg/m³ respectively, and on Day 2, 24.62 mg/m³ and 1.59 mg/m³ respectively. MEKP values measured on Day 1, STEL and the longer interval were 0.494 mg/m³ and 0.083 mg/m³ and on Day 2, 0.51 mg/m³ and 0.066 mg/m³. Concentrations complied with the regulations on HCS of the OHS Act, Act 85 of 1993.

Discussion: Despite compliance, control measures are still suggested to lower personal exposure of employees to styrene and MEKP in the lamination room, due to the severity of the possible health risks. Less hazardous substitutions are available for the styrene resin and MEKP hardener. The local exhaust ventilation needs to be re-designed, and Ansell® Barrier® Gloves are also recommended to reduce dermal exposure during lamination. This may limit possible short- and long-term health effects and which may extend their economic contribution to the country’s growing economy.

Conclusion: Considering SBAH’s reputational risk and the recent revision in national and international legislation, additional control measures should pre-emptively be put in place to adhere to the reasonably practicable principle.
Abstract Detail

POPULATION TRENDS AND BURDEN OF DISEASE PROFILE IN SOMALIA FROM 1990 TO 2017

**Background:** In Somalia, general health indicators and information on the health trends for important causes of mortality and morbidity are lacking. Somalia and globally aim to attain the United Nations (UN) Sustainable Development Goals (SDGs) for health and decrease premature deaths due to communicable (CDs) and non-communicable disease (NCDs) by 40% by the year 2030.

**Objectives:** To describe the trends in population health and disease burden in Somalia in the past 27 years and show the pattern of health transition across the country from 1990 to 2017.

**Methods:** This cross-sectional study retrieved secondary data from the Institute for Health Metrics and Evaluation (IHME) system. All health-related data were cleaned, captured, and descriptively analysed through SAS 9.4. From 1990 to 2017, we analysed Mortality rates, Disability-adjusted life years (DALYs), Years of Life Lost because of premature death (YLLs), Years lived with disability (YLDs), Health-Adjusted Life Expectancy (HALE), and Age-Standardised Death Rate (ASD). Causes and risks of mortality and morbidity were categorised in communicable diseases (CMNN), non-communicable diseases (NCD) and injuries.

**Results:** The total population across all age groups increased by 52% from 7 175 478,19 in 1990 to 16 880 386,43 in 2017. Life expectancy has improved from 1990 to 2017 from 52.5 to 60.7 years old for females and 48.0 to 56.6 years old for males. The total causes of DALYs declined by 52% (from 120 860,71 to 58 321,04); YLD declined by 8% (from 9 957,15 to 9 152,86); and the YLLs declined by 56% (110 903,56 to 49 168,18) for both sexes. The maternal mortality rate declined by 34% (522,99 to 343,86) and under 5 mortality rate by 63% (5 176,54 to 1 899,17) for the same time period. CMNNs was the main cause of DALYs, NCDs for YLDs and CMNNs for YLLs in 2017. HALE saw a steady increase over the 27-year period. CMNNs was the main cause of ASD in 1990 then declined and NCDs became the main cause of ASD in 2017.

**Conclusions:** Somalia’s health status has improved over the 27-year period between 1990 and 2017, although certain geographically and societal factors still play an important role in rates not changing.

**Keywords:** Somalia, burden of disease, population health
THE EFFECT OF PULSE ELECTROMAGNETIC FIELD STIMULATION TRAINING ON THE NEURO AGILITY OF NETBALL PLAYERS.

Introduction: Biofeedback makes physiological responses visible and measurable. Neurofeedback is a type of biofeedback that controls the information sent to the brain. Neuro Agility Brain Profile is the user friendly name for Neuro-Link’s Neuro Agility Profile, abbreviated as the NAP, which is a brain analysis report that illustrates 7 attributes of a person’s neurological design and 6 drivers that influence their overall brain performance. This assessment is the foundation of our work as we believe: ‘You can’t improve what you can’t measure.’ The Bellabee device, that will be used for the intervention, uses pulse electromagnetic field (PEMF) technology whereby frequencies are directly picked up by the brain via pulses. The audio frequencies created by the Bellabee are converted into an electromagnetic pulse which enables the brain to follow a specific rhythm; thus this device can be used to relax the subject or energise them. The aim of this study is to determine the effects of pulse electromagnetic field stimulation on the neuroagility of netball players.

Method: In this intervention study we will be focussing on the neuro agility of 10 netball players. The neuro agility will be assessed by means of a pre-NAP assessment, twenty PEMF intervention sessions and a post-NAP assessment test. The pre-assessments values will then be compared to the post-assessments values to indicate any increase or decrease in performance.

Potential Results: Potential outputs of this program as hypothesised include improved neuro agility of the players. The project interventions are expected to vastly improve the overall performance of the netball team as a whole and on the court.

Potential Discussion and Conclusion: Potentially we can conclude that PEMF training will improve neuro-agility of netball players. Ultimately, this study has the potential to have a valuable impact as it can possibly improve performance of teams when competing.
THE EFFECT OF BLUE, GREEN AND URBAN SPACES ON ACUTE STRESS LEVELS IN AN ADULT POPULATION: A PSYCHOPHYSIOLOGICAL PERSPECTIVE.

Introduction: Natural environments are known to have a positive impact on health and wellbeing. The positive effects that come along with the exposure to natural settings include the release of tension and anxiety, preventing mental fatigue as well as relaxing the mind. Furthermore these environments are normally correlated with positive affect. Research has shown that natural environments are more likely than human-made environments to reduce stress in adults, while urban environments tend to cause feelings of anxiety and aggression. The proposed study will investigate the extent to which urban, green and blue areas influence acute stress levels in healthy adults while a psychophysiological measure is being conducted in approximately 40 adults.

Methods: The physiological measures will include neuro-agility profile, cardiac health such as the heart rate variability and cardio stress index, while the psychological measures will be assessing affect on five factors: fear, positive affects, anger/aggression, attentiveness as well as sadness using the Zuckerman Inventory of Personal Reaction (ZIPERS). Furthermore the Nature Relatedness Scale will be assessing the extent to which the participants feel connected to nature, with the aim of explaining the different responses to natural environments that will be presented. In essence, the study will incorporate a four-group experimental design to address the stress-relieving effects of the above mentioned areas.

Potential Results, Discussion and Conclusion: The hypothesis is that natural spaces (green and blue) decrease acute stress levels, while urban areas elevate the stress levels. It is almost impossible to control every potential stressor because of the subjective nature of stress, but this study will develop possible ways in which the effects of stressful stimuli are mitigated.
EVALUATING AND ENHANCING SPATIAL VISUALIZATION SKILLS IN GEOSCIENCE STUDENTS

**Introduction:** Stereopsis is the ability to receive depth perception - three-dimension vision, through the fusion of binocularity which supports our object recognition. Well-developed abilities to think in three-dimensions (3D) are extremely important for geologists, especially those working in a mining environment. Consequently, geology students are introduced to basic concepts of 3D visualization in their first year of study, where they are required to produce cross-sections based on geological maps. However, it seems that there are a number of students that fail to fully grasp 3D concepts. The aim of this study will be to investigate the effect of the Limitless You Peak Performance Program (LYPPP) on the brain, health-, skill-related fitness and spatial visualization skills of Geoscience students and to show a recordable improvement in 3D spatial thinking ability amongst the students.

**Materials and Methods:** Cohort prospective study design will be followed. At the start of the study the participants (control and experimental group) will perform three different pre-assessment tests. These tests include a brain profile which will determine their brain performance, health tests which will determine their health-related fitness and visual skill tests which will determine their skill-related fitness. After the pre-assessment tests, the participants (experimental group) will perform the LYPPP, which consists of fifteen intervention sessions, with each session focusing on exercises that serves to enhance the brain, health and skill-related fitness of the participant. After the intervention sessions, the participants (control and experimental group) will perform post-assessment tests which are the same as the pre-assessment tests.

**Potential Results:** The project output serves to determine if there is a significant difference between the post-assessment and pre-assessment tests. We predict that the intervention sessions (LYPPP) will improve the geology students’ abilities to think in 3D.

**Potential Discussion and Conclusion:** Potentially we will be able to conclude that the LYPPP fifteen intervention sessions will improve the geology students’ overall visual perception and their spatial visualization skills.
SEVERITY OF OBSTRUCTIVE SLEEP APNEA IN A SOUTH AFRICAN POPULATION

**Introduction:** Sleep apnea is classified as a sleep disorder characterized by a cessation of breathing, known as apneas. During these events, the airway becomes blocked, leading to the temporary inability of normal ventilation. Apneas/hypopneas indirectly lead to the over-activity of the sympathetic nervous system. Sleep apnea may lead to various other disorders such as hypertension, diabetes mellitus or heart failure when not treated.

**Methods:** A total of 119 patients that had suspected OSA, were referred to a private practice of clinical neurophysiology by their respective physicians. They were subsequently admitted at a sleep laboratory, based in Pretoria, for a single night to test for the disorder. Full polysomnography (PSG) was used to monitor the patients’ sleep. Various information such as the desaturation index, amount of obstructive sleep apneas/hypopneas, sleep architecture and baseline oxygen-haemoglobin saturation were interpreted from the test. This information was then used to assess the severity of the disorder in the patients. The PSG data were then compared with other aspects of the patient such as BMI, medical history and questionnaires. A total of 84 patients met the inclusion criteria (male and age > 18) and were selected for the study population.

**Results:** The mean BMI was found to be 34.33 (SD ± 7.31) and the mean apnea/hypopnea index (AHI) was 40.28 (SD ± 28.36). The mean oxygen deprivation state percentage (ODSP) was 23.26% (SD ± 18.42). Negligible correlations were found between age and ODSP (r = 0.042, p = 0.583) as well as age and AHI (r = 0.010, p = 0.900). With regards to BMI, both the ODSP and AHI correlated weakly with coefficient values of 0.222 (p = 0.003) and 0.264 (p < 0.000) respectively.

**Conclusion:** This study concludes that there are other possible strategies and parameters for aiding in the diagnosis of OSA in South Africa. When correlations were done between the AHI and ODSP, similar values were obtained by using Kendall’s correlation coefficient. They yielded a significantly strong linear relationship (r = 0.821, p < 0.000). This proves that the severity of OSA in a specific male population in South Africa can be assessed differently by using other variables and parameters such as ODSP.
Presenting Author: J Naicker (Orthopedics)

Authors: J Naicker (Orthopedics) N Mogale (UP), S Matshidza (University of Free State)

Abstract Detail

AN ANATOMICAL STUDY OF THE INCIDENCE AND VARIATIONS OF THE CORONA MORTIS IN A SOUTH AFRICAN SAMPLE

Introduction: Orthopaedic surgeons worldwide are fast accepting the innovative Modified Stoppa approach as the preferred anterior approach repair pelvis fracture repairs, unknowing of its iatrogenic consequences leading to haemorrhage and fatality in patients. Such mortality is due to the inadvertent severing of the Corona Mortis (CM) vessels, which are defined as the anastomosis between the obturator and the external iliac vessels normally via the accessory obturator vessels.

Methods: This study investigated the variations and incidence of the CM and the constituent vessels in a South African sample using 31 adult cadavers. After careful dissection of the blood supply of the pelvis, the locality of the CM in relation to bony landmarks encountered during anterior approaches to the pelvis was recorded. These landmarks included the pubic tubercle, pubic symphysis and the anterior inferior iliac spine in order to map out ‘safe zones’ adjacent to these landmarks for surgeons to use when exposing the pelvis. Correlations between sex, side, age and body mass index (BMI) with the presence of the CM were noted. The point of bifurcation of the abdominal aorta and the length of the common iliac vessels were documented. The position of these common iliac vessels along the quadrilateral plate of the pelvis, were also observed.

Results: The incidence of the CM was observed in 64.52% of the study sample, with 61.29% being venous and 3.23% being of arterial vessels. Twelve of which were present on the left hand side solely, eight only on the right hand side and ten bilateral cases. Venous CM resulted in an anastomosis between an accessory obturator veins which presented with a 75.81% incidence or second accessory obturator vein with an incidence of 22.58%. Arterial CM consisted of an anastomosis between the accessory obturator arteries which resulted in an incidence of 3.23%. The results of this study will assists physicians in administering minimally invasive procedures, where the risk of haemorrhage and mortality is greatly reduced by better understanding of the deviations and precedence of the CM and its possible locations.
RESILIENCE AS A PREDICTOR OF CARDIOVASCULAR DISEASE RISKS

Introduction: During the past few years the Employee Well-Being Program at the University of Pretoria has provided all staff members with health and risk related assessments (HRA) to identify staff members who might be at risk of severe diseases such as cardiovascular diseases and diabetes mellitus.

These HRA screenings have been vital in identifying these staff members and encouraging them to take part in the intervention programmes at the institute. It is necessary to research new ways of screening to improve the effectiveness of the assessments. Thus, the aim of this study will be to test if resilience could be used as a new screening tool to predict cardiovascular risk.

Materials and Methods: The health and risk assessments (HRA) performed on the employees of the University of Pretoria by the EWP@UP consists of an extensive set of tests including InBody assessments, blood oxygenation, hypermobility, heart health, body composition, blood glucose and cholesterol, flexibility and static balance tests. These tests will be used to identify candidates that are at risk of cardiovascular or other serious diseases.

The answers of the resilience questionnaire will then be compared with the statistics obtained from the HRA screenings to see if there is a correlation.

Potential Results: The study will potentially demonstrate whether resilience models will be able to predict the risk of cardiovascular disease. We predict that resilience models could be added to the HRA screening as a predictor of cardiovascular disease risks.

Potential Discussion and Conclusion: Potentially we will conclude that higher resilience correlates to a lower risk of cardiovascular disease.
Presenting Author: RC dos Santos (Physiology)

Authors: RC dos Santos (Physiology) M Kleynhans (Physiology), P du Toit (Physiology)

Abstract Detail

EFFECTIVENESS OF A SIX-WEEK YOGA PROGRAM ON THE WELLBEING AND RESILIENCE OF UNIVERSITY EMPLOYEES

**Introduction:** In most working environments, much pressure is placed on employees. To some, pressure may be a catalyst that drives productivity, but to most, it may be a debilitating notion that hinders any form of optimal success. Through the construct of improved resilience, employees may be equipped with the ability to manage stressful events with the aim of producing ideal results. Achieving a sense of resilience to the events of stress will prepare employees to respond productively when faced with significant pressure.

Physical activity has been known to improve wellness through its positive effects on fatigue, self-confidence, appearance, and various health-related parameters. Thus, an increase in physical activity interventions within the workplace may have a unique potential to positively influence physical and psychological health among employees, resulting in improved resilience and productivity. This study will, therefore, focus on the effectiveness of a six-week yoga intervention program in wellness among staff members at the University.

**Materials and Methods:** All tests will be conducted under the same terms and conditions. Once the Physical and Readiness Questionnaire (PAR-Q) has been completed by the employees, employees will attend a Health Risk Assessment (HRA) in which four major aspects including, physical body indices, strength and flexibility, health, and fitness will be evaluated. Thereafter, employees will be randomised where a Well-being Scale will be completed. This randomised group will undergo a 6-week yoga intervention program, after which a post intervention HRA and Well-being Scale will be completed.

**Potential Results:** The outcome of the study is to identify the effects of a yoga intervention program in high risk employees at the University of Pretoria on their resilience and wellbeing. It can be predicted that yoga will improve well-being and resilience.

**Potential Discussion and Conclusion:** We can expect an improvement in employee well-being and resilience after a yoga intervention program.
LINEZOLID RESISTANCE MECHANISMS IN STAPHYLOCOCCAL ISOLATES COLLECTED IN GAUTENG, SOUTH AFRICA

Background: Staphylococci are Gram-positive bacteria that cause opportunistic hospital- and community-associated infections, such as skin and soft tissue infections, endovascular infections, pneumonia, endocarditis and sepsis. The management of staphylococcal infections relies on accurate detection and treatment to reduce morbidity and mortality. Linezolid is one of the few antibiotics available for the treatment of staphylococci; therefore, the detection of resistant isolates is essential. Several mechanisms can mediate linezolid resistance, including both plasmid and chromosomally-mediated mechanisms. The presence of the plasmid-mediated chloramphenicol-florfenicol resistance (cfr) gene is increasingly reported. In South Africa, information about linezolid resistance mechanisms is limited. This study aimed to identify the mechanisms of linezolid resistant clinical staphylococci obtained from the private sector in Gauteng, South Africa.

Method: Staphylococcal isolates collected from 2016 to 2018 were utilised for this study. Inclusion criteria were staphylococci that tested resistant to linezolid using the Vitek2 (bioMérieux) system. The DNA was extracted, followed by conventional multiplex PCR assays to speciate the isolates using previously described primers. The cfr gene was detected using a singleplex PCR with previously described primers. The minimum inhibitory concentration (MIC) values of the isolates were determined using the Epsilotest (bioMérieux). Pulsed-field gel electrophoresis was performed to investigate genetic relatedness.

Results: The PCR assays identified 42 Staphylococcus capitis, 24 S. epidermidis and six S. haemolyticus isolates. The cfr gene was detected in eight (33.3%) of the S. epidermidis isolates. The cfr gene was not found in the S. capitis and S. haemolyticus isolates. Linezolid resistance ranged between 8 μg/mL and >256 μg/mL. Preliminary pulsed-field gel electrophoresis results show that the isolates are genetically related, the cfr positive S. epidermidis isolates were clonally related.

Discussion and Conclusion: Linezolid is an important treatment option for staphylococcal infections. The high prevalence of antibiotic resistance to linezolid is worrisome since it limits the possibility of effective antibiotic treatment options of patients. The presence of the cfr gene is a concerning factor contributing to linezolid resistance; therefore, the timely detection and judicious use of antibiotics are essential to prevent further spread and transmission of this resistance mechanism.
THE EFFECT OF INFRA-SLOW FLUCTUATION NEUROFEEDBACK TRAINING ON DEVIANT BRAIN ACTIVITY IN PRE- AND POST- QUANTITATIVE ELECTROENCEPHALOGRAMS

Background: Infra-Slow Fluctuation training is a relatively new technique which is used together with quantitative electroencephalograms (QEEG) in neurofeedback. ISF is used as a training technique for the brain to decrease deviant brain activity and to ensure an overall balance of the different brainwaves (Delta, Theta, Alpha, Beta). ISF tries to balance the brain by addressing the over- or understimulation of certain brainwaves. In this manner it can potentially decrease deviant brain activity. Therefore, it is necessary to determine what potential it holds and what ISF training is capable of doing physiologically.

Aim: The aim of the project was to determine whether ISF training has a significant effect on deviant brain activity in participants who decided on their own volition to undergo neurofeedback training.

Method: The method that was used entailed generating data by performing pre- and post- QEEG's on the participants selected from KB Neurofeedback cc. The ISF training occurred between QEEG measurements. The data were analysed to determine whether there was any significant effect of the training on brain activity. The program, QEEG Pro, used a database to produce a detailed report which provided an holistic view of the dynamics of the different brainwaves and the effect of the ISF neurofeedback training on the brain. This protocol was approved by the ethics committee (238/2018).

Results: The project output demonstrated that ISF training has a significant impact of brain functionality by decreasing deviant brain activity in certain brainwaves and improving overall network coherence and amplitude. For instance, the decrease in deviant activity with regards to amplitude suggests that the brain becomes more balanced. Whereas, the decrease in deviant activity with regards to coherence suggests that the different brain sites become more interconnected.

Discussion and Conclusion: ISF training can improve overall performance by balancing the excessive activation and deactivation network relations. Ultimately, this project has the potential to further have a valuable impact as it can possibly verify the validity of the ISF training technique.
Abstract Detail

MORPHOLOGICAL ASSESSMENT OF DETERGENT DECELLULARISED DERMAL EXTRACELLULAR MATRIX SCAFFOLD FOR WOUND HEALING STUDIES

**Background:** The shortcomings encountered in tissue engineering for the replacement of skin lost to disease or trauma can be circumvented by generating biological substitutes capable of replacing damaged tissue. The extracellular matrix (ECM) is the main structural component of biological substitutes, having constructive and remodelling constituents such as collagen that provides structural and biochemical support. Through decellularisation of skin using detergents, the ECM is isolated from native tissue to produce a biological scaffold for organ regeneration. The morphology of these detergent treated scaffolds still needs to be investigated as these protocols can potentially remove soluble collagen and other essential ECM constituents. This study investigated the effects on the morphology of scaffolds decellularised using different detergent protocols.

**Materials and methods:** Fresh, full thickness porcine skin was cut, washed in Phosphate Buffered Saline (PBS) and subjected to one of three protocols: 2% Triton X-100 with 0.1% SDS, 2% Triton X-100 with 2% sodium deoxycholate (DOC) and 2% sodium deoxycholate only. The extent of decellularisation was determined using light microscopy and histological stains such as Haematoxylin and Eosin to quantify remaining cells and Picrosirus red to identify collagen morphology. Morphology was also assessed using Scanning Electron Microscopy (SEM).

**Results:** The 2% Triton X-100 with 0.1% SDS protocol displayed the highest removal of cells compared to native skin. It was also observed that the acellular porcine dermis had a porous meshwork of collagen. The remaining protocols retained significant amounts of nuclear material.

**Conclusion:** All tested protocols removed the cellular components, with the Trion X-100 with SDS protocol the most effective in removing cells and cellular debris from porcine dermis. Some ultra-structural components were also removed which may indicate a loss of extracellular matrix making the scaffolds less dense than the native control.
THE EFFICACY OF RADICAL DEBRIDEMENT AND SPINAL INSTRUMENTATION IN ADULT PATIENTS WITH POTT'S PARAPLEGIA

**Background:** To review the efficacy of radical debridement and spinal instrumentation in adult patients with Pott’s paraplegia. The incidence of spinal TB has dramatically increased in developing countries. There’s also an increase in HIV infection and anti-tuberculosis drug resistance in these countries. Antituberculosis chemotherapy is still the mainstay treatment of spinal TB. Surgical intervention is indicated in patients with neurological deficit, failed chemotherapy, unstable spine and kyphotic deformity correction.

**Methods:** A retrospective study design, review of adult patients admitted in our spinal unit with Pott’s paraplegia over a 10 year period. Patients included were above the age of 18 that had surgical intervention combined with chemotherapy and those that had chemotherapy only. Patients excluded did not conform to the inclusion criteria. A total of 84 patients were reviewed with a female to male ratio of 1.05:1 and a mean age of 40 years. All the patients had antituberculosis chemotherapy for 8 weeks then reviewed. 28.6% of the patients had surgical intervention and were followed up for a minimum of 12 months. Surgical intervention was anterior radical debridement and fusion plus instrumentation, posterior lateral debridement and fusion plus posterior instrumentation and anterior radical debridement with fusion.

**Results:** Two thirds of the patients improved on antituberculosis chemotherapy only. The remainder (24) had surgical intervention. Of the 24 patients, 15 had significant neurological improvement, 8 patients improved from ASIA A to C, 4 patients from ASIA B to D and 3 patients from ASIA C to E. Then 4 of the patients remained as ASIA A after 12 months of follow up.

**Conclusion:** Shows that 2/3 of the patients can improve on antituberculosis chemotherapy in the short term follow up. Antituberculosis chemotherapy is still mainstay treatment for TB spine. Radical debridement and spinal instrumentation combined with antituberculosis chemotherapy is still indicated in patients with neurological deficit ASIA C and less, failed with chemotherapy, progressive neurology, instability and kyphotic deformity.
Abstract Detail

RETROSPECTIVE ANALYSIS OF FIREARM-RELATED FATALITIES AT THE PRETORIA MEDICO-LEGAL LABORATORY FROM 2012 TO 2018

Introduction: Firearm fatalities is the leading cause of violent non-natural deaths not just in South Africa but globally. Only a few studies have been done regarding the description and characteristics of firearm fatalities in the world, and even less in South Africa.

Aim: The aim of this study is to provide a retrospective analysis of all the firearm fatalities admitted to the Pretoria Medico-Legal Laboratory from the 1st of January 2012 to the 31st of December 2018. Statistical information regarding firearm fatalities in Pretoria will be provided by this study, information that is currently lacking. This information could be used in future studies regarding firearm fatalities. This study will also focus on creating profiles of firearm related fatalities that occurred in the Pretoria Medico-Legal jurisdiction.

This study will be conducted by the Department of Forensic Medicine and will only consist of cases handled by the pathologists that are part of the Pretoria Medico-Legal Laboratory.
Presenting Author:  CL Pretorius (Forensic Medicine)

Authors:  CL Pretorius (Forensic Medicine) R Blumenthal (Forensic Medicine), G Saayman (Forensic Medicine)

Abstract Detail

SUICIDE IN PRETORIA: A RETROSPECTIVE REVIEW 2015-2018

Introduction: Two previous studies were done by the Department of Forensic Medicine of the University of Pretoria indicating a clear difference in suicide profiles between two time periods. The current study will be a follow-up study from the two previous studies. The common drivers of suicide in South Africa have change throughout the years, contributing to the differences in suicide profiles in the area.

Purpose of this study: The purpose of the current study is to determine the trends of suicides in the area of Pretoria that is under the jurisdiction of the Pretoria Medico-Legal Laboratory for the period 2015 to 2018.

Methods: The authors will retrospectively review suicide information from case records from the Pretoria Medico-Legal Laboratory from 1 January 2015 to 31 December 2018. Two main themes will be explored: The first of which will be the suicide demographics for this region, and the second will look at incidence and prevalence rates in the jurisdiction.
Faculty Day 2019 Abstract 2019095  
Poster in the Clinical Category

Presenting Author: R Hwenjere (UP)

Authors: R Hwenjere (UP), P du Toit (UP), V Nortje (UP)

Abstract Detail

EFFECT OF LIMITLESS YOU PEAK PERFORMANCE PROGRAM ON THE BRAIN, HEALTH AND SKILL-RELATED FITNESS OF NETBALL PLAYERS

**Introduction:** Limitless You Peak Performance Program (LYPPP) is a training assessment program designed to enhance cognitive intelligence, reduce stress and improve the performance of an athlete. We normally ignore how powerful of an organ the brain can become in an in-game situation and can be the difference between an average and an elite athlete. The LYPPP enhances the brain and body agility of athletes.

**Materials and Methods:** In this intervention study we will be focussing on brain, health and skill-related fitness tests and interventions of 17 netball players. The brain, health and skill-related fitness tests will be assessed by means of a pre-assessment, fifteen intervention sessions and a post-assessment test. The pre-assessments values will then be compared to the post-assessments values to indicate any increase or decrease in performance.

**Potential Results:** Potential outputs of this program as hypothesised include improved brain, health and skill-related fitness in the players. The project interventions are expected to vastly improve the overall performance of the netball team as a whole.

**Potential Discussion and Conclusion:** The impact of the study is very important as it is directed towards athletes whose brain, health and skill related fitness takes its toll during a match, when the choices they make plays a very big role on the outcome.
THE EFFECT OF HEART RATE VARIABILITY COHERENCE BREATHING ON THE NEUROFEEDBACK OF ATHLETES.

**Introduction:** Neurofeedback is a type of biofeedback strategy that makes physiological responses visible and measurable. Neuro agility is a combination of brain flexibility and brain fitness. Heart rate variability coherence breathing is a slow breathing exercise that is used to improve heart rate variability, and by doing so, improve the balance of the autonomic nervous system. This study aims to determine the effects of heart rate variability coherence breathing on brain wave activity neuro agility.

**Materials and Methods:** All the participants will perform a pre Quantitative Electroencephalogram (QEEG) assessment to determine their brain wave activity and heart rate variability. They will also complete a neuro agility profile assessment to determine brain flexibility, brain fitness and neuro agility. The intervention phase will include heart rate variability coherence breathing for 20 sessions of 25 minutes. The intervention will be performed using a cellphone app called Kardia. The participants will then complete a post QEEG and neuro agility profile assessment.

**Potential Results:** The project output will be to potentially demonstrate whether heart rate variability coherence breathing contribute to neuro agility and performance improvement. We predict that heart rate variability coherence breathing will contribute to performance improvements.

**Potential Discussion and Conclusion:** The heart rate variability coherence breathing could be used in combination with other performance markers in improving neuro agility and performance of participants.
Presenting Author:  GD Buchanan (UP)

Authors:  GD Buchanan (UP),  MY Gamieldien (UP),  S Tredoux (UP),  ZI Vally (UP)

Abstract Detail

SOUTH AFRICAN MAXILLARY PREMOLAR ANATOMY USING CONE BEAM COMPUTED TOMOGRAPHY (CBCT) AND TWO CLASSIFICATIONS

Introduction:  This cone beam computed tomography (CBCT) study aimed to describe maxillary premolar anatomy of a South African subpopulation using two classification systems.

Materials and methods:  A total of 601 maxillary premolars were evaluated.  For each tooth, the root number and canal configurations were described according to the classification systems devised by Vertucci (1984) and Ahmed et al. (2017).  Correlations between root number and sex were determined using the Chi-squared test (P = 0.05).

Results:  Two roots were present in approximately half of all maxillary first premolars (54.1%, n = 171/316).  The majority of maxillary second premolars displayed one root (78.2%, n = 223/285).  Single-rooted maxillary second premolars were more commonly observed in females (P < 0.05).  The Vertucci Type IV configuration was most prevalent canal type found in maxillary first premolars.  Maxillary second premolars showed a greater tendency toward the Vertucci’s Type I configuration.  The classification system proposed by Ahmed et al. showed the most prevalent maxillary first premolar configuration to be 2MP B1P1.  The most common configuration in maxillary second premolars was 1MP1.

Conclusion:  Diverse root and canal anatomy was found in this South African subpopulation.  Both classification systems can adequately describe maxillary premolar anatomy, however the system proposed by Ahmed et al. may more accurately describe teeth with complex configurations.
Abstract

MOLECULAR DETECTION AND CHARACTERISATION OF HUMAN ADENOVIRUSES FROM SOUTH AFRICAN CLINICAL AND ENVIRONMENTAL SAMPLES

Introduction: The human adenoviruses (HAdVs) belong to the family Adenoviridae, and are nonenveloped double-stranded DNA viruses. These viruses currently comprise of at least 88 types, divided into seven species (A-G). The HAdVs are distributed worldwide causing several diseases such as gastroenteritis, conjunctivitis, respiratory and urinary tract infections. Species F is the most common species associated with gastroenteritis. These viruses cause sporadic and epidemic outbreaks occurring mostly from midwinter to early summer. Therefore, current diagnostic assays are aimed at detecting HAdV-F only, whereas studies in other parts of the world showed that other types such as HAdV-A, B, and C are also associated with gastroenteritis. Currently, in South Africa, there is a lack of information on the genotypes of HAdVs. The aim of this study was to detect and characterise adenoviruses in stool specimens and environmental raw sewage and treated effluent within Tshwane, using molecular methods.

Methods: From 1 January 2018 to 30 April 2018, clinical specimens (100) and one litre raw (8) and ten litre effluent (8) environmental samples were collected. For the environmental samples, viral recovery was performed using the glass wool adsorption-elution method and secondary concentration by polyethylene glycol/sodium chloride precipitation. All samples were subjected to nucleic acid extraction. For detection, real-time polymerase chain reaction (PCR) was performed and for genotyping, conventional semi-nested PCR, cloning and Sanger sequencing of five clones per sample were done, followed by phylogenetic analysis.

Results & Discussion: The HAdV was detected in 32/100 (32%) clinical specimens, in 4/8 (50%) effluent and in 7/8 (87.5%) in raw sewage environmental samples. The HAdV-B and HAdV-C were most prevalent within the clinical specimens and environmental samples respectively. No HAdV-F was detected, which may be due to the limited number of clones that were sequenced and the small sample size. The results from the clinical samples showed the importance of testing for HAdV. The findings from the environmental samples, mainly the raw sewage samples are indicative of symptomatic and asymptomatic strains shed by the community. The presence of HAdVs in treated effluent is a public health concern, as it may contaminate downstream water sources.
DETERMINANTS OF ANTIRETROVIRAL TREATMENT NON-ADHERENCE AND VIROLOGICAL FAILURE AMONG ADULT HIV/AIDS PATIENTS IN UMZINYATHI DISTRICT, KWAZULU-NATAL, DECEMBER 2016

Background: Non-adherence to ART plays a crucial role in virological failure. uMzinyathi is a rural, socio-economic disadvantaged area with a socio-economic status in Quintile 1. In South Africa no studies had yet been done regarding ART in such settings. This study aimed to demonstrate the factors associated with non-adherence and virological failure defined as >/1000 copies/ml of the HIV virus.

Method: A retrospective cross-sectional study was conducted using patients who had started ART between 01 January 2016 to December 2016 and followed up after six months. A validated questionnaire was used to collect data.

Descriptive statistics were used to achieve the objective(s) of the study. In addition, logistic regression analyses were carried out to estimate multiple odds ratios. The required sample size to detect an adjusted odds ratio of 2 or greater with a power of 80% was 1 042. Post-regression tests used included ROC curves, GOF tests, and residuals analysis.

Results: Non-adherence measures demonstrated that 63% of clients were late for their visit with no drugs at hand while 36% missed visits, but overall 95% of clients were virologically suppressed. Patients starting on ART had 5% virological failure rate after six months. Proving baseline adherence counselling is correlated with missed visits and late for clinical visit with significant Spearman Rs less than 0.05. The final model was 0.66, which indicated that the model’s predictions were fair. Post-regression with the lowest values of AIC 405.946 and BIC 425.7406 and residual analysis with no outliers were considered. Age and number of days late were statistically significant. Age was further investigated categorically. Ages between 33 and 44 were significantly less than 0.05 with OR 0.315, which is protective. Further research is needed to investigate the exact number of days late and why ages between 33 and 44 seemed to be more protective in virological failure

Discussion and Conclusions: Virological failure rates of 5% can be used as projections of second line drugs procurement. Baseline adherence counselling is important in ensuring adherence to ART. Number of days late, ages between 33 and 44, and baseline adherence counselling are key factors in the prevention of virological failure
VIRULENCE PROFILES OF METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS ISOLATES OBTAINED FROM NEONATE AND BURN WARD CLINICAL OUTBREAKS AT THREE PUBLIC HOSPITALS IN GAUTENG

**Abstract**

**Background:** Methicillin-resistant Staphylococcus aureus (MRSA) is a significant human pathogen that causes infections resulting in high morbidity and mortality. Hospitalised neonates and burn wound patients represent a vulnerable immunocompromised group at risk for MRSA outbreaks in healthcare settings. The severity and progression of infection depends on the virulence factors MRSA employs; however, information on virulence profiles of MRSA in South Africa remains limited. The aim of this study was to identify the virulence profiles of 120 MRSA isolates obtained from outbreak specimens from neonates and burn wound patients in three Gauteng hospitals, using multiplex-PCR assays.

**Methods:** The MRSA virulence factors targeted in this study using multiplex assays were the adhesion and biofilm formation gene: icaA; haemolysins: hla, hlb, hld, hlg, hlg-2, hld; staphylococcal enterotoxins (SEs): sea, seb, sec, sed, see, seg, she, sei, sej, sen, seo and sem; exfoliative toxins A and B: eta and etb; and toxic-shock syndrome toxin-1: tst.

**Results:** Preliminary results obtained from a portion of the MRSA isolates showed that the majority (70%) of the MRSA isolates were hla positive. The sea gene was the next most frequently detected in 50% of the isolates followed by, hlg-2 (30%), icaA (20%), eta (8%) and seb (8%).

**Discussion and Conclusion:** The genes detected in the study encode important virulence factors that have been associated with increased pathogenesis in MRSA. The haemolysin toxins (hla & hlb), which were detected in the MRSA isolates are associated with severe inflammation and tissue necrosis. MRSA isolates producing enterotoxin (A & B) and exfoliative toxin (A) can cause food poisoning and scalded skin syndrome respectively. The biofilm formation gene (icaA) that was detected makes treatment of MRSA and its eradication from hospital devices more difficult, because antibiotics and disinfectants cannot easily penetrate biofilms.

**Conclusion:** The MRSA isolates from the burn and neonatal patients in this study setting were found to carry important virulence genes that can potentially increase morbidity and mortality in these patients. It is therefore important to implement effective infection control strategies in these clinical settings to prevent the spread of MRSA infections.

**Key words:** Burn patients, Methicillin-resistant Staphylococcus aureus, Neonates, Virulence
HIGH INCIDENCE RATE OF MEDICAL ENCOUNTERS DURING ULTRA-DISTANCE RUNNING EVENTS - A SAFER STUDY OVER 5 YEARS IN 84 117 ULTRAMARATHON RUNNERS

**Purpose:** Currently limited data is available regarding medical encounters (both injury- and illness-related) during ultra-marathons and the extent of the problem. Therefore, the purpose of this study was to determine the incidence rate of medical encounters over multiple years during an ultra-marathon running event.

**Methods:** This study was performed using a retrospective clinical audit on the annual Comrades Marathon distance running event (90km) in South Africa, involving 84 117 race starters during the 2014 – 2018 period. Medical encounters (MEs) (moderate and serious life-threatening), were collected over the years by medical doctors during and immediately after the event, and retrospectively coded using the latest definitions. The main outcome variable was the incidence rate for all MEs (both injury- and illness-related) and specific organ systems (illness-related) and main anatomical area (injury-related) were calculated as an incidence rate per 1000 starters (IR; 95% CI).

**Results:** Over the 5 years of data collection 1 768 medical encounters were recorded, with an overall medical encounter (ME) incidence rate over of 21.0 (95% CI: 20.0 – 22.0) per 1000 starters. The incidence rate for illness-related MEs was 20.2 (95% CI: 19.3 – 21.2), injury-related incidence rate was 0.8 (95%CI: 0.6 – 1.0), and 1.9 (95% CI: 1.6 – 2.2) per 1000 starters for serious life-threatening MEs. The most commonly affected organ systems for illness-related MEs were the fluid and electrolyte (10.5; 95% CI: 9.8 – 11.2), central nervous system (4.0; 95% CI: 3.5 – 4.4), gastrointestinal (2.8; 95% CI: 2.4 – 3.1) and cardiovascular (1.2; 95% CI: 1.0 – 1.5).

**Conclusion:** The Comrades Marathon had a high incidence of MEs (21 per 1000 starters) compared to other endurance running events, such as the Two Oceans marathons (incidence rate of: 5 – 13 per 1000 starters, for 21.1km and 56km). This high incidence is comparable to 1 in 50 runners requiring medical attention during the event. This high incidence rate increases the burden on the medical staff and race organisers, and therefore, interventions should be investigated to decrease this incidence and ensure the participants’ safety.
THE RELATIONSHIP BETWEEN WAIST CIRCUMFERENCE AND FORCED VITAL CAPACITY IN ELDERLY INDIVIDUALS RESIDING IN PRETORIA

Background and aim: The aging process leads to a number of structural and functional changes to the pulmonary system. Additionally, aging is associated with the redistribution of adipose tissue from the extremities to the abdomen. Central adiposity has proven to be associated with a decline in forced vital capacity (FVC) in the general population. Central adiposity negatively influences chest wall compression and diaphragm descent during respiration. Little is known, however, about how the age related changes in fat distribution further influences the relationship between central adiposity and respiratory volume in the elderly. Thus the study aimed to determine the relationship between waist circumference (WC) and FVC, in the elderly residing in Pretoria, South Africa.

Methods: A quantitative, cross-sectional study design was used. Overall 115 elderly individuals volunteered. The data of 71 participants (age 77 yrs ± 7.12) was included. Body mass, body fat percentage, stature, WC and waist:hip ratio were assessed. FVC was assessed by spirometry. Pearson’s correlation coefficient was used to determine the strength and direction of associations. The level of significance was set at p ≤ 0.05.

Results: Of 71 participants (63% female; 37% male), 34 (48%) had WC measures above the norm. Interestingly, the mean WC measures were higher in participants 75 years and older, in both gender samples. FVC measures remained similar across age categories, except in the male participants 90 years and older (0.58 L lower than male average). WC significantly (p ≤ 0.05) and positively correlated with FVC in the total sample (r = 0.29) and within the samples above and below the recommended norm for WC (r = 0.47 and r = 0.66, respectively). Insignificant (p ≥ 0.05) correlations were found between WC and FVC in the gender specific samples.

Conclusion: Positive associations were noted between WC and FVC. This is contradictory to the supporting literature. The associations noted may have been influenced by the greater percentage of the sample falling below WC norm. Future research should use larger samples, including only participants with WC measures greater than the predicted norm, and possibly using a direct measure for central adiposity.

Key words: waist circumference, forced vital capacity, elderly
Faculty Day 2019 Abstract 2019103

Presenting Author: N Puzicha (UP)

Authors: N Puzicha (UP)

Abstract Detail

DETERMINING MEDICATION PRESCRIPTION AND ADMINISTRATION ERRORS IN A PAEDIATRIC ONCOLOGY WARD IN GAUTENG

Introduction: Medication errors in paediatric patients are a complex health problem occurring worldwide. Previous work has researched the incorporation of electronic methods in prescribing and administering medication, but little is known about medication errors in hospitalised children in South Africa, where all prescription and administration of medication is done manually.

Methods: A quantitative, observational, cross-sectional design was used to conduct this study. The setting for the study was a paediatric oncology ward in a central hospital in Gauteng, South Africa. A convenient sampling method was used, and data was collected using pre-determined structured data sheets. A total of 432 prescribed medications written on prescription charts in the paediatric oncology ward were analysed and 1064 medication administrations were directly observed. This data was used to determine the types, frequencies and contributing factors to prescription and medication administration errors.

Results: During prescription chart analysis, a total error rate of 56% was discovered in the general writing and labelling of prescriptions while a significant number (78%) of all prescriptions were incomplete. Relating to the error type, it was found that 119 of 432 prescribed medications had a prescription error with wrong dose errors being the most prevalent. Contributing factors which increase the incidence of prescription errors were scheduled medications, bed occupancy, day of the week, incomplete prescriptions and illegible writing.

Discussion: In the direct observation of medication administration, a significant error rate of 93% was found. Documentation errors comprised 63%, making this type of error the most prevalent. Of 1,064 medication administrations observed, 1 in 10 medications were omitted. When considering the “rights of medication” (right patient, medication, dose, route, time), dose errors were the most frequently observed. Contributing factors which increased the incidence of medication administration errors were the type of medication, scheduled medications, route of administration, rank of the administrator, bed occupancy, and the day of the week on which the administration took place.

Conclusion: The findings indicate that supervision and training in both prescription and medication administration would contribute to achieving this goal.
PERCEPTIONS AND BELIEFS OF PRIMARY CARE NURSES AND GENERAL PRACTITIONERS ON INSULIN INITIATION OF PEOPLE WITH TYPE 2 DIABETES IN THE TSHWANE DISTRICT: A KNOWLEDGE, ATTITUDES AND PRACTICES SURVEY

Background: In South Africa, initiation of insulin in primary care has been identified as a major challenge. Insulin therapy is often delayed or not started, leading to poor clinical outcomes. Perceptions on insulin use vary among healthcare professionals (HCPs) in different cultures and settings.

Aim: To investigate the attitudes and practices of HCPs in order to identify the barriers and opportunities for insulin therapy in primary care in the Tshwane District.

Settings: Primary health care clinics and community health centres in Subdistricts 3 and 6, Tshwane District.

Methods: Structured questionnaires explored domains like attitudes and beliefs regarding insulin, barriers to insulin initiation and reluctance to start insulin. The nurses’ questionnaire was administered by a fieldworker whereas doctors received their questionnaire via email. The surveys were conducted over a period of 13 weeks.

Results: Of the 73 HCPs surveyed, 68% were nurses and 84% were females with a median number of ten years of service in primary care. The main barriers to insulin initiation according to the HCPs were: fear of needles (14%), poor patient knowledge on insulin (13%), poor adherence to treatment (12%), patient socio-economic conditions (11%) and insufficient knowledge and training of HCPs (9%). The majority of HCPs believed that their patients would be worried about having to start insulin (79%). Only 24% of HCPs believed that most patients would eventually need to go on insulin, 86% preferred to delay insulin therapy and 79% thought patients would be reluctant to accept insulin. The majority of doctors were reluctant to start insulin in people with diabetes who did not adhere to their appointments and treatment regimen (91%), who were of a certain age because of the risk of hypoglycaemia (68%) or who were unable to refrigerate insulin (77%). Most nurses (90%) believed that insulin could be initiated by nurses if adequately trained and 77% of doctors thought that changes to the healthcare system were needed to improve insulin initiation.

Conclusion: Interventions focusing on HCPs knowledge, attitudes and practices are required to optimise insulin use in primary care.

Keywords: diabetes, primary care, insulin initiation, KAP survey
Abstract Detail

IN VITRO EFFECTS OF PALMITOLEIC ACID ON OSTEOBLAST DIFFERENTIATION IN MG-63 OSTEOSARCOMA CELLS AND HUMAN ADIPOSE-DERIVED STROMAL CELLS

Introduction: During bone remodelling, osteoclasts resorb bone and osteoblasts form new bone. Osteoblasts are derived from mesenchymal stem cells (MSCs) such as adipose-derived stromal cells (ASCs). ASCs differentiate into adipocytes or osteoblasts, depending on specific regulators. The mitogen-activated protein kinase (MAPK) pathway may interfere with osteoblast differentiation at an early stage. Runt related transcription factor 2 (RUNX2) exerts an effect downstream from p38 MAPK. RUNX2 phosphorylation by p38 MAPK increases osteoblast differentiation markers such as alkaline phosphatase (ALP), osteoprotegerin (OPG) and reduces receptor activator of NF-kB ligand (RANKL) expression. Palmitoleic acid (PLA) has shown to have anti-osteoclastogenic effects through inhibiting MAPK pathways. The effects of PLA on osteoblasts has not yet been reported and may provide insight into the mechanisms of PLA in bone remodelling. The study examined the effects of PLA on osteoblastogenesis in MG-63 osteosarcoma cells and ASCs.

Methods: MG-63 and ASCs were seeded at 5 000 cells/cm² in 96-well plates. Cell viability was measured after 24 hours of PLA (0-100 µM) treatment. MG-63 and ASCs were seeded at 5 000 cells/cm² in 48-well plates and differentiated into osteoblasts using osteogenic media containing 50 µM ascorbic acid, 1 µM dexamethasone and 10 mM ß-glycerophosphate for 21 days in the presence of PLA. ALP activity assay and Alizarin Red S staining was performed to detect ALP and calcium mineral matrix deposition. Gene expression was determined by q-PCR for early osteoblast specific genes such as ALP, OPG and RANKL in ASCs. Future experiments will investigate gene expression in MG-63 cells.

Results: Cell viability was not affected by PLA in undifferentiated MG-63 and ASCs. ALP activity was not increased significantly after 7, 14 and 21 days of PLA treatment in MG-63 and ASCs. Calcium deposition was not significantly increased after 21 days of PLA in MG-63 and ASCs. Q-PCR revealed that ALP and the OPG:RANKL ratio were increased by PLA-treated cells compared to osteogenic media only treated cells in ASCs at 7 and 14 days.

Discussion and Conclusion: PLA increased ALP markers and OPG:RANKL ratio in ASCs, indicating osteogenesis may be stimulated. OPG inhibits bone resorption, thus a high OPG:RANKL ratio may protect bone.
Presenting Author: TCdS Camacho (UP)

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Abstract Detail

COMPARATIVE UPPER-QUARTER POSTURE ANALYSIS OF FEMALE ADOLESCENT FREESTYLE SWIMMERS AND NON-SWIMMERS

Introduction: Adolescent club-level swimmers maintain high training volumes for 11 months of the year. The demanding upper-quarter limb movement patterns imposed by freestyle swimming, may lead to adaptive muscle length and tension changes that may predispose adolescents to postural malalignment, pain and injury.

Aim: The study aimed to record and quantify the static upper-quarter postural alignment of female adolescent freestyle swimmers, and to compare the results to that of their non-swimming peers and to normative values. The study was ethically approved (124/2017). Signed informed consent was obtained from all volunteers before commencement of data collection.

Methods: The evaluation group (EVAL) consisted of 35 competitive swimmers (age: 15 ± 3 y; stature: 166.5 ± 9.9 cm; body mass: 65.5 ± 7.7 kg) and the control group (CON) of 36 peers (age: 15 ± 3 y; stature: 164.2 ± 6.7 cm; body mass: 62.1 ± 9.1 kg). Sagittal posture was assessed by the photographic posture analysis method. Summary statistics (median ± interquartile range) and inter-group differences (Mann-Whitney U-test) were calculated utilising the STATA 13 software package.

Results: The analysis showed significant differences (p = 0.00) between groups for all variables, with EVAL demonstrating restricted median scores for head-tilt angle (-8.7 deg.), cervical angle (-13.3 deg.), and protraction- and retraction angle (-24 deg.) and a higher score for thoracic angle (+7.4 deg.), when compared to CON. Furthermore, the median scores demonstrated by EVAL deviated from accepted normative values for head-tilt angle (-4.6 deg.), cervical angle (-16.5 deg.), protraction- and retraction angle (-15 deg.) and thoracic angle (+21.2 deg.). Therefore, EVAL demonstrated all measurement deviations indicative of risk for forward head with rounded shoulder postural malalignment. However, two median scores demonstrated by CON also deviated from the norm indicating a risk for forward head (cervical angle -3.2 deg.) and mid-thoracic kyphotic posture (thoracic angle +13.8 deg.).

Conclusion: In conclusion, adolescents risk developing upper-quarter postural malalignment possibly because of poor postural habits during computer use, studying, or school backpack carrying. In this group of participants, the risk for postural malalignment and its associated risk for future pain and injury, may have been exacerbated by years of freestyle swim training.
THE ROLE OF THE G PROTEIN COUPLED OESTROGEN RECEPTOR IN THE REGULATION OF METASTATIC PARAMETERS IN AN IN VITRO BREAST CANCER MODEL

Introduction: The G protein coupled oestrogen receptor (GPER) has emerged as an alternative oestrogen receptor and has been linked to tumour progression in various tumour types. A common P16L substitution was found to lead to mislocalisation of the receptor leading to altered function and worse prognosis. Intracellular localisation has been linked to a poorer prognosis and tamoxifen resistance, but the mechanism that governs these changes is not understood presently. In this study the contribution of GPER to breast cancer metastasis was investigated by assessing its influence on metastatic parameters in vitro.

Methods: Genomic sequencing of three breast cancer cell lines with varying metastatic capabilities (MCF-7, MDA-MB-231 and BT-20) was performed to determine which GPER variant is expressed. Protein expression of GPER in these breast cancer cell lines was measured by Western Blot analysis where subcellular localization was studied by confocal microscopy. The effect of GPER activation (by its agonist G-1) and inhibition (by its antagonist G-36) were studied by crystal violet staining and preliminary migration assays were performed in the same way using wound healing assays.

Results: The two metastatic cell lines (MCF-7 and MDA-MB-231) express both the wild-type and P16L GPER variants found diffusely within the cytoplasm, where the non-metastatic BT-20 cell line expresses only the P16L variant found in clusterings throughout the cytoplasm. GPER protein is expressed in all three cell lines with the MCF-7 cell line expressing five times as much GPER protein compared to the MDA-MB-231 and BT-20 cell lines. This contradicts literature where MDA-MB-231 cells are generally used as GPER-negative control. A slight increase in proliferation is seen in MCF-7 and MDA-MB-231 cells when treated with G1 and G-36. Interestingly, no effect on collective migration was seen with either treatments.

Discussion: Preliminary data show no evidence of GPER involvement in collective migration, however this may be due to lack of plasma membrane expression. The effect of GPER on speed and directionality of migration will need to be assessed by live imaging and signalling assays will need to be done to determine if the metastatic and non-metastatic cells couple to different GPER-related signalling pathways.
THE ROLE OF PREF-1 IN IN VITRO ADIPOGENIC DIFFERENTIATION OF MESENCHYMAL STROMAL/STEM CELLS FROM ADIPOSE TISSUE AND WHARTON’S JELLY

Introduction: The ability of human derived mesenchymal stromal/stem cells (hMSCs) to differentiate into adipocytes provides a robust in vitro model to study adipogenesis.

Aim: The aim of this study was to determine whether pre-adipocyte factor 1 (Pref-1), a negative regulator of adipogenesis, may be responsible for the poor adipogenic differentiation observed in human Wharton’s jelly derived mesenchymal stromal/stem cells (hWJSCs).

Methods: hMSCs were isolated from adipose tissue and umbilical-cord derived Wharton’s Jelly and induced to undergo adipogenic differentiation for a period of 21 days. Endpoints investigated included immunophenotype, adipogenic differentiation potential and Pref-1 (mRNA and protein) expression levels.

Results: The results obtained for hWJSCs were compared to those obtained for adipose derived stromal/stem cells (hASCs) which were used as the control cell type given their well-established adipogenic differentiation capacity. A similar phenotypic profile was observed for hWJSCs and hASCs: CD34+/ CD36+/ CD44+/ CD45-/ CD73+/ CD90+/ CD105+. hWJSCs displayed higher levels of Pref-1 mRNA and poor adipogenic differentiation despite PPARγ up-regulation. However, no significant difference in Pref-1 protein expression was detected between the two cell types with the techniques employed. The poor adipogenic capacity of hWJSCs could therefore not be conclusively attributed to Pref-1 at the protein level in this study. Further investigation will be required to explore this phenotype.
Presenting Author: LS Jordaan (Physiology)

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Abstract Detail
A STUDY DEMONSTRATING THE ROLE OF OXIDATIVE STRESS IN ACTIVITY EXERTED BY Diallyl TRISULPHIDE INTERACTIONS IN A NEUROBLASTOMA CELL LINE

Introduction: Anticancer treatments are notorious for having severe side effects and a high cost, while not always being effective. A naturally occurring bioactive compound found in garlic, diallyl trisulphide (DATS), reportedly owns cytotoxic- and antiproliferative effects. The aim of this study was to determine the influence of an antioxidant in the effects exerted by DATS in neuroblastoma (SH-SY5Y) cells.

Materials and Methods: The influence of DATS in the SH-SY5Y cell line was evaluated in the presence or absence of an antioxidant, N-acetyl cysteine (NAC). The influence on cell proliferation was assessed using crystal violet staining (spectrophotometry). The effects on cell rounding and morphology were evaluated using light microscopy.

Results: Data indicates that 2.5 µM, 5 µM, 10 µM, 75 µM and 150 µM DATS exposure for 24 h resulted in cell growth of 97%, 103%, 102%, 57% and 55%. However, when cells were co-exposed to DATS and NAC, cell growth decreased to 84%, 87%, 73%, 47% and 49%. This data suggests that antiproliferative activity was more prominent when cells were co-exposed DATS/NAC compared to DATS-only treated cells. Furthermore, 2.5 µM, 5 µM and 10 µM DATS exposure for 48 hours resulted in decreased cell growth to 94%, 96% and 90%. Co-exposure with DATS/NAC resulted in more prominent decreased cell growth to 93%, 80% and 72%. Data from light microscopy confirms that cell rounding increases after exposure to DATS in a dose-dependent manner. Cell rounding became more prominent after co-exposure to DATS/NAC.

Discussion and Conclusion: Data obtained in this study demonstrates that DATS exhibits antiproliferative activity and induces cell rounding in a dose- and time-dependent manner in the SH-SY5Y cell line. However, when cells are co-exposed to DATS and NAC, these above-mentioned effects are more prominent. Furthermore, the influence of DATS on hydrogen peroxide production and cell cycle progression will be demonstrated by means of fluorescent microscopy (2, 7-dichlorofluoresceindiacetate) of flow cytometry (propidium iodide staining). This study contributes to the known knowledge regarding the effects exerted by naturally occuring organosulphur containing compound in the presence and absence of a well known antioxidant in a nueroblastoma cell lines.
A MULTIFACTORIAL APPROACH TO ANALYSING THE OSTEOLOGICAL MANIFESTATION OF OSTEOPETROSIS

**Introduction:** Osteopetrosis is a rare inherited group of disorders characterised by increased bone density and bony sclerosis. Osteopetrosis has been classified into three broad categories in the literature: autosomal recessive; autosomal dominant type I and autosomal dominant type II. The Pretoria Bone Collection currently houses the skeletal remains of two individuals that demonstrate signs often associated with osteopetrosis; however, no further information regarding the type is available. Furthermore, because the condition is quite rare, the availability of the affected skeletons has offered a unique opportunity to conduct an in-depth investigation into the osteological manifestation of osteopetrosis.

**Methods:** In the study, the osteological manifestation of osteopetrosis was analysed through a multifactorial approach that included morphological assessments, osteometric analyses, and weight analyses. These approaches were unique as the majority of previous studies assessing the condition were limited to assessments of living individuals in case studies.

**Results:** The analysis resulted in demonstrating different osteo-morphological manifestations in the two individuals, namely surface osteoblastic nodule development throughout the skeleton (Individual 1) and smooth, dense surface appearance with minimal osteoblastic nodule development (Individual 2). Descriptive statistics of the osteometric data demonstrated that the cranial dimensions of the affected individuals were up to 41.4% (Individual 1) and 48.5% (Individual 2) larger than the average dimensions. Moreover, the postcranial dimensions were up to 169.7% (Individual 1) and 167.9% (Individual 2) larger than the average postcranial dimensions. The results of the weight analysis showed an extensive difference between the mean bone weights of five female and five male individuals compared to the bone weights of Individuals 1 and 2. Absolute and relative technical error of measurement was used to demonstrate the extent of the increase in bone weight in the affected individuals.

**Discussion:** The current study confirms previous research, as the results show that osteopetrosis causes an extensive change in weight and size of the entire skeleton when compared to unaffected individuals; however, while the bones of both affected individuals are larger and heavier than those of their unaffected counterparts, the individuals studied presented with two distinct morphological manifestations. The current study has provided additional insights into a previously limited bone disease.
Presenting Author: CN Sithole (UP)

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Abstract Detail

IN VITRO EFFECTS OF GPR120 AGONIST ON REACTIVE OXYGEN SPECIES PRODUCTION IN OSTEOCLASTS DERIVED FROM RAW 264.7 MURINE MACROPHAGES

Introduction: Osteoclasts are large multinucleated bone cells derived from macrophage lineage and are capable of resorbing bone when stimulated by receptor activator of nuclear factor-kB (NF-kB) ligand (RANKL) binding to its receptor, receptor activator of NF-kB (RANK). Reactive oxygen species (ROS) are important in cell signalling and evidence strongly suggests that they play a role in osteoclast formation by mediating RANK signalling in osteoclast differentiation. Osteoclast over activity can lead to metabolic bone disorders such as osteoporosis. G-protein coupled receptor 120 (GPR120), a functional receptor for n-3 fatty acids, is highly expressed in RAW 264.7 cells and has been identified as a negative modulator of osteoclast differentiation and function. The aim of the study was to investigate whether TUG-891, a GPR120 agonist, could modulate reactive oxygen species pathways to inhibit osteoclast formation in vitro in RAW264.7 murine macrophages.

Methods: RAW 264.7 cells were seeded at 5000 cells/well in a 96-well plate. Alamar blue assay was performed to assess cell viability after 24 hours exposure to TUG-891 [0, 20, 40, 60, 80 and 100 ÅM]. Dimethyl sulfoxide (DMSO) (0.1%) was used as the vehicle control. Tartrate-resistant acid phosphatase (TRAP) staining was done to assess the effects of TUG-891 on osteoclast differentiation after treatment with RANKL for 5 days. TRAP positive cells of three or more nuclei were counted. All experiments were conducted in triplicate with three biological repeats conducted for each experiment.

Results: TUG-891 did not affect cell viability when compared to the vehicle control. TRAP staining showed a significant reduction in the number of osteoclasts that formed for the 60 and 100 ÅM concentrations of TUG-891 when compared to the RANKL positive treatment.

Discussion and conclusion: The study suggested that GPR120 activation can inhibit osteoclast formation. Future studies will evaluate how TUG-891 affects ROS production and to further elucidate the mechanisms of action of TUG-891 on osteoclast formation. Furthermore, the expression of proteins involved in ROS pathways (Nrf2, NQO1, HO-1 and Nox1) will be assessed to determine whether GPR120 activation can modulate ROS production through these pathways.
Abstract Detail

IDENTIFICATION AND POTENTIAL PHARMACOLOGICAL CHAPERONE RESCUE OF OXYTOCIN RECEPTOR MUTATIONS THAT CAUSE DECREASED CELL SURFACE EXPRESSION

Introduction: Oxytocin is a neuropeptide hormone expressed in neurons of the hypothalamus. These neurons project to the posterior pituitary, where oxytocin is released into the general circulation. The neurons also project to several other brain regions, including the amygdala, which are important for emotion recognition and control. Oxytocin elicits its effects through interacting with the oxytocin receptor (OXTR), a G-protein-coupled receptor (GPCR), which is expressed in many central and peripheral tissues. Oxytocin/OXTR signalling plays a critical role in lactation and parturition. It also has central roles regulating stress responses through the hypothalamic-pituitary-adrenal (HPA) axis and in social and bonding behaviours. Disrupted oxytocin/OXTR signalling has therefore been implicated in many psychological and pathophysiological disorders. Mutations in GPCRs often cause misfolding of the receptor which results in a loss of function as they are detected by cellular quality control (QC) systems and are retained intracellularly and targeted for degradation rather than being expressed at the cell surface. Pharmacological chaperones are small-molecule, cell-permeant drugs which enter the cell and bind to misfolded mutant receptors allowing them to evade the QC systems and essentially rescue receptor cells surface expression and function.

Methods: Several OXTR mutations implicated in various psychological/pathophysiological conditions were identified from a literature search. A variety of in silico tools were then utilised to identify those mutations most likely to disrupt receptor function and structure/folding. These short-listed mutations and were then introduced into a mammalian expression vector encoding the OXTR using site-directed mutagenesis. An inositol phosphate accumulation assay was used to measure response of the mutant receptors to oxytocin stimulation in order to confirm their non-functionality. A receptor ELISA assay was then conducted to determine the cell surface expression of the mutants in order to determine which cause intracellular retention.

Results: The OXTR mutations resulted in varying degrees of receptor signalling and cell surface expression. Those mutations with loss-of-function and reduced cell surface expression will now be selected for investigation of potential pharmacological chaperones (including WAY 267 464, a small-molecule OXTR agonist) able to restore their cell surface expression/function.

Conclusion: OXTR mutations can affect receptor function and/or expression. Therefore, identification of small-molecule (cell permeant) OXTR ligands which can act as pharmacological chaperones therefore might have therapeutic potential.
AN EX VIVO STUDY ON THE EFFECT OF FULVIC ACID ON THE HYPERCOAGULABLE STATUS OF POORLY CONTROLLED TYPE 2 DIABETIC PATIENTS

Introduction: Type 2 diabetes mellitus (T2DM) is a worldwide burden. It was estimated to be responsible for 3.96 million deaths in adults between the age of 20 and 79 years in 2010. This accounts for 6.8% of global mortality. The high prevalence of diabetes has important social, financial and development implications especially in low- and middle-income countries. T2DM is associated with a hyperglycaemic state and hyperglycaemia ultimately result in inflammation and hypercoagulability. In this study, the investigator will observe the effect of Fulvic acid on the hypercoagulable state of poorly controlled type 2 diabetes mellitus patients. Many people do not have access to expensive medical care and Fulvic acid may provide a cheaper alternative.

Materials and Methods: Blood from the test group (20 patients) will be obtained from poorly controlled type 2 diabetes patients form Steve Biko Academic Hospital. Then, naïve whole blood T2DM blood samples will be tested ex vivo before treatment and whole blood T2DM will be tested after treatment, thus with the addition of Fulvic Acid ex vivo. The effect of Fulvic acid on red blood cell (RBC) deformation, agglutination, platelet formation, and fibrin formation after clot formation will be observed using a scanning electron microscope. Viscoelastic properties will be observed using the Thromboelastograph (TEG) to determine the reaction time (R), kinetics (K), angle, and maximum amplitude (MA) of clot formation. These results will be used to compare poorly controlled T2DM before treatment with poorly controlled T2DM after Fulvic Acid treatment ex vivo.

Possible results: No significant results were obtained from the TEG. This can be due to the small sample size. Sample collection is still ongoing, for a bigger sample size. Morphological results should still be obtained to see if Fulvic avid had an effect on the morphology of the cells.

Possible Conclusion: Fulvic Acid had no significant effect on the hypercoagulable status of poorly controlled type 2 diabetic patients when considering the TEG. It can therefore be concluded, that it cannot be used as a cheaper alternative method to improve the hypercoagulable status of these patients. However, the morphology should also be considered before making a final conclusion.
Presenting Author: N Surajlal (Physiology)

Authors: N Surajlal (Physiology), AM Joubert (Physiology), FAM Wenhold (Human Nutrition), MH Visagie (Physiology)

Abstract Detail

OXIDATIVE-STRESS MEDIATED CELL DEATH INDUCED BY A GARLIC CONSTITUENT (DIALLYL TRISULFIDE) IN BREAST CANCER CELLS

Background: Breast cancer is the leading cause of cancer-related mortality in women worldwide. Previous studies have suggested that diallyl trisullphide (DATS), a constituent of garlic, exerts antiproliferative effects in breast cancer cells. The aim of this study was to investigate the role of reactive oxygen species (ROS) in the effects exerted by DATS in a tumourigenic breast cell line.

Materials and Methods: Triple negative breast cancer cells (MDA-MB-231) were exposed to DATS (10 μM-150 μM) in the presence or absence of an antioxidant, 2 mM N-acetyl cystein (NAC). The effect of DATS on proliferation and cell morphology (cell rounding) was assessed using spectrophotometry (crystal violet) and light microscopy. The production of hydrogen peroxide was evaluated by means of fluorescent microscopy (2,7-dichlorofluoresceindiacetate) and the cell cycle progression was evaluated by flow cytometry (propidium iodide).

Results: Crystal violet data demonstrated a dose-dependent decrease in proliferation from 83.93% (10 μM DATS) to 52.67% (150 μM DATS) after 24 hours of treatment, which was increased by NAC to 97.54% (150 μm DATS). Light microscopy indicated a dose-dependent increase in cell rounding induced by DATS from 9 (10 μM) to 55 (150 μM) after 24 hours of exposure. However, co-exposure with NAC decreased rounded cells to 6 cells after exposure to 150 μM DATS. Fluorescent microscopy demonstrated a dose-dependent increase in ROS production measured by fluorescent intensity from 0% (10 μM) relative to cells in growth media to 67% (150 μM). Flow cytometry indicated a dose-dependent increase in the sub-G1 phase (suggesting the occurrence of apoptosis) from 11.65% (10 μM) to 26.42% (150 μM) after 24 hours of exposure to DATS. However, the increase in the sub-G1 phase was significantly inhibited by NAC (7%) after exposure to 150 μM DATS.

Discussion and Conclusion: This study demonstrates that the effects of DATS on proliferation, morphology, ROS production and cell cycle progression are inhibited by NAC in the MDA-MB-231 cell line suggesting that DATS exerts a ROS-dependent mode of action. Research contributes to knowledge of the role of oxidative stress induced by DATS in a breast tumourigenic cell line.
Presenting Author: O Smit (UP)

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Abstract Detail

HIGH-RISK HUMAN PAPILLOMAVIRUSES DETECTION USING SELF-COLLECTED AND HEALTH CARE WORKER COLLECTED SAMPLES FOR HUMAN PAPILLOMAVIRUSES PRIMARY SCREENING

Background: The Human papillomavirus (HPV) is the most common sexually transmitted infection worldwide. Persistent infections with high-risk HPV (hr-HPV) genotypes lead to precancerous lesions that can ultimately result in cervical cancer. In South Africa (SA) cervical cancer is a key cause of morbidity and mortality with the number of invasive cervical cancer cases remaining very high, and therefore proper prevention programmes such as HPV screening and recall systems are needed.

Aim: To evaluate the digene® HC2 HPV DNA assay (QIAGEN, Germantown, USA) as a primary screening assay for hr-HPV genotypes in SA women. Objectives: To perform hr-HPV genotyping in self-collected samples (SS) versus health care worker collected samples (HCWS) for detection of hr-HPV using digene® HC2 HPV DNA assay.

Methods: This was a cross-sectional study with 400 women aged 25 - 65 years, in which the digene® HC2 HPV DNA assay was used for detecting hr-HPV genotypes in SS and HCWS methods. The digene® HC2 HPV DNA assay is considered as the gold standard method for HPV screening, as being the first FDA approved assay for hr-HPV diagnostic assay.

Results: Of the overall 400 patients, 82.5% (330/400) had concordant results for both SS and HCWS sampling methods. While a total of 17.5% (70/400) had discordant hr-HPV results, with 30% (21/70) hr-HPV positive only for HCWS, and 70% (49/70) were hr-HPV positive only for SS. The PPV and NPV between the two sampling methods were 63% and 92% respectively, while the sensitivity and specificity was 80% and 83% respectively. By using the kappa formula, a kappa value of 0.58 (moderate agreement) was determined between HCWS and SS.

Discussion and Conclusion: While some health care workers as well patients are concerned with the quality of self-sampling, the current study has shown a good concordance between SS and HCWS sampling methods comparable with other studies. The use of HPV self-sampling could potentially improve women participation in early HPV screening and the detection of cervical cancers, especially in developing countries.
Presenting Author: MK Naude (UP)

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Abstract Detail

ASSESSMENT OF THE TOXICITY, ESTROGENIC AND ANDROGENIC ACTIVITY OF VARIOUS BRANDS OF PARACETAMOL AND IBUPROFEN

Introduction: Scientific literature has revealed that many environmental contaminants, including pharmaceuticals, are found in drinking water sources in South Africa and act as endocrine disrupting chemicals (EDCs). EDCs are described as “exogenous substances that cause adverse health effects in an intact organism, or its progeny, consequent to changes in endocrine functions.” Many of these environmental contaminants have been associated with reproductive health issues in both humans and wildlife due to long term low levels of exposure. EDCs can be of organic or synthetic origin and can impact on hormone biosynthesis, secretion, transport, metabolism or elimination of hormones.

Methods: In this study, two common pharmaceuticals, ibuprofen and paracetamol, are analysed to determine if they possess estrogenic and androgenic activity using recombinant yeast screen assays. Moreover, the role of added chemicals in the commercial formulations of these analgesics is tested. Subsequently, the possible toxicity of these compounds is tested in the mammalian Sertoli cell line TM4 by measuring cell growth using MTT assays in response to exposure.

Potential impact: This study will give valuable information regarding the endocrine disruptive activity and toxicity of paracetamol and ibuprofen that has been detected in drinking water sources in South Africa, thereby addressing United Nations Sustainable Development Goals 3 (good health and well-being) and 6 (clean water and sanitation).
Abstract Detail

THE IMPACT OF AN 8-WEEK POWER OUTPUT TRAINING PROGRAM ON THE AGILITY AND POWER OUTPUT OF CYCLISTS

Introduction: Physical activity is movement of the body that works the muscles and requires energy. Performance markers include sleep, hydration, energy levels, mood state, body weight, wellness, pain and performance. To achieve a high level of performance for a longer duration of time, muscle fatigue needs to be postponed. This study will evaluate the effectiveness of an 8-week power output training program on the power output, brain and body agility of cyclists.

Materials and Methods: In this intervention study we will be focusing on the power output, body composition, brain and body agility of cyclists. The 20 participants in study will consist of cyclist from the RevolutionFit Cycle Lab where standardized environmental conditions of temperature, luminosity and noise will be set. These aspects will be assessed by means of a pre-assessment, an 8 week power output training program and a post-assessment test. The pre- and post-assessments will consists of the Neuro-Agility Profile (NAP) Advanced+ assessment, InBody and Functional Threshold Power output (FTP) test. The NAP Advanced+ is a multidimensional neuroscience approach to the brain and it is a brain profiling assessment that provides people with opinion on the thirteen components of neuroagility. A regular FTP assessment gives an indication of improvement in an individual’s performance level. The pre-assessments values will then be compared to the post-assessments values to indicate any increase or decrease in performance.

Potential Results: The potential outcomes of this study predict an improved neuro agility and a higher functional threshold power (FTP) test which results in an increased power to weight ratio.

Potential Discussion and Conclusion: Potentially we can conclude that the 8-week power output training program will improve agility and FTP levels of the cyclists. Ultimately, this study has the potential to have a valuable impact as it can possibly improve performance of cyclists when competing.
IDENTIFICATION OF MISSENSE SINGLE NUCLEOTIDE POLYMORPHISMS IN THE G PROTEIN COUPLED OESTROGEN RECEPTOR THAT AFFECT CELL SURFACE EXPRESSION AND SIGNALLING.

Introduction: Breast cancer is the most frequent cause of cancer related deaths among women. Increased risk of breast cancer has been linked to long term exposure to oestrogen which plays an important role in the reproductive development of females. Oestrogen acts by binding to and activating various oestrogen receptors, including the seven transmembrane G protein-coupled oestrogen receptor (GPER). Upon oestrogen stimulation, GPER activates several downstream signalling pathways that results in the proliferation and migration of breast cancer cells. Endocrine therapy for breast cancer, such as tamoxifen treatment and aromatase inhibitors, targets the action of oestrogen but studies show that GPER may in fact induce resistance to such treatments. To understand the relationship between GPER and breast cancer biology including chemoresistance and migration, the genetic variation of GPER and its effect on the physiological function of the protein is studied. Several known missense polymorphisms in the GPER gene are recreated in an in vitro cell system and used to analyse their effect on receptor expression, localisation, signalling capability and cell proliferation.

Methods: Five annotated missense polymorphisms of GPER with potential functional effects were identified. The polymorphisms were recreated in an in vitro cell system by cloning the mutations and expressing the variant protein. GPER expression was analysed using western blot while localisation was visualised using Confocal Laser Scanning Microscopy (CLSM). Lastly, cell proliferation and cell signalling were assayed using appropriate analyses.

Results: 5 nucleotide changes were introduced separately into the wild type GPER construct and expressed in HEK293T cells. CLSM imaging revealed that GPER is mostly localised intracellularly potentially on the endoplasmic reticulum with no significant differences between the wildtype and the mutants.

Conclusion: A number of polymorphisms of GPER have been identified with potential function altering effects. So far, no differences in localisation of these mutants have been observed but it is clear that GPER is not a predominantly plasmamembrane localised GPCR.
THE IN VITRO DIFFERENTIATION OF ADIPOSE-DERIVED STROMAL CELLS INTO THE MYOGENIC LINEAGE

Introduction: Mesenchymal stromal cells (MSC) are a population of adult stem cells that exhibit multilineage differentiation potential and differentiate into adipogenic, osteogenic, chondrogenic and myogenic lineages. The inherent multipotency of MSCs make them relevant for the possible treatment of musculoskeletal disorders. MSCs isolated from the stromal vascular fraction of adipose tissue are referred to as adipose-derived stromal cells (ASC). A limitation associated with ASC expansion includes a lack of standardised protocols and the use of non-human supplements. The Institute for Cellular and Molecular Medicine (ICMM) has published extensively on the adipogenic differentiating of ASCs. The aim of this study was to optimise the differentiation of ASCs into the myogenic lineage.

Methods and Materials: Undifferentiated ASCs was isolated from lipoaspirates (obtained from voluntary procedures done in healthy patients) via collagenase digestion and immunophenotyped using defined cluster of differentiation markers. ASCs were induced in medium supplemented with either dexamethasone and hydrocortisone (Dex/Hydro) or 5-azacytidine (5-Aza) alone. ASC myogenic differentiation was studied at 7-day intervals over 42 days in the Dex/Hydro-stimulated induction, and 21 days for 5-Aza. Cell morphology was assessed using brightfield and confocal microscopy and compared to differentiating C2C12 murine myoblasts which served as a positive control. To obtain fluorescence images, cells were fixed, permeabilised and stained with 4',6-diamidino-2-phenylindole and tetramethylrhodamine-conjugated phalloidin to visualise the nuclei and actin filaments respectively. Myotubes were defined as multinucleated cellular structures. The appropriate controls were included in this study. Ethical clearance was obtained from the Faculty of Health Sciences Research Ethics Committee, University of Pretoria.

Results and discussion: Addition of media containing both Dex/hydro or 5-Aza promoted differentiation over their respective induction periods. Myotube formation was observed from day 14 and resembled the multinucleated structures observed during the differentiation of C2C12 cells.

Conclusion: Biochemical induction promoted differentiation of ASCs into a myogenic lineage. Further analysis to confirm myogenesis based on gene expression using reverse transcriptase real-time PCR and protein expression using immunocytochemistry for appropriate myogenic targets will provide more insight to this process.

Keywords: Adipose-derived stromal/stem cells; ASC; Mesenchymal stromal/stem cells; MSC; myogenesis; differentiation.
PRESENTING AUTHOR: M Tshabalala (Institute for Cellular and Molecular Medicine)

AUTHORS: M Tshabalala (Institute for Cellular and Molecular Medicine)

Abstract Detail

IMPUTATION AS A TOOL TO UNDERSTAND HLA DIVERSITY IN SOUTH AFRICAN POPULATIONS

**Background:** Despite the importance of human leukocyte antigen (HLA) typing results in research and clinical applications, HLA typing is still generally inaccessible in most resource-limited settings. There are however an increasing number of next generation sequencing data sets from South Africans that may be used to determine HLA alleles in silico. We describe HLA alleles from 24 whole genomes from South African individuals using in silico methods to augment the paucity of HLA diversity data in these populations.

**Methods:** Ethical approval was granted by University of Pretoria and the Southern African Human Genome Program (SAHGP) ethics committees. Whole genome sequence data was used to determine HLA alleles by HLAscan and HLA-HD imputation tools. Additionally, classical HLA alleles were imputed from SNP genotyping data of the 24 South African genomes.

**Results:** In silico HLA imputation methods predicted high resolution (up to 8 digits) classical and non-classical HLA alleles from the 24 South African genomes. From SNP based imputation, classical HLA allele amino acid sequences were also determined using SNP2HLA tool.

**Conclusions/Significance:** We demonstrate the feasibility of using whole genome sequence and single nucleotide (SNP) data to understand HLA diversity, especially in populations with limited HLA typing data. With the increasing availability of human genomic data at the population level through improvements in NGS and reduction of sequencing costs, HLA imputation might augment HLA typing. Results from this study benchmark the use of sequencing data to support HLA disease association studies, population genetics and to better inform donor recruitment strategies into registries.
THE ROLE OF OXIDATIVE STRESS IN THE EFFECTS MEDIATED BY A GARLIC CONSTITUENT (DIALLYL TRISULFIDE) WITHIN A CERVICAL CANCER CELL LINE.

Background: Cervical cancer is the fourth most commonly diagnosed cancer with approximately 90% of cervical cancer-related mortality occurring in developing countries. Diallyl trisulphide (DATS) is an organosulfur compound found in garlic that exerts antiproliferative- and antimitotic activity in several tumourigenic cell lines. The aim of this study is to investigate if DATS exerts antiproliferative activity, antimitotic activity and induces cell death in tumourigenic cervical cancer cells and to determine if these above-mentioned effects are dependent on reactive oxygen species (ROS) production.

Materials and methods: Cervical cancer cells (HeLa) were exposed to DATS (25 Åµm - 300 Åµm) in the presence and absence of 2mM N-acetyl cysteine (NAC), a ROS scavenger, for 24- and 48 hours. The effect of DATS on cell growth was assessed using spectrophotometry (crystal violet assay). The influence of DATS on cell rounding and morphology were investigated by means of light microscopy.

Results: Data showed that 200 Åµm DATS exposure for 24 hours decreased cell growth to 83%; however, the antiproliferative effect was completely abrogated by NAC. Furthermore, 48 hours exposure to 25 Åµm, 75 Åµm, 150 Åµm, 200 Åµm and 250 Åµm DATS reduced cell growth to 86%, 64%, 48%, 44% and 40%. These antiproliferative effects were completely inhibited when cells were co-exposed to DATS and NAC. Light microscopy revealed that DATS decreases cell density and increases cell rounding in a dose-dependent manner. Furthermore, these effects on cell rounding induced by DATS were completely abrogated by NAC.

Discussion and conclusion: This study shows that the effects of DATS on proliferation and cell rounding are inhibited by NAC in the HeLa cell line, which suggests that DATS exerts a ROS-dependent mode of action. The influence of DATS on hydrogen peroxide production and cell cycle progression will be assessed in the future via fluorescent microscopy and flow cytometry, respectively. This study adds to what is currently known about the role of oxidative stress in the effects induced by DATS in a cervical tumourigenic.
Abstract Detail

THE ROLE OF OXIDATIVE STRESS IN THE EFFECTS MEDIATED BY A GARLIC CONSTITUENT (DIALYL TRISULFIDE) WITHIN A CERVICAL CANCER CELL LINE.

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IN VIVO IMAGING OF CHRONIC PAIN DISORDERS: TRACER BIODISTRIBUTION, PHARMACOKINETIC AND TARGETED IMAGING IN DOGS USING GALLIUM-68-SUBSTANCE-P-PET/CT

Background: Chronic pain disorders, such as fibromyalgia, have been associated with several pathophysiological mechanisms including increased amounts of Substance P and NK1 receptors, documented in histological samples of chronically painful tendon tissue.1 Despite promising results in rodents, systemic blockade of NK1 receptors in patients has not shown any convincing analgesic effect. This study aims to evaluate biodistribution studies of Gallium-68 (68Ga) radiolabelled 1,4,7,10-tetraazacyclododecane-1,4,7,10-tetraacetic acid-[Thi8, Met(O2)11]-Substance P (DOTA-SP) in healthy dogs and in dogs that suffer from chronic pain by way of PET/CT imaging as a potential diagnostic agent for NK-1 receptor distribution. Domesticated animals (e.g., cats and dogs) are considered to be better models than rodents for translation into humans.

Methods: 68Ga-radioactivity was obtained by eluate fractionation from a tin-dioxide-based 68Ga/68Ge generator (0.6M HCl); 50 μg of sodium acetate buffered DOTA-SP (pH 3.5-4) was incubated at 95 °C for 15 min followed by purification. The radiochemical purity was determined by HPLC using an Agilent 25 cm StableBond column with isocratic conditions: 75% of 0.1% TFA/H2O and 25% of 0.1% TFA/acetonitrile. Following sterile filtration, 68Ga-DOTA-SP was administered intravenously and tracer biodistribution was demonstrated in healthy & diseased dogs using 3 static PET/CT image acquisitions within 150 min. The SUV quantification was achieved by 3D-VOI (volume of interest) analysis. Tracer represented in arterial blood and urine samples was quantified.

Results: The radiochemical purity of 68Ga-DOTA-SP was ≥ 98%. The highest tracer uptake occurred in the urinary bladder (5.6 MBq, SUV= 44 g/ml) and kidneys demonstrating rapid renal excretion. Considerable tracer uptake was observed in liver (3.3 MBq, SUV= 3.5 g/ml) due to first pass effects, and intestines (1.8 MBq, SUV= 0.9 g/ml), decreasing gradually over 120 min. Minimal uptake was seen in other organs (SUV≤ 0.50 g/ml). Time-activity-curves yielded a pharmacological half-life in healthy dogs of 6 min for 68Ga-DOTA-SP and an excretion rate of 19 MBq/hour; 43% of the activity was recovered in urine over 150 min. Abnormal tracer uptake was observed in 3/3 dogs including the legs, hips and shoulders. Intense unilateral 68Ga-DOTA-SP accumulation was particularly noted in the hip region of a dog presenting with chronic pain and lameness in the back legs.

Conclusion: 68Ga-DOTA-SP labeling could be achieved with high radiochemical purity. In vivo, the tracer showed rapid renal elimination and minimal non-specific organ uptake. The ability to target a “painful site” in a dog with chronic pain warrants further preclinical and clinical testing concerning diagnosis of chronic pain disorders.

REFERENCES:
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Authors: NL Verwey (Human Nutrition), FAM Wenhold (Human Nutrition), JC Jordaan (Statistics)

Abstract Detail
NUTRIENT INTAKE OF FIRST AND THIRD YEAR DIETETICS STUDENTS AT THE UNIVERSITY OF PRETORIA

Introduction: University students are an important target group for dietary assessment, as habits may track into later adulthood and become a risk for developing non-communicable diseases (NCDs). Dietetics students as future nutrition educators should be aware of their own intakes and the challenges involved in recording dietary intake. Furthermore, the diet of students may change as they progress their studies.

Aim: To evaluate and compare nutrient intakes of first and third year dietetics students at the University of Pretoria (UP).

Methods: In this cross-sectional study, the population was first (2012-2015) and third year (2012-2017) dietetics students. Dietary intake was assessed using multiple-day, weighed food records. All data were analysed by the same dietitian (FoodFinder3). Intakes were evaluated by comparison to Dietary Reference Intakes (DRIs). Beyond descriptive statistics, comparison between the two groups was done with Mann-Whitney U. Ethical approval: 2/2018.

Results: The reported mean energy intake of first (n=105) and third year (n=166) groups was below the Estimated Energy Requirement (EER). About half of the third years did not meet the Acceptable Macronutrient Distribution Range (AMDR) for carbohydrates. The intakes of both groups for carbohydrates and protein met the Adequate Intakes (AIs). Over 50% of both year groups met the Estimated Average Requirement (EAR) for riboflavin, vitamins B6, B12 and zinc. EARs were met by over 50% of the third year group only for vitamins A and C. For calcium, only 17% of the first years and 36% of the third years were above the EAR. Only 8% of all participants exceeded the EAR for folate. There was a significant difference (P≤0.001) between the two year groups for magnesium, protein, calcium, vitamin A and zinc. Mean intakes of first years were all lower than the third year group (exception: carbohydrates). Of all the participants, 8% exceeded the Upper Limit (UL) for magnesium.

Conclusion: A large percentage of dietetics students, particularly first year dietetics students, recorded intakes below the recommendations for selected nutrients. However, underreporting cannot be ruled out.
IMPACT OF AN ERAS PREOPERATIVE FASTING EDUCATIONAL INTERVENTION ON THE KNOWLEDGE, ATTITUDES, BELIEFS AND PRACTICES OF NURSES AND DIETITIANS IN GOVERNMENT HOSPITALS (PRETORIA)

Background: Enhanced recovery after surgery (ERAS) program is a multidisciplinary approach designed to increase pain-free and stress-free surgical procedures, reduce morbidity and decrease length of hospital stay. In South Africa, limited research regarding ERAS preoperative fasting guidelines implementation indicates that health care professionals has inadequate knowledge and training on these guidelines, thus highlighting the need for educational interventions to be developed.

Objectives: To assess the impact of an educational intervention (PROF-G) on the knowledge, attitudes, beliefs and practices (KABP) of healthcare professionals regarding ERAS preoperative fasting guidelines.

SETTING: Adult surgical wards in two government hospitals in Pretoria.

Methods: The study was a quantitative, experimental Quasi, non-equivalent control group design. The sample size for the experimental group was n= 41 (Dietitians = 6; nurses = 35) and the control group n= 9 (Dietitians = 5; nurses = 4). The experimental group received 10 minutes of education on pre-operative fasting ERAS guidelines and the control received no education. The impact of the education program on the participants’ KABP was measured using a pre-intervention and post-intervention questionnaire with data analysed in Microsoft excel using descriptive statistics.

Results: The KABP of the participants in the experimental group showed improvement from baseline scores in all 4 categories after the education intervention. Knowledge scores improved by a score of 4.9 (23.33%) for dietitians and 4.5 (21.43%) for nurse. Attitude scores improved by 1.7 (17%) for dietitians and 2.85 (28.5%) for nurses. Belief scores improved by 3.4 (26.67%) for dietitians) and 6.29 (41.9%) for nurses. Practice scores improved by 0.37 (3.08%) for dietitians and 9.74 (81.17%) for nurses. Control group scores showed negligible changes.

Conclusion: The study found that overall KABP of ERAS pre-operative fasting guidelines was poor for both dietitians and nurses. After the PROF-G education intervention, the KABP improved with the knowledge scores showing the most improvement. Further studies with larger sample sizes are needed to confirm the impact of ERAS education interventions.
Abstract

RISK FACTORS ASSOCIATED WITH MORTALITY IN CHILDREN UNDER FIVE YEARS OLD WITH SEVERE ACUTE MALNUTRITION IN LIMPOPO PROVINCE-SOUTH AFRICA, 2014-2018

Background: Mortality in children <5 with Severe Acute Malnutrition (SAM) reaches up to 30% in South Africa despite the implementation of the World Health Organization SAM management guidelines. We aimed to identify risk factors associated with mortality among children <5 hospitalized with SAM in Limpopo Province public hospitals from 2014 to 2018.

Methods: We conducted a cross-sectional review of hospital records of children <5 who were admitted with SAM in seven hospitals of Limpopo Province. We extracted socio-demographic and clinical history information from admission books, patient files and death registers using a data capture sheet. We used chi-square test and multivariable logistic regression to identify risk factors associated with mortality.

Results: A total of 956 children were included in the study, with 50.2% (480/956) males and 49.8% (476/956) females. The median age was 13 months (range 2 to 59 months) and 45.3% (433/956) of the children were between two and twelve months old. The overall SAM mortality from 2014 to 2018 was 25.9% (248/956). Diarrhoea and lower respiratory tract infections were the most common complications among SAM children with 63.8% (610/956) and 42.4% (405/956) respectively. Factors associated with mortality included history of herbal medication ingestion (adjusted Odds Ratio (aOR): 2.1, 95% Confidence Interval (CI): 1.2-2.6, p=0.008), diarrhoea (aOR: 1.9, 95% CI: 1.2-3.3, p=0.011), anemia (aOR: 3.8, 95% CI: 2.2-6.6, p<0.001), hypoglycemia (aOR: 11.2, 95% CI: 5.3-23.6, p<0.001) and human immunodeficiency virus (HIV) infection (aOR:2.2, 95% CI: 1.4-3.9, 0.002).

Conclusions: Herbal medication and health conditions such as diarrhea, anemia, hypoglycemia and HIV infection were associated with increased mortality in children with SAM. These risk factors should be taken into consideration when managing children with SAM.

Key words: Severe Acute Malnutrition; Mortality; <5 children; Limpopo Province
AN EX VIVO STUDY ON THE EFFECT OF CURCUBOOST ON THE HYPERCOAGUBILITY OF POORLY CONTROLLED TYPE 2 DIABETES MELLITUS PATIENTS

Introduction: Diabetes Mellitus is one of the most prevalent metabolic diseases in the world. Type 2 Diabetes Mellitus is the most commonly diagnosed form of diabetes and can affect people of any age, gender and ethnic background. The disease can develop due to multiple factors and is marked by hyperglycaemia as a result of insulin resistance and a corresponding drop in insulin production. It is also associated with a disturbance in haemostasis, often leading to hypercoagulation and pathological changes to erythrocytes, mainly due to the upregulation of circulating inflammatory markers within this population. This hypercoagulable state most notably affects the vascular system, which is especially sensitive to inflammation that activates the coagulation system. This disturbance within the vascular system contributes to poor wound healing, a phenomenon commonly associated with patients diagnosed with the disease.

This study aims to investigate the effect of Curcuboost on the hypercoagulability of poorly controlled Type 2 Diabetes Mellitus (T2DM) patients. This will be achieved by investigating the ultrastructural changes that occur in components involved in the coagulation system, as well as examining the viscoelastic properties of blood collected from patients diagnosed with the disease. This study is intended to gain insight on the effects that these haematological changes have on the process of wound healing and circulation as well as to better understand and open opportunities to provide a more cost-effective treatment for managing the complication of the disease.

Materials and Methods: This study will be a laboratory based experimental study. Sample analysis using scanning electron microscope (SEM) and Thromboelastography (TEG), and will be done on blood ex vivo obtained from an experimental group of T2DM patients from the Steve Biko Academic Hospital.

Potential Results: The project outcome would potentially be to demonstrate whether CurcuBoost will have an effect on the coagulation process in poorly controlled T2DM patients. We hypothesize that Curcuboost will decrease the rate of fibrin clot formation and thus improve the hypercoagulability state of poorly controlled T2DM patients.

Potential Discussion and Conclusion: The project output will be to potentially identify a natural and more cost effective alternative for treatment of Type 2 Diabetes Mellitus related hypercoagubility to improve circulation and aid poor wound healing within this population.
RESPIRATORY ILLNESS INCIDENCE, DETAILED CLINICAL DIAGNOSES, CLINICAL CHARACTERISTICS AND SEVERITY DURING THE SUPER RUGBY UNION TOURNAMENT A PROSPECTIVE STUDY INVOLVING 103 979 PLAYER DAYS

Background: Respiratory tract (RT) illness accounts for a significant proportion of medical consultations in elite athletes. The incidence, clinical diagnoses, clinical characteristics and severity (time loss ≥1 day) of RT illness in rugby players during the annual Super Rugby tournament, over five consecutive seasons were determined.

Methods: Elite rugby players (n=1144) from 5 South African teams participating during the 2013-2017 seasons, were followed over the 16-week competition period for each year (103 979 player days). Team physicians completed a daily illness log, consisting of the daily squad size and RT illness details, including: clinical diagnoses (infective/non-infective), clinical characteristics (symptoms) and training/match days lost.

Results: The RT system accounted for 67.7% of all illness. Infective RT illness at 58.5% (IR=2.6/1000 player-days, 95% CI: 2.3-3.0), was significantly more (p<0.001) than non-infective RT illness at 9.2% (IR=0.4/1000 player-days, 95% CI: 0.3-0.6). Diagnoses of infective illness (% of all illness) included: acute upper RT infections (45.4%), influenza (4.5%), and acute lower RT infection (2.6%). Diagnosis of non-infective illness: allergic rhinitis (3.6%), allergic sinusitis (3.4%). Most common presenting symptoms: sore throat (48.0%), cough (15.8%), fever (8.6 %). Time loss of ≥1 day was reported for all RT system illness (49.7%), RT infections (55.7%), and RT non-infections (11.6%). Time-loss of ≥1 day was 100% for influenza and pneumonia, followed by acute lower RT infections (91.7%), acute infective sinusitis (55.6%), and acute upper RT infection (49.5%).

Conclusion: During the Super Rugby tournament, infective RT illness accounts for >58% of all illness. The most common diagnoses are acute URT infection, influenza and allergic conditions, with sore throat, coughing and fever the most common presenting symptoms. Team physicians need to take this in account when preparing the medical bag. Preventative measures can only be designed and implemented to protect the health of these athletes once risk factors are known.
ROLE OF OXIDATIVE STRESS IN APOPTOSIS INDUCED BY A SULPHAMOYLATED ESTRADIOL ANALogue IN BREAST CELL LINES

Background: In silico-designed estradiol analogues including 2-ethyl-13-methyl-17-oxo-7,8,9,11,12,13,14,15,16,17-decahydro-6-cyclopenta[a]phenanthrane-3 sulphamate (ESE-one) induce oxidative stress, exert antiproliferative- and antimitotic activity. However, the mode of action utilized by ESE-one remains to be elucidated. The aim of the study was to assess the role of oxidative stress in the induction of apoptosis by ESE-one in breast tumourigenic cell lines.

Methods: The effects of 0.5 µM ESE-one were investigated in the presence or absence of various reactive oxygen species (ROS) scavengers in MCF-7- and MDA-MB-231 cell lines after 24 hours exposure. Influence on cell growth, morphology and ROS production were evaluated using spectrophotometry, light microscopy and fluorescent microscopy. Flow cytometry was utilised to investigate effects on mitochondrial membrane potential and cell cycle progression.

Results: Antiproliferative activity was demonstrated by 0.5 µM ESE-one with 40% cell growth reduction. Tiron (superoxide radical scavenger) abolished ESE-one’s antiproliferative activity. N,N’-dimethylthiourea (hydrogen peroxide scavenger) exposure inhibited ESE-one’s antiproliferative activity in the MCF-7 (100%)- and MDA-MB-231 (80%) cell lines. Exposure to trolox (peroxyl radical) resulted in partial restoration of cell growth in MCF-7- (75%)- and MDA-MB-231 (70%) cell lines. Light microscopy data revealed an appearance of rounded cells following ESE-one exposure. Combination exposure to ESE-one with tiron, N,N’-dimethylthiourea and trolox resulted in a decreased number of rounded cells (69%, 91% and 81%). Fluorescent microscopy confirmed increased ROS production induced by ESE-one. Cell cycle data demonstrated a decrease in MCF-7 cells in G2/M phase in cells exposed to ESE-one when co-exposed with tiron (34%) and trolox (30%) compared to ESE-one only. In ESE-one-treated MDA-MB-231 cells, the rescue effect was also present in tiron-co-treated cells (37%) and in trolox-co-treated cells (18%). ESE-one induced mitochondrial membrane depolarization in the MDA-MB-231 cells. This effect was abolished by tiron and N,N’-dimethylthiourea.

Discussion and conclusion: This study suggests that the antiproliferative- and antimitotic activity exerted by ESE-one in breast tumourigenic cell lines is dependent upon production of superoxide, hydrogen peroxide and peroxyl radicals. Involvement of the mitochondrial membrane potential is indicated in the MCF-7 cell line owing to superoxide and hydrogen peroxide. This study contributes towards knowledge regarding the oxidative-stress signaling pathways utilised by antimitotic sulphamoylated compounds.
RELIABILITY OF BASELINE CONCUSSION TEST RESULTS IN YOUTH ATHLETES FROM TWO CONSECUTIVE SPORTS SEASONS

**Background:** The baseline method of the King-Devick test and the Cogstate test is widely accepted as one of the safest approaches in the management of a concussion. The comparison between post-injury and baseline values can aid in an accurate and unbiased return to play decision. However, the natural growth and development of the brain, especially in children and adolescents, may influence the reliability of concussion tests.

**Aim:** To determine test-retest reliability from one sports season to the next, for both the King-Devick and the Cogstate test in male and female adolescents aged 13-18 years.

**Methods:** A prospective study design, where participants served as their own control, was employed. A total of 108 (King-Devick) and 112 (Cogstate) participants completed their pre-season baseline in 2016 and 2017.

**Results:** King-Devick results showed a significant difference (p = 0.001) between baseline values after a year. Test-retest reliability was low (r=0.58) between 2016 and 2017 baseline values. Cogstate results also showed a significant difference (p = 0.02) between baseline values after a year. Test-retest reliability was low (r=0.54) between 2016 and 2017 baseline values.

**Conclusion:** Age was a significant factor, more so than sex, in the differences reported for both the King-Devik and Cogstate tests, especially in the younger age groups. Baseline testing should be administered regularly, i.e. less than one year apart, to ensure test-retest reliability and to account for neurological changes associated with aging.
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Abstract Detail
ASSESSING MODIFIED CHITOSAN WOUND DRESSINGS TO ENHANCE WOUND HEALING IN THE PORCINE MODEL

Background: Dressings enhancing wound healing can improve the outcome of wounds where tissue replacement is required, like for burns and ulcers. Chitosan (Cs) is reported to bind growth factors, with reduced wound healing times when used in dressings. Lipophilic modified chitosan was chemically synthesised by addition of different percentages of lauric acid residues to improve on Cs outcomes.

Methods: Lauroyl chitosan (LCs) was synthesised and chemically characterized. Cytotoxicity/proliferation assays using primary fibroblasts and sulphorhodamine-B for cell enumeration were performed as well as a skin sensitivity patch assay. Porcine collagen extracted from skin was added to lauroyl chitosan (1:4) to make a wound-filler paste. Wound healing studies using LCs enriched with collagen fibres (Co/LCs) alone and with platelet rich plasma (Co/LCs/PRP) as dressing material were performed using the porcine full-skin thickness wound healing protocol.

Results: In vitro assays showed that the LCs lacked significant differences in platelet adhesion compared to Cs but the LCs sample exhibited a sustained release of growth factors over 24 hours compared to both Cs and collagen. Cytotoxicity assays showed that neither LCs nor Cs was toxic to primary fibroblast cells, with the LCs significantly (43%) promoting fibroblast proliferation compared to the control.

A skin-sensitivity patch test using Cs and LCs indicated no adverse reaction on human skin. Co/LCs Sixteen full-thickness skin wounds were made along the dorsum of each of 4 pigs with 2 treatments and a control randomly applied as dressing material: Co/LCs, Co/LCs/PRP and the standard treatment. The differences in wound healing were observed with biopsies taken at 3 day intervals over 21 days. Co/LCs/PRP significantly induced haemostasis, wound contraction and accelerated wound closure and healing from the wound bed. Results from histological examinations demonstrated advanced granulation tissue formation, collagen deposition and epithelialization in the wounds treated with Co/LCs/PRP.

Conclusion: Co/LCs/PRP is considered to be an improved wound dressing due to acceleration of wound healing, promotion of fibroblast proliferation with increased collagen deposition and minimal scarring.
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Abstract Detail

CHANGES IN HEART RATE VARIABILITY WHILE EXERCISING IN HUMID AND HIGH TEMPERATURES

Introduction and Purpose: During competition in hot environments, endurance athletes often exercise/compete at intensities that stress their cardiovascular system. The primary aim of the study was to quantify the effect of increased core temperature (while exercising in a hot and humid environment) on autonomic cardiac control and to determine if heart rate variability (HRV) indicators may be indicative of a rise in core temperature.

Material and Methods
The study was conducted in a climatic chamber where healthy male volunteers (n=14) exercised in a hot and humid environment for 120 minutes while core temperatures increased from normal, 37°C, to ~39°C. RR interval data was continuously sampled for 120 minutes and compared with recorded baseline values (sampled during exercise in the same environment at normal core temperature: 37°C).

Results: The results showed that increases in core temperature were accompanied with a rise in HR (84 bpm to 124 bpm, p=0.0034) which was largely due to vagal withdrawal and an overall decrease in all HRV indicator values: a) time domain indicators (Mean RR: 663.64 to 502.86, p=0.0034; STDRR: 26.45 to 18.46, p=0.031; RMSSD: 22.83 to 11.07, p=0.03; pNN50: 4.63 to 1.12, p=0.02), b) frequency domain indicators (LFms2: 437.86 to 141.50, p=0.011; HFms2: 197.29 to 45.89, p=0.0085) and c) non-linear HRV indicators (SD1: 16.34 to 8.09, p=0.036; SD2: 64.03 to 22.44, p=0.0099). However, indicators of autonomic balance all showed non-significant changes: LFNU: p=0.504; HFNU: p=0.517 and LF/HF: p=0.395. Indicators of complexity and self-similarity gave heterogeneous results (SampEn and DFA). From the exploratory regression analyses, it was observed that MNRR (R^2=0.463), MNHR (R^2=0.59) and DFA?1 (R^2=0.350) show the most promise with regards to HRV indicators that could act as predictive indicators of elevated core temperature.

Conclusion: Quantification of HRV indicators in young and healthy athletes indicated that increases in core temperature, during exercise, decreased all variability measures while maintaining autonomic balance. Furthermore, HRV indicators such as MNRR, MNHR and DFA?1 may have potential to indicate a rise in core temperature as there is a clear association between core temperature and these HRV indicators.
THE ROLE OF THE KISSPEPTIN RECEPTOR, KISS1R, IN BREAST CANCER CELL MIGRATION, INVASION AND PROLIFERATION.

Introduction: The kisspeptin receptor, also known as KISS1R or GPR54, is the endogenous receptor for the neuropeptide, kisspeptin, which is encoded by the KISS1 gene. Kisspeptin was first identified as a metastasis suppressor in human melanoma cell line, C8161, in 1996. Its receptor, KISS1R belongs to a group of cell surface receptors called G-protein-coupled receptors (GPCRs). KISS1R binding by kisspeptin leads to Gαq/11 stimulation, phospholipase C activation, which hydrolyzes phosphatidylinositol-4,5-bisphosphate to produce the secondary effectors, diacylglycerol and phosphatidylinositol-1,4,5-triphosphate (IP3). IP3 binds to the IP3 receptor on the endoplasmic reticulum, thereby causing calcium mobilization. Subsequent studies in other cancers such as pancreatic, lung, bladder and ovarian cancer, have also shown that kisspeptin and KISS1R expression are correlated with decreased metastasis by inhibiting migration and invasion. However, in breast cancer, kisspeptin and KISS1R have been shown to play a contradictory role, by promoting metastasis. They have been shown to be expressed in aggressive breast cancers, such as triple negative breast cancer cells (TNBC). The exact mechanism through which KISS1R promotes metastasis in breast cancer has not been elucidated.

Aim: The aim of this study is to determine the role of KISS1R in breast cancer cell migration, invasion and proliferation and to assess whether KISS1R expression is correlated with metastasis repression or induction.

Results: Our preliminary data on KISS1R protein expression shows that the non-metastatic cell line, BT20, expresses KISS1R while MCF7 and MDA-MB-231 have very low to no KISS1R expression, suggesting that in fact KISS1R expression is associated with a lack of metastasis. KISS1R expression will be silenced in BT20 to determine if loss of the receptor results in increased migration and loss of epithelial morphology while KISS1R will be overexpressed in MDA-MB-231 to determine if the presence of KISS1R inhibits migration thereby showing whether KISS1R is a metastasis modulator.

Abstract Detail
AN INVESTIGATION OF THE KNOWLEDGE OF SOUTH AFRICAN HIGH SCHOOL RUGBY COACHES ON CONCUSSION AND THE RETURN-TO-PLAY PROTOCOL WITH THE AID OF A VALIDATED QUESTIONNAIRE

Introduction: Concussion is a complex pathophysiological process affecting the brain. The coach plays a pivotal role in the management of the concussed player. Assessing the knowledge of the high school rugby coaches in South-Africa will enable future education on the subject to focus on those areas where knowledge is lacking.

Methodology: A cross-sectional, descriptive study design was used with the aid of a validated questionnaire. First team rugby coaches of South African high schools were asked to complete questionnaire. Relationships between total scores for different demographic groupings were established using non-parametric techniques due to the presence of small and uneven sample sizes of the groups.

Results: Symptom recognition score of 78 % and general concussion knowledge score of 80% compare well with international research. Maddock question knowledge score of 26 % and return-to-play knowledge score of 62 % were not adequate. Educational programs (Boksmart) is the most popular source of knowledge followed by healthcare providers. choice. Boksmart accredited coaches did significantly better than the non-accredited coaches in the total score knowledge score (p=0.0418). Large category school coaches scored better in general concussion knowledge compared to small school coaches (p=0.0084). A significant difference was observed between the different coach age groups with the 35-44 year group indicating the best scores. Less than 3 years in coaching and the least qualified coaches scored worse than the other groups.

Conclusion: South African high school rugby coaches do not have sufficient knowledge to manage the return-to-play of concussed players adequately. Boksmart accreditation, the size of the school and the age group of the coaches were identified as predictors for superior knowledge. Coaches at small schools were identified as a possible group with inferior knowledge of concussion.
Abstract Detail

EXERCISE MAY DECREASE SYNCOPE SECONDARY TO POSTURAL CHANGE IN FEMALES WITH RA: PILOT STUDY

**Background:** The autonomic nervous system (ANS) regulates heart rate via sympathetic and parasympathetic influences. Rheumatoid arthritis (RA) patients suffer from autonomic dysfunction, which may consequently lead to syncope with possible falls after posture change i.e. rising from supine to standing position. Previous research has shown general ANS improvement after exercise, but not in specific relation with posture change.

**Objective:** Determine the effect of exercise on posture change (supine to standing) in females with RA as measured by short-term heart rate variability (ANS function).

**Methods:** Patients with confirmed RA were randomly selected to a control- (RAC) or exercise group (RAE). RAE group (n=19) trained 2-3 times/ week under supervision. RAC group (n=18) continued their current sedentary lifestyle. The medium intensity exercise programme lasted 12 weeks. No medication change was allowed during this time. ANS function and balance were determined by quantification of the inter-beat interval variability, with the Polar 810i heart rate monitor system. Frequency domain analyses were used for quantification: LF (ms²) – mainly sympathetic influence; HF (ms²) – parasympathetic influence; and LF/HF – autonomic balance.

**Results:** The two groups’ baseline demographic data (age, sex, disease activity, disease duration) matched. Comparing pre- to post posture change intervention (i.e. standing value minus supine value), all frequency domain parameters changed as anticipated (i.e. vagal withdrawal and increased sympathetic influence) for the RAE group. The RAC group’s measurements deteriorated: LF (ms²): RAE -1.03 to 22.03 (stronger sympathetic influence); RAC 43.45 to -31.21 (weaker sympathetic influence); HF (ms²): RAE -24.03 to -33.34 (better vagal withdrawal); RAC -191.7 to -114.1 (less vagal withdrawal); LF/HF: RAE 10.57 to 15.04; RAC 2.9 to 7.6

**Conclusion:** Preliminary results indicate that exercise may indeed improve autonomic function in RA patients, in such a way that posture change will not be an added burden for falls in an already otherwise compromised population.
Abstract Detail

THE VALIDITY AND RELIABILITY OF THE DIGITAL SCALE TO MEASURE LOWER LIMB WEIGHT BEARING IN STROKE PATIENTS

**Background:** Stroke is a non-communicable disease, causing global death and disability. People who survive a stroke present with walking impairments, mainly due to the paresis that impairs their ability to bear weight on the affected limb. One of the goals of rehabilitation is to improve the weight bearing so that the affected person can have a functional walking pattern. However, the measurement of weight bearing is a challenge. The gold standard for measuring weight bearing like the force plate is not practical for majority of the clinical settings due to financial restrictions, logistical and technical challenges. This study therefore explored the validity and reliability of the digital scale, when compared to the force plate, to measure lower limb weight bearing.

**Methodology:** A cross-sectional validation study was conducted with forty stroke patients aged 40-70, who suffered their first stroke resulting in hemiplegia or hemiparesis. Weight distribution on individual lower limbs was measured with the participants standing astride on the two AMTI® force plates first, followed by the two Pure Pleasure® digital scales. Three measurements were recorded for each device, two by the researcher and one by the research assistant.

**Data Analysis:** The agreement between the two devices, inter-rater and intra-rater readings were assessed by determining the intra-class coefficient (ICC) and Bland-Altman method.

**Results:** Excellent intra- and inter-rater reliability with (ICC values of 0.96 to 0.99 and 0.98 to 0.99 respectively) with a confidence interval of 95% with both readers. The Bland-Altman plot revealed good agreement between the digital scale and the force plate, with force plate to digital scale ratios of 1.58:1.56 (SD ±0.7).

**Conclusion:** The measurements obtained with digital scale were valid and in agreement with Force plate measurements. Hence, digital scale could be used confidently by clinicians as an objective cost-effective, user friendly and portable measurement of lower limb weight bearing in rehabilitation settings.

**Keywords:** weight bearing assessment, lower limb weight bearing, weight bearing following stroke, limb loading, weight bearing using digital scales
INVESTIGATION OF THE PRESENCE OF ALPHA-, BUNYA-, AND FLAVIVIRUSES WITHIN ANOPHELES MOSQUITOES COLLECTED IN SOUTH AFRICA USING MOLECULAR SCREENING METHODS

Introduction: Arthropod-borne viruses threaten the health of humans and animals including domestic animals, wildlife and livestock. Many arboviruses plaguing the world originated in Africa but went largely unnoticed locally. Due to changing climates and epidemiologic factors, emerging arboviruses may lead to outbreaks of disease in non-endemic areas. The role of the Anopheles mosquito as an arbovirus vector in South Africa remains unclear.

Methods: To determine the potential arboviral vectorial capacity of the Anopheles mosquito, a total of 102 pools of Anopheles mosquitoes collected in four provinces from rural, urban and wildlife sites in South Africa were screened over four years (January-May 2015-2018) for the presence of arboviruses using a one-step real-time reverse-transcription polymerase chain reaction (RT-PCR) with primers designed to detect the a large portion of the Orthobunyaviruses, and a heminested real-time RT-PCR with primers specific for Flaviviruses and Alphaviruses.

Results: Through these methods, it was established that An. coustani & An. rufipes, An. pharoensis, and An. pretoriensis may be potential vectors for Middleburg virus, Shuni-like virus and Sindbis virus respectively. As none of these mosquitoes have been shown to harbour these viruses before, these results highlight the importance of screening mosquitoes not traditionally considered vectors to help to identify emerging zoonotic arboviral diseases and their vectors in South Africa. This research has contributed to understanding of the distribution of different Anopheles species across South Africa, and the role of the Anopheles mosquito as a potential arbovirus vector in South Africa and should be targeted for vector competence studies. This surveillance may assist in prevention, diagnosis and control of these arboviruses before they emerge internationally.
TRENDS IN BURDEN OF DISEASE IN ZAMBIA: A GLOBAL BURDEN OF DISEASE ANALYSIS FROM 1990 TO 2015

**Background:** Zambia has experienced changes in its demographic and epidemiological disease patterns over the last 25 years. The country continues to grapple with population disparities, societal unrests, shifts in the burden of infectious disease and emerging non-communicable diseases. These challenges can only be met if health financing is appropriately allocated. In this study, we investigate trends in the burden of disease in Zambia between 1990 and 2015. We also consider whether changes in health financing have adjusted with a shifting burden of disease.

**Methods:** In this cross-sectional study, we analysed secondary data on the Global Burden of Disease (GBD) from the Institute for Health Metrics and Evaluation. We used GBD measurements, emphasizing metrics such as Disability-Adjusted Life Years (DALYs), Years of Life Lost (YLLs) and Years Lived with Disability (YLDs) for the period 1990 to 2015.

**Results:** From 1990 to 2015, life expectancy increased from 50.72 to 58.55 years. As of 2015, Zambia is facing a triple burden of disease, with a growing demand for care, shifting from communicable to non-communicable diseases (NCDs), and injuries including chronic diseases associated with an ageing population. Despite evidence for a shift in demand of care, Zambia is still prioritising communicable diseases such as HIV/TB and immunization programmes. HIV/TB, maternal and child health and immunisation programmes, all combined received more than 220 million USD in 2015. In 2015, only 2% of health spending was for non-communicable diseases while 74% was for communicable diseases.

**Conclusion:** Zambia is currently facing a triple burden of disease. The 25-year health trends showed a decrease but still high communicable diseases with a rising prevalence of NCDs and injuries.

**Keywords:** Zambia, communicable diseases, non-communicable diseases, health finances, the burden of disease, DALY
Faculty Day 2019 Abstract 2019140
Poster in the Basic Category

Presenting Author: DA Gomes (Physiology)

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Abstract Detail

IN VITRO EFFECTS OF THE BROMODomain INHIBITOR BZT-W49 ON CELL PROLIFERATION IN BREAST CANCER CELLS

Background: Bromodomains are epigenetic readers that recognise and read acetylated histone markers associated with open and active chromatin regulating transcription. Effects of Bzt-W49, an in silico-designed bromodomain 4 inhibitor, have previously been tested on osteoclast function and formation. Inhibition of transcription of cell cycle progression regulators by Bzt-W49 may reduce cell proliferation. This study determined the influence of Bzt-W49 on cell proliferation in breast cancer and bone cell lines. The estrogen receptor positive Michigan Cancer Foundation-7 (MCF-7) cell line and cells isolated from a pleural effusion of a patient with invasive ductal carcinoma (MD Anderson (MDA-MB-231)) were used. MDA-MB-231 cells are negative for estrogen receptors (ER), progesterone receptors (PR), and E-cadherin.

Materials and Methods: The influence of a 48h exposure of MCF-7 and MDA-MB-231 cells to Bzt-W49 (1µM to 35µM) was assessed via spectrophotometry after crystal violet staining in dose-dependent studies. Effects of single or multiple freeze-thaw cycle(s) of Bzt-W49 was also determined via crystal violet staining; which was conducted since the effective concentration of Bzt-W49 (25µM) was higher than the half maximal inhibitory concentration (IC50) previously determined. A stock solution of Bzt-W49 underwent repetitions of freeze-thaw cycles (S1) and was compared to stock solution of Bzt-W49 that underwent one freeze-thaw cycle (S2). Light microscopy photomicrographs were captured to assess the effects of Bzt-W49 on osteoclast morphology.

Results: The IC50 of Bzt-W49 was previously reported to be 1µM on osteoclasts. A statistically significant 2-fold decrease in cell number was observed at 25µM of Bzt-W49 when compared to cells propagated in medium only within MDA cell line. Bzt-W49 was 50% less effective on MCF-7 cells when compared to MDA-MB-231 cells. A statistically significant 1.9- and 1.5-fold decrease in cell number was observed in S2-treated MDA cells when compared to S1-treated MDA cells at 10 µM and 15µM respectively. Both solutions of Bzt-W49 were 50% less effective on MCF-7 cells when compared to MDA cells. Consequently, stability of the compound may be compromised after several freeze-thaw cycles. Light microscopy photomicrographs revealed compromised cell density in Bzt-W49-treated osteoclast cells with little cytotoxicity as the visual analysis of bzt-W49 and RANKYL treatments were similar.

Conclusion: This study revealed that a 48h exposure to Bzt-W49 resulted in decreased cell proliferation in both MDA-MB 231 and MCF-7 cells. Decreased cell density of treated breast cancer cells supports the findings observed in osteoclasts. Liquid chromatography mass spectrometry will assess Bzt-W49 stability. Further studies will investigate the differential mechanism of action that Bzt-W49 exerts on the two types of breast cancer cell lines that contribute to reduced cell proliferation.
Faculty Day 2019 Abstract 2019141

Poster in the Clinical Category

Presenting Author: Z White (Human Nutrition)

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Abstract Detail

DEVELOPING AN IMPEDANCE BASED EQUATION FOR FAT FREE MASS OF BLACK PRE-ADOLESCENT SOUTH AFRICAN CHILDREN

Background: Bioelectrical impedance analysis (BIA) is a practical alternative to dual-energy X-ray absorptiometry (DXA) for determining body composition in children. Currently, there are no population specific equations available for predicting fat free mass in South African populations. We determined agreement between fat-free mass (FFM) measured by DXA (FFM-DXA) and FFM calculated from published multi-frequency bioelectrical impedance prediction equations (FFM-BIA); and developed a new equation for predicting FFM for pre-adolescent black South African children.

Methods: Data were collected from a cross-sectional, convenience sample of 83 children (mean age 8.5 ± 1.4 years; 44 [53%] girls). We measured body composition using whole-body DXA scans (Hologic Discovery W densitometer) (FFM-DXA). We used the Seca mBCA 514 Medical Body Composition analyzer to measure impedance values, which were then used to calculate FFM using 17 published prediction equations (FFM-BIA). We compared FFM-BIA with FFM-DXA using paired sample t-tests, and used Bland-Altman and intra-class correlations to determine agreement between the methods. We developed a new predictive equation for FFM using multiple linear and stepwise regression analyses, cross validated against FFM-DXA.

Results: Only two equations yielded FFM estimates that were similar to the DXA readings (P > 0.05). According to the Bland-Altman analysis, the mean difference in FFM (kg) was 0.15 (LOA: -2.68; 2.37) and 0.01 (LOA: -2.68; 2.66). Our new prediction equation, FFM=105.20+0.807*Sex+0.174*Weight+0.017*Reactance+15.71*log(RI), yielded an adjusted R² = 0.9544. We did not see any statistical shrinkage during cross-validation.

Conclusion: A new equation enables the BIA-based prediction of FFM in the assessment of preadolescent black South African children.
TUMOUR VOLUME AS A PREDICTOR OF METASTASES IN PATIENTS PRESENTING WITH HIGH-GRADE CONVENTIONAL OSTEOSARCOMA

Introduction: Survival rates in osteosarcoma have been found to be in the region of 60% in patients with localized disease, 20-40% in metastatic disease, with current multimodality treatment protocols. Tumour volume is one of the factors known to be poor a prognostic indicator. Majority of patients present late with large tumours for treatment.

Aim: To investigate the association between tumour volume and the presence of skeletal or pulmonary metastases at time of presentation in patients with osteosarcoma.

Material and Method: Retrospective review was performed on the records of all patients with osteosarcoma referred to our tertiary level Orthopaedic oncology unit, from 2010 to 2014. Diagnosis of osteosarcoma was confirmed on histology. Age at presentation, gender and anatomical site of the tumour were recorded. Tumour size was measured on MRI, pulmonary metastases on CT and skeletal metastases on technetium bone scan. Strata statistical software was used to analyse the results.

Results: There were 61 patients. Mean age was 21 years ([SD] 11.9 years) with an equal distribution between male and female (50.8 vs. 49.2%). Evidence of metastasis at time of presentation (pulmonary n=44 (72%); skeletal n=16 (28%)). Mean tumour volume at presentation was 1114 cm3 (SD 1285 cm3). There was no difference in the tumour volume at presentation between patients with and without pulmonary metastases at time of diagnosis (p=0.85). Tumour volume, however, did appear to predict the presence of skeletal metastases (p = 0.02). Receiver operating characteristic (ROC) analysis identified the optimal break point for tumour volume as a predictor of the presence of skeletal metastases as 1383 cm3 (Sensitivity 60%, Specificity 87%). Univariate analysis of tumour volume greater than 1380 cm3 revealed an OR of 13.6 (95% CI 2.5 -72.5; p < 0.01) for the presence skeletal metastases at time of presentation. Multivariate analysis of a tumour volume greater than 1380 cm3 yielded an OR of 8.6 (95% CI 1.1-67.1; p=0.039) for presence of skeletal metastases.

Conclusion: There are greater chances of skeletal metastases in patients with tumour volumes greater than 1380 cm3.
CORRELATION OF HEMATOPOIETIC STEM CELL TRANSPLANTATION QUALITY ASSURANCE PARAMETERS WITH ENGRAFTMENT SUCCESS IN MULTIPLE MYELOMA PATIENTS

Background: Haematopoietic stem cell transplantation (HSCT) is a well-established treatment option for haematological and other disorders. Achieving engraftment success following transplantation is one of the challenges associated with HSCT. HSCs are mobilized from the bone marrow using human granulocyte colony stimulating factor (G-CSF) and are identified and enumerated using the cluster of differentiation (CD) 34 antigen. In collaboration with the Alberts Cellular Therapy (ACT), Netcare Pretoria East Hospital, the objective of this study was to correlate laboratory generated quality assurance parameters as well as clinical parameters (such as patient conditioning and chemotherapy regime) with engraftment success in a cohort of multiple myeloma (MM) patients.

Method: This retrospective study focused only on autologous HSCT recipients treated for MM at the ACT center from 2012-2017 (145 patients). All laboratory-related parameters, engraftment data and clinical data were captured into a database. The clinical parameters investigated included the mobilization and conditioning agents used during patient preparation for a HSCT. Furthermore, the archived apheresis flow cytometric data was re-analysed using Kaluza software. Multiparametric statistical analysis using Graphpad Prism was used to determine the presence of a significant correlation between the captured data and engraftment success.

Results & Conclusion: We observed that the variable proportion of total nucleated cells (TNC) within the transplanted products are indicative of the time to engraftment. It was found that rapid engraftment was associated with a proportionally lower number of TNCs, while delayed engraftment was associated with a proportionally higher number of TNCs. We also found that previous cycles of chemotherapy as well as the mobilization agent(s) used have no effect on the relative proportions of CD34+ HSPC and TNCs collected during a harvest. Combination of all recorded parameters, including parameters not usually unreported, may potentially be useful to develop a reliable predictive model of engraftment success and thus patient outcome prior to HSCT.
INFLAMMATION LINKED CYTOKINE AND METABOLITE ALTERATIONS IN BREAST CANCER

**Background:** Breast cancer being the most frequently diagnosed cancer in women, results in most cancer-related mortalities among women. The heterogenetic nature of tumours as well as limited health resources highlight the requirement for personalised treatment. Pre-clinical predictive models, including ex vivo platforms, require high throughput and multi-parameter characterization of functional networks in order to accurately simulate the tumour microenvironment. The current study aims to assess the involvement of the immune system and cellular metabolim that can be utilised as predictive markers in diagnostic models.

**Methods:** Breast cancer patients (n=26) were recruited, prior to surgery, at Steve Biko Academic Hospital and matched to control subjects (n=13) with informed consent. Concentrations of 27 different cytokines were simultaneously determined using a multiplexed bead-based assay (Bio-Plex Pro® Human Cytokine 27-plex Assay). Untargeted metabolic profiling was carried out using quantitative time of flight mass spectrometry (QTOF-MS).

**Results:** Positive mode ionisation metabolomics identified 368 features while negative ionisation mode resulted in 26 metabolic features with a 1.5 fold change or higher which was regarded as significant. The arachidonic acid metabolic pathway was identified as the most dysregulated pathway in the cancer patients. Significant positive correlation of vascular endothelial growth factor (VEGF), interleukin-1 receptor antagonist (IL-1ra) and fibroblast growth factor (FGF) to interleukin-9 (IL-9) was shown in breast cancer while a negative equivalent correlation was seen in control participants.

**Conclusion:** The differences in metabolite and cytokine abundance suggests altered metabolic pathways in cancer. These alterations can distinguish between the two subject groups. A pro-inflammatory metabolic pathway involving arachidonic acid was noted to be upregulated correlating with increased levels of VEGF in cancer patients. The combined analysis of cytokine expression and metabolome analysis resulted in predictive markers that will be useful to develop ex vivo models.
DETECTION OF MYCOBACTERIUM TUBERCULOSIS FROM GUINEA PIG TISSUES FOLLOWING NATURAL TRANSMISSION OF MYCOBACTERIUM TUBERCULOSIS USING PRIMEMIX REAL-TIME PCR

**Background:** The use of guinea pigs as an animal model in tuberculosis research has been widely used in vaccine and drug development. Guinea pigs are well characterized and have immunological responses to Mycobacterium tuberculosis (M. tuberculosis) infection. The aim of this study was to develop techniques which enhance the recovery and detection of M. tuberculosis from guinea pig tissues with early disease (low bacterial load).

**Methods:** A total of 42 tuberculin skin test positive guinea pig lung and spleen tissues were harvested and homogenized in 1X phosphate buffered saline (1X PBS) solution and PrimeStore® molecular transport medium (PS-MTM). For culture, tissue homogenates from 1X PBS were serially diluted and cultured on Middlebrook 7H11 agar. Mycobacterium tuberculosis DNA was extracted from the tissue homogenates of 1X PBS and PS-MTM. A real-time PCR assay was performed on DNA extracted from lung and spleen tissues from 1X PBS and PS-MTM, in triplicates, using the PrimeMix MTB real-time PCR assay (PM-PCR). Spoligotyping was performed to determine the most transmissible strain.

**Results:** All the 1X PBS 100% (42/42) lung tissues were positive for M. tuberculosis. Only 95.24% (40/42) spleen tissues were positive for M. tuberculosis. From the PS-MTM lung samples, 95.24% (40/42) were positive for M. tuberculosis, and 97.62% (41/42) of the PS-MTM spleen samples were positive for M. tuberculosis. Mycobacterial growth was observed in only six samples, four spleen and 2 lung samples. Of the 42 strains, 41 were regarded as orphans, whereas 1 was regarded as atypical.

**Conclusions:** Mycobacterium tuberculosis was detected from lung and spleen tissues using PM-PCR. There was no statistically significant difference between 1X PBS and PS-MTM PM-PCR positivity. Although PS-MTM did not provide more positives than 1X PBS as a transport medium, PS-MTM has the advantage of providing samples that can be safely stored at ambient temperature. Molecular methods are more advantageous than culture; with only six samples being positive with culture, this may indicate a low bacterial load which PM-PCR was able to detect. The spoligotypes were regarded as orphans which could be a result of guinea pigs being infected with more than one strain. The techniques developed in this study are able to detect M. tuberculosis in low bacterial loads.
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Abstract Detail

**18F-FLUORODEOXYGLUCOSE POSITRON EMISSION TOMOGRAPHY AND COMPUTED TOMOGRAPHY METABOLIC PARAMETERS IN OESOPHAGEAL CARCINOMA**

**Background:** Carcinoma of the oesophagus is a very ominous disease with an extremely poor prognosis with > 50% of patients having unresectable disease at their first presentation. Nodal involvement is the poorest prognostic factor and survival rate drops dramatically with N2 or above disease. The aim of this study was to identify metastatic patterns of oesophageal carcinoma and to determine the abilities of FDG-PET/CT metabolic parameters in predicting the presence of distant metastasis and overall survival.

**Materials and Methods:** Forty-eight patients with histological diagnosis of oesophageal carcinoma underwent 18F-FDG PET/CT for staging. Maximum and mean standardized uptake values (SUVmax and SUVmean), metabolic tumor volume (MTV) and total lesion glycolysis (TLG) of the oesophageal cancer lesion were determined. We compared these parameters and determined their abilities to predict the presence of metastasis.

**Results:** The mean age of the patients was 62 years ±13.94 with a 1:1 male to female ratio. There was almost an equal distribution between the middle and distal thirds (40%) of the oesophagus with only 20% of the lesions involving the proximal oesophagus. There was no significant associations between MTV of the primary tumor and distant metastasis; however, TLG performed well in predicting the presence of distant metastasis. Both MTV and TLG were independent prognostic factors for overall survival. There was no correlation between SUVmax and SUVmean and metastasis.

**Conclusion:** PET/CT metabolic parameters such as MTV and TLG can be predictors of overall survival in patients with oesophageal cancer, while TLG perform well in predicting the presence of distant metastases.
THE ROLE OF CELL-TO-CELL COMMUNICATION IN DETERMINING METASTATIC BEHAVIOUR OF BREAST CANCER CELLS

**Introduction:** Breast cancer, the most commonly diagnosed cancer in females, is not lethal until it metastasises to and overpowers essential organs. A prerequisite to metastasis is epithelial-mesenchymal-transition (EMT), a conserved physiological process shown to play an important role in numerous physiological processes such as embryonic development and wound healing. EMT results in the transition of epithelial cells to a mesenchymal like state aids which induces cell motility.

The ability of cells to communicate constitutes an important characteristic of all multi-cellular organisms. Cells continuously relay information with their environment and other cells. These interactions can influence cell behaviour and function. It is becoming clear that cell-to-cell communication plays a role in the metastatic spread and/or progression of cancer but the mechanisms of action are not yet fully known or characterised.

Initially believed to merely be a cell’s waste disposal mechanism, extracellular vesicles (EVs) have been shown to house numerous bio-molecules ranging from antigens and proteins to micro-RNA (miRNA) capable of regulating or initiating a wide range of cellular functions.

**Methods:** In this study we have asked whether molecules or EVs emanating from metastatic breast cancer cells can affect the migratory capacity and cellular adhesion behaviour of a non-metastatic breast cancer cell line, BT-20. We have established different methods to generate and visualise EVs, to test their transformative capacity and determine their impact on the recipient cell line.
THE FEASIBILITY AND UPTAKE OF THE ETONOGESTREL IMPLANT AND THE INTRA-UTERINE CONTRACEPTIVE DEVICE AT THE TIME OF UTERINE EVACUATION IN WOMEN MANAGED WITH INCOMPLETE MISCARRIAGE.

Introduction: Unintended pregnancies account for an estimated 44% of all pregnancies worldwide and 75% of pregnancies in South Africa. The use of effective contraception decreases the incidence of unintended pregnancies and the subsequent termination of unwanted pregnancies. There is no South African data available on the feasibility and uptake of offering a choice of immediate etonogestrel implant (EI) placement or intra-uterine contraceptive device (IUD) insertion at the time of uterine evacuation in women managed with incomplete abortion.

Aim: The aims of the study were to investigate the uptake and acceptability of two different long acting reversible contraceptive (LARC) options in women with incomplete abortions, at the time of uterine evacuation, and to assess the alternative contraceptive options chosen by women who decline LARCs and their motivation behind declining LARCs.

Methods: This was a prospective study conducted at the Department of Obstetrics and Gynaecology, Kalafong Provincial Tertiary Hospital, Pretoria, South Africa over a six-month period. All women older than eighteen years who were able and willing to provide informed consent, diagnosed with and managed for first or second trimester incomplete miscarriages were eligible for recruitment. All participants were managed per standard protocol for incomplete miscarriage, counseled on all the contraceptive methods available to them and then allowed the opportunity to choose their preferred contraceptive.

Results: One hundred and fifty five participants were enrolled of which 132 (85.16%) opted for contraception. Of these, 67 women (43.22%) opted for LARCs, of which 32 (20.65%) had an IUD inserted and 35 (22.58%) had an EI inserted. Sixty-five (41.93%) women accepted other methods of contraception. The most common reason for declining LARCs was experience with other forms of contraception. Twenty-three (14.84%) women declined any form of contraception, with the most common reason being the desire for another pregnancy.

Conclusion: The uptake of all forms of contraception was very high among a population of women presenting with incomplete miscarriage. This finding emphasizes the importance of offering all women contraception at the time of managing their miscarriages.
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Abstract Detail

HISTOLOGICAL CHARACTERISTICS OF CERVICAL LARGE LOOP EXCISION OF TRANSFORMATION ZONE (LLETZ) BIOPSIES OF PATIENTS TREATED FOR CERVICAL PREMALIGNANT (CIN) LESIONS AT KALAFONG PROVINCIAL HOSPITAL (KPTH)

Background: Cervical cancer is the most common gynaecological cancer in South Africa, despite the fact that it is regarded as a preventable cancer. Cervical cytology is an important screening method to prevent cervical cancer in women, allowing effective treatment of pre-malignant changes in the cervix when present.

LLETZ is highly effective in the treatment of CIN with retention of fertility. The reported success rate of LLETZ ranges from 73-98% and 14.4% of patients will have persistent or recurrent disease on cytological follow-up.

Purpose: To describe the population of patients treated for CIN lesions with LLETZ and to describe their histological characteristics of specimens.

Method: A retrospective descriptive study based at KPTH between 1 August 2015 and 31 July 2016 involving 267 patients with CIN lesions who had LLETZ procedures and were eligible for inclusion into the study. The study compared the histological characteristics of HIV infected and uninfected patients, correlated cytology with histology results, and assessed the histological parameters of the specimens.

Results: The mean age was 39 years (SD: 9.2; range of 22-67 years) and mean parity of 2 (SD: 1.5; range 1-9). 69% of patients were HIV infected, 9.7% were HIV uninfected and 21.3% had unknown status.

Cervical cytology had a sensitivity of 93.8% and specificity of 21.4% for detecting CIN compared to the final histology. 33% of the specimens submitted for histology were fragmented and 70% of the fragmented specimens were from HIV infected patients. 248 of the specimens submitted had a largest diameter of above 10 mm and 17 had a diameter of less than 10 mm.

Positive ectocervical and endocervical margins were present in 17.6% and 52.1% respectively of the specimens submitted for histology.

In 8.3% of cases patients received repeat LLETZ procedures, and 68.1% of the patients who had repeat LLETZ procedures were HIV infected.

Conclusion: Cervical cytology had a high sensitivity for detecting CIN which supports the policy of "see and treat".

The population had a high rate of positive endocervical margins; a risk factor for residual disease and fragmentation impairs interpretation of the margins. These findings highlight the importance of follow-up.
AN EXPLORATION OF THE CHALLENGES OF PRIMARY CAREGIVERS OF CHILDREN WITH MENTAL ILLNESS ATTENDING AN OUTPATIENT CHILD PSYCHIATRIC CLINIC AT A PUBLIC HOSPITAL IN GAUTENG PROVINCE

**Background:** Primary caregivers of children with mental illness experience various challenges in caring for their children. Challenges such as not knowing how to manage their child’s behaviour, the need for constant supervision, being blamed for their child’s mental illness, caregivers’ own poor psychological well-being, and various somatic symptoms have been identified in the literature. This cumulative challenges of caregivers are associated with poorer developmental outcome in mentally ill children, which affects their quality of life. The care pressures of primary caregivers of mentally ill children are high, and it is possible that those pressures could reduce the level of care to their children, and jeopardise their physical and mental health. Consequently, those caregivers experience a low quality of life. To ensure primary caregivers receive the necessary support form psychiatric nurses, it is important to understand the challenges these caregivers experience in caring for their children with a mental illness.

**Design and method:** An explorative, descriptive qualitative approach was used to answer the research question, “What are the challenges primary caregivers of children with mental illness experience in caring for their children with mental illness?” Purposive sampling was used to select 10 female primary caregivers of children with mental illness. Unstructured interviews were conducted in 2018 at a child psychiatric clinic at the outpatient department of a public psychiatric hospital in Gauteng Province. Data was analysed using Tesch’s method of open coding. Trustworthiness was ensured according to Lincoln and Guba’s framework and the researcher adhered to ethical principles of beneficence, respect for human dignity, and justice to ensure the research was conducted in an ethical manner.

**Findings and recommendations:** Two themes, namely, challenges experienced by caregivers and coping strategies were identified. The findings indicated that primary caregivers experienced various challenges that affected their quality of life. It was due to their children’s behaviour, lack of support in caring for their children, inadequate access to appropriate schools for their children, and insufficient funds to address their children’s needs. It contributed to the primary caregivers experiencing sadness, frustration and anger.

To ensure the challenges caregivers’ experience in caring for their mentally ill children are addressed, recommendations were provided for the psychiatric nurses working at the outpatient clinic, and the nursing management and training department at the psychiatric hospital.
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Poster in the Basic Category

Presenting Author: SD Hargrave (UP)

Authors: SD Hargrave (UP), AE Mercier (UP), BVL Potter (Oxford University), AM Joubert (UP), J Helena (UP), R Lakier (UP)

Abstract Detail

BREAST CANCER CELLS TREATED WITH A TETRAHYDROISOQUINOLINE SULFAMATE ANALOGUE PRIOR TO RADIATION UNDERGO APOPTOSIS DUE TO INCREASED REACTIVE OXYGEN SPECIES FORMATION

Introduction: 2-Methoxyestradiol (2ME2) disrupts microtubule dynamics via binding to the colchicine site, which confers anticancer properties to the compound. In an attempt to increase the biological and pharmacological efficacy of 2ME2, a novel non-steroidal analogue, 2-(3-bromo-4,5-dimethoxybenzyl)-7-methoxy-6-sulfamoyloxy-1,2,3,4-tetrahydroisoquinoline (STX3451) as its sulfamate ester, was designed. A tetrahydroisoquinoline core was used to mimic the A and B rings of 2ME2. This study aimed to investigate the effect of STX3451-exposure prior to radiation on breast cancer cells with regard to the induction of a metaphase block, augmentation of deoxyribonucleic acid (DNA) damage, the induction of apoptotic cell death and the related intracellular signalling.

Methods: Confluent MDA-MB-2310 and MCF-7 breast cancer cells were exposed to the half maximum growth inhibitory concentration (IG50) of STX3451 (0.07 µM) for 24 hours before being exposed to 6 Gray radiation. Experiments were terminated 2-, 24- or 48 hours after radiation. Cells exposed to the drug and radiation in isolation were used as experimental controls. Manual scoring of micronuclei using light microscopy was used to examine the extent of DNA damage and repair. Flow cytometric analysis of hydroethidine staining was used to quantify ROS production. Flow cytometry was used to analyse cell cycle progression, as well as to determine the induction of apoptosis by Annexin V quantification.

Results: When compared to vehicle control, cell cycle analysis detected an increase in the percentage of cells in metaphase block 48 hours after radiation when treated with STX3451 prior to radiation. This was accompanied by an increased ROS formation. Micronuclei quantification indicated increased DNA damage in combination treated cells.

Conclusion: Cells are most sensitive to radiation during metaphase. Thus, STX3451 may be a candidate for radiosensitization studies as the compound causes a metaphase block. Increased micronuclei and ROS formation are proposed mechanistically to increase the induction of death in cells pre-exposure to STX3451 before radiation. Future studies will further investigate cell fate with this treatment combination to further elucidate the signalling of apoptosis and the induction of senescence.
Presenting Author:  L Swanich (Human Nutrition)

Authors:  L Swanich (Human Nutrition) UE MacIntyre (Human Nutrition),  B Pretorius (Institute for Food, Nutrition and Well-being), C de Jager (UP Institute for Sustainable Malaria Control)

Abstract Detail

FOLIC ACID CONTENTS OF DRY AND COOKED FORTIFIED MAIZE MEAL IN THE VHEMBE REGION ARE LOWER THAN REFERENCE VALUES

Introduction: Folic acid, the synthetic form of the essential vitamin folate, is one of eight micronutrients added to maize meal under the National Food Fortification Programme.

Objective: To determine whether the folic acid content of dry maize meal available in the Vhembe region complies with fortification regulations and to compare that of stiff and sour maize meal porridge to the South African Food Composition Table (SAFCT) value.

Methods: As part of an environmental health study, two brands super (Brands A; B) and one special (Brand C) maize meal were obtained from commercial outlets and a mill in the Vhembe region during November 2017 and April 2018. One 500g dry composite sample from each brand was collected during each study period. In addition, five cooks each prepared three to five pots of stiff and sour porridge using the Brand C composite per study period. 500g composite samples were collected for each porridge type and cook. Folic acid was analysed in duplicate by the South African Grains Laboratory. Average dry folic acid content of each brand was compared to the fortification regulations. Mean folic acid content of each porridge type was compared to the SAFCT value for fortified stiff maize meal (special) porridge using the single sample t-test (α = 0.05).

Results: Six dry and 25 cooked (stiff: 13; sour: 12) composite samples were analysed. Dry folic acid content met between 32 to 104% of the regulations and was higher in the November 2017 samples. Mean folic acid content of stiff (51±12.34 µg/100g) differed significantly from that of sour porridge (41±2.5 µg/100g) in November 2017 (p=0.047) but not in April 2018 (13.7±3.0 µg/100g; 13.4±3.2 µg/100g). The folic acid content of all porridge samples was lower than the SAFCT value, varying from 17.6±4.2% (sour porridge, April 2018) to 66.8±16.2% (stiff porridge, November 2017).

Conclusion: The folic acid content of dry maize meal differed between study periods with only one sample achieving the fortification regulations. The low folic acid content of the porridges in comparison to the SAFCT value suggests that folic acid intakes from maize meal may be overestimated in the target population.
LOCALISATION OF KISSPEPTIN AND NEUROKININ B RECEPTORS IN RAT BRAIN AND PERIPHERAL TISSUES

Introduction: Reproduction is controlled by Gonadotropin Releasing Hormone (GnRH) which is the main stimulator of the anterior pituitary gland, initiating the release of follicle-stimulating hormone (FSH) and Luteinising hormone (LH). Kisspeptin and Neurokinin B (NKB) are neuropeptides that have been shown to be upstream regulators of GnRH which is a central regulator of the hypothalamic-pituitary-gonadal axis. Kisspeptin is found predominantly in the arcuate nucleus of the hypothalamus and is secreted to GnRH neurons where it binds to its cognate receptor to release GnRH. Kisspeptin may have other effects in the brain involving appetite, metabolism and reproductive behaviours as well as many additional effects on peripheral tissues such as the placenta and pancreatic beta cells.

Aim: This study aims to determine the localisation of radiolabelled Kisspeptin 10 (OH-YNWNSFGLRF-NH2) and NKB (OH-DMHDFVFGLM-NH2). Kisspeptin 10 (Kp) and NKB will be synthesised with the azamacrocyclic metal-ion-chelator, 1,4,7,10-tetraazacyclododecane-1,4,7,10-tetra-acetic acid (DOTA) bound to the N-terminus of Kp and NKB, to facilitate complexation of the radiometal isotope gallium-68 (68Ga). Modifications at this region are usually tolerated and the peptides retain their receptor binding and activation. This is currently being confirmed in vitro, using cells which have been transfected with cDNA encoding the Kisspeptin or NKB receptors and stimulating the receptors with Kisspeptin and NKB in an inositol triphosphate accumulation assay. Having established biological activity, the peptides will be labelled with gallium-68 radionuclide chelated to a DOTA ring covalently bound at the NH2-terminus of the peptides. Radio labelled peptides will then be injected into 6-week-old male rats and the rats imaged using micro-PET/CT to show receptor localisation in the brain and various other peripheral areas over time intervals. Results obtained thus far indicate that the DOTA-labelled KP has a lower potency than KP and that the NKB-DOTA is slightly less efficacious than NKB. Further analysis will be completed to confirm these results.
Presenting Author:  KB Gama (Medical Microbiology)

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Abstract Detail

GENETIC RELATEDNESS OF METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS ISOLATES ASSOCIATED WITH OUTBREAKS IN BURN WOUND AND NEONATAL WARD PATIENTS AT HEALTHCARE CENTRES IN GAUTENG, SOUTH AFRICA

Introduction and aim: Methicillin-resistant Staphylococcus aureus (MRSA) is a pathogen known for causing infections due to its ability to persist in healthcare settings and the community. It is one of the leading causes of nosocomial infections and has been associated with an increase in the morbidity and mortality of patients such those in burn wound and neonatal wards. These particular patients are especially susceptible to MRSA infection due to a compromised or immature immune system, antibiotic usage, surgical procedures, extended hospital stay and overcrowding. An increase in MRSA isolates in burn wound and neonatal ward patients has been observed between 2015 and 2018 at three healthcare centres in Gauteng. The aim of this study was to molecularly characterise and genotype MRSA isolates causing outbreaks in burn wound and neonatal ward patients at healthcare centres in Gauteng, South Africa.

Methods: A total of 30 isolates were obtained from the Department of Medical Microbiology culture bank. The total genomic DNA was extracted and an identification M-PCR assay was performed targeting the genus specific 16S rRNA gene, the species-specific nuclease (nuc) gene, methicillin A (mecA) gene confirming MRSA, and the Panton-Valentine Leukocidin (pvl) gene. Pulsed-field gel electrophoresis was performed.

Results: All the isolates were confirmed as MRSA and none were positive for the pvl gene. Identical banding patterns were observed for some of the MRSA isolates that originated from different hospitals. Unique banding patterns were observed for the remainder of isolates.

Conclusion: Some of the MRSA isolates from the three hospitals are clonally related, which highlights that the same clone is circulating and surviving in the hospitals. New unique MRSA strains were also introduced in these hospitals, which caused serious infections. This study highlights the importance of the strict adherence to infection prevention and control programs in the healthcare settings.

Key words: methicillin-resistant Staphylococcus aureus, outbreak, nosocomial infection, infection control, genetic relatedness, burn wound patients, neonates
UNDER 5 YEARS BURDEN OF DISEASE TRENDS IN ZAMBIA: A GLOBAL BURDEN OF DISEASE ANALYSIS FROM 1990 TO 2015

Background: Under 5 mortality is an important part of the Sustainable Development Goals (SDGs), particularly SGD 3, target 3.2 which states: By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births. There has been a global effort towards ensuring child survivorship, shown by the decrease in the mortality rates over recent decades. However, Sub-Saharan Africa still contributes largely to the total under 5 deaths per year. In this study, we investigate trends in the burden of disease of the under 5 years population in Zambia between 1990 and 2015.

Methods: In this cross-sectional study, we analysed secondary data on the Global Burden of Disease (GBD) from the Institute for Health Metrics and Evaluation. We used GBD measurements, emphasising metrics such as Disability-Adjusted Life Years (DALYs), Years of Life Lost (YLLs) and Years Lived with Disability (YLDs) for the period 1990 to 2015.

Results: There has been a marked decrease in the under 5 mortality rates over the study period, although communicable diseases are still dominating towards their contribution to the Burden of disease Zambia. Between 1990 and 2015 there has been a change in the causes of death. In 1990, the under 5 mortality rate was 185 per 1000 live births, which significantly declined to 64.9 per 1000 live births in 2015. The diseases contributing to the top 5 DALYs have also changed in overtime, with the top 5 (2015) consisting of Maternal and neonatal conditions, Respiratory Infections and TB, HIV/AIDS and STI’s, Other Non-communicable conditions and Enteric Infections.

Conclusion: Zambia is facing a triple burden of disease. The shifting disease trends are an indicator of changing disease profiles, which would need the health system to re-engineer and refocus their priorities to meet the changing trends.

Keywords: Zambia, the burden of disease, communicable diseases, NCDs, Injuries, under 5 mortality
PROTEOMIC CHARACTERISATION OF PRIMARY BREAST TUMOUR EXTRACELLULAR MATRIX PROTEINS

**Background:** Breast cancer is the most commonly diagnosed type of cancer in women where high mortality rates are mostly due to late stage diagnosis and lack of appropriate personalised therapy. Breast tumours are complex tissue masses consisting of distinct cell types embedded in variable extracellular matrix (ECM). Studies have highlighted the role of the ECM in tumour development and progression to tissue invasion and metastasis. The ECM consists of numerous protein components that provide a scaffold for cellular growth and binding sites for factors that exhibit tumour promoting properties. Therefore, ECM protein components can potentially be targeted by new or existing anticancer therapies as well as characterised as prognostic or staging markers for breast cancer. The aim of this study was to optimise sample preparation and proteomic analysis to characterise ECM in breast tumour samples.

**Materials and methods:** Breast tumours were resected from patients diagnosed with Stage II-IV invasive ductal carcinoma at the Steve Biko Academic Hospital. Haematoxylin and Eosin staining confirmed diagnosis. ECM proteins were extracted using SDS-Tris lysis buffer and repeated cycles of hydrostatic pressure were applied using a 2320EXT Barocycler®. Following either in-gel or in-solution digestion, tryptic digests were analysed using an Agilent 1100 HPLC system coupled to a SCIEX TripleTOF 6600 mass spectrometer. Spectral data was analysed using PEAKS Studio 6 software.

**Results:** A total number of 166 proteins with 40 ECM proteins were identified using the gel based proteomic method, whereas the in-solution digestion identified 1163 total proteins and 132 ECM proteins. ECM proteins such as collagens, fibronectin and laminins, all reported to play a distinct role in breast cancer development and progression, were identified with high confidence.

**Conclusion:** A complete sample preparation for proteomic characterisation of tumour associated ECM components was optimised and high numbers of key ECM proteins were identified. This method will be used to assess histological samples of patient tumour biopsies for the comparison of levels of relevant ECM proteins from non-tumorous tissue and breast tumour masses. This will allow for identification of potential ECM signatures related to tumour development and to identify possible ECM drug targets for cancer chemotherapy.
Abstract Detail
DEVELOPING A PROGRAMME TO EDUCATE YOUNG CHILDREN ABOUT MALARIA TO EFFECT BEHAVIOURAL CHANGE PRE-INTERVENTION FINDINGS

Introduction: Education is important in decreasing malaria cases according to the World Health Organization. The rural Limpopo River Valley (LRV) region in Vhembe District, Limpopo Province, South Africa, has the highest malaria incidence in the country. Malaria impacts school attendance, which affects socioeconomic development, but malaria is preventable. Therefore, if a malaria education intervention is taught at schools then children could learn malaria prevention methods. If children can be taught to prevent malaria then it could contribute towards lower malaria cases. A song to teach about disease prevention could thus potentially assist in behavioral change.

Methods and aim: A study involving Grade 3 learners from 12 Primary schools is currently taking place in the LRV region. The aim is to determine, which malaria education intervention can be used to help memory retention of malaria prevention, and to effect behavioural change. The study involves a pre-intervention questionnaire, an intervention and, a 6 week post-intervention questionnaire. The 12 Primary schools were divided into 4 groups, each group received an intervention (song only, drama only, both song and drama) or nothing (control). The study includes interested parents to determine if malaria knowledge is gained by the children’s intervention. The Grade 3 teachers formed a focus group to give feedback on their selected intervention.

Results: It is expected that the song alone will be the best method due to its cultural and age appropriateness. When leaving the schools after implementing the song intervention, the children were still heard singing. Pre-interview questionnaire data and discussions showed interesting findings about malaria knowledge. Majority of children could identify malaria came from mosquitoes, but not the transmission. A majority of children, teachers, and parents discussed wearing long sleeves protected themselves against malaria, in spite of the hot climate. A discussion with a school teacher revealed that malaria medication is being used for a different reason than intended, which impacts on how the medication is handed out to women.

Conclusion: In conclusion, if children’s behaviour is affected by learning the song’s information, then it can reduce their risk of malaria. Educating about malaria exposure should reduce malaria cases and potential mortality incidents.
Abstract Detail

WHOLE BLOOD STIMULATION: EFFECT OF ADDITIVES IN BLOOD COLLECTION TUBES ON TLR EXPRESSION IN ACTIVATED MONOCYTES

Introduction: Blood collection tubes have many components, such as stoppers, lubricants, surfactants, and separator gels which can leach into specimens and/or bind analytes from a specimen, additives in tubes may also potentially alter analyte stability. Because of these interactions with blood specimens, blood collection devices and tubes may serve as a potential source of inconsistent laboratory results. In particular, cytokine measurements performed on plasma have been found to vary between different blood collection tubes due to the different anticoagulants used. Blood collection tubes containing EDTA, ACD, heparin-lithium and preservative-free heparin were compared.

Aim and methods: The aim of the present study was to compare the effects of the additives in different blood collection tubes viz. EDTA, ACD, heparin-lithium and preservative-free heparin on the activation of TLR4 and 3 on monocytes treated with the endotoxin, LPS and the synthetic analogue of double-stranded RNA, PolyI:C, respectively. TLR 4 and 3 expression on monocytes was determined by flow cytometry before and after whole blood stimulation (WBS) with either LPS or PolyI:C. An increase in the expression of both of the TLR markers was observed on the monocyte population following WBS from all the tubes investigated, however, the most compelling results were obtained from the blood drawn in EDTA tubes.

Results: The information generated from this study will give valuable insight into which tubes would best be suited for the collection of blood samples for WBS studies that are routinely performed in the Department of Immunology while preventing the unnecessary drawing of excess blood from infants enrolled in studies in the future.
Abstract Detail
TOWARDS BIOMIMICRY OF THE CYSTIC FIBROSIS BACTERIAL-HOST INTERACTION PRODUCTS: FOCUS ON COMMON BACTERIAL PATHOGENS

**Introduction:** There is an emerging interest in understanding how the cystic fibrosis (CF) bacterial pathogens interact and how they influence CF pathogenicity. This interest is influenced by the appreciation that, from a microbial ecological standpoint, microbes do not exist as individuals but function as a structured community. The microbe-host interactions, of the co-existing pathogens, appear to play an important role in the pathogenesis of polymicrobial infectious diseases like CF. It is therefore believed that a key to the discovery of a vaccine for this infectious disease, lies within the complex bacterial-host interactions.

**Methods:** In this study, the differentially expressed proteomic profiles of mixed cultures of the three major bacterial pathogens associated with CF, (that is, Burkholderia cepacia, Pseudomonas aeruginosa and Staphylolococcus aureus), were determined and assessed.

**Aim:** The aim was to identify the immunoresponsive antigens that are differentially expressed in mixed culture when compared to individual cultures. The study employed the use of TCA/Acetone for protein extraction and the extracted proteins were resolved (in triplicate) on two dimensional SDS-PAGE using 7 cm, pH 3-10, immobilized pH gradient (IPG) strips.

**Results:** The expression pattern of the immunoresponsive antigens (proteins) in individual bacterial cultures were different from those of co-cultures as seen on Western blots, following treatment with CF positive human sera. These differentially expressed immunoresponsive antigens were identified by mass spectrometry and in silico vaccine design suggest that they represent potential antigenic candidates for vaccine development.
DETECTION AND QUANTIFICATION OF DIFFERENT ENDOGENOUS CARDIOTONIC STEROIDS BY LIQUID CHROMATOGRAPHY TANDEM MASS SPECTROMETRY

**Introduction:** Endogenous cardiotonic steroids (CTS) are positive inotropic agents that increase blood pressure and found in elevated concentrations in hypertensive patients. Helicobacter pylori (H. pylori) infections have been associated with hypertension due to the possible production and modification of endogenous CTS during colonisation. The aim of this study was to validate a sensitive method for targeted detection and quantification of low concentrations of endogenous CTS present in biological samples.

**Methods:** An extraction method from whole blood was optimised using reversed phase Solid Phase Extraction. A targeted LC-MS/MS method using an Agilent binary series 1100/1200 LC system with a Kinetex C18 RP column (100 x 2.1 mm, 2.6 Åµm) coupled to a Sciex 4000QTRAP tandem mass spectrometer was developed and validated for the detection and quantitation of 8 different CTS in both whole blood and solvent. The method was validated according to the International Conference on Harmonization guidelines with regards to sensitivity, selectivity, recovery, linearity, range, LOD, LLOQ, precision, accuracy, reproducibility, carry-over and stability. Data analysis was performed with Analyst® Software (version 1.5.2).

**Results:** The CTS calibration curves were linear over a concentration range of 0.1-40 ng/mL with coefficients of determination greater than 0.990. The analytical method was selective with an estimated limit of detection (LOD) and limit of quantitation (LOQ) between 0.02-0.5 ng/mL and 0.1-2 ng/mL respectively. Accuracy and precision were found to be within acceptable limits of 20 % for all analytes and their stability in methanol at -20Â°C and -80Â°C was established for at least a month.

**Conclusion:** The quantitative method was successfully validated, over expected in vivo concentration ranges for 8 different CTS. The method will be applied to biological samples to detect and quantify the presence of endogenous CTS in hypertensive patients.
THE KNOWLEDGE AND ATTITUDES OF MOTHERS OF LOW-BIRTHWEIGHT AND PRE-TERM INFANTS REGARDING THE PRACTICE OF KANGAROO MOTHER CARE IN A DISTRICT HOSPITAL IN PRETORIA

Introduction: Globally, of all yearly births, 15.5% result in infants with a low birth weight (LBW) or being born prematurely. The occurrence of LBW infants in developing countries is on the rise, with 14.3% being born in Africa. These infants statistically have a greater chance of death, developing illness or disease, or being born with physical and mental birth defects. This often results in the infants remaining underweight from infancy to childhood. Developing countries have recognised the need for Kangaroo Mother Care (KMC) which involves placing an unclothed infant in a kangaroo position (KP) on its mother’s bare chest. The knowledge and attitudes of mothers concerning KMC plays an important role in the success of this strategy. Therefore the purpose of this study is to assess the knowledge and attitudes of mothers who practice KMC.

Aim: To assess the knowledge and attitudes of mothers that have been admitted to Tshwane District Hospital’s KMC ward towards the practice of KMC.

Methods:
Design: Quantitative, observational, cross-sectional study design.
Setting: Kangaroo Mother Care ward at Tshwane District Hospital in Pretoria, South Africa.
Sampling: Thirty one mothers were interviewed using convenience sampling method.
Data Collection: A face-to-face interview using a researcher administered questionnaire.
Data Analysis: Data was analysed using descriptive statistics.

Results: 31 mothers participated in the study. 100% of mothers had knowledge that KMC increases bonding towards the mother and infant. Majority (87%) stated that it helps with breastfeeding, majority (77%) stated that it should be practiced on infants weighing between 1-1.8 kg. 100% of mothers believe that KMC involves both parents and 94% of mothers stated that nurses should be involved with the practice. Overall, mothers had a positive attitude towards the practice of KMC. Conflicting results were found in the attitudes towards the nurses’ support, as 39% of mothers agreed that supporting them is a burden for the nurses.

Conclusion: Majority of the mothers in the KMC ward have overall satisfactory knowledge and positive attitudes toward KMC. A clear conclusion could not be made regarding the support that nurses give the mothers due to conflicting results; further research is needed for these aspects.
CHARACTERISING SELECT HEPATOCYTE CULTURES FOR IMPROVED HEPATOTOXICITY TESTING

**Background:** Drug-induced hepatotoxicity is a major contributor to post-marketed drug withdrawals, despite using in vitro pre-clinical models to predict the toxicity profile of drugs. Conventional monolayer culturing of human-derived cell lines have shown limitations as drug toxicity models and lacks sufficient resemblance to functional human liver tissue. Three-dimensional cultured cells are preferred over monolayers to predict in vivo toxicity due to better tissue modelling. The aim of this study was to characterise selected hepatic culture models and compare their ability to predict hepatotoxicity.

**Methods:** HepG2 cells were cultured as monolayers and spheroids using the liquid overlay method for up to 21 days. Forty thousand cells were seeded per well in 24-well plates. Twenty thousand cells were seeded in agarose-coated 96-well plates. On Day 4, 7, 10, 14, 17 and 21 of culture, cells were stained with fluorescein diacetate (FDA) and propidium iodide (PI) then evaluated microscopically. Protein content was determined using bicinchoninic acid (BCA) assay.

**Results:** FDA staining was observed to be more intense on the periphery of the spheroids than the central area and non-localised in monolayer cultures. PI staining was observed to be centralised in HepG2 spheroids with minimal staining for monolayer cells. A significant fold-change was seen in the protein content of HepG2 monolayer cells at Day 17 (47.0 µg/well) of culture, compared to Day 0 (20.4 µg/well). A significant fold-change in the protein content of spheroids at Day 4 (20.4 µg/spheroid) and 7 (21.2 µg/spheroid) of culture, compared to Day 0 (7.6 µg/spheroid) was observed.

**Conclusion:** The data generated suggests that the liquid overlay method allows for faster cellular proliferation of HepG2 spheroids, compared to HepG2 cells cultured in monolayers. Furthermore, the robust spheroid culture conditions of the liquid overlay method are beneficial for high-throughput hepatotoxicity testing.
REPORT OF BAGAZA VIRUS IN HIMALAYAN MONAL PHEASANTS IN SOUTH AFRICA IN 2016-2017

Introduction: Flaviviruses (family Flaviviridae) are arboviruses of medical and veterinary importance, some with humans as part in their life cycles, although the reservoir or amplifying hosts are not always known. The flavivirus genus consists of over 70 viruses including West Nile- and Bagaza virus (BAGV). Bagaza virus, similar to Israel turkey meningoencephalitis virus (ITMV) was first described in 1966 from Culex mosquitoes in the Bagaza district of Central African Republic. In 1978, BAGV was isolated in South Africa from turkeys presenting with clinical signs similar to ITMV. Since then, BAGV has been detected in various mosquito species in Western Africa and India and in wild partridges in Spain. No further evidence of the virus has been reported in other parts of Africa. Zoonotic transmission was reported in India after patients with acute encephalitis demonstrated 15% positivity for anti-BAGV neutralizing antibodies.

Methods: A cluster (n=16) of neurological disease and death in Himalayan monal pheasants (Lophophorus impejanus) and three tragopan pheasant (Tragopan melanococephalus) from two localities in or near Pretoria (2016-2017) was investigated. Molecular and phylogenetic analysis as well as electron microscopy on cell culture isolates was used to identify BAGV as the likely aetiology.

Results: Here we report detection of BAGV in eight dead Himalayan monal pheasants over 2 seasons, suggesting that BAGV may circulate undetected in South Africa. More data is needed to determine the endemcity of BAGV and to determine the reservoir host and vectors of BAGV in South Africa, as well as defining the seroprevalence of these infections in birds, and possibly humans.
AIRWAY PROSTHODONTICS

Introduction: The new narrative seems to suggest that airway obstruction could be the root cause for a vast number of dental complications seen in everyday practice. Airway Prosthodontics, describes how dysfunctional breathing has an impact on the development and health of the stomatognathic system. It goes beyond traditional sleep dentistry which mainly focused on oral appliances and obstructive sleep apnoea (OSA) and places focus on how the patient developed these disorders.

Method: Literature on airway development, consequences of mouth breathing, sleep and sleep-related breathing disorders (SRBD) was read. Malocclusion as a consequence and its association with sleep bruxism (SB), gastro-oesophageal reflux disorders (GORD) and temporomandibular disorders (TMDs) was deduced.

Result: Compensatory parafunction as a result of mouth breathing resulted in postural changes of the tongue and mandible, which in turn resulted in airway instability and collapsibility as well as SRBD like snoring, OSA and upper airway resistant syndrome (UARS). Although there’s correlation between SRBD and bruxism, a cause and effect relationship has not been established. Regarding GORD, there is a shift from the classic belief that erosive wear on teeth was a result of backflow of acidic digestive contents into the oesophagus. The new narrative suggests that it is respiratory reflux that introduces acidic enzymes into the larynx and pharynx, causing enzymatic damage to these structures and also erosive tooth wear.

TMDs have been reported as the leading cause of non-dental pain and historically, malocclusion and bruxism were believed to cause myofascial discomfort. It has since been established that 90% of the population do not present with a harmonious occlusion (CR = MI), yet they do not present with TMDs. Malocclusions that have been correlated with TMD symptoms included unilateral cross bite, deep bite, increased overjet and anterior open-bite conditions

Conclusion: Patients are becoming more aware of sleep-related breathing disorders and are expecting intervention from clinicians. Dentists must be abreast with the latest information regarding diagnosis, and management of these conditions. Management of SRBD includes behaviour modification, continuous positive airway pressure (CPAP), oral appliance therapy (OAT) and surgery.
CONTEXTUALISATION OF PHYSIOTHERAPY CLINICAL PRACTICE GUIDELINES FOR HOSPITALISED PREMATURELY BORN INFANTS IN SOUTH AFRICA

**Background:** The incidence of premature infant births in South Africa (SA) is estimated to be 84 000 per year. Premature birth is associated with lower educational qualifications and decreased rate of employment due to increased risk of disability. Physiotherapists have an opportunity to potentially decrease the risk of impairment in the neonatal intensive care unit (NICU), high care unit (HCU) or kangaroo mother care (KMC) wards. Physiotherapists in high-income countries have well-defined clinical practice guidelines (CPGs) to guide the standard of practice, which is non-existing in upper-middle-income countries like SA. Ethical approval was obtained (99/2014).

**Purpose:** The primary aim of the study was to contextualise a CPG for physiotherapists treating prematurely born infants in the NICUs, HCU or KMC wards.

**Methods:** An exploratory sequential mixed method research design was used. Phase one was qualitative, with focus group discussions / interviews with consenting multidisciplinary team members and interviews / survey questionnaire with consenting parents or caregivers to determine the current patient journeys of infants in SA. An integrative literature search identified current CPGs for physiotherapy management of prematurely born infants. Phase two entailed the compilation of a questionnaire consisting of evidence-based statements based on the results of phase one. The evidence-based statements were validated in phase three with a Delphi method (quantitative).

**Results:** In phase one, four possible patient journeys were identified. Seven CPGs or position statements were identified and critically appraised by three appraisers using the AGREE II tool, and three were found to be valid for the inclusion in this study. With the authors' of the selected CPG / position statements' permission, their statements were re-formulated to be appropriate for the SA health care context. The evidence-based statements were tested by clinical and academic physiotherapy experts working in the NICUs, HCU or KMC wards in SA. Statements that were graded >80% to be relevant and valid were included in the CPG.

**Conclusion(s):** A clinical practice guideline was contextualised for the use of physiotherapists working in the NICU, HCU or KMC ward in SA. Future research is encouraged to determine the uptake of the CPG into physiotherapy practice in SA.
EMERGENCE OF NOROVIRUS GIV AND PUTATIVE NOVEL INTERGENOTYPE RECOMBINANTS IN PRETORIA, SOUTH AFRICA: ENVIRONMENTAL SURVEILLANCE AS AN EARLY WARNING-SYSTEM

Introduction: GII.4 noroviruses are a major cause of viral acute gastroenteritis. Between 1995 and 2012, new GII.4 variants emerged every 2-3 years causing six pandemics. Since the emergence of Sydney_2012 variant, no novel variants have been reported. Prevalence of GII.4 Sydney_2012 intergenotype recombinants and non-GII.4 strains with GII.P16 polymerase is on the rise. High diversity of human noroviruses and periodic emergence of novel strains necessitates continuous global surveillance.

Aims: The aim of this study was to assess the diversity of human noroviruses in selected wastewater samples from Pretoria in South Africa (SA) using amplicon based next-generation sequencing (NGS).

Methods: Between May 2018 and February 2019, 72 wastewater samples (36 raw sewage and 36 effluent) were collected fortnightly from two wastewater treatment plants in Pretoria, SA. Samples were processed using skimmed-milk flocculation and glass wool adsorption-elution virus recovery methods and screened for human noroviruses using real-time RT-qPCR. The BC genotyping region (570 bp) was amplified from selected norovirus-positive samples and subjected to Illumina MiSeq NGS.

Results: Noroviruses were detected in 79% (57/72) of samples. The majority (97%, 35/36) of raw sewage samples were positive for at least one human norovirus, compared to 61% (22/36) of effluent samples. Norovirus GII strains predominated (97%, 55/57), followed by norovirus GI (51%, 29/57) and GIV (3.1%, 2/57). Detected strains include putative novel recombinants (GI.P3/GI.7, GI.P4/GI.7, GI.P7/GI.3 and GI.P7/GI.4), emerging possible-pandemic recombinants (GII.P16/GII.4 Sydney_2012 and GII.P16/GII.2) and other previously reported intergenotype recombinants (GI.Pd/GI.3, GII.P7/GII.6, GII.P7/GII.9, GII.Pg/GII.12 and GII.P21/GII.13). Overall, 11 polymerase and 10 capsid genotypes were characterised and GII.4 Sydney_2012 and GI.7 strains co-dominated.

Discussion: Environmental surveillance has successfully detected the emergence of novel GI intergenotype recombinants, possible-pandemic GII human noroviruses harboring the GII.P16 polymerase and GIV strains. This is the first report of GIV human noroviruses in SA. Continuous surveillance for human noroviruses in wastewaters does not only identify emerging and established strains circulating in a given population but also serves as an early warning-system for possible outbreaks.
PUBLIC BELIEF OF BENEFITS AND BARRIERS TO VEGAN DIETS IN SOUTH AFRICA AND VARYING AMBITANCE

BACKGROUND: Global awareness and adoption of plant based vegan diets has increased recently, partially due growing medical, environmental and animal-welfare motivations. Perceptions of benefits and barriers to FPBVD vegan diet adoption in South Africa are so far unexamined.

AIM: To assess the public perception of benefits and barriers to adopting plant based diet and the role that ambivalence (mixed positive and negative beliefs) plays in diet choice.

METHODS: A descriptive cross-sectional study using self-administered questionnaires on Qualtrics was conducted between November 2018 - March 2019. The survey included demographic, food frequency questions (FFQ) and Likert scale agreement-disagreement statements on benefits and barriers. The study population included registered students at the Faculty of Health Sciences, UP; individuals on Vegan social media groups, and family/friends of the above.

Diet was self-identified and confirmed with FFQ. Ambivalence was evaluated using ratios of accumulative individual Likert scales of benefit with barrier statements.

RESULTS AND DISCUSSION: Of the sample (n=537), 116 (25.3%) were vegans, 42 (9.2%) vegetarians, 59 (12.9%) meat avoiders, 241 (52.6%) omnivores.

Predominant barriers to FPBVD included “like/taste” preference, availability, concerns around gatherings, cultural influences, family and friend behaviours and need for information and social norms.

Vegan participants held lower perceptions of barriers and reflected slightly more altruistic attitudes towards veganism with “creating a more peaceful world” outscoring more personal benefits.

All diet groups displayed ambivalence, omnivores(1,14) meat-avoiders (-6,62); vegetarians(-1,60) and vegans(-1,32). These ratios display omnivores agreed to barriers the most over benefits and their perceived barriers outweigh benefits, meat avoiders do perceive benefit but relatively strong barriers, but on average disagreed to them; vegetarians perceive benefit more and barriers less; vegans had highest positive benefit agreement with closely equal barrier disagreement with stronger benefit agreement outweighing the barriers.

CONCLUSION: This study exhibits the first snapshot of this health behaviour in the country and provides a reference to guide health programs and services, oriented towards the South African and global non-communicable disease burden and demonstrates an opportunity for health care professionals to produce more accurate health promotion messages towards eliminating misperceived barriers.
"WHY ISN'T MY HOUSE BEING SPRAYED ANYMORE?": A CROSS-SECTIONAL SURVEY OF KNOWLEDGE, ATTITUDES AND PRACTICES ABOUT MALARIA, AMONG ADULTS VISITING A COMMUNITY HEALTH CENTRE IN BUSHBUCKRIDGE, MPUMALANGA, SOUTH AFRICA

Background: South Africa is one of 21 countries identified by the World Health Organisation to have the potential to eliminate malaria by the year 2020. However, the country strategy for elimination by 2018 was not achieved. Instead, South Africa experienced a rise in reported malaria cases and unfavourable clinical outcomes if malaria was contracted in the country. In view of the negative clinical outcomes and the resurgence of malaria cases it is important to investigate if knowledge attitudes and practices around malaria has changed unfavourably over time.

Methods: A cross-sectional survey in Hluvukani Community Health Centre in Bushbuckridge Municipality, Mpumalanga Province was conducted in December 2018 to March 2019. A piloted structured questionnaire was administered to 225 adults visiting the health facility. Descriptive statistics were used to summarize data and compared to a previous KAP study done in the area in 2008.

Results: All the respondents had heard about malaria, and 98% correctly associated it with mosquito bites. Knowledge of signs and symptoms was adequate as 76% could identify at least three common acute symptoms of malaria and 91% would seek care on the same day of suspecting malaria. Indoor residual spraying (IRS) was highly desired, however only 48% had had their house sprayed within the past two years. Approximately 94% thought they were at risk of getting malaria; 34% thought malaria risk had decreased due mainly to IRS and increased knowledge, while 15% felt malaria risk had increased citing decreased IRS coverage and overcrowding as the main reasons.

Conclusion: The study showed increased knowledge, particularly in signs and symptoms, an improvement in positive malaria treatment-seeking behavior and increased use of bed nets when compared to a previous study. IRS was understood to be an important malaria reduction strategy by almost all respondents; however, reported coverage low and respondents were about this. Intensiﬁed community engagement is critical for malaria elimination to be realized in South Africa and key changes to the malaria control and prevention strategy need to be communicated to communities to ensure that positive gains made towards malaria elimination are not reversed.
Abstract Detail

DEVELOPMENT OF A SOLID-PHASE AND LIQUID-LIQUID EXTRACTION BASED HIGH RESOLUTION TANDEM MASS SPECTROMETRY METHOD FOR THE DETECTION OF CARBAMATE PESTICIDES AND THEIR METABOLITES IN SUSPECTED POISONING CASES

Introduction: Pesticide poisoning is a major global public health concern, with more than three million cases annually. Organophosphorus insecticides are the common pesticides seen in acute poisoning in South Africa. Aldicarb, also known as “Two-Step” or “Galephirimi”, is commonly sold in the informal sector as a rodenticide but has resulted in many acute poisoning cases. Data with respect to the true incidence of and positive identification of the pesticides involved in poisoning fatalities is lacking. The aim of this study development of a sensitive method for the determination of different carbamates and their metabolites in biological samples using ultra-performance liquid chromatography coupled to a quadrupole-time of flight mass spectrometry (UPLC-q-TOF/MS).

Methods: Four SPE cartridge types (Oasis Prime HLB, Strata C8, Strata C18, Sep-Pak C18) were used for blood sample extractions, whereas liquid-liquid extraction was used for stomach content samples. Analysis was performed on an Acquity HSS T3 C18 UPLC column. Mobile phases were 2 mM ammonium formate with 0.2% formic acid in water (Buffer A) and methanol (Buffer B). Detection and quantification were carried out on a Synapt-G2 q-TOF mass spectrometer. Masslynx™ 1.4 software was used for identification and quantitation of the analytes.

Results: Symmetrical high intensity peaks were observed after extractions using Sep-Pak cartridges. Ten carbamates were successfully detected in spiked blood samples, with detection limits between 1 ng/mL and 250 ng/mL. Efficient separation of carbamates was also achieved in the gastric content samples; however sensitivity and detection limit was two to three fold higher than for the SPE extracted blood samples.

Conclusion: The developed method for the extraction and detection of ten carbamate pesticides from biological matrices was successfully validated and will be applied to assess decay kinetics of post-mortem samples. Potentially this sensitive method will result in confirmation of cause of death in forensic cases.
Abstract Detail

RISK FACTOR PROFILE FOR NON-COMMUNICABLE DISEASES: FINDINGS OF A STEPS SURVEY AMONG THE SUPPORT STAFF AT UNIVERSITY OF PRETORIA, SOUTH AFRICA

Introduction: Non-communicable diseases (NCDs) account for 71% mortalities globally and 60% in South Africa. Common behavioural health risk factors linked to NCDs include: smoking, alcohol consumption, physical inactivity and unhealthy diet. The aim of the study was to profile NCD risk factors among insourced support staff at the University of Pretoria.

Methods: A cross-sectional, descriptive study was conducted among a convenient sample of insourced support staff (18-64 years) at the University of Pretoria (n=146, 39.7% males). The World Health Organisation (WHO) STEPwise approach to chronic disease risk factor surveillance (STEPS) questionnaire was administered to collect: firstly, the behavioural risk profile (alcohol consumption, smoking habits and NCD history which were obtained using a face-to-face interview technique (STEP I). Secondly, the physical risk profile using anthropometric (weight, height, waist circumference, body mass index (BMI)) and blood pressure measurements (STEP II). Lastly, the biochemical risk profile (finger prick blood glucose and cholesterol) measurements (STEP III). Data was double entered in Microsoft Excel 1997-2003 (.xls) files before being exported and analysed as means and frequency distributions using Epi-Info version 3.5.1.

Results: A quarter of the sample reported consuming alcohol daily and 18.5% were current smokers. The majority of participants (97.8%) had low daily fruit and vegetable intake. Eighty percent of the study population ‘always’ or ‘often’ added salt to their food when cooking and 17.8% reported consuming ‘too much’ or ‘far too much’ salt. Based on body mass index (BMI), more than two thirds of all the participants were overweight or obese of which 75.7% were females and 24.3% were males. Again, 61% of the study population had central obesity, of which 76% and 34% were females and males respectively. More than a third of the participants had raised; blood pressure (20.6% >140/90 mmHg), cholesterol levels (15.7% >5.2 mmol/l) and blood sugar (4.8%).

Conclusion: The study identified low fruit and vegetable intake, high salt intake, overweight and obesity (including central obesity) and alcohol use as the most prevalent NCD risk factors among insourced support staff. Appropriate tailored nutrition education and monitoring are needed to lower the elevated risk.
Abstract Detail

PRURITUS FOLLOWING INTRATHecal MORPHINE FOR POST-OPERATIVE ANALGESIA

Background: Intrathecal morphine (ITM) is a commonly used technique for postoperative analgesia following major surgery. Itching is a common side-effect of intrathecal and epidural administered opioids and has been described to be more bothersome than the pain for which the ITM was initially used for. Anatomical distribution of pruritus has been anecdotally observed to involve areas of the body not often described. Diagnosis and management thereof needs further evaluation within our hospital setting.

Objective: We determined the incidence, severity and anatomical distribution, as well as ITM dose associated with pruritus in the two main academic hospitals of the University of Pretoria. Furthermore the effect of breakthrough pain management on pruritus incidence as well as the incidence of nausea and vomiting following ITM were also evaluated.

Methods: We conducted a prospective study involving 83 patients who had received ITM. Interviews were held with patients at 6 to 9 and 24 to 36 hours following ITM administration.

Results: Thirty seven (44.58%) patients experienced pruritus at the first interview while twenty three (27.71%) experienced pruritus at the second interview. The incidence of pruritus was determined to be 60%. ITM dose was not associated with pruritus during the first interview (p = 0.426), but was statistically significant during the second interview (p = 0.030). Severity of pruritus was also not associated with ITM dose (p =0.8740; p =0.1191). The trigeminal area of the face was the most common area of pruritus at both interviews (n = 30; n = 22). The second most common area was the lower limbs (n =24) and the posterior trunk (n = 15) at the two interviews respectively. The incidence of nausea and vomiting was 25.30% and 15.66% for the two interviews and was not associated with ITM dose (p = 1.000; p = 0.173). Seven out of the initial 37 patients with pruritus wanted treatment at the first interview and 3 out of 23 patients at the second interview. The total amount of patients requiring treatment of the initial 83 was 10.84% (n=9, one patient requested treatment twice). Thirty six (43%) patients required additional analgesia at the first interview. No ITM dose was proven to be more superior in decreasing postoperative analgesic requirements (p = 0.457), but the analgesic requirements increased to 97% (n =77) after the first 24 postoperative hours.

Conclusion: There is a high incidence of pruritus following ITM, with an anatomical distribution extending to areas other than the trigeminal area. The severity of the pruritus is not associated with ITM dose and the majority of patients do not require treatment. ITM decreases analgesic requirements on the first postoperative day.
DIFFERENCE IN ILLUMINATION LEVELS WITH THE APPLICATION OF INCANDESCENT/FLUORESCENT AND LED LAMPS

Introduction: Almost every aspect of a mineworker’s job depends on illumination, seeing that their primary source of light is a cap lamp, this raises some questions about how effective the cap lamps are. Majority of the cap lamps used are incandescent cap lamps, and the alternative is LED cap lamps. Incandescent lamps produce heat during illumination, therefore it has a high energy demand, while on the other hand, LED lamps produce much less heat and most of the energy is converted into light energy, making it much more efficient. For this reason LED lamps last much longer in the same conditions, where the same type of battery is being used. Mine workers are dependent on their peripheral vision in order to identify slip trip and fall (STF) hazards found in the mines.

Methods: The effectiveness of incandescent and LED cap lamps were compared in terms of light intensity from the light source at different distances ranging from 1.83 m to 3.66 m, at angles ranging from 0° to 20°, to determine which cap lamp is better suited to illuminate the periphery of a miner underground.

Results: The incandescent light bulb produced the highest lux level at a short distance at 0° having a difference in light intensity of 28.8%. At all other angels tested, the LED lamp was more efficient with higher lux levels. At 20° the LED proved to have a 57.2% higher light intensity. The outcome of the results indicate that LED cap lamps are better for peripheral illumination and incandescent lamps for areas where a concentrated beam of light is required in mines.

Recommendations: It is recommended that the selection of a specific cap lamp will depends on the application. Incandescent cap lamps protect workers against STF hazards, by illuminating their periphery and incandescent cap lamps for inspection purposes.


Illumination, Incandescent, LED (Light emitting diode), light intensity, Lux, digital Luxmeter (GoldiLux), slip-trip-and-fall hazards, periphery, mine...
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Abstract Detail

NUTRITION KNOWLEDGE OF SECOND YEAR MEDICAL (MBCHB) STUDENTS AT A UNIVERSITY IN GAUTENG IN 2019

Objective: The study aimed to determine the nutrition knowledge of second-year medical students after they completed a nutrition-related module at a university in Gauteng in 2019. Different aspects of nutrition knowledge were assessed in order to identify gaps in knowledge and understanding of healthy eating practices and principles. The study aimed to determine their nutrition knowledge on:

- The quality of dietary recommendations made by health professionals.
- Sources of nutrients.
- Choosing everyday foods.
- Diet and disease relationship.
- How each score of the above-mentioned categories compare with each other.

Study Design: A quantitative, cross-sectional observational study was done whereby nutrition knowledge was measured and interpreted after the completion of the general nutrition knowledge questionnaire. The questionnaire was made available to the students to complete anonymously on an electronic platform.

Subjects: A total of 220 out of 300 students completed the questionnaire, but only 134 questionnaires were correctly and fully completed. Forty-two students (31%) were males and 93 (68.9%) were females.

Results: The students scored 60% and above for the sections: dietary recommendations, sources of nutrients and the diet and disease relationship but the score on knowledge of choosing everyday foods was below 60%.

Conclusion: Second-year medical students had an overall above average nutrition knowledge score. However, there is a gap in knowledge with regards to choosing everyday foods as well as identifying sources of protein. Therefore, it is imperative to consider modifying the nutrition content being offered in the nutrition-related module, with more emphasis being placed on choosing everyday foods. Furthermore, certain themes within the module, particularly that which pertains to protein sources, should be expanded on.
Abstract

CERVICAL PAIN AND THE ASSOCIATION THEREOF WITH SCAPULA AND CERVICAL DYSKINESIS IN GRADE 7 LEARNERS IN PRIVATE SCHOOLS IN TSHWANE

**Background:** Cervical pain is a common musculoskeletal condition that starts as early as adolescence and continues on into adulthood. Cervical pain in the adolescent population is present worldwide and affects between 18-40% of all adolescents.

**Aim:** The aim of this study was twofold; firstly, to determine the presence of cervical pain in Grade 7 learners in private schools in Tshwane. Secondly, to determine the association of cervical pain with scapula- and cervical dyskinesis in these learners.

**Methodology:** Grade 7 learners (n=123) from four private schools in Tshwane participated in the study. A questionnaire on cervical pain and predetermined related factors to cervical pain was completed. The Scapula Dyskinesis Test and Overhead Arm Lift Test were used to determine scapula and cervical dyskinesis.

**Results:** Data was analysed using Analysis of variance (ANOVA). Of the 123 learners, 21% presented with cervical pain. A high odds ratio was found with regards to the chronicity of cervical pain (OR=0.77). More girls than boys presented with cervical pain (p=0.04) Factors such as headaches (p>0.001) and seated activities like doing homework (p=0.004), recreational usage of IT equipment (p=0.009) and phone usage (p=0.075) showed statistically significant associations with cervical pain. A high percentage of learners presented with scapula and cervical dyskinesis.

**Discussion:** The results of the study regarding cervical pain are in line with those of previous studies. Even though there was a high percentage of learners that presented with scapula and cervical dyskinesis there was no association with cervical pain. There are two possible reasons for the lack of association despite the presence of dyskinesis. Firstly, compensatory mechanisms may be present in learners with dyskinesis without cervical pain. As learners are exposed to factors associated with cervical pain the compensatory mechanisms might be insufficient. This may lead to fatigue of postural muscles, increase in global muscle activity and the presentation of cervical pain. Secondly, in the presence of cervical pain, motor cortex smudging may take place. This will lead to altered muscle activation patterns and poor movement strategies, with the potential of leading to joint dysfunction and ultimately more pain.

**Keywords:** Cervical pain, adolescents, dyskinesis
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Abstract Detail

FOUR PILLARS OF CLINICAL SUPERVISION AN INSIDER PERSPECTIVE.

**Background:** Successful work-integrated-learning (WIL) in Physiotherapy is impossible without the valuable inputs and contributions made by the clinical supervisors at the healthcare institutions. These clinical supervisors are qualified Physiotherapists employed by a clinical site and formally appointed to assist with the clinical accompaniment and supervision of the undergraduate Physiotherapy students. Training these students would be impossible without this collaborative partnership. In 2018, during informal discussions between clinical supervisors and faculty members of the Physiotherapy department at the University of Pretoria (UP), South Africa, the clinical supervisors articulated a need for continuous professional development (CPD), especially on the didactics of clinical supervision.

**Purpose:** To ensure standardisation and to address the voiced CPD-need, faculty members from the Physiotherapy Department and the School’s Education Consultant presented a series of clinical supervision workshops to equip the clinical supervisors with knowledge and skills as it relates to ethical conduct, clinical accompaniment, teaching and assessment.

**Methods:** To collect data, a descriptive qualitative design was utilised. The Knowledge café® or World café® method was used and participants had to discuss a specific (unique) question related to clinical supervision at each of the three stations. Their responses were captured in images, words and symbols. As the participants rotated, they were confronted with a new question at each station. After the rotation, the anchor at each station was asked to share and summarize their conclusions referring to the words, symbols and/or drawings. After the session, the researchers analysed the Qualitative data thematically and extracted specific categories, themes and sub-themes.

**Results:** From the clinical supervisors’ data four categories emerged. It was evident that clinical supervision is balanced on four pillars [categories], namely the clinical supervisor, the students, the immediate clinical setting / environment and the Higher education institution. The clinical supervisor should exhibit specific personal attributes to enable facilitation of learning. There were however also expectations from the clinical supervisors as it related to the other stakeholders in this partnership. They expected the students to be diligent, communicate in a certain manner and to maintain a professional relationship with the supervisor. The Higher Education institution should provide structure, guidelines (objectives and outcomes for clinical training) and support while the clinical environment should be conducive to allow optimal learning to take place.

The clinical supervisors also proposed strategies such as peer evaluation, knowledge sharing and online group discussions to optimise learning. Debriefing/reflective conversations between students and supervisors) and rewards for students also emerged as a theme as well as the possibility of supervisors fulfilling the role of life-mentors or coaches.

**Conclusion(s):** For optimal, effective clinical supervision to take place, all 4 pillars in this partnership should be securely cemented and carry an equal load (responsibility).
IMMUNOMODULATORY PROPERTIES OF ADIPOCYTE DERIVED STROMAL/STEM CELLS CULTURED IN HUMAN PLATELET LYSATE

**Introduction:** Adipose derived stem/stromal cells (ASCs) are multipotent progenitor cells isolated from adipose tissue. ASCs are promising candidates for clinical applications because of their ability to differentiate into several cell types of mesodermal origin; they are also capable of immunomodulation. Cells cultured in the presence of animal-derived components, such as fetal bovine serum (FBS), may transfer xenogeneic antigens and antibodies into the human body and trigger an immune response. Because FBS is subject to scrutiny, there is a need for alternatives to FBS which will be GMP compliant. One of these alternatives is pooled human platelet lysate (pHPL).

**Aim:** To analyse and compare the effects of pHPL versus conventional FBS supplemented medium on the immunomodulatory activities of ASCs in vitro.

**Methods and materials:** Isolated ASCs were co-cultured (72h) in the presence of phytohaemagglutinin (5µg/mL) activated peripheral blood mononuclear cells (PBMCs). This was performed in 6-well plates using direct co-culturing. CD45+ PBMC viability, proliferation and activation were measured to determine whether immune suppression or immune stimulation was observed. Experiments were performed in medium supplemented with FBS.

**Results and discussion:** PHA treated ASCs displayed an altered immunophenotype, the proportion of CD105+ (34.9%) cells decreased when compared to the control (85.43%). In co-culture experiments, we observed ASC attachment to PBMCs upon PHA activation, suggesting a possible in vivo activity that has heretofore not been described. PBMCs in co-culture displayed an increase in CD25+ expression (52%) when compared to controls (37%), indicating increased activation upon co-culture, and suggesting immune-stimulation. This finding contrasts with literature where ASCs have been shown to be immunosuppressive.
GOING FOR GOLD: BRAIN AND BODY AGILITY

Introduction: Limitless You Peak Performance Program (LYPPP) is a highly developed assessment and intervention program, with various applications designed specifically to reduce overall stress, improve cognitive intelligence and the enhancement of the overall performance. This program also serves to strengthen the brain-body balance by assessing and training the three core areas of performance, namely; brain performance, health-related fitness and skill-related fitness. The purpose of case study 1 was to investigate the impact of the LYPPP on overall wellbeing of the participant; purpose of case study 2 was to determine the effect of the LYPPP on the body and brain agility of rugby referees and the purpose of case study 3 was to determine the performance levels of professional athletes by using the LYPPP.

Materials and Methods: This testing involved pre-assessment and post-assessment tests (after interventions). The pre- and post-assessment tests consisted of an online Neuro agility profile; Health related assessments to determine various physical risk factors, strength and fitness inadequacies, and cardiovascular disease risk; Mental skills assessment to assess cognitive skills; Physical related skills assessment to assess strength, speed, power, balance, coordination, reaction time, flexibility, endurance, visual and spatial ability; More specialized assessments which include brain fitness, biofeedback and neurofeedback, lung function testing, metabolic profiling, heart rate variability, and ultrastructural morphology.

Results: Case study 1: Health-related fitness components with notable improvements include reduced CS1%, which relates to reduced cardiovascular risk as well as stabilized and improved blood coagulability. Of the skill-related fitness components, major post-intervention improvements were seen for all of the visual skills assessments as well as the coordination tests. Both major components of the brain-fitness index revealed excellent improvements in overall psychological performance and functionality. Case study 2: Significant improvements were seen in the brain fitness and overall brain performance, body composition, heart health, blood pressure, static balance, muscular endurance, muscular power, visual skills as well as cardiovascular endurance.

Discussion and Conclusion: The LYPPP is a complete holistic assessment and training program that strengthens the brain-body agility by improving brain, health and skill-related fitness.
RESULTS OF ODONTOID PEG FRACTURE TREATMENT AT A TERTIARY HOSPITAL

**Background:** The axis most frequently fractures at the odontoid peg waist. Odontoid fractures account for up to 20% of all cervical spine fractures. Historic treatment with traction and then immobilization for 12 weeks has since evolved to include internal fixation of these fractures. We undertook the study to determine the prevalence of odontoid type II fractures in relation to cervical spine fractures and clinical outcomes in patients treated in our hospital.

**Materials:** This is a retrospective review of patients admitted with axis fractures from January 2008 to December 2018. We excluded patients with multiple injuries. From the odontoid peg fractures patients, demographics, neurologic deficit, method of treatment, fracture union and clinical outcomes were recorded.

**Results:** Fractures of the cervical spine were 231, 42 involved the odontoid peg. Of these, 36 were male and 8 female. Age range was 16â€“86 years. Fracture distribution by type was 1, 24 and 17 for types I, II and III respectively. The type I fracture was treated with a hard collar. Cones calipers treatment was used in 17 of type II fractures, 7 of which were later converted into halo frame and 2 to surgery. Three underwent primary surgical treatment. Type III fractures were treated with a collar in 1 patient, cones traction in 15, later converted to halo in 2 patients. One patient was treated surgically.

Six patients were treated surgically, 2 for non-union after 66 and 89 days in traction, 4 patients were treated primarily surgically after a few days of cones calipers immobilization. One was treated with an odontoid peg screw, another had a Brooks procedure and the third had C1-C2 transarticular screw fixation. The remaining three had C1-C2 posterior fusion with screw-rod constructs. All the patients went on to union, including the 2 that later required surgery for non-union.

**Conclusion:** Odontoid peg fractures heal well with non-operative management. Type II fractures have a higher non-union rate on nonoperative treatment. The introduction of a halo frame reduces hospital stay and may be the answer in the prolonged bed occupancy of these fractures.
Abstract Detail

INTER-RATER AGREEMENT OF SCORES TO ASSESS QUALITY OF CARE USING THE IDEAL CLINIC ASSESSMENT TOOL IN PUBLIC SECTOR PRIMARY HEALTH CARE FACILITIES IN SOUTH AFRICA

Introduction: Ensuring quality can be expensive when multiple points of measurement are used on a national scale. This study determined if the scores obtained from the Ideal Clinic Assessment Tool (ICAT) used to assess the quality of care in public Primary Health Care (PHC) facilities in South Africa showed inter-rater agreement between self-assessments, district peer reviews and cross-district peer reviews.

Methods: ICAT scores obtained in the three types of reviews in 2017 were recorded. For analyses the three types of reviews were paired as follows: self-assessments/district peer reviews, self-assessment/cross-district peer reviews and district/cross-district peer reviews. The global scores and averages of the Vital elements for the three paired reviews for 587 facilities across all provinces were compared using Bland-Altman plots. All the facilities that conducted all three types of assessments were included.

Findings: The Bland-Altman plots for the country showed no inter-rater agreement between the global scores and averages of the Vital elements for the facilities in any of the three paired reviews. Similarly, there was no inter-rater agreement between the global scores of the three paired reviews in any of the nine provinces in the country.

Conclusion: There is still a need to continue to conduct both district and cross-district reviews in PHC facilities as there were no inter-rater agreement in the global scores and averages of the Vital elements of the facilities. Further studies are required to determine what factors contributed to the disagreement in scores between the different types of reviews.
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Abstract

GENETIC DIVERSITY AND LINEAGES DISTRIBUTION OF MYCOBACTERIUM TUBERCULOSIS ISOLATED FROM NATIONAL HEALTH LABORATORY SERVICE/ TSHWANE ACADEMIC DIVISION, SOUTH AFRICA.

Background: Tuberculosis (TB) is one of the top ten leading cause of death worldwide with millions of new TB cases reported every year. A causative agent of TB, Mycobacterium tuberculosis (M. tuberculosis) species are divided into six main different lineages which are characterized by genetic diversity that gradually occur during evolution. This study describes the genetic diversity and lineage distribution amongst M. tuberculosis obtained from the National Health Laboratory Service/ Tshwane Academic Division, South Africa.

Methods: One hundred and fifty M. tuberculosis cultures were collected and sub-cultured on MGIT 960 machine. Positive cultures were identified for M. tuberculosis by Ziehl-Nelseen stain and DNA was extracted using PrimeXtract DNA extraction kit prior to lineage identification with spoligotyping.

Results and Discussion: Of the 150 samples, 110 (73.3%) were susceptible TB and 40 (26.7%) were multidrug resistance (MDR)-TB. Only 62.7% M. tuberculosis (76 Susceptible and 18 MDR-TB) were genotyped into 10 different families while 37.3% were orphans. Beijing formed the biggest cluster constituting 28%, followed by the T family (10%) and LAM lineage (9.3%). The overall diversity for non-Beijing lineage was T1 (8.6%), S (4%), LAM3 (3.3%), LAM4 (2.7%), Manu 1 (2.7%), LAM 11 ZWE (2%) X3 (2%), CAS (1.3%), EAI5 (1.3), H (1.3%), H3-T3 (1.3%) LAM9 (1.3%), T2-T3 (1.3%), T2 (0.6%) and X1 (0.6). LAM lineage was more associated with MDR-TB by 42% in this study. Although Beijing lineage is mostly associated with MDR-TB, in this study only 9.5% of total Beijing strains were associated with MDR-TB.

Conclusion: A high distribution of Beijing lineage was reported in this study, with LAM lineage showing a high association with drug resistance. The association between LAM lineage and MDR-TB may reveal mutations within the M. tuberculosis genome and virulence. Further studies needed to evaluate single nucleotides polymorphisms (SNPs) within M. tuberculosis virulence genes in both Beijing and LAM lineages.
Abstract Detail

APPEALS RELATED TO PRESCRIBED MINIMUM BENEFITS (2006-2016)

**Introduction:** Prescribed Minimum Benefits (PMBs) in South Africa (SA) are a set of minimum health services that all members of medical aid schemes have access to, regardless of their benefit options or depleted funds. Medical aid schemes are liable to pay for these services. However, approximately 40% of all complaints received by the Council for Medical Schemes (CMS) are in relation to PMBs. Individuals/stakeholders who are unsatisfied with judgements on their complaints are allowed to appeal. If medical schemes, members and healthcare providers were compliant with PMB regulations, there should not be PMB appeals. This study determined and described the pattern of PMB appeals from 1 January 2006 to 31 December 2016.

**Methods:** A cross-sectional study utilised CMS Judgements on Appeals database. Data for PMBs, levels of appeal, judgements, appellants, respondents and medical scheme types were extracted. The CMS’s lists of chronic conditions, PMBs and registered schemes were used to confirm PMBs and to categorise schemes as either open or restricted.

**Results:** A total of 370 appeal reports were retrieved and 123 PMB appeals were included in the study. The median of PMB appeals per year was 11 (IQR 9-27). Half of the appeals (50.4%, n=62) were by medical aid schemes appealing their liability to pay for PMBs and of these 69.4% (n=43) were found in favour of members. The remaining half (49.6%, n=61) were appeals by members appealing that schemes were liable to pay and of these 80.3% (n=49) were in favour of the medical aid schemes. Treatment options that were scheme exclusions constituted 34.4% (n=21) of reasons schemes were found not liable to pay. Different types of cancers and emergency conditions constituted one-quarter of all PMB appeals.

**Conclusion:** The complexity of the medical scheme system appears to favour medical schemes overall rather than members who might lack the knowledge of processes and guidelines and who bear the financial consequences. The financial cost and personal consequences of rejected claims are inconsistent with the affordable care objective of PMBs.
Faculty Day 2019 Abstract 2019182
Poster in the Basic Category

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Abstract Detail

SOUTH AFRICAN MILK, MAAS AND YOGHURT PRODUCTS: USE OF NUTRITION CLAIMS AND ADHERENCE TO THE DAIRY CLASSIFICATION AND FOOD LABELLING REGULATIONS

Introduction: The FBDG “Have milk, maas or yoghurt everyday” aims to address the low calcium and potassium intakes, and the high prevalence of non-communicable diseases among South Africans. Regulations can play a crucial role in guiding consumers to make healthier food choices.

Aim: To determine the use of nutrition claims on South African milk, maas and yoghurt products and adherence to the dairy classification and food labelling regulations.

Methods: An observational cross-sectional study design was used. A total of 189 products across five national stores were included. Nutritional information was recorded using an electronic data collection sheet and evaluated using the dairy classification regulations, the SA Nutrient Profile Model for eligibility and the SA labelling regulations. Descriptive statistics were used to analyse data on MS Excel.

Results: Ninety six percent (n=182) of dairy products complied with the new dairy classification regulations. 170 (89.9%) products were eligible to make claims, of which only 93 made claims. There were a total of 93 nutrient content claims, 4 structure function and no health claims made, with certain products having more than one claim. Fifteen percent (n=29) of the products made calcium content claims. Another claim, “source of vitamins” was made by 26 of the 189 products (13.8%). Only four products (2.1%) were endorsed by the GI foundation and six (3.2%) by the Diabetes Association of South Africa.

Conclusion: The majority of dairy products do not make claims even when they are eligible to. Food labelling is not used optimally by the dairy industry to guide consumers in making healthy food choices with regard to milk, maas and yogurt products.
EXPERIENCES OF HEALTHCARE PROFESSIONALS CARING FOR DRUG RESISTANT TUBERCULOSIS PATIENTS IN A TB HOSPITAL.

Introduction: Multi-drug resistant tuberculosis (MDR-TB) continues to be a global public health challenge. Managers of healthcare settings that pose a specific occupational risk, such as a TB hospital struggle with recruitment, retention and a high turnover. What is not known is what can be done in these settings to mitigate these human resource challenges. This study describes the experiences of healthcare professionals caring for MDR-TB patients at a TB hospital.

Method: The phenomenological study used a fieldworker who collected data via in-depth individual interviews from 20 participants. A purposive sampling technique was used. The study had ethical approval.

Main findings: Six themes emerged from the study: Infrastructural challenges; Human resources challenges; Lack of equipment and supplies; Support; Risk and reward; and Emotions. This “risky” occupational environment held additional environmental risks and led to additional risk-taking with regard to working outside the scope of practice and subsequent feelings of burnout. On the other hand, participants valued the opportunity to develop relationships with patients in an atmosphere that was not characterised by urgency.

Conclusion: While aspects such as salaries are beyond the scope of the hospital manager, this study identified the modifiable factors that managers can address to reduce the avoidable risks of working in a TB hospital and strengthen those aspects that staff regarded as positive and worthwhile.
THE EPIDEMIOLOGY OF SINDBIS VIRUS IN SOUTH AFRICA

Introduction: Sindbis virus (SINV) is an arthropod-borne virus (arbovirus) which falls within the Alphavirus genus in the family Togaviridae. Previously, SINV infection was not considered a major public health concern in humans until recent epidemics in SA 1974 and in the 1980s. Clinical manifestation can range from rash, fever, fatigue and arthralgia and encephalitis. However, infection can occur without giving rise to symptoms. Sindbis virus is frequently diagnosed using different methods, such as reverse transcription polymerase chain reaction (RT-PCR) and serological tests. However, because of the short viremia of arboviruses, serological tests play a central role in laboratory confirmation of alphaviruses globally. This study aims to investigate the association of SINV on neurological and febrile cases during the arbovirus season (summer and autumn) in South Africa.

Aim: This study aims to investigate the association of SINV on neurological and febrile cases during the arbovirus season (summer and autumn) in humans and animals as part of a one health approach.

Methods: Different sets of samples were selected as follows: January-June 2017 NHLS human CSF specimens during a SINV Outbreak in Gauteng; January-December 2017 Serum/CSF specimens collected from Horses in the Gauteng province; Samples collected in August 2018 to August 2020 from patients with Acute Febrile Disease of Unknown Cause (AFDUC) will be selected from the African Network for improved Diagnostics, Epidemiology and Management of Common Infectious Agents (ANDEMIA) study and Mosquito pools collected in 2017. The samples were subjected to manual total nucleic acid extraction using the QIAamp Viral RNA Kit. The 2017 set of samples from humans were retrospectively screened with a conventional nested real-time alphavirus PCR. These samples will be screened using a commercial immunofluorescence assay (IFA) serological assay and confirmed with neutralisation assays. An IFA for horses will be developed using the technology adopted from the human commercial IFA. The samples collected as part of the ANDEMIA study are being prospectively screened using the multiplex PCR on the LCD array Chip and a set from January to June 2019 and 2020 will be screened using the commercial IFA. The mosquito pool from 2017 will be screened using the conventional nested real-time alphavirus PCR.

Results: A total of 125 human CSF specimens and 116 horse sera or CSF were screened and they were all negative for SINV virus. These samples will be used in a pilot study for screening using serological assays. To date, a total of 217/381 samples were screened using the LCD array chip multiplex PCR and all of them were SINV negative.

Conclusion: Culturing of known SINV positives from previous years is still in progress and they will be characterised and they will also be used a positive controls for optimisation of One-step real-time RT-PCR.
Abstract Detail

TOWARDS THE DEVELOPMENT OF POLYMER-DRUG CONJUGATES FOR THE TREATMENT OF MALARIA

**Background:** Malaria is an infectious tropical disease caused by Plasmodium parasites with a global incidence estimated at 219 million in 2018. Complicated cases of malaria are associated with *P. falciparum* and *P. vivax* infections, with pregnant women and children under the age of five at the highest risk. Artemisinin-combination therapy (ACT) consisting of two drugs with different pharmacokinetic profiles to reduce the risk of drug resistance is used orally in combatting uncomplicated malaria. The artemether-lumefantrine combination is the most widely used antimalarial, but both drugs show poor aqueous solubility with lumefantrine being poorly water-soluble and low bioavailability. Nanotechnology can improve drug physicochemical properties, including reduced toxicity with increased aqueous solubility and bioavailability. The conjugation of a drug to a water-soluble polymer can improve the pharmacodynamics of the drug. Here we report the development of a polymer-lumefantrine conjugate for improved treatment of uncomplicated malaria.

**Materials & Methods:** Lumefantrine was conjugated to chitosan and characterised by NMR, FT-IR and UV/Vis analysis. The particle size was determined by DLS. A RBC haemolysis assay was conducted to determine the cytotoxicity of the conjugate. The in vitro antimalarial activity was determined against chloroquine-sensitive 3D7 *P. falciparum* strain, using a lactate dehydrogenase (pLDH) assay.

**Results:** FT-IR showed successful linkage of lumefantrine to polymer, while NMR results were inconclusive. The conjugate particle size averaged 80 nm in diameter. RBC haemolysis was evident at 1 mg/ml. The IC50 of chloroquine-sensitive *P. falciparum* 3D7 strain was 0.69 µg/ml.

**Conclusion:** The successful synthesis of a chitosan-lumefantrine conjugate is reported. FT-IR analysis indicated successful conjugation. The conjugate showed anti-parasitic activity against chloroquine-sensitive 3D7 *P. falciparum* strain. Although lower than the reported IC50 for lumefantrine, the drug loading and the hydrodynamic particle size of 80 nm may contributed to such a low potency. The haemolysis results suggest that the conjugate would not be suitable for IV administration.
CORRELATION OF LIFESTYLE, PRECLINICAL KNOWLEDGE AND EMOTIONAL INTELLIGENCE WITH THE FIRST CLINICAL BLOCK PERFORMANCE OF PHYSIOTHERAPY STUDENTS

Background: Clinical education is a critical component of physiotherapy education programs, essential for preparing undergraduate physiotherapy students to gain professional knowledge, develop technical skills and become competent for independent practice. Studies have shown that a relationship exists between clinical performance and lifestyle, preclinical knowledge and emotional intelligence; but, limited research has been done in South Africa regarding this topic.

Aim: The aim of this research study was to investigate possible correlations between first clinical block performance and factors such as lifestyle, preclinical knowledge and emotional intelligence of physiotherapy students. DESIGN: The study utilized an observational analytical cross-sectional design and was conducted on the Prinshof Campus of the University of Pretoria.

Methodology: A total of 36 third and 34 fourth year physiotherapy students from the University of Pretoria of the year 2018, was recruited using a non-probability total population sampling method. The students’ end of first clinical block scores, The Simple Lifestyle Indicator Questionnaire (SLIQ), the students’ previous end of year scores and The Assessing Emotions Scale (AES) were used as measurements. Data was entered into an Excel spreadsheet, exported to and analysed using the MedCalc® Statistics Program and SPSS Version 25.

Results: Significant correlations were found between first clinical block performance and preclinical knowledge (p=0.01) as well as first clinical block performance and item five of the AES (p=0.045); while lifestyle and overall emotional intelligence showed no significant correlation with the first clinical block performance. A significant difference in life stress between third and fourth year students was found. The overall lifestyle score was also significantly different between the third and fourth years (p=0.04), with the fourth years presenting with a higher mean SLIQ score.

Conclusion: Preclinical knowledge and one AES item were the only factors significantly correlating with the first clinical block performance of both third and fourth year physiotherapy students.

Keywords: Correlation, lifestyle, preclinical knowledge, emotional intelligence, first clinical block, Physiotherapy students.
PREVALENCE OF FLUOROQUINOLONE RESISTANT ENTEROBACTERIAE IN MEN UNDERGOING TRANSRECTAL PROSTATE BIOPSIES

Background: Transrectal ultrasound-guided biopsy of the Prostate (TRUBP) and/or finger guided biopsy of the prostate (FBP) are performed frequently to diagnose prostate cancer. The procedure is associated with significant risk of infectious complications. The majority of pathogens responsible for the infection are gram negative Enterobacteriaciae family (GNB) of which Escherichia coli (E.coli) is the most commonly found. Fluoroquinolone (FQ) antibiotics are most commonly used as prophylaxis to prevent infective sequelae. However, fluoroquinolone-resistance (FQR) in E.coli and other GNB has increased worldwide.

The American Urology Association (AUA) Best Practise Policy Statement advises antimicrobial prophylaxis in all patients undergoing transrectal prostate biopsies and recommends fluoroquinolones as the antibiotic of choice.

Study problem: No uniform protocol addresses the escalating problem of FQR organisms that are responsible for the majority of urinary tract infections and, more significantly, for bloodstream infection, after diagnostic transrectal prostate biopsy. Local population is very important to ensure appropriate antibiotic prophylaxis is given and thus decreasing the rate of antibiotic resistance.

Aims: To determine the prevalence of fluoroquinolone-resistant Enterobacteriae in men undergoing transrectal prostate biopsies and to identify the microbial patterns at both the Steve Biko Academic hospital (SBAH) and Kalafong hospital (KH). Also, to evaluate if standard protocol on antibiotic prophylaxis during prostate biopsy is appropriate.

Objectives: To establish the spectrum of enterobacteriae organisms including the frequency of ST131 clone in Escherichia coli isolates from patients undergoing transrectal prostate biopsies,

To determine the prevalence of FQR in Escherichia coli isolates from normal rectal flora of patients undergoing transrectal prostate biopsies,

To determine the correlation between rectal swab and urine culture findings in patients with symptomatic UTI.

Methods: Isolate identification and antibiotic susceptibility profiles were determined from rectal swabs using the Vitek (Biomerieux, Lyon France) gram negative card system. Antimicrobials tested included ampicillin, amikacin, amoxicillin-clavulanic acid, ciprofloxacin, gentamycin, ofloxacin, piperacillin tazobactam, nitrofurantoin, colistin, tobramycin and trimethoprim/sulfamethoxazole. ST131 clone and quinolone resistant genes from E. coli isolates were detected using DNA extraction and PCR assays.

Results: Gram negative Enterobacteriae was found in 61% of isolates from the rectal flora of men undergoing transrectal prostate biopsies. Most common gram negative microorganism identified was E. coli (46%). However, 39% of patients were carriers of fluoroquinolone-resistant E. coli on rectal swabs immediately prior to their biopsies. All the E. coli pathogens were susceptible to Nitrofurantoin, Amikacin and Tigecycline. ST131 clone was identified in all of the seven (39%) FQR E. coli isolates. The most common qnr gene found was qnr A and represented 47% of the FQR E. coli isolates. The qnr B gene was found in 27% of these isolates.
Abstract Detail

THE ROLES OF THE POTASSIUM-UPTAKE SYSTEMS, TRK AND KDP, IN THE EXTRACELLULAR AND INTRACELLULAR GROWTH OF MYCOBACTERIUM TUBERCULOSIS

**Background:** Tuberculosis (TB), a disease caused by Mycobacterium tuberculosis (Mtb) bacterium, is the leading cause of mortality, due to a single infectious agent, globally. The disease control measures are hindered by the incomplete understanding of bacterial pathogenicity. Potassium (K+) has been shown as an essential component for Mtb virulence determinants. However, the roles of its transporters in Mtb virulence have not been completely characterised.

**Aim:** To determine the roles of the only two sequenced active K+-uptake systems of Mtb, the Trk and Kdp, during bacterial extracellular and intracellular growth.

**Methodology:** The Mtb K+-uptake-deletion mutant strain with both Trk and Kdp systems inactivated (triple trk/kdpDE/kdpFABC-deletion knockout) was constructed using homologous recombination based on two step strategy, followed by confirmation of the mutant using polymerase chain reaction (PCR) and whole genome sequencing (WGS). The rates of growth of the mutant were determined in relation to those of the WT strain extracellularly in planktonic and biofilm cultures and intracellularly in human monocyte-derived macrophages.

**Results:** Three of the 70 colonies screened by PCR were positive for the mutations of the trk and kdp genes and two of these clones were confirmed by WGS. Only one mutant clone, F18, was selected for phenotypic characterisation in planktonic, biofilm and macrophage cultures. The rates of growth of the mutant strain were lower than those of the WT during early growth phases but were similar between the strains at the late growth phases in all the environments. In planktonic and biofilm environments, the lower growth rates of the mutant strain were associated with elevated extracellular pH levels. However, the extracellular pH levels decreased at the late growth phases and were comparable between the strains during planktonic growth but remained elevated in the mutant during biofilm development.

**Conclusion:** These findings demonstrated the essentiality of the K+-uptake systems during bacterial growth in modulating varying extracellular pH levels, which are conditions encountered by the bacteria in extracellular and intracellular environments during infection in the host.
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Abstract Detail

PRODUCTION OF A 68GA-LABELED PROSTATE-SPECIFIC MEMBRANE ANTIGENE TARGETING AGENT FOR PET/CT IMAGING: KIT-BASED RADIOLABELING VERSUS MODULE-BASED AUTOMATED RADIOSYNTHESIS

Introduction: The development of new gallium-68 based radiopharmaceuticals for positron emission tomography (PET) is one of the fastest growing research area in nuclear medicine. The labeling of peptides with gallium-68 was historically done by a labour intensive manual labeling techniques but due to a higher clinical demand, better radiolabeling solutions had to be developed that adhere to radiation safety principles. This study is set out to directly compare two alternative methods for gallium-68 radiolabeling of the prostate-specific membrane antigen targeting agent PSMA-11. Hereby the radiosynthesis performance by an automatic synthesis unit is measured up to that of a single vial kit-based radiolabeling solution.

Methods: The following parameters was analysed retrospectively for each synthesis method and compared: economic considerations, radiation burden, characteristics and quality of the final product and reliability. The data sets consist of 40 radiosyntheses for each of the methods in a dual-radiopharmacy production approach. Both facilities procure gallium-68 from a commercially available 68Ge/68Ga generator available in both centers. An automatic, remote controlled, GMP-complaint radiosynthesis module (Scintomics®GRP IBX, Germany), was utilized to produce 68Ga-PSMA-11. PSMA-11 kits were manufactured in a clean-room under aseptic conditions (Nuclear Energy Commission South Africa, Pelindaba, South Africa). Both radiolabeling protocols were optimized in-house before the comparison (Ebenhan et al, 2015 ,.....)

Results: The cost of 68Ga-PSMA-11 production using the automatic unit was significantly higher (R4400) than the kit based radiosynthesis: (R150) for the peptide and additionally consumables from the hospital (syringes, sterile filters and needles) are used. Both methods are capable to provide up to 3 personalized patient doses of 68Ga-PSMA-11. The operator time per radiosynthesis was significantly longer (38 minutes) for the automatic unit than using kits (21 ± 3 minutes), thus providing a lower molar activity of 78 ± 11 MBq/μmol compared to 126 ± 15 MBq/μmol when using the kits. The average body exposure of radiosynthesis with the automatic synthesis unit is significantly lower (2.0 ± 1 μSv) than that of the kit based method (16.6 ± 5.8 μSv) per synthesis.

Discussion: Both methods are reliable alternatives for the labour intensive manual synthesis of PSMA-11. Given sufficient infrastructure and cost considerations, a remote, modules-based radiosynthesis will provide a GMP-complaint radiopharmaceutical with an absolute predictable and repeatable outcome and minimum staff requirements. The kit-based method is a relevant, less expensive alternative still produces a radiopharmaceutical of excellent quality; however the hospital radiopharmacy must consider adequate staff radiation safety measures to avoid unnecessary-high exposure to radioactivity.
SUGAR SWEETENED BEVERAGES: A KNOWLEDGE ATTITUDE AND PRACTICE (KAP) STUDY DONE WITH PRIMARY SCHOOL LEARNERS, PARENTS AND TEACHERS IN THE PRETORIA EAST AREA OF GAUTENG

Introduction: Focussing on the link between high sugar consumption, non-communicable diseases and overweight and obesity trends, the South African Treasury implemented a taxation of Sugar-Sweetened Beverages (SSBs) in 2018.

Aim and methods: This study aimed to identify the knowledge and practices of learners regarding the consumption of SSBs, to identify the knowledge, attitude and practices of parents regarding the consumption of SSBs, and to identify the knowledge and attitude of life-orientation teachers regarding the consumption of SSBs. The study was conducted within the Pretoria East area of Gauteng, in quantile 5 schools, and made use of learner focus group discussions, and student, parent/guardian and teacher questionnaires.

Results: Main results of this study found that the majority of learners reported a link between sugar intake and weight gain, feeling sleepy, and a lack of concentration. Learners reported no link between sugar intake and skin problems or feeling bloated.

Majority of both parents/guardians and teachers reported a link between sugar intake and skin problems, head ache tension, joint pain, fatigue, feeling bloated, a foggy mind, diabetes, sugar withdrawal symptoms, heart disease, and obesity. Majority of both reported looking at food labels when grocery shopping, and reported that SSBs are not freely available in their homes. Although majority of both were found to believe that sugar tax would benefit overall health, however, only 66.8% knew that SA had implemented sugar tax.

Majority of the parents/guardians reported sending their children to school with packed lunchboxes, and that their children do not receive money for tuckshop purchased on more than 3 occasions a week.

Conclusion: In conclusion, learners, teachers and parents are generally aware of the health effects of sugar in SSBs, the health promotion strategies and support the taxation of SSBs.
THE ESTABLISHMENT OF AN ALLOGRAFT RODENT MODEL FOR TUMOUR ENHANCED PERMEABILITY AND RETENTION AND VALIDATION BY MICROPET/CT

Introduction: The development of novel radiopharmaceuticals that target tumors through the enhanced permeability and retention (EPR) effect is gaining popularity as a research field. Macromolecules (>40 kDa) are retained in tumors via leaky vasculature and an impaired lymphatic system. Because this phenomenon (adaptations to vasculature) cannot be evaluated in vitro, it is important that applicable animal models are developed to evaluate suitable tracers. This study aimed to qualify a rodent allograft model for the evaluation of tumor targeting specificity through the EPR effect. The novel tracer 64Cu-GluCAB (albumin binding diagnostic imaging agent) was utilized to validate the tumor model using micro-scaled positron emission tomography/computed tomography (µPET/CT).

Methods: Following approval by the NWU-AnimCare Ethics committee (NWU-00254017-A5) the animal model was established by injection of rodent breast cancer (E0771) cells suspended in Matrigel (2.5 x 105 cells/mouse) into the mammary fat pad of female C57BL/6 mice. Tumour growth was monitored 2-3 times a week using a digital calliper. 64Cu-GluCAB µPET/CT imaging was performed when an average tumour volume of 207± 62 mm3 was accomplished. Four static µPET/CT scans were performed at 1, 2, 6 and 24 hours followed by post mortem ex vivo biodistribution; blood, tumours and several organs were collected and analysed by automated gamma counting. Tracer uptake was correlated with histopathologic analyses.

Results: The E0771 derived allograft model was successfully established with tumours detected within one-week post inoculation, with a tumour take rate of 100% (26/26) and average doubling time of 36 ± 20 hours. The biodistribution profile of 64Cu-GluCAB illustrated high accumulation in the plasma (4.1 ± 0.2% injected dose/g), confirming that the 64Cu-GluCAB precursor (without albumin) bound to albumin in vivo; hence, increasing the biological half-life of this compound. Furthermore, a tumour-to-muscle ratio (0.33 ± 0.04) was deemed inadequate to assure good visualization E0771 tumours by way of µPET/CT. This data suggest that the EPR effect is not an obvious phenomenon and highlights the importance of characterising in vivo tumour models in respect of the EPR effect prior to application in evaluation of radiopharmaceuticals.
Abstract Detail

COMPARISON OF THE ABILITY OF THE PHARMACOPERONE, LHR-CHAP, TO RESTORE FUNCTION OF MOUSE AND HUMAN MUTANT LUTEINISING HORMONE RECEPTORS

Introduction: Mutations in G protein-coupled receptors are implicated in many endocrine disorders. Inactivating mutations can impede interactions with ligands or down-stream signalling components, but often cause receptor misfolding and failure of translocation to the cell membrane (their site of action). Pharmacological chaperones, cell-permeant molecules which interact with and stabilise misfolded mutant receptors, have been identified for several GPCRs. One, LHR-Chap, has been previously described by us to ‘rescue’ the cell surface expression/function of misfolded human luteinising hormone receptor (LHR) mutants. This allosteric agonist also rescues function of mutant human LHRs with deficiencies in hormone-binding or signalling. We now intend to examine in vivo ‘rescue’ of these mutant LHRs in transgenic mice. As a prerequisite, it is necessary to ensure that (i) the mouse LHR mutations selected mimic their human counterparts and (ii) LHR-Chap can rescue their localisation and/or function.

Methods: To this end, a selection of LHR-Chap-responsive human LHR mutations were selected (with defective cell surface expression, hormone-binding or hormone signalling) and corresponding mutations were created in mammalian expression vectors encoding mouse LHR. Cells were then treated with LHR-chap and total and cell surface receptor expression levels were measured. Signalling after rescue was also determined using an inositol phosphate receptor accumulation assay.

Results: Using a cell-based exogenous expression system, cell surface expression, of the mouse LHR mutants was determined and were found to reflect that of their human counterparts. Similar to the human LHRs, LHR-Chap was able to rescue cell surface expression of retained mouse LHRs and was able to elicit signalling in hormone binding- or hormone-signalling-deficient mouse receptors.

Conclusion: LHR-Chap treatment showed rescue of cell surface expression, hormone binding- and hormone-signalling in mouse LHR mutant receptors. This has enabled suitable mouse LHR mutations to be identified for introduction into transgenic mouse models for demonstration of the in vivo activity of LHR-Chap in rescuing reproductive function.
Presenting Author: MsMehlape (UP)

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Abstract Detail

NUTRITION KNOWLEDGE AND ATTITUDES OF YOUNG ADULT BASKETBALL AND SOCCER ATHLETES AT A SPORTS ACADEMY IN NORTH WEST PROVINCE, SA.

Background: Food products advertising, and strong media and internet coverage on nutrition are among the major challenges in translating sound and clear nutrition messages to athletes. Poor nutrition knowledge, attitudes, and lack of involvement of nutrition experts are among the reasons why young adult athletes end up adopting poor, misinformed dietary practices that may have negative impact on their performance.

Aim: To determine the nutrition knowledge, attitudes and practices of young adult soccer and basketball athletes between the ages of 14 and 25 years in the North West Province during the years 2017 and 2018.

Setting: A world class sports campus with numerous pitches, fields, a high performance gymnasium and a medical centre near Rustenburg.

Method: A cross-sectional descriptive design and convenience sampling were employed. Three adopted and modified tools (Nutrition Knowledge-Attitudes Questionnaire, Questionnaire of Eating Attitudes and Behaviour (Q-EAB), and the Rapid Eating Assessment for Patients (REAP) were used for data collection. The data were analysed using Epi-Info (Version 7.2.2.6). Ethical approval: Faculty of Health Sciences Research Ethics Committee, U.P; 333/2017.

Results: The sample (N=170) had a mean age of 16 years, and the majority were males (65.5%). Athletes were found to be knowledgeable on carbohydrates and their roles (50%), carbohydrate exchanges (70%), protein sources (61.8%), diet-disease relationship (over 60%). However, the athletes lacked knowledge with regards to the roles of protein in the body (71.4%), vitamins (74%), fat (50%), supplements (70.6%), hydration (65.9), reliable nutrition information sources (64.1%). On a positive note, 70% of the athletes showed positive attitudes towards good nutrition and were willing to adopt healthier eating habits.

Conclusions: Young adult basketball and soccer athlete could be at risk of having negative health consequences resulting from poor nutrition knowledge. The need to include dietitians in sports teams to integrate nutrition principles into the training programmes of young adult soccer and basketball athletes came to the forefront.
ACTIVITIES CHILDREN WITH CEREBRAL PALSY ENGAGE WITH IN AN UNDER-RESOURCED AREAS

Introduction: Limitations in participation for children with cerebral palsy (CWCP) can be enhanced through the provision of environmental adaptations and assistive devices. CWCP living in under-resourced areas have less access to environmental adaptations to augment participation. To plan occupational therapy interventions, we need to determine what activities CWCP participate in and what type of environmental supports are utilised.

Objectives: The study was designed to describe the types of daily activities CWCP aged 5-6 years in under-resourced areas, South Africa, engage in to inform OT intervention.

Methods & results: A quantitative cross-sectional descriptive survey design was used to identify and categorize these activities. A developed instrument based on the ICF (International Classification of Function) and OTPF (Occupational Therapy Practice Framework) was used to collect data. The results indicated that this sample of CWCP participated in fewer activities than in other countries. The occupational areas of concern were identified as lack of leisure activities, school attendance and limited participation in instrumental activities of daily living. Most time was spent at home, doing sedentary, isolated play activities. Mothers were the primary caregivers, provided assistance for self-care tasks. Caregiver burden was identified as a concern. Only mobility assistive devices used were issued and used.

Conclusion: Issues emanating from the study that require OT intervention include addressing caregiver burden, investigation into lack of provision of assistive devices, parent education on participation in childhood occupations and greater community development. Advocating for implementation of early childhood development policies, improved environmental supports and appropriate assistive devices is needed.
INVESTIGATION OF IN VITRO PROSTATE-SPECIFIC MEMBRANE ANTIGEN EXPRESSION IN MCF-7 AND MDA-MB-231 BREAST TUMOUR CELLS

**Introduction:** Breast and prostate cancer mutually represent the most commonly occurring malignancies worldwide in women and men, respectively. The mutative state, recurrence capacity, resistance to conventional chemotherapy, low success rate of surgery and risks associated with radiotherapy confound the management of both these malignancies. There are several similarities between breast and prostate cancer, like growth hormone dependence and similar chemotherapeutic interventions. Therapy based on radiopharmaceuticals targeting the prostate-specific membrane antigen (PSMA) is proving to be a cutting-edge theranostics intervention for prostate cancer. Clinical positron emission tomography (PET) scans have located anti-PMSA binding sites in breast cancer in vivo. This indicates possible non-prostatic expression of PSMA, therefore research focuses on the understanding the cellular kinetics, protein expression profiles and genomic variation of breast cancer. This may lead to possible discovery of underlying biomarkers such as PSMA or similar surface molecules that can aid in development of more selective, effective and safe diagnostic and therapeutic alternatives, which are financially considerate within the African demographic.

**Methods:** In vitro cultures of LNCaP prostatic as well as MCF-7 and MDA-MB-231 breast carcinoma cell lines were tested for surface expression of PSMA by flow cytometry, immunohistochemistry and ELISA using appropriate fluorescent-tagged antibodies.

**Results:** Findings demonstrate positive PSMA identification in breast tumour associated neovasculature and its accompanying distant metastases sites in the clinical environment however in vitro expression has not yet been confirmed.

**Conclusion:** Clinical confirmation of PSMA expression in breast cancer enhances the evidence of the potential usefulness of PSMA investigation in vitro.
INVESTIGATING THE POTENTIAL OESTROGENIC AND ANDROGENIC ACTIVITY OF SELECTED OVER-THE-COUNTER (OTC) ANTIHISTAMINES AVAILABLE IN SOUTH AFRICA

Introduction: Hormones are regulatory chemical signals that are carried in the bloodstream to various parts of the body. They are able to bind to receptors at target cells and tissues to carry out their regulatory response. This interaction between the hormones and their target receptors form part of the endocrine system. The endocrine system is responsible for modulating growth, metabolism, development and other processes in the body responsible for sustaining life. Any irregularities in the functioning of the endocrine system may lead to cancers, reproductive disorders or even birth defects. It has been observed that there are a number of natural and man-made compounds (which include pharmaceuticals, pesticides and even plasticizers) that are able to either mimic or interfere with the body’s hormones resulting in the disruption of the endocrine system. Such compounds are referred to as endocrine disrupting chemicals (EDCs). EDC’s are natural or synthetic compounds which are able to interfere with the endocrine system through the disruption of hormone synthesis and action. These EDCs may affect humans when they are either consumed, inhaled, through dermal contact or when they are leached into the environment where they may enter into drinking water sources. Recent findings have, however, indicated that any effects observed may be in response to small EDC doses over an extended exposure time. Moreover, effects are more likely to be observed from exposure to a mixture of EDCs rather than a single endocrine disruptor. Of the compounds found in South African surface waters, antihistamines were detected in large concentrations; however, there is limited information indicating the EDC activity of these antihistamines. This class of pharmaceutical products are histamine receptor antagonists which are commonly used in the treatment of allergy symptoms. This project; therefore, explores if selected over-the-counter antihistamines and their metabolites show nuclear receptor-mediated endocrine disruptive activity and Sertoli cell toxicity which will be determined using in vitro bioassays (namely a yeast oestrogen and androgen assay as well as an MTT assay).
Faculty Day 2019 Abstract 2019199 Poster in the Basic Category

Presenting Author: P Hlubi (UP)

Authors: P Hlubi (UP) AM Joubert (UP), BA Stander (UP), AE Mercier (UP), S Marais (UP)

Abstract Detail

POTENTIAL ANTI-CANCER EFFECTS OF A NOVEL SIRTUIN 1 AND 2 INHIBITOR IN A CERVICAL ADENOCARCINOMA AND PROSTATE CARCINOMA CELL LINE IN VIVO.

Introduction: Prostate and cervical cancer remain highly prevalent worldwide. Chemotherapy resistance and unfavourable side effect profiles drive the need for exploring new treatment strategies. Sirtuin inhibitors have been identified as a potential anti-cancer treatment, but limitations, such as low potency and poor physiochemical properties need to be overcome. Previous studies have shown an increased expression of sirtuin (SIRT) 1 and 2 in cervical and prostate cancer cells. BB1, an in silico designed analogue was derived from thieno [3, 2-d] pyrimidine-6-carboxamides using docking and molecular dynamic tools. Previous studies by Stander et al showed that BB1 inhibits sirtuin 1 and 2 with an IC50 of 8.6 µM against MDA-MB-231, 12.8 µM against MCF-7 and 11.4 against EA.hy926 cells.

Aim: The aim of this study was to investigate the potential anti-cancer effect of BB1 on cell growth, morphology and cell cycle progression in a cervical adenocarcinoma (HeLa) and prostate carcinoma (Du145) cell line.

Methods: Du145 and HeLa cells were incubated with BB1 (0.75µM-50µM) for 48 hours. Cell viability were assessed using crystal violet (CV) staining. Cell morphology was analysed using polarization-optical transmitted light differential interference contrast (PlasDIC) microscopy. All experiments were conducted in triplicate with three biological repeats and appropriate controls.

Results: The mean and standard error of the means of all the data were expressed relative to the solvent control dimethyl sulfoxide (DMSO) and analysed by analyses of variance (ANOVA) with Bonferroni post-analysis (P<0.05). Micrographs of HeLa cells showed a decrease in cell density after 48 hours of exposure to 25M-50M of BB1 treatment and had morphological features of apoptosis including rounded cells and cell shrinkage. CV analysis showed a statistically significant decrease in cell growth at 50M when compared to the solvent control. Micrographs of Du145 cells had a decrease in cell density and morphological features of apoptosis. Du145 cells had a dose dependent decrease in cell growth after 48 hours of exposure to 12.5M-50M BB1 relative to the solvent control. Future studies will include cell cycle analysis of treated Hela and Du145 cells. This will enable us to confirm any cell cycle changes induced by BB1.
ENERGY AND MACRONUTRIENT CONTENT OF BREAST MILK FROM SOUTH AFRICAN MOTHERS OF PRETERM INFANTS: AN EXPLORATORY STUDY

Background: Human milk is the feed of choice for all infants, including preterm infants. Milk from mothers who delivered prematurely has a different macronutrient composition during the first weeks of life (i.e. preterm milk) when compared to mature milk. In calculating preterm infants’ nutritional intake, the energy and macronutrient composition of mothers’ milk is largely assumed to be similar to published figures. Little is known about the actual content of South African mothers’ milk. The objective of this study was to analyse the macronutrient content of human milk from mothers who gave birth to preterm infants in a tertiary South African hospital in 2018.

Methods: Mothers provided samples of milk expressed during both, the day and night. These samples were analysed separately and also mixed in equal parts to approximate a 24-hour sample. A total of 193 (87 day; 53 night; 53 mixed) human milk samples were analysed with mid-infrared spectroscopy (MIRIS HMA™, Uppsala Sweden), and 164 (72 day; 42 night; 50 mixed) retained for statistical analysis after 29 (15%) out-of-range readings were excluded. Preterm milk was defined as milk collected within the first 14 days of life and mature milk as that collected from day 15 of life onwards.

Results: Human milk samples were obtained from 85 mothers (age: 27.7±6.7 years) of infants with mean gestational age 30.3±2.9 weeks and mean birth weight 1310±401g. At the time of sample collection infants had a mean post-menstrual age of 33.6±3.1 weeks and a mean weight of 1461±376g. Mean protein, carbohydrate, fat and energy content of mixed samples per 100mL were 1.5±0.4g, 7.2±0.7g, 3.5±1.0g and 69.0±9.7kcal respectively. Preterm milk (n=13) had 1.9±0.3g protein and 66.4±10.4kcal, and mature milk (n=37) 1.4±0.4g protein and 69.9±9.5kcal, per 100mL. The protein content of both preterm (P=0.0002) and mature (P=0.0022) milk as well as the energy content of mature milk (P<0.001) were significantly higher than published data (Cormack, 2016).

Conclusion: Macronutrient content of human milk from South African mothers differs from published data.
Presenting Author: S Harmse (Private practice)

Authors: S Harmse (Private practice) TL Buys (UP), N Claassen (UP)

Abstract Detail
EVALUATING VALIDITY OF MODAPTS AS AN ASSESSMENT METHOD OF WORK SPEED

**Background:** Based on latest statistics only 0.9% of the Economically Active People in South Africa are persons with disabilities. Furthermore, many of the persons with disability in South Africa are employed in sheltered employment with little or no prospect of career advancement. Occupational therapists depend on standardised procedures to evaluate work capacity, ability to work and rehabilitation needs. MODAPTS may be a more cost-effective alternative to standardise work assessments, yet hardly any studies report its validity as an assessment method in occupational therapy. This study aimed to evaluate face, content and criterion validity of MODAPTS as an assessment method of work speed.

**Methods:** A quantitative cross-sectional research design was used. Two electronic surveys were utilised to determine face and content validity of MODAPTS. The Lynn method was used to analyse data related to face and content validity. Criterion validity was evaluated by comparing MODAPTS to Valpar Component Work Samples (VCWS), the gold standard of work samples, namely that utilises the Methods-Time-Measurement (MTM) technique. A deterministic model was used to evaluate the comparability of MODAPTS to MTM.

**Results:** Face validity for MODAPTS as an assessment method of work speed was confirmed through an agreement of 94.73%. Content validity basic movement and handling of smaller and larger articles as well as other body actions codes was confirmed with an agreement of 100% respectively. Content validity was however not confirmed for mental and clerical operations codes (67%). Criterion validity for basic movements, handling smaller articles and other body actions was confirmed but not for tasks involving mental and clerical operations.

**Conclusions:** MODAPTS demonstrated adequate face, content and criterion validity. The results of this study indicate that MODAPTS can be used to assess work speed in physical and manual tasks. It is recommended that further research be conducted on the development and use of work samples to assess work capacity.
EPIDEMIOLOGY OF PAEDIATRIC AND ADOLESCENT FRACTURES ADMITTED TO TEMBISA HOSPITAL, A SOUTH AFRICAN PROVINCIAL HOSPITAL

Background: There are limited studies available that examine the epidemiology of children and adolescents admitted with orthopaedic injuries in developing countries. South Africa possesses several elements that make our population unique, which may influence fracture patterns and their management. These statistics can help to identify areas that can benefit from preventative measures. Information regarding admission duration and type of management can also potentially aid hospital management to adequately plan and budget for these patients.

Methods: We did a cross sectional record review for the period from 1 January 2016 to 31 December 2017. Convenience sampling was done and demographic and clinical data was collected from patient records. All patients younger than 18 years at the time of injury, which were admitted with fractures of the appendicular skeleton, spine or pelvis, were included. Patients with incomplete clinical records and isolated tuft fractures were excluded.

Results: A total of 731 patients were admitted in this period, with 526 (72%) remaining after incomplete records were excluded. From these records we found a higher percentage of males admitted (73%) compared to previous publications and the average age was 7.72 years (SD = 4.49). A fall on level ground was the most common mechanism of injury (70.0%), followed second by pedestrian vehicle accidents (12.2%). The most frequently fractured regions that required admission were the forearm (36.4%), humerus (26.5%), femur (18.9%) and the tibia/fibula (12.5%). The average duration of admission was 8.59 days (SD = 9.00). Out of the 307 (58.3%) patients taken to theater, hardware was used in 148 (28.1%). Additional non-skeletal injuries were sustained by 14 patients and 13 patients sustained fractures to multiple regions. There was one death, which occurred in a patient with gunshot trauma.

Conclusion: The need to provide safer environments for children has already been recognized in South Africa. By providing a current descriptive picture of traumatic orthopaedic injuries and exploring current treatment practice patterns, we hope to guide policies that promote paediatric trauma prevention, improve treatment and reduce the associated morbidity and mortality.
**Presenting Author:** TH Sadiki (Human Nutrition)

**Authors:** TH Sadiki (Human Nutrition) GJ Gericke (UP)

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**Abstract Detail**

MATERNAL KNOWLEDGE AND PRACTICES OF INFANT AND YOUNG CHILD FEEDING

**Introduction:** Improper feeding practices is one of the major factors leading to the increase in undernutrition, especially in developing countries.

**Aim:** To assess and compare mothers’ knowledge, Infant and Young Child feeding (IYCF) practices and the anthropometric status of children (0 to 24 months).

**Setting:** Ameca Clinic (Rural) and South Lunzu clinic (urban) in Blantyre district, Southern Malawi.

**Method:** A cross-sectional design and convenience sampling were employed; 212 mother/child pairs (urban clinic) and 214 mother/child pairs (rural clinic). The WHO questionnaire (IYCF practices), FAO knowledge questionnaire, a height board, SALTER scale and MUAC tape were used for data collection according to standard procedures. Data were analysed using Epi info and WHO Anthro. [Ethics approval: University of Pretoria, Faculty of Health Sciences (501/2018), and Malawi Ministry of Health.]

**Results:** Half of the women (urban and rural) knew the recommended IYCF practices (urban mean score=6.25 and rural mean score=5.65/total of 9). Almost all children were put to breast immediately after birth in both urban (90.57%) and rural (93.50%) areas. Exclusive breastfeeding under 6 months was 53.33% in the urban and 61.97% in the rural areas, introduction of solid, semi-solid or soft foods was high in both urban (77.27%) and rural (80%) areas, minimum dietary diversity was 71.50% in the urban and 23.94% in the rural areas (p<0.0001). The minimum meal frequency was relatively low in both the urban (38.69%) and rural (38.73%) areas, minimum acceptable diet was also low in both urban (32.12%) and rural (11.26%) areas. Most children in both areas showed normal growth; stunting was reported to be 28.28% in the rural (n=198) and 10.73% in the urban (n=205) areas (p=0.0001).

**Conclusion:** Majority of the mothers in both areas knew the recommended IYCF practices. Hence, the difference in stunting is probably related to food insecurity not nutritional knowledge. Further investigations into food insecurity are recommended.
Faculty Day 2019 Abstract 2019205 Poster in the Clinical Category

Presenting Author: RP Dimo (Health)

Authors: RP Dimo (Health) TK Madiba (UP)

Abstract Detail

NURSING PRACTICES ASSOCIATED WITH DELAYED DIAGNOSIS OF MALNUTRITION IN CHILDREN UNDER 5 YEARS IN WEST RAND DISTRICT PRIMARY HEALTH CARE FACILITIES

Background: Despite improvement in child health outcomes, undernutrition in children under five years continues to be major public health problem, contributing to childhood morbidity, mortality, impaired intellectual development and increased risk of diseases in adulthood. Various factors known to contribute to malnutrition are challenging to overcome.

Objectives: To assess the practice patterns and knowledge of nursing personnel in the West Rand working with children under 5 years related to delayed diagnosis of malnutrition

Design: An observational, descriptive, cross-sectional study, from June 2018 to September 2018.

Setting: The study was conducted at 36 primary healthcare clinics in West Rand Health District Council Area, Gauteng, South Africa.

Subjects: The study subjects were 49 nursing personnel working with mother and child.

Results: All the 49 subjects participated and their ages ranged from 27 to 59, with a mean age of 42.5 years (±9.7). Majority were females 98% and 98% were professional nurses. Nearly two thirds (61%) of the participants had good knowledge, 33% had excellent knowledge whilst only 6% had poor knowledge. Those who attended the 8 Hours and the integrated management of childhood illness (IMCI) courses had significantly more knowledge as compared with those who did not attend (p<0.05). There was a significant difference between practice patterns and knowledge (p=0.021), with those with good and excellent knowledge taking anthropometric measurements as compared to those with poor knowledge. There was statistically significant difference between measurements and practice patterns of the following: MUAC tapes and MUAC measured (p=0.00), length measured and plotted height for age graph (p=0.00). There was no association between practice pattern and availability of anthropometric equipments (p=0.069) however there was a correlation noted (p=0.024).

Conclusion: More than half the nurses had good knowledge on factors causing malnutrition. The knowledge was influenced by attendance of 8 hours and integrated management of childhood illness courses whilst the practice patterns were influenced by the level of knowledge. Compliance with good practices was adequate and influenced by the level of knowledge with those with good knowledge complying more. Almost all clinic had the necessary anthropometric equipment

The findings highlighted shortcomings related to implementation of the integrated management of acute malnutrition and nutrition component of the integrated management of childhood illness at the primary healthcare clinics.

Keywords: nursing practices, malnutrition, child health, delayed diagnosis, anthropometry
THE RELEVANCE OF POST REDUCTION COMPUTED TOMOGRAPHY SCANS IN ADULT PATIENTS WITH TYPE I POSTERIOR HIP DISLOCATIONS AND CONCENTRIC REDUCTION ON PLAIN RADIOGRAPHS

**Background:** It is widely accepted that it is mandatory to perform post reduction CT scans for all posterior hip fracture dislocations. However, there is no consensus in the literature regarding simple posterior hip dislocations, where bony fragments are usually small and may not warrant surgical intervention.

**Aim:** The aim of the study was to investigate whether the use of post reduction CT scans influence subsequent management of type I posterior hip dislocations.

**Methods:** In this cross-sectional study, 11 consecutive patients with type I posterior hip dislocations had their post reduction xrays and CT scans reviewed. The images were retrieved from the PACS system at our institution, from 2006 – 2017. Xrays were assessed for hip joint space widening at the superior, axial and medial positions as described by Baird et al and compared with the uninjured side. Differences of >1mm were considered as joint space widening. Axial views on CT scans were assessed by the radiologist, for presence and size of intra-articular fragments and associated fractures. Statistical analysis was undertaken using the Fischer exact and McNemar tests to measure relationship between CT scan and xrays, while the Cohen’s Kappa co-efficient was used to measure agreement between the two modalities.

**Results:** Two patients (18%) were found to have hip joint space widening on xrays. On CT scan, two patients (18%), one with joint space widening on xrays, had intra-articular fragments, and one patient (9%) was found to have an extra-articular rim fracture. There was no statistically significant difference (p=0.451) between the results from the two modalities. When matched, using the McNemar Test, there was no statistical difference (p=0.5437) between xrays and CT scan. Cohen’s kappa coefficient showed a 73% agreement between xrays and CT scans. None of the patients had any surgical intervention

**Conclusion:** Although CT scan is superior in detecting intra-articular fragments compared to plain x-rays, our study has demonstrated that it does not influence treatment in type I posterior hip dislocations.
Presenting Author: E Kok (Pharmacology)

Authors: E Kok (Pharmacology) A Marais (UP), V Steenkamp (UP), WG van Hougenhouck-Tulleken (UP)

Abstract Detail
ERYTHROPOIETIN TREATMENT IN ANAEMIC PATIENTS AT THE NEPHROLOGY UNIT OF THE STEVE BIKO ACADEMIC HOSPITAL - A RETROSPECTIVE, CROSS-SECTIONAL STUDY

Background: Anaemia in chronic kidney disease (CKD) mostly results from a decrease in the production of erythropoietin (EPO) by the failing kidney. CKD progression requires treatment with erythropoiesis stimulating agents and iron supplementation to ensure sufficient erythrocyte production. Best clinical practice guidelines should be adhered to in managing CKD to reduce morbidity and mortality related to anaemia associated cardiovascular disease. Likewise, guideline deviations create an increased strain on the resources of the treatment facility. The aim of this study was to assess treatment trends in managing anaemia in CKD patients at the Steve Biko Academic Hospital (SBAH).

Methods: Data from patients receiving treatment at the SBAH Nephrology Unit between 2 January 2018 - 31 August 2018 were assessed. Only individuals with stage 5 CKD receiving either haemodialysis, or peritoneal dialysis were included, whilst those with less than 3 months’ treatment were excluded. Measured variables included demographical information, current EPO treatment and/or iron supplementation regimens versus serum haemoglobin/iron levels and quantity of administered blood products.

Results: Data from 97 patient files were reviewed. Haemodialysis accounted for 43% (n = 42), and peritoneal dialysis 57% (n = 55). An intergroup comparison between the number of results where both haemoglobin and iron were within the target range versus the number of results where both parameters fell outside the target range yielded a significant difference (p = 0.0031). Patients receiving peritoneal dialysis reached serum haemoglobin and iron levels closer to normal target values compared to those receiving haemodialysis.

Conclusion: Managing anaemia in CKD is a complex process. More stringent iron control, especially for patients receiving haemodialysis, including the administration of long acting EPO preparations once a month, is proposed. The latter will contribute to improvement of clinical outcomes of patients with CKD.
THE IMPACT OF CHANGES IN MALARIA CONTROL STRATEGIES IN SOUTH AFRICA ON DDT EXPOSURE AND SEMINAL PARAMETERS

**Introduction:** Exposure to complex mixtures of endocrine disrupting chemicals (EDCs) are associated with adverse male reproductive health. In malaria-endemic areas, traditional huts are sprayed with 1,1,1-trichloro-2,2-bis(chlorodiphenyl)ethane (DDT) while modern structures are sprayed with pyrethroid-insecticides. DDT has estrogenic properties, and its metabolite DDE is a potent anti-androgen. With housing modernization and DDT sourcing costs, spray programs have changed. This study investigated effects of lower DDT levels and seminal parameters of men from DDT-exposed and non-exposed villages.

**Methods:** In a cross-sectional study conducted between 2012-2017, 431 young males, aged 18–40 (24±4) years were recruited from six villages (three DDT-exposed – n=236; three non-DDT exposed – n=195) in a malaria endemic area in Limpopo Province, South Africa where DDT is used in indoor residual spraying. Exposure levels of DDT and metabolites were measured in blood plasma and semen analyses conducted according to WHO standards. Linear regression models were examined to evaluate DDT/DDE effects on different reproductive outcomes. Seminal parameters were used as continuous variables in regression analysis and the dfbeta (dfβ) statistic was determined.

**Results/Discussion:** Mean p,p’-DDT exposure levels in the 2012–2017 period were 0.92 ug/g (range 0.01 – 3.05) in the non-sprayed village and 0.92 ug/g (range 0.11 – 14.98) in the sprayed villages. In sprayed villages p,p’-DDE exposure levels were significantly lower from 216.9±210.6 ug/g (mean±SD) during 2003–2008 to 5.88±6.6 ug/g during 2012–2017 (P < 0.001). Men in the 2012–2017 group with p,p’-DDE levels between 0.26 and 2.25 µg/g are 2.6 times more likely to present with oligozoospermia than men with either lower or higher p,p’-DDE levels (P<0.030). No significant differences were seen in the sperm concentration and motility. Linear regression models indicated mean sperm head defects (B= 0.01, P = 0.05) and tail defects were higher with increasing p,p’-DDT (B= 0.25, P < 0.01) and p,p’-DDE (B= 0.25, P = 0.001) exposure levels. Similar to 2003–2008 findings, current results point to weak associations between p,p’-DDE plasma concentrations and sperm chromatin defects (%DFI) in participants from sprayed-villages (P < 0.010). In addition to DDT exposure, the role of complex environmental chemical mixtures should be investigated as health implications may include epigenomic and metabolomic effects.
Presenting Author: RLN Makgopa (Physiology)

Authors: RLN Makgopa (Physiology), V Nortjie (Physiology), TB Mnisi (Physiology), P du Toit (Physiology)

Abstract Detail

THE IMPACT OF EXERCISE AND NUTRITION SCIENCE EDUCATION ON THE BRAIN AND BODY AGILITY OF NATIONAL CERTIFICATE IN FITNESS STUDENTS

Introduction: The concept of wellness has transformed over the decades with the ever-changing societal lifestyle. There are various factors that influence one's overall sense of wellbeing, one of the most essential being brain and body agility: overall wellbeing = brain agility + body agility. The brain agility consists of brain fitness and brain flexibility, while body agility is determined by health-related fitness and skill-related fitness. This exercise and nutrition science program will strengthen the brain-body balance by assessing and training the three core areas of performance, namely; brain performance, health-related fitness and skill-related fitness.

Methods and materials: Two categories of assessments (pre and post) will be conducted to determine mental and physical wellness. Mental wellness (brain agility) will be determined by the neuro agility profile (NAP) assessment. Physical wellness (body agility) consists of health-related fitness index and the skill-related fitness index assessments.

Possible results: The project output will be to potentially demonstrate whether the exercise and nutrition science educational program will improve the brain and body agilities of students enrolled in the National Certificate in Fitness. The prediction is that there will be an improvement in agility after the completion of the intervention.

Possible Discussion and Conclusion: Potentially we can conclude that an exercise and nutrition program will ultimately improve the overall agility of the National Certificate in Fitness students, and by extension, the clients the students will work with as trained individuals upon completion of their certificate.
Presenting Author: MT Lamola (National Institute For Communicable Diseases)

Authors: MT Lamola (National Institute For Communicable Diseases)

Abstract Detail

THE PREVALENCE OF MALARIA IN THE FIVE DISTRICTS OF LIMPOPO PROVINCE, SOUTH AFRICA, FROM 2015 – 2017

Background: Despite the availability and usage of long-lasting insecticidal nets (LLINs) and indoor residual spraying (IRS), malaria remains an important public health problem. Limpopo province (LP) is among the three malaria endemic provinces in South Africa (SA). Information on the prevalence of malaria in the five districts of LP for recent years is limited.

Objectives: To estimate the prevalence of malaria, proportions of imported malaria cases and determine malaria risk factors in the five districts of LP, from January 2015 to December 2017.

Methods: A retrospective review of routinely collected data obtained from Malaria Information System (MIS) and Laboratory Information System (LIS) of the National Health Laboratory Services (NHLS) from 2015 to 2017 was done. Data analysis was performed using Excel Microsoft and Stata 15. Bivariable and multivariable logistic regression analysis were done to identify risk factors associated with malaria infection with Adjusted Odds Ratio (aOR), 95%CI and p-values <0.05.

Results: In total, 43 199 malaria cases were reported from 2015 to 2017. Median age of malaria cases was 25 years and interquartile range (IQR; 12-40 years). Among the malaria cases, males were 50.9% (22 028/43 199), females 49.1% (21 171/43 199) and 48.8% (21 079/43 199) were from Vhembe district. The age group with the highest proportion of malaria cases was 25-29 years 10.5% (4 521/43 199). Vhembe district had the highest malaria prevalence in 2015(155), 2016(53) and 2017(158) per 100 000 population. LP had the highest malaria prevalence in 2017(331 per 100 000 population). Waterberg district had the highest imported malaria cases with 28.5% (437/1 532). On multivariate analysis, factors significantly associated with increased malaria infection were ages 25-29 years [aOR 1.70; 95% CI 1.56-1.85; p=<0.001] and 40-44 years [aOR 1.70; 95% CI 1.55-1.86; p=<0.001]; other factors such as sex and district were not significantly associated with the likelihood of malaria infection.

Conclusion: These findings demonstrate the need for routine awareness campaigns to reinforce malaria case finding and treatment in the general population of LP and strengthening cross-border collaborative initiatives to tackle imported malaria infections especially in Vhembe district, which borders three countries (Botswana, Zimbabwe and Mozambique)
Presenting Author:  NS Mwase (UP)

Authors:  NS Mwase (UP)

Abstract Detail

HUMAN HEALTH RISK OF INHALATION EXPOSURE TO PM2.5 IN PRETORIA, SOUTH AFRICA

Aim: The aim of this project is to measure PM2.5 and assess the health risks that this pollutant poses to humans in Pretoria as part of my MSc (Epidemiology) project.

Design: The study is a two part study combining an exposure assessment and Human Health Risk Assessment study.

Setting: The study was conducted in an urban background area located in Pretoria Gezina, South Africa. The area is mostly a residential area with not very heavy traffic and away from the highway.

Data and method: Gravimetric analysis was used to determine PM2.5 concentrations from 19 April, 2019 to 23 April, 2019. Estimate of possible health risks from exposure to airborne PM2.5 was performed using the USA Environmental Protection Agency human health risk assessment framework. A scenario-assessment approach where normal (average exposure) and worst-case (continuous exposure) scenarios were developed for intermediate (24-hour) and chronic (annual) exposure periods for different exposure groups (infants, children, adults).

Outcome measures: Presence or absence of adverse health effects from exposure to airborne pollutants.

Results: The average annual ambient concentration of PM2.5 was 21.49 ± 13.61µg/m3 which was higher than the annual World Health Organization PM2.5 air quality guideline. Infants and children, rather than adults, are more likely to be affected by 24-hour exposure. Moreover, for chronic annual exposure, PM2.5 posed no health risk to sensitive individuals, with the severity of risk varying across exposed groups.

Conclusion: Daily levels of PM2.5 pose a health risk to infants and children in Pretoria. It is recommended that the City of Tshwane Air Quality Managements Plan, which is currently under review, addresses local and long range sources of PM2.5 in the city.
APNEA-HYPOPNEA INDEX DURING DIFFERENT SLEEP STAGES IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

Introduction: The increase in the rate of obesity and ever-growing population of elderly has seen a rise in the rates of individuals with sleep apnea. Sleep apnea may lead to a vast amount of pathologies including hypertension, arrhythmia, increased blood pressure, lung dysfunction, and stroke. The increase in incidences has shown an urgency for further research to be done to gain insight on the impact it has and the processes it may affect within the body. Determining the apnea-hypopnea index in sleep stages N1, N2, and N3 in patients with obstructive sleep apnea may hold vital information on reasons for certain pathologies that may arise due to obstructive sleep apnea (OSA).

Methods and Materials: A sample of patients from a neurophysiology practice will be studied and assessed using a polysomnogram. This will give us a detailed description on the amount of times patients may stop breathing, the oxygen saturation, sympathetic activation, and muscular activity that may occur in the different sub divisions of non-rapid eye movement (NREM) sleep and the impact it could have if these processes were altered via interruptions.

Potential Results: The project will be to determine a linear correlation between the depth of sleep stages and the apnea-hypopnea index (AHI) in patients suffering from obstructive sleep apnea. We predict that the AHI will increase with an increase in the depth of sleep, as a higher state of arousal will be required to wake the patient from sleep during an apnea and hypopnea.

Discussion and Conclusion: Potentially we can conclude that the severity of obstructive sleep apnea and the AHI will be higher in NREM stage 3 sleep compared to NREM stage 2 sleep and NREM stage 1.
DEVELOPMENT AND FACE VALIDITY ASSESSMENT OF A DIABETES NUTRITION EDUCATION DVD FOR LOW LITERACY LEVEL ADULTS LIVING WITH DIABETES

Background: Providing information to people with diabetes can help them make better choices regarding self-care activities to manage their diabetes appropriately. Written information e.g. pamphlets is the main method used to provide patients with information. However, more digital methods for educating people with diabetes are being developed and implemented.

Aim: To develop a diabetes nutrition education DVD (DNE-DVD) and assess the face validity using diabetes patients.

Setting: Diabetes outpatient clinic of a tertiary academic hospital in Gauteng Province, South Africa.

Methods: The DNE-DVD was developed using guidelines identified from the literature on education materials (including digital formats) for low literacy people. The content was based on information from previous nutrition education programmes implemented both at primary and tertiary health care settings of South Africa. A mixed method approach (quantitative and qualitative) was used for the DNE-DVD assessment. Adults (18-65 years) with type 1 and type 2 diabetes (n=63) watched the DNE-DVD individually or in a group and thereafter completed an interviewer administered questionnaire to assess the face validity of the DNE-DVD. In addition, three focus group discussions (n=10) were held. Descriptive statistics were used for quantitative data analysis and thematic framework analysis for qualitative data.

Results: The developed DNE-DVD is 18 minutes and comprises three sections i) what is diabetes, ii) treatment modalities and complications, and iii) healthy eating. The DNE-DVD messages are conveyed through cultural appropriate visuals accompanied with explanations using simple language. Quantitative results indicated that most participants found the visuals easy to see (84.1%), understand (85.7%) and made sense (85.7%). The language was clear (79.4%) and appropriate (77.7%) and the message understandable (77.8%). Participants reported that they would watch the DNE-DVD again.

In the qualitative domain, participants reported that the DNE-DVD was clear, the language was easy and the illustrations eye catching and understandable. Participants felt seeing and hearing would enhance their memory of the content. Overall, participants felt the DNE-DVD improved the understanding of diabetes.

Conclusion: Participants assessed the DNE-DVD positively for visual appeal, language simplicity, understandability and overall clarity thereby confirming its face validity. The quantitative results were in agreement with the qualitative results.
Presenting Author: DF Joubert (Physiology)

Authors: DF Joubert (Physiology), A Phulukdaree, BA Stander

Abstract Detail

HIGH THROUGHPUT IN SILICO SCREENING AND IN VITRO TESTING OF POLYPHARMACOLOGICAL BROMODOMAIN 4 AND CANCER ASSOCIATED KINASE INHIBITORS

Introduction: Polypharmacology has recently become an intense subject of research, specifically in the development and design of anti-cancer compounds1. Drugs that have more than one target, potentially have higher efficacy in the treatment of triple negative breast cancer and can potentially prevent drug resistance from developing1. Bromodomain containing protein 4 (BRD4) is a known dysregulated enzyme in triple negative breast cancer, together with other kinases such as aurora kinase A and B (AurkA-and B), cyclin dependant kinases 4 and 6 (CDK4/6), polo like kinase (PLK1) and epidermal growth factor receptor (EGFR)2-7. The research set out to identify a dual BRD4/Kinase inhibitor by means of virtual high throughput screening.

Methods: The Biofocus â„,c library of compounds, supplied by the council for scientific and industrial research (CSIR), was docked into the crystal structures of BRD4 using the Maestro interface suite from which a list of promising compounds with docking scores lower than -9. Indicating good enzyme/inhibitor interaction, was identified. This list of compounds was then docked into the crystal structures of AurkA and B, CDK4/6, PLK1 and EGFR individually generating a second list of compounds with low docking scores.

Results: A list of over 200 potentially promising BRD4 inhibitors were identified, most of which contain thieno-pyrimidine or imidazo-pyridazine backbones in their chemical structure.

Conclusion: The list of dual BRD4/Kinase inhibitors will undergo further virtual screening to identify the molecular dynamics of the enzyme/inhibitor interactions using the Maestro interface suite.

The next phase of research is to assess the identified dual BRD4/Kinase inhibitors for enzymatic activity and in vitro testing.
Abstract Detail

A NOVEL USE FOR FECAL MICROBIAL TRANSPLANTATION

Introduction: Fecal microbial transplantation is indicated for recurrent Clostridium Difficile infection. However, numerous novel indications have emerged in the literature.

Case: We present a 61 year old critically ill male, who underwent faecal microbial transplantation to address gut microbiome dysbiosis and multidrug resistant (MDR) Klebsiella infection. The recipient’s stool was analysed using 16s rRNA sequencing before transplantation, showing marked loss of diversity in the microbiome, as well as predominance of MDR species.

Methods: A faecal microbial transplantation was performed, after rigorous screening of the donor in accordance with the European Gastroenterology Society guidelines. The patient was successfully discharged from ICU with no further episodes of sepsis and 6-month follow up 16s rRNA sequencing of his stool revealed significant improvement in the diversity of his gut microbiome and eradication of the MDR organism.

Results: There are only a few case reports of faecal microbial transplantation for colonization with multi-drug resistant organisms published in the literature. The successful eradication of multidrug resistant organisms in this patient, together with an improvement in his gut microbiome diversity, sets the stage for further studies to evaluate the role of faecal transplant in critically ill patients with multidrug resistant organisms and loss of diversity in their gut microbiome.
Presenting Author: W Van der Merwe (UP)

Authors: W Van der Merwe (UP), C Maree (UP)

Abstract Detail

SELF-PERCEIVED LEADERSHIP DEVELOPMENT OF PEER TUTORS IN INTERPROFESSIONAL UNDERGRADUATE HEALTHCARE STUDIES

Background: Peer tutors are used as teaching partners in undergraduate programmes at the University of Pretoria to transfer knowledge and practical skills to students from various healthcare disciplines. Peer tutors are therefore placed in leadership positions and their role in the development, learning, and success of fellow students is widely documented in literature on education and leadership. In spite thereof, minimal research has been done on the development of leadership abilities through involvement in tutor training programmes and little is known about their development as leaders. The assumption of this study was that leadership skills of peer tutors can be developed by introducing them to the transformational leadership model of Kouzes and Posner - “The five practices of exemplary leaders”.

Purpose: The aim of this study was to describe the self-perceived leadership development of peer tutors in undergraduate healthcare studies during participation in a tutor training programme.

Methods: A triangulation mixed method design was used to collect complementary quantitative and qualitative data with equal contribution. The study sample (total sampling) consisted of 12 tutors appointed for the academic year. The tutors attended orientation on the content of their respective modules, a tutoring and a leadership workshop. Data collection was done by means of structured self-report instruments completed in the beginning and end of the programme, a narrative description of their experiences halfway through the academic year and an unstructured focus group at the end of their tutoring responsibilities.

Results: The study is still in progress but preliminary results show that all the tutors taking part in the tutor training programme exhibit much of the same characteristics as described by Kouzes and Posner’s five practices of exemplary leaders. All the tutors wanted to tutor in order to help peer students by inspiring a shared vision. Becoming a tutor was challenging for some, as they had to tutor their peers, so they had to take a risk and develop their own leadership abilities in order to do so. Some tutors found it hard to enable others to act, but they all verbalized that they often got better results when they made a point of recognizing others and celebrate small victories.

Conclusion: An increased focus on leadership development in addition to the focus on their knowledge and skills, lead to better tutoring abilities and skills outcomes of the tutees, as well as improved academic programme output. It contributes to interprofessional education and eventually improved outcomes for patients and communities.

Implications: This study is expected to serve as the basis for a follow-up study to determine the impact of leadership development of tutors on the clinical knowledge and skills retention in peer undergraduate health care students, as well as the effect on interprofessional collaboration and health outcomes of patients.
Abstract Detail

A NOVEL USE FOR FECAL MICROBIAL TRANSPLANTATION

**Introduction:** Fecal microbial transplantation is indicated for recurrent Clostridium Difficile infection. However, numerous novel indications have emerged in the literature.

**Case:** We present a 61 year old critically ill male, who underwent faecal microbial transplantation to address gut microbiome dysbiosis and multidrug resistant (MDR) Klebsiella infection. The recipient’s stool was analysed using 16s rRNA sequencing before transplantation, showing marked loss of diversity in the microbiome, as well as predominance of MDR species.

**Methods:** A faecal microbial transplantation was performed, after rigorous screening of the donor in accordance with the European Gastroenterology Society guidelines. The patient was successfully discharged from ICU with no further episodes of sepsis and 6-month follow up 16s rRNA sequencing of his stool revealed significant improvement in the diversity of his gut microbiome and eradication of the MDR organism.

**Results:** There are only a few case reports of faecal microbial transplantation for colonization with multi-drug resistant organisms published in the literature. The successful eradication of multidrug resistant organisms in this patient, together with an improvement in his gut microbiome diversity, sets the stage for further studies to evaluate the role of faecal transplant in critically ill patients with multidrug resistant organisms and loss of diversity in their gut microbiome.
THE ASSOCIATION OF JOINT EFFECTS OF AIR POLLUTION ON RESPIRATORY DISEASE HOSPITAL ADMISSIONS IN CAPE TOWN: 2011-2016

Background: Air pollution has adverse health effects on everyone globally. Populations such as those in South Africa are affected disproportionately. Air pollution refers to air pollutants that are released into the air from different sources. No study in South Africa has ever investigated the joint health effects of air pollution.

Aim: In this MSc (Epidemiology) project, the aim was to investigate the association of joint effects of PM10, NO2 and SO2 on cardiovascular disease and respiratory disease hospital admissions in Cape Town from 1 January 2011 to 31 October 2016.

Study Design and Methods: The case-crossover epidemiology study design was applied. Respiratory disease hospital admission data were obtained from a private hospital group; after ethics approval. PM10, NO2 and SO2 and weather data were obtained from the Department of Environmental Affairs and the South African Weather Services. Classification and regression trees along with generalized linear mixed models were applied to determine the association between daily air pollution and daily counts of respiratory and cardiovascular hospital admissions. Associations are reported as relative risks (RR) along with the 95% confidence intervals (CI).

Results: 47,611 respiratory disease hospital admissions that occurred on the 1,766 days that had PM10, NO2 and SO2 data, were applied in the statistical analyses. Of these 47,611 hospital admissions, 49%, 33% and 18% were from 0-14, 15-64 and >=65 year olds. 64 different air pollution mixtures or day types were possible using the quartiles of PM10, NO2 and SO2 data. Eventually 7 air pollution mixtures were identified. The RR of the 7 mixtures varied from 1.0 to 1.3. The mixture with the strongest association 1.3 (95% 1.1-1.5) were composed of PM10 in the 3rd quartile, NO2 in the 2nd to 4th quartiles and SO2 in the 1st to 4th quartiles.

Conclusions: Significant joint effects of PM10, NO2 and SO2 were observed on respiratory disease hospital admissions. Next age groups and sex will also be investigated, along with cardiovascular disease hospital admissions.
Presenting Author: TMG Boshomane (Nuclear Medicine)

Authors: TMG Boshomane (Nuclear Medicine)

Abstract Detail

THE POTENTIAL CLINICAL ROLE OF 18F-FDG PET-DERIVED METABOLIC PARAMETERS IN EXTRAPULMONARY TUBERCULOSIS AMONG HIV-INFECTED PATIENTS: AN EXPLORATIVE PROSPECTIVE STUDY

Objective: 18F-FDG PET/CT is a useful imaging modality to quantify the extent of tuberculous in clinical practice. The baseline disease extent has been shown to be prognostic predicting response to standard regimen of anti-tuberculous treatment (ATT) as well as duration of treatment. HIV-infected individuals are susceptible to reactivation of old tuberculosis (TB) and the acquisition of new disease. We herein report our preliminary results on an-going study evaluating the role of 18F-FDG in quantifying disease extent among HIV-infected and HIV-uninfected patients with extra-pulmonary TB.

Methods: Thirty-three patients with extrapulmonary tuberculosis were prospectively recruited to undergo a 18F-FDG PET/CT scan prior to the initiation of ATT. 18F-FDG PET-derived metabolic parameters including SUVmax, SUVmean, MLV and TLG were computed for all tuberculous lesions in each patient. We compared these clinical characteristics and PET-derived metabolic parameters between HIV-positive and HIV-negative patients.

Results: The mean age was 38.1 years. Twenty patients (60%) were female whilst thirteen (40%) were males. A total of 63.6% of the patients were HIV-positive. The HIV-infected patients were older compared with the HIV-uninfected patients (37.0 vs. 33.0). There was a preponderance of females among HIV-infected patients (66.7% of all HIV-infected patients) compared with HIV-uninfected patients (54.5% of all HIV-uninfected patients). Of the HIV-infected patients, only four patients were immunologically controlled with a CD 4 count >200 cells/uL. The median CD 4 count for the HIV-infected patients was 132 cells/uL (range: 32 - 1008). Subjects who were HIV-positive had a higher SUVmax (16.6 vs 9.8), SUVmean (4.4 vs 3.6), MLV (186.3 vs. 104.2) and TLG (757.5 vs. 369.9) when compared to HIV-negative patients suggesting higher disease burden in HIV-infected patients.

Conclusions: Our preliminary data demonstrates the potential of 18F-FDG PET-derived metabolic parameter in the assessment of disease extent in patients with extra-pulmonary TB. HIV-positive patients demonstrated higher disease burden compared with HIV-uninfected patients. This suggests that immunologically uncontrolled HIV-infected patients may respond less favourably to ATT and require longer treatment duration compared with HIV-uninfected patients.
Presenting Author: D Bogoshi (Medical Microbiology)

Authors: D Bogoshi (Medical Microbiology), J Osei Sekyere (Medical Microbiology), V Naidoo (Paraclinical Sciences), NM Mbelle (Medical Microbiology)

Abstract Detail

MOLECULAR EPIDEMIOLOGY AND MECHANISMS OF COLISTIN AND CARBAPENEM RESISTANCE IN ENTEROBACTERIACEAE FROM CLINICAL ISOLATES, THE ENVIRONMENT AND PORCINE SAMPLES IN PRETORIA, SOUTH AFRICA

Introduction: Increasing resistance in Enterobacteriaceae is a significant problem demanding immediate attention. Although carbapenems and colistin antibiotics are the last therapeutic choice for treating Gram-negative infections, studies in the clinical, veterinary and environmental settings have reported increasing resistance to these antibiotics. The biggest concern is that antibiotic resistance is increasing at a faster rate than the development of newer antibiotics. Countries that suffer due to this phenomenon are the developing countries. The study aims to describe the molecular epidemiology and resistance mechanisms of colistin and carbapenem resistance in clinical, porcine and environmental Enterobacteriaceae isolates in Pretoria, South Africa.

Method: VITEK®-2 confirmed 100 colistin and carbapenem-resistant isolates collected from the departmental isolate bank at NHLS. The clinical isolates were subcultured on blood agar. A total of 99 porcine (88 stool) and environmental (11 effluents) samples were collected in November 2018 and March 2019 from a Winterveldt farm. Both the porcine and environmental samples were screened using the eosin methylene blue agar with colistin and ertapenem disks. Pure colonies (118 porcine and 57 environmental) were obtained. All isolates were identified and a minimum inhibitory concentration of colistin and carbapenems were determined using the MicroScan WalkAway® System. Isolates resistant to colistin were confirmed by broth microdilution method.

Results: A total of 275 Gram-negative isolates were identified from clinical, environmental and porcine using the MicroScan. The MIC results for clinical isolates revealed 84% and 88% resistance to colistin and carbapenem respectively. Of the porcine samples, 20% of the isolates were resistant to colistin while 3% were carbapenem-resistant. Environmental isolates were 23% colistin resistant. Confirmation of colistin resistance isolates with BMD was 93%, 79% and 100% for clinical, porcine and environmental isolates respectively. Overall colistin susceptibility was higher among porcine isolates compared to the clinical and environmental samples.

Conclusion: The study identified Enterobacteriaceae and phenotypically confirmed resistance to colistin and carbapenems in a One Health Approach analysis. The presence of carbapenem resistance in the environmental isolates raises a public health concern as to the source. Genotypic testing is, therefore, required to further confirm and highlight the significance of One Health approach studies.
Abstract Detail

HAND WASHING KNOWLEDGE AND SKILLS OF STUDENTS AT THE SCHOOL OF HEALTHCARE SCIENCES IN SOUTH AFRICA

Introduction: Nosocomial infections are a major cause of morbidity and mortality in South Africa. One method to prevent cross-contamination is an effective hand hygiene technique. This technique requires more knowledge and skills than social hand washing in order to remove contaminants on the healthcare workers’ hands and therefore needs to be analysed to determine efficient hand washing practice. The aim of the study was to determine if the students at the school of health care science (SHS) have adequate knowledge and the correct skills regarding hand washing.

Methods: A non-experimental, cross-sectional study was conducted in a population of 239; and a convenience sample of 100 participants completed questionnaire. Ethical clearance and approval were granted by the Faculty of Health Sciences Research and Ethical Committee of the University of Pretoria (502/2015). Permission was granted by all the respective SHS Head of Departments to include their students in the study. All participants included in the study consented to participate and were given an opportunity to withdraw anytime when needed with no explanation. A descriptive statistical analysis was used to analyse the data.

Results: Healthcare sciences students had an overall mean average of 46.8% for the knowledge questionnaire and 80% mean average for the observation. Participants who took longer than 30 seconds to wash their hands had a high mean average. There was no correlation found between knowledge and skills. Healthcare sciences students did not have adequate knowledge regarding hand washing and infection control and did not have adequate skills regarding hand washing in order to prevent the spread of nosocomial infections.

Conclusion: This study was of importance for infection control in the identified population. The findings obtained from this study can serve as a baseline for further studies to improve infection control in developing health care workers.

Keywords: Hands Washing, Knowledge, Skills, Nosocomial Infection, Hygiene
Abstract Detail

EVALUATION OF EXHALED CARBON MONOXIDE AND CARBOXYHAEMOGLOBIN LEVELS OF FORKLIFT DRIVERS OPERATING IN THE BANANA RIPENING CENTRE OF THE TSHWANE FRESH PRODUCE MARKET

**Introduction:** Previously determined elevated carbon monoxide levels at the Banana Ripening Centre of the Tshwane Fresh Produce Market, most likely from forklift operation, prompted the necessity for a study to be conducted on the personal exposure of forklift drivers operating in the area due to the harmful nature of carbon monoxide toxicity. The aim of this study was to determine the exhaled carbon monoxide and carboxyhaemoglobin levels in the four exposed forklift drivers at the end of the first shift of the week and again at the end of one week of ordinary work.

**Methods:** A cross-sectional study of the exhaled carbon monoxide values, measured by direct reading instrumentation according to NIOSH method 6604, and analysis of venous blood for carboxyhaemoglobin percentage was done and quantified per forklift driver per shift. All four of the forklift drivers who participated were found to have elevated levels of carbon monoxide as determined by the Biological Exposure Indices in the proposed Hazardous Chemical Agents Regulations of the Occupational Health and Safety Act 85 of 1993.

**Results:** It was determined that carboxyhaemoglobin as well as exhaled carbon monoxide levels were higher at the end of the week of exposure as opposed to marginally lower results obtained at the beginning of the week after their first shift. All measured carboxyhaemoglobin results were higher than recommended and three of the four forklift drivers had elevated exhaled carbon monoxide readings at the end of their shifts at the end of the week.

**Discussion:** The adverse health effects of prolonged exposure to carbon monoxide inhalation has not yet been determined. Extensive monitoring of each forklift driver and the environment in which they work will be essential in minimising any detrimental effects. This can be done by regular air monitoring of the working environment and medical surveillance including biological monitoring and biological effects monitoring in line with current legislation.
Faculty Day 2019 Abstract 2019222

Presenting Author:  MNS Janse van Rensburg (UP )

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Abstract Detail

EVALUATING COMMUNITY HEALTH WORKER EDUCATION POLICY THROUGH THE LENS OF THE NC(V) PRIMARY HEALTH QUALIFICATION

**Background:** In 2018, the South African National Department of Health (NDoH) published a five-year policy framework and strategy for ward-based primary healthcare outreach teams (WBPHCOT) to improve team management and leadership and support service delivery. In the same year, the World Health Organization (WHO) published guidelines on health policy and system support to optimise community health worker (CHW) programmes.

**Aim:** This presentation provides an assessment of the NC(V) Primary Health qualification in terms of the education and training aspects of the 2018 NDoH- and WHO policy guidelines and recommendations.

**Setting:** Data for the NC(V) Primary Health evaluation was drawn from two full-time and one part-time offering of the qualification at two TVET colleges.

**Methods:** A qualitative pragmatic enquiry examined the context, design, implementation, and outcomes of the qualification through document reviews, in-depth interviews, focused group discussions, and individual written reflections. Inductive and deductive analyses facilitated emergent themes to be interpreted by applying appropriate models and theoretical frameworks.

**Results:** The evaluation of NC(V) Primary Health shows that the Department of Higher Education and Training (DHET) created and implemented a standardised, curriculated national programme for CHW education that substantially met the NDoH’s rPHC 2010 requirements as well as those recommended by the 2018 WHO guidelines.

**Conclusion:** The NC(V) Primary Health programme demonstrates the value of a single, national, quality-assured qualification for CHWs that substantially addresses WHO guidelines and recommendations, NDoH training needs, and many CHW learning expectations. Despite the termination of the programme by the DHET, it remains an important example in the light of the uncertainty that prevails regarding the pre-service training of this cadre of health worker.
Abstract Detail

A MIXED METHODS STUDY TO EXAMINE THE KNOWLEDGE, ATTITUDES AND PRACTICE OF COMMUNITY HEALTH WORKERS REGARDING EARLY CHILDHOOD MENTAL HEALTH IMPAIRMENT IN THE HOME ENVIRONMENT

Introduction: This study investigated the knowledge, attitudes and practice of community health workers (CHWs) regarding early childhood mental health impairment. Much ignorance and stigma exist around mental health impairment. The sooner mental health impairments are detected, the better the chances of getting help to affected children. The knowledge, attitudes, and practice of CHWs are thus critical in addressing and teaching people about mental health impairments in early childhood.

Setting: The study was conducted with ward-based primary healthcare teams in Daspoort in the Tshwane District municipality. The ward-based outreach teams (WBOTs) consist of a team leader and around ten community health workers. This approach is based on the Community Oriented Primary Care (COPC) model.

Methods: Data was collected using mixed methods. A qualitative focus group with CHWs was performed, which informed a quantitative survey that was done with 16 purposively selected CHWs.

Results: Results showed that the knowledge CHWs possess of health, albeit basic, helps them while performing their duties, such as triage of any given family visited. Their knowledge is crucial for appropriate health education and detecting families’ needs in order to refer those with impairments at an early stage. Their attitudes are highly influenced by their experience and place of work. The study found that CHWs with more experience had a better understanding of mental health and mental health problems and thus household members with mental health challenges were mostly referred to health professionals for proper screening. Complicated mental health matters were referred to the team leader, who then attended to the matter and educated the CHWs further on how to handle similar challenges in the future. However, more information about mental health impairments still needs to be disseminated to the public at large, and the CHWs are health catalysts for this. CHWs felt they were not adequately trained regarding mental health impairments and they needed more education about the complexity of mental health impairments in children.
Faculty Day 2019 Abstract 2019224

Presenting Author: MA Ambele (UP)

Authors: MA Ambele (UP)

Abstract Detail

GENOMIC HETEROGENEITY IN CLINICAL ORAL CANCER CASES

**Introduction:** The lack of clinical biomarkers for head and neck cancer subtypes limits early diagnosis and monitoring of disease progression.

**Methods:** This study investigated genetic alterations in clinically identical tumor, tumor-adjacent dysplastic epithelium (TADE) and normal epithelium (NE) in five oral cancer patients using a VELscope® device and OncoScan® assay to identify potential clinical biomarkers for early diagnosis and disease progression.

**Results:** One of the tumor samples examined was an “M” class tumor with a high confidence BRAF:p.G469A:c.1406G>C somatic mutation, which is the first to be reported in oral cancer. Another tumor showed mosaicism in genetic alterations, indicating the presence of multiple clones. Overall, each patient’s tumor, TADE and NE showed a distinct genetic profile which indicates intertumoral clonal/genetic diversity. Genetic alterations such as gain of 14q32.33 was common to four tumors while LOH of 22q11.23 was present in all 5 TADE. No molecular event was identified that is common to all NE and/or TADE that progressed to tumors. Interestingly, some genetic alterations progressed from NE through TADE into tumors in individual patients. This study has documented that despite similar clinical presentations, there exists a high degree of genomic heterogeneity in oral tumorigenesis not only in the tumor but also between TADE and NE. It is therefore not possible to identify a common clinically relevant biomarker for early development and disease progression in these patients. The progression of certain genetic events from NE/TADE into tumors in individual patients is indicative of early markers of disease progression and illustrates the need for personalized management.
RAPID EYE MOVEMENT APNEA-HYPOPNEA INDEX VERSUS NON-RAPID EYE MOVEMENT APNEA-HYPOPNEA INDEX IN PATIENTS WITH OBSTRUCTIVE SLEEP APNEA

**Introduction:** The Apnea-Hypopnea Index (AHI) is currently a widely used and accepted diagnostic criterion in cases of obstructive sleep apnea (OSA) and is often the only considering factor when OSA is suspected. This is an extremely useful tool but does not show any insight into the variation of AHI between different stages of sleep. In this study the AHI occurring in rapid eye movement (REM) and Non-REM (NREM) sleep will be ascertained and compared with the goal of better understanding the underlying processes within this highly prevalent disorder. The aim of the study is to identify the prevalence and clinical correlation between AHI in REM sleep versus NREM sleep.

**Materials and methods:** The study cohort will include patients (n=40) admitted to spend a night in Groenloof sleep clinic, by referral of Bernard Tjallinks (Clinical Neurophysiologist), at which time they will undergo a sleep study by means of polysomnography. The patients will be consulted by this study’s principle researcher, supervised by a qualified clinical neurophysiologist.

Patient histories will be obtained by means of a questionnaire, which will include the Epworth sleepiness scale as well as factors influencing sleep apnea, such as; chronic medication, age, sex, BMI and relevant medical history. The patient will then be connected to a polysomnograph recording device which will remain attached to the patient and will record details of the patient’s physiological parameters (respiration, blood-oxygen desaturation and brain wave frequencies at relevant sites) from 22:00 to 06:00 (overnight).

The data will also be completely randomised in order to avoid any source of bias on the part of the researcher and analysed by a qualified neurophysiologist. Data for the cohort will be studied and relevant statistical analysis will be done accordingly.

**Potential Results and Conclusion:** It is hypothesised that the AHI during REM sleep will be higher than that of NREM sleep. This has been shown to be true in other cohorts and it is the goal for this to be proven accurate in a South African cohort for the first time through this study.
AUDIT OF BURN PATIENTS PRESENTING TO KALAFONG ACADEMIC HOSPITAL: A 5 YEAR REVIEW

**Background:** Burn injuries are common and cause tremendous physical and emotional injury to those affected. Management of burn wounds are extensive and multi-disciplinary which often leaves a large economic impact on the health system. Kalafong Academic Hospital (KAH) has a resource constraint 12 bed ward which accepts burn injuries from across Pretoria as well as areas north of the Jukskei River.

**Aim:** Review and improve the immediate and long-term management of burn patients at KAH.

**Method:** A 5 year retrospective review (January 2014 - December 2018) of adult (12 years or older) patients admitted to the KAH burns ward or ICU. Data was reviewed to identify patient demographics, burn injury patterns and length of hospital stay.

**Results:** 456 adult patients were admitted over the study period (female: 37,4%, male: 62,6%). The majority of patients were in the 21-40-year age range (21-30 years: 35,7%; 31-40 years: 25,65%). Flame burns accounted for 75,44% of admissions. Young males between 21-30 years accounts for 56,5% of electrical burns. February and July showed the most admissions during the year. Approximately 4,82% of burn patients required ICU admission. Over the 5-year study period; mortality per TBSA is as follows: 0.33% below 20% TBSA, 7,96% between 20 - 50% TBSA, 55,56% between 50-70% TBSA and 100% for >70% TBSA group. Length of hospital stay varied on the TBSA burnt, averaging 35 days in hospital across all burn admissions.

**Conclusion:** Burn injuries can be fatal if not managed brisk and appropriately. Adequate protocols should be in place to allow appropriate management of burn wounds. Burn units should ideally have an in-ward dedicated burn theatre as well as ICU rooms to allow for adequate and prompt management.
ILEOSIGMOID KNOT: KALAFONG ACADEMIC HOSPITAL EXPERIENCE

**Background:** Ileosigmoid knotting (ISK), or double volvulus, is a rare cause of intestinal obstruction with rapid deterioration in the patients’ clinical condition resulting in fatal consequences.

**Aim:** Improve clinical knowledge of ISK in a local setting allowing earlier recognition and improved management.

**Method:** A 7 year retrospective review (January 2011-January 2018) of patients presenting with ISK at Kalafong Academic Hospital was conducted. We evaluated our local patient populations’ clinical, biochemical and radiological signs, intra-operative and post-operative outcomes.

**Results:** Ten ileosigmoid knot patients presented to Kalafong Hospital over the study period; average age was 44.2 years old with a 100 percent male predominance. One patient died peri-operatively and one was HIV positive. Ninety percent of patients had no previous surgical history. 80 percent had deranged kidney function on admission. All patients presented with signs of peritonitis, while 80 percent had abdominal distention. On plain abdominal radiographs, 90 percent had large bowel obstruction features and 70 percent had small bowel obstruction features. 70 percent had no air in the rectum and 50 percent had a coffee bean sign.

Forty percent had ileocaecal valve involvement with a Hartman’s procedure performed in 70 percent of patients and primary anastomoses performed in 20 percent of patients. Fifty percent of patients developed a superficial surgical site infection. Average length of stay was 15.4 days.

**Conclusion:** Ileosigmoid knots should be considered as a cause of bowel obstruction in male patients regardless of a history of previous abdominal surgeries. Radiological features suggestive of small and large bowel obstruction should alert the surgeon of ISK being a possible cause. Surgical management is almost always required, but being aware of ISK as a cause can allow the surgeon to prepare and manage the patient more effectively.
EVALUATION OF MONOCYTE/MACROPHAGE PROFILE IN BREAST CANCER PATIENTS AT STEVE BIKO ACADEMIC HOSPITALS

**Introduction:** Breast cancer (BC) is the most frequently diagnosed female cancer in Sub-saharan Africa. Monocytes (Mo) are precursors of macrophages (M?). Monocytes are recruited into the tumour microenvironmet where they differentiate into tumour associated macrophages (TAMs). Macrophages are classified into M1 M? which are anti-tumour whilst M2 M?, also referred to as TAMs, are pro-tumour thus favour cancer progression/metastasis. High frequency of TAMs is associated with poor clinical prognosis in Breast Cancer (BC) patients. Both Mo/M? populations are viral reservoirs and transport vehicles throughout the life cycle of human immunodeficiency virus (HIV).

**Aim(s):** This study evaluated Monocyte/Macrophage profiles in HIV+ and HIV- BC patients undergoing surgical therapy.

**Methods:** Peripheral blood mononuclear cells (98% purity) from 16 HIV- and 5 HIV + BC patients were analysed pre-operatively, 24hrs & 1 week post-operatively, University of Pretoria ethical approval number 498-2017. Flow cytometry markers anti-CD80/CD284 antibodies (M1 M?), anti-CD163/CD206 (M2 M?) and anti CD16/CD14 antibodies (Mo) were used.

**Results:** An increase in circulating monocytes in breast cancer patients compared to the breast reduction patients was found. A high M1 macrophage count was observed in HIV negative control patients, possibly due to the inflammatory response following surgical trauma. An increase in M2 macrophages is noted in breast cancer patients correlating well with previous macrophage studies.

**Conclusion/Recommendations:** An increase in monocytes in BC patients compared to controls was observed. Increased M2 markers have been reported in BC patients in literature, however our results will be validated by ongoing follow-up studies.
BIG DATA ANALYSIS REVEALS THE EXISTENCE OF SEASONAL PSEUDOHYPERKALAEMIA EVEN IN TEMPERATE CLIMATES

Background: Seasonal pseudohyperkalaemia has been described in colder northern hemisphere countries. The lower temperatures may inhibit red cell Na-K-ATPase allowing the efflux of potassium and higher measured levels. It has not been described in warmer subtropical climates.

Aims: The aim was to determine if seasonal variation in serum potassium occurred in a temperate climate.

Methods: We conducted a retrospective review of serum potassium results over two years in two South African provinces with different microclimates and seasonal temperatures. The study included patient samples from surrounding clinics and hospitals in Pretoria, Gauteng province, and in Durban, KwaZulu-Natal province, South Africa. Average temperature ranges were obtained from the South African weather service from the same period (June 2015-June 2017).

Results: A total of 91,420 results were analysed and we found a statistically significant difference between the January (summer) and June (winter) serum potassium levels (p<0.0001). These results demonstrate that the winter months in South Africa are associated with significantly higher measured potassium results.

Conclusion: Seasonal pseudohyperkalaemia may be more widespread than realized and can occur in more temperate climates and laboratories should take the appropriate action when transporting samples as this could influence interpretation and clinical management.
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Conclusion: Seasonal pseudohyperkalaemia may be more widespread than realized and can occur in more temperate climates and laboratories should take the appropriate action when transporting samples as this could influence interpretation and clinical management.
SELECTIVE SCREENING OF HEREDITARY GALACTOSAEMIA IN A TERTIARY LAB, SOUTH AFRICA

Background: The objective of the study was to investigate the effectiveness of screening for hereditary galactosaemia with Benedict’s test and thin layer chromatography in a tertiary laboratory from a developing country.

Methods: Data of galactosaemia screening results performed on Benedict’s test followed by thin layer chromatography were retrospectively analysed. This was followed by analyses of confirmatory tests i.e. GALT activity and DNA studies.

Results: 878 paediatric patients were screened, 58% were male and the subject's ages at the time of the screening ranged from 5 days to 19 years with median age of 52 days. 48% tested positive/trace on the Benedict’s test of which 52 % of these had galactose present on thin layer chromatography. 29% of patients with galactosuria were followed up with GALT activity of which 14 patients (22%) of had pathological low GALT activity. There were 9 more patients with negative Benedict’s test and no galactosuria with low GALT activity. 23 screened patients with significantly low GALT activities, 5 followed up with normal GALT activities, two had packed red blood cells transfusions days of GALT analysis, 3 had missing files and 6 had final diagnoses other than galactosaemia commonly biliary atresia and herbal intoxication. 8 patients that were screened were confirmed to have Galactosaemia based on the clinical features and low GALT activity. 3 of these patients had a negative Benedict’s test while 4 testing positive with galactosuria present and 1 tested positive on Benedict’s test and had no galactosuria. 1 patient had both negative Benedict’s test followed up with a positive one and with significant amount of galactose detected on thin layer chromatography. In addition, during the research study period, 6 more patients were diagnosed with galactosaemia by low GALT without screening tests performed. The median age at which the diagnosis was made in the screened patients was approximately 3 months (82 days) and 9 months (254 days) in the non-screened sample. Confirmatory DNA testing was performed in 3 patients, 2 were heterozygotes and 1 homozygote for S135L mutation.

Conclusion: Benedict's test and thin layer chromatography in screening of galactosaemia were found to unreliable and limited by several factors that require cautionary interpretation and application.
AN AUDIT OF PATIENTS WITH ABRUPTIO PLACENTA IN THE PRETORIA ACADEMIC COMPLEX

**Background:** Obstetric haemorrhage is the 3rd most common cause of maternal death in South Africa. Abruptio placentae (AP) contributed 12.9% to deaths caused by haemorrhage in the 2014-2016 Saving Mothers report. Antepartum haemorrhage is the leading cause of perinatal mortality in regional, provincial tertiary and central national hospitals according to the 2012-2013 Saving Babies report.

**Aim:** To investigate the risk factors, management, and outcomes of pregnancies affected by AP.

**Methods:** We conducted a prospective descriptive study of all cases with AP managed in a one-year period at the Pretoria Academic Complex. All patients that presented with AP were recruited for the study. The demographics, risk factors, management, complications and outcomes were reported using descriptive statistics.

**Results:** One hundred cases of AP occurred during the study period, with an incidence of 1% (100/9911). Known risk factors were not predictive of AP. A woody hard abdomen, a typical presenting sign of AP, occurred more frequently in patients with >50% AP (43% vs 57%; p=0.002). 61 (61%) cases had caesarean delivery while 37 (37%) had normal vaginal delivery. More cases had post-partum haemorrhage in the >50% group (67% vs 33%; p=<0.001 ). 58 (58%) live babies and 44 (44%) stillborn babies were delivered. 36 (82%) of the live babies had 5 minute APGAR score >7 in the <50% AP group compared to 8 (18%) in the >50% AP group.

**Conclusion:** The known risk factors of AP are not predictive of AP. The clinical findings of AP are late signs associated with severe placental separation. Perinatal and maternal morbidity and mortality can be reduced by early resuscitation and delivery of the fetus.
ACCESSIBILITY OF ANTIRETROVIRAL TREATMENT AMONG SOUTH AFRICAN POPULATION, 2017

Background: In 2017, an estimated 7.9 million people were living with HIV (PLHIV) in South Africa (SA), of whom 4.4 million (56%) were receiving antiretroviral treatment (ART). Factors leading to underutilization of ART include people not knowing their HIV status, stigmatization, and socio-demographic factors. In order to achieve universal ART coverage, these factors need to be identified and addressed. We investigate the accessibility and use of ART among South Africans.

Methods: Data were analyzed from the fifth South African National HIV Prevalence, Incidence and Behaviour survey; a cross-sectional household survey conducted between 2016â€“2017 in SA. We analyzed factors associated with ART non-use among PLHIV. Logistic regression analysis was performed to determine the association between ART non-use and selected demographics, socioeconomic, and behavioural variables.

Results: A greater proportion of females living with HIV [65.5% (95% confidence interval (CI): 62.3-68.5)] accessed treatment than males [56.3% (95%CI: 51.0-61.5)]. Half of the children aged 0-14 years living with HIV were on ART. KwaZulu-Natal Province had the highest proportion of people accessing ART, more evident in females [71.8% (95% CI: 64.2-78.3)] than males [65.7% (95%CI: 55.3-74.8)]. On multivariate regression analysis, being aged 35-49 years [adjusted odds ratio (aOR) 3.51 (95% CI: 2.31-5.32) p<0.001] and 50-64 years [aOR 5.05 (95% CI: 2.99-8.54) p<0.001] was significantly associated with ART non-use. People living in rural areas [aOR 1.70 (95% CI: 1.26-2.29) p=0.001] were less likely to use ART compared to those in urban areas.

Conclusions: Our results suggest that despite increasing use of ART over the years, there is a gap in treatment coverage for those aged 35 years and older. There is also a need to encourage and educate people living in rural areas about the importance and benefits of knowing their status and being on treatment.

Keywords: Antiretroviral treatment, HIV status, South Africa
Presenting Author: E Rossouw (Paediatrics)

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Abstract Detail

THE MOLECULAR EPIDEMIOLOGY, DIVERSITY AND HOST INTERACTIONS OF GASTROENTERITIS VIRUSES IN CHILDREN UNDER THE AGE OF FIVE YEARS IN PRETORIA, SOUTH AFRICA

Introduction/Aim: Viruses such as noro- rota- and sapovirus are common causes of gastroenteritis, infecting millions of people annually. Host susceptibility to norovirus and rotavirus is linked to fucosyltranferase-2 (FUT2)-based secretor status. The aim of this study was to investigate the susceptibility to, prevalence of and relationship between gastroenteritis viruses in the paediatric population.

Methods: From July 2016 to December 2017 blood, stool and saliva specimens were collected from 205 children (<5 years) hospitalised with gastroenteritis at Kalafong Tertiary Provincial Hospital. A follow up stool specimen was collected six weeks after enrollment for 47/205 subjects. Five gastroenteritis viruses were detected using the Seegene GI-virus multiplex real-time assay. Noro-, rota- and sapoviruses were genotyped based on conventional RT-PCR, nucleotide sequencing and phylogenetic analysis. FUT2 genotyping was performed using a real-time PCR on either whole blood or stool specimens. The HBGA phenotype of these children was determined by ELISA.

Results: Ninety-six children (47%) tested positive for at least one gastroenteritis virus, with co-infections detected in 9%. Rotavirus predominated (46/205), followed by norovirus (32/205), adenovirus (15/205), sapovirus (9/205) and astrovirus (3/205). A total of 27/32 norovirus, 44/46 rotavirus and 8/9 sapovirus strains have been genotyped, of which norovirus GII.4 and rotavirus G3 and P[4] predominated. Thirteen out of 44 (30%) asymptomatic follow up specimens tested positive for norovirus. FUT2 genotyping of the children showed a 69:31 ratio between secretors and non-secretors. Seventy-five percent (72/96) of the virus-infected children were secretors whereas only 25% (24/96) were non-secretors. The HBGA phenotypes of 51/205 saliva specimens have been determined, with Le(y) (48/51), Le(b) (34/51) and Le(a) (16/51) being most prevalent.

Conclusion: Rotavirus is still the leading cause of gastroenteritis hospitalisations in children in this setting despite the introduction of the vaccine. Norovirus is the second most prevalent virus representing 14% of these gastroenteritis hospitalisations. The preliminary data suggest that the predominant noro- and rotaviruses genotypes preferentially infect secretors, with specific genotypes linked to infection in non-secretors. The HBGA profile is highly variable within the study population, with no specific pattern linked to viral infection observed thus far.
DETERMINATION OF THE PREVALENCE AND DIVERSITY OF VIRAL GASTROENTERITIS INFECTIONS IN THE ELDERLY POPULATION OF THE TSHWANE REGION IN SOUTH AFRICA

Introduction: Acute gastroenteritis is a significant cause of morbidity and mortality worldwide, specifically in developing countries where access to, and availability of adequate health care is limited. Individuals at the extremes of age (<5 years and ≥65 years of age) and the immunocompromised have the highest risk of severe gastroenteritis. In South Africa, the burden of viral gastroenteritis in individuals ≥65 years of age is unknown since current surveillance studies are limited to the paediatric population.

Methods: Between September 2017 and February 2019, 340 stool specimens from individuals ≥65 years that were submitted for pathogen testing to Lancet Laboratories in the Tshwane region, were screened for five gastroenteritis pathogens. The FTD Viral gastroenteritis multiplex real time polymerase chain reaction (PCR) assay, which detects human adenovirus, human astrovirus, norovirus GI and GII, rotavirus and sapovirus was used on the QuantStudio 5 real time platform. Detected viruses were genotyped based on conventional PCR and RT-PCR amplification of selected regions, nucleotide sequence and phylogenetic analysis as well as BLASTn analysis.

Results and Discussion: Fourteen percent (48/340) of the elderly individuals tested positive for at least one gastroenteritis virus. The caliciviruses predominated with 19% (9/48) norovirus GI, 33% (16/48) norovirus GII and 27% (13/48) sapovirus detected. Human adenovirus was identified in 13% (6/48) of specimens and rotavirus and human astrovirus were detected in 4% (2/340) of individuals, respectively. Virus genotyping is ongoing, to date the norovirus GII polymerase type GII.Pe and the capsid types GII.4 and GII.6 have been characterised. Rotavirus G9P[8] and human adenovirus types C and D were also identified. Norovirus GII.4 is the predominant genotype globally and also responsible for severe disease.

Conclusion: The results show that viral gastroenteritis is significant in the elderly population. A better understanding of the viral aetiology of gastroenteritis is important since these individuals are at risk for severe infections and often reside in closed settings such as old age homes and frail care centres. Outbreaks are more likely to occur in these settings and identification of a viral aetiology may assist in implementing the appropriate measures to combat and prevent outbreaks.
SYNDROMAL AND UNDIFFERENTIATED ANXIETY IN ACUTE PHASE SCHIZOPHRENIA

Background and aim: Existing literature on anxiety in schizophrenia is confined to well-established diagnostic syndromes as defined independently from and outside the context of schizophrenia. It is not known yet whether anxiety that is not differentiated into these syndromes (that is, undifferentiated anxiety) is empirically discernible from syndromal anxiety in acute phase schizophrenia and whether it amounts to an entity discernible from no anxiety.

Methods: The study compared anxiety features among 111 participants in an acute phase of schizophrenia, stratified into three groups after sampling, by using the SCID either directly or indirectly through statistical modelling for patients without SCID-data. One group met DSM-IV diagnostic criteria for one or more of the syndromal anxiety disorders irrespective of having undifferentiated anxiety features concurrently. The second did not meet DSM-IV criteria for any syndromal anxiety disorder, yet qualified for the DSM-IV diagnosis of anxiety disorder not otherwise specified. The third group comprised patients who did not meet DSM-IV criteria for any syndromal anxiety disorder, nor for an anxiety disorder not otherwise specified. The groups were compared for anxiety, psychotic severity, depressive features, akathisia and medication use.

Results: On two measures of anxiety and for both data sets, the groups were statistically significantly different. The undifferentiated anxiety group was statistically significantly different from the syndromal group on the Staden Schizophrenia Anxiety Rating Scale (S-SARS) for both data sets (SCID-data set: mean difference=7.46, 95% Confidence Interval (CI) = 3.73 to 10.98, p<0.001; Replicative data set: mean difference=7.69, 95% CI=3.97 to 11.24, p<0.002). For both data sets, the groups were not statistically different for akathisia and medication use, nor were the group comparisons confounded by psychotic severity. Depressive features were not a significant confounder in the group comparisons for the replicative data set. Although they were significant for the SCID-data set, the confounding effect was negligible.

Discussion: The results suggest some patients in acute phase schizophrenia present with undifferentiated anxiety that is discernible from both syndromal anxiety and those without any anxiety. This finding may serve as empirical foundation for clinicians to recognise undifferentiated anxiety in acute phase schizophrenia, and for clinically important subsequent research.
Presenting Author: L Mavudzi (SHSPH)

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Abstract Detail
SYNDROMAL AND UNDIFFERENTIATED ANXIETY IN ACUTE PHASE SCHIZOPHRENIA

Background: The morbidity and mortality of patients with human immunodeficiency virus (HIV) has decreased in most developing countries. Apart from the scourges of communicable diseases, the developing countries are also facing a non-communicable disease epidemic.

Objective: This study aims to investigate patterns in the disease burden of communicable and non-communicable diseases of in-patients at a tertiary hospital from 2009 to 2016.

Methods: Using patient admission and discharge data to and from a tertiary hospital, this study described changing patterns in the admitted patients’ profile for disease burden and mortality from 2009 to 2016. Descriptive statistics for measures of central tendency and spread and inferential statistics are reported. Linear regression was used to assess the trends of communicable and non-communicable diseases over time.

Results: A total of 45155 patient records were analysed. The median age was 43 years (IQR=13 to 101). The admission cases for the CD only group are significantly higher than the NCD only group by 989 in 2009 and 2167 than the group who had both. The NCD & CD group remains considerably lower than the other two groups from 2009 – 2016. For every increase of one year, admissions for the CD only group decreases by 190, significantly more than the other two groups which decrease by 70 (=190-120) and 12 (=190-178) cases per year respectively. For every increase of one year, admissions for the CD only group decreases by 190, significantly more than the other two groups which decrease by 70 (=190-120) and 12 (=190-178) cases per year respectively.

Conclusion: Communicable diseases still remain the main reason of admission at the tertiary hospital although they are decreasing faster the non-communicable diseases. An epidemiological transition in the tertiary hospital from predominantly communicable to non-communicable diseases in terms of morbidity is expected if these disease patterns continue. The majority of the mortality burden is still however related to communicable diseases.
RISK FACTORS ASSOCIATED WITH ILLNESS-RELATED MEDICAL ENCOUNTERS DURING A 109KM CYCLING EVENT: A 3-YEAR STUDY IN 102251 RACE STARTERS, A SAFER STUDY

Purpose: Currently there are limited data on the risk factors associated with illness-related medical encounters (IMEs) in endurance cycling events. Therefore, the purpose of this study was to determine the risk factors associated with IMEs in endurance cycling.

Methods: A retrospective, cross-sectional study design was used in the Cape Town Cycle Tour (109km) with 102251 race starters over 2012 – 2014 years. Race medical doctors recorded all of the IMEs for the 3 years on race day. The IMEs were grouped into common illnesses by final diagnosis (fluid and electrolyte, cardiovascular, respiratory, exercise associated muscle cramps), and the severity of the IME. A Poisson regression model was used to determine the univariate risk factors associated with IMEs.

Results: Risk factors associated with all IMEs during an endurance cycling event were year (2012 vs 2013, p=0.0133; 2012 vs 2014, p<0.0001), sex (females vs males, p=0.0087), cycling pace (20km/h vs. 20-<25km/h, p<0.0001; <20km/h vs. 25-<30km/h, p=0.0003; <20km/h vs ≥30km/h, p=0.0046). The risk factors for serious and life-threatening IMEs were older age (p=0.0095) and slow cycling pace (p=0.0048). Risk factors associated with specific common IMEs were: fluid and electrolyte disorders (year, females, slower cyclists), cardiovascular illness (older age), serious cardiovascular illness (year, older age, slower cyclists) and respiratory illness (females, older age, the slower and faster cyclists).

Conclusion: Older age, females, slower and faster cycling pace and year were associated with IMEs in endurance cycling. These data should be used to inform medical teams for race day preparation, and future prevention programmes for IMEs in future.
Presenting Author: J Killops (Sport, Exercise Medicine and Lifestyle Institute)

Authors: J Killops (Sport, Exercise Medicine and Lifestyle Institute), M Schwellnus (Sport, Exercise Medicine and Lifestyle Institute), DC Janse van Rensburg (Section Sports Medicine), S Swanevelder (Biostatistics Unit, SAMRC), E Jordaan (Biostatistics Unit, SAMRC)

Abstract Detail

1 IN 190 CYCLISTS IN A 109KM CYCLING EVENT REPORT A MEDICAL ENCOUNTER: A 3-YEAR STUDY IN 102251 RACE STARTERS A SAFER STUDY

Purpose: There are limited data on medical encounters, including deaths during cycling events. Therefore, the purpose of the study was to determine the incidence and nature of medical encounters during a mass community-based participation cycling event.

Methods: Using a retrospective, descriptive study design, the 2012-2014 Cape Town Cycle Tour (109km) was studied. The cohort consisted of 102251 race starters (male=80354, female=21897). All medical encounters (moderate, serious life-threatening, sudden cardiac arrest / death) were recorded for the 3 years, on race day, by medical doctors according to the latest definitions. The outcome measures were the overall illness-related (by organ system) or injury-related (by anatomical region) encounters incidence rate (IR per 1000 starters; 95% CI), as well as the severity.

Results: Over the 3 years, 539 medical encounters were recorded (IR 5.27; 4.84–5.74), with a higher injury-related (3.23; 2.90–3.60) compared to illness-related (2.10; 1.84–2.40) (p<0.0001) IR. The IR of serious life-threatening medical encounters was 0.49 (0.37–0.65) and with 3 cardiac arrests and 1 death occurring (2.93 and 0.98 per 100000 starters respectively). The injury IR was highest in the upper limb (1.85; 1.60–2.13), lower limb (0.96; 0.79–1.0) and head / neck (0.77; 0.62-0.96) regions, while illness IR was highest for fluid/electrolyte abnormalities (0.59; 0.46-0.76) and the cardiovascular system (0.48; 0.36–0.63).

Conclusion: In a 109km mass community-based participation cycling event, 1 in 190 cyclists suffered from a medical encounter (moderate to severe). The injury-related (1 in 310 cyclists) encounters were higher than illness-related medical encounters (1 in 476). The severity of the encounters is also important, as serious life-threatening medical encounters occurred in 1 in 2045 cyclists. Future studies should investigate the risk factors associated with these medical encounters to enable the development and implementation of safer cycling strategies.
RISK FACTORS ASSOCIATED WITH INJURY-RELATED MEDICAL ENCOUNTERS DURING A 109KM CYCLING EVENT: A 3-YEAR STUDY IN 102251 RACE STARTERS – A SAFER STUDY

Purpose: Currently there are limited data on the risk factors associated with injury-related medical encounters (IMEs) in endurance cycling events. Therefore, the purpose of this study was to determine the risk factors for IMEs in endurance cycling.

Methods: A retrospective, cross-sectional study was performed using the 109km Cape Town Cycle Tour (2012 – 2014) and the 102251 race starters. Over the 3 years medical doctors recorded all IMEs on race day. IMEs were grouped into main anatomical area of injury (head / neck, upper limb, chest, torso, hip / pelvis and lower limb), and a Poisson regression model was used to determine the risk factors associated with IMEs.

Results: The risk factors associated with all IMEs during the Cape Town Cycle Tour were year (2014 vs 2012, p<0.0001; 2014 vs 2013, p<0.0001), sex (females vs males, p<0.0001), older age (>50 years vs 41-50 years, p=0.0212), faster cycling pace (>30km/h vs <20km/h, p=0.0063; >30km/h vs 20-<25km/h, p=0.0051; >30km/h vs 25-<30km/h, p=0.0160). The risk factors for serious and life-threatening injuries were females (p=0.0413), older age (p=0.0178). For specific main anatomical areas: head/neck (female, older age), upper limb (year, female, older age, faster cyclists), chest (year, faster cyclists), torso (year, female, faster cyclists), hip/pelvis (year, female), lower limb (year, older age).

Conclusion: Year, older age, faster cycling pace and female sex were all risk factors for injuries during an endurance cycling event. These risk factors should help inform race organisers and medical teams on race day to ensure the best medical care is given, and effective injury prevention programmes are disseminated. Future studies should also investigate the implementation of pre-screening medical questionnaires to determine if there are further risk factors associated with medical encounters.
Faculty Day 2019 Abstract 2019241 Poster in the Clinical Category

Presenting Author: M Schwellnus (Sport, Exercise Medicine and Lifestyle Institute)

Authors: M Schwellnus (Sport, Exercise Medicine and Lifestyle Institute), M Borjesson (Sahlgrenska University Hospital, Goteborg, Sweden), S Swanevelder (Biostatistics Unit, SAMRC), E Jordaan (Biostatistics Unit, SAMRC)

Abstract Detail

PRE-RACE MEDICAL SCREENING AND RISK PROFILE STRATIFICATION PREDICTS ADVERSE EVENTS IN 76654 DISTANCE RUNNERS A SAFER STUDY

Purpose: It is not known whether pre-race screening with risk stratification in recreational endurance runners can predict adverse events during a race. Therefore the purpose of the study was to determine if pre-race medical screening and risk stratification predicts adverse event during a race.

Methods: A prospective study (with a cross-sectional analysis) study design was used in the Two Oceans marathon races (21.1km, 56km) with 76654 race entrants. All entrants completed a pre-race medical screening questionnaire, and were risk stratified into four groups [very high risk (VHR; existing cardiovascular disease – CVD: n=2361; 3.1%), high risk (HR; risk factors for CVD: n=8429; 11.0%), intermediate risk (IR; existing other chronic disease, medication use or injury: n=34682; 45.2%), and low risk (LR: n=31182; n=40.7%)]. Runners in the VHR and HR received a targeted educational intervention. Race starters and finishers were recorded, and all medical encounters (ME) were documented. The did-not-start (DNS) rate (defined as % entrants that did-not-start), did-not-finish (DNF) rate (defined as % starters that did-not-finish), adverse event rate (AE) [defined % starters that either DNF or had an ME] and ME rate (% runners with a medical encounter) were compared across risk categories.

Results: The DNS rate was not significantly different between groups, but AE rates were significantly higher (%; 95%CI) in the VHR (2.3; 1.8-3.0; p=0.0017), HR (1.8; 1.5-2.1; p=0.0323) and IR (2.0; 1.9-2.2; p<0.0001) compared to the LR (1.5; 1.3-1.6). Similarly, there were significantly higher DNF rates (%; 95%CI) in the VHR (2.2; 1.6-3.0; p=0.005), HR (1.8; 1.5-2.1; p=0.017) and IR (1.9; 1.8-2.1; p<0.0001) compared to the LR group (1.4; 1.2-1.5). ME rate was not different between groups (overall p=0.1601).

Conclusion: Pre-race medical screening and risk stratification in recreational endurance runners can predict adverse events during races and could be implemented to prepare medical staff and race organisers during events. Future studies should investigate the risk factors associated with these adverse events, and refine the interventions accordingly.
Purpose: There are limited data on pre-race screening and the risk factors associated with adverse events in endurance running. Therefore the purpose of this study was to determine the risk factors associated with not finishing, adverse events and medical encounters.

Methods: Using a prospective, cross-sectional study design during the Two Oceans marathon races (21km, 56km), 76654 race entrants were considered participants. All entrants completed a pre-race medical screening questionnaire upon registration. All race starters and finishers were recorded, and all medical encounters (both injury- and illness-related, ME) were recorded by medical doctors on race day. Main outcome variables were the univariate risk factors associated with the adverse event rate (AE) [defined as those that did-not-finish or had an ME] using race day factors and medical history.

Results: The risk factors significantly associated with the adverse event rate were: year (p<0.0001), age category (p<0.0001), previous Two Oceans experience (p=0.0035), racing pace (p<0.0001), race distance (p<0.0001), BMI (p=0.0001), training pace (p<0.0001), times training for race (p<0.0001), years of recreational running (p<0.001), history of cramping (p<0.0001), metabolic disease (p=0.00337), cancer (p=0.0446), allergies (p=0.0018), medication use (p=0.0002), male >45years (p<0.0001), woman >55years (p=0.0257), diabetes (p=0.0417) and medication use during races (p=0.0058).

Conclusion: Non-communicable diseases and cardiovascular risk factors were found to be significantly associated with adverse events during a distance running event. Other training-related risk factors were also found to be associated with adverse events, illustrating the need for appropriate preparation for the event. The questionnaire should be implemented to prepare medical staff and race organisers for medical encounters and non-finishers during events, and implement intervention strategies.
Abstract

THE TEAM ILLNESS PREVENTION STRATEGY (TIPS) IMPLEMENTED IN THE SUPER RUGBY TOURNAMENT REDUCED ACUTE ILLNESS BY 59%: A CONTROL-INTERVENTION STUDY OVER 7 SEASONS INVOLVING 126 850 PLAYER-DAYS

Objectives: Acute illness is as common as injuries in elite athletes, and often interrupts both training and match availability in rugby players. Therefore, the purpose of this study was to determine if a Team Illness Prevention Strategy (TIPS) reduces the incidence of acute illness during the Super Rugby tournament.

Methods: Over a period of 7 years, 1340 male professional rugby union player seasons from 6 South African teams participating in the Super Rugby tournament (2010-2016) were studied. During these 7 years, each team’s medical staff recorded all illnesses daily (126 850 player days) in a 3-year control (C: 2010-2012; 47553 player days) and a 4-year intervention (I: 2013-2016; 79297 player days) period. Following the 3 year C period, a team illness prevention strategy was implemented in the I period, following agreement by consensus. Main outcome measures were the comparison of the incidence rate (IR: per 1000 player days; 95% CI) of all acute illness, illness by main organ system and infective illness (all and by main organ system), and illness burden (days lost due to illness per 1000 player days) between the C and I period.

Results: The IR of acute illness was significantly lower in the I (5.5: 4.7-6.4) vs. the C period (13.2: 9.7-18.0) (p<0.001). The IR of respiratory (C=8.6: 6.3-11.7; I=3.8: 3.3-4.3) (p<0.0001), digestive (C=2.5: 1.8-3.6; I=1.1: 0.8-1.4) (p<0.001), skin and subcutaneous tissue illness (C=0.7: 0.4-1.4; I=0.3: 0.2-0.5) (p=0.0238), all infections (C=8.4: 5.9-11.9; I=4.3: 3.7-4.9) (p<0.001), and illness burden (C=9.2: CI 6.8 – 12.5; I=5.7: CI 4.1 – 7.8) (p=0.0314) were significantly lower in the I vs. the C period.

Conclusion: The team illness prevention strategy during the Super Rugby tournament was associated with a reduced incidence of all acute illness (59%), infective illness (49%), and illness burden (39%) in the South African teams. These results indicate that a similar TIPS may have important clinical implications in other travelling team and individual sport settings.
Presenting Author: S Spijkerman (UP)

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Abstract Detail

COMPARING THE HAEMOGLOBIN DILUTION AND GRAVIMETRIC TECHNIQUES OF BLOOD LOSS ESTIMATION - A LABORATORY STUDY

**Introduction:** Paediatric patients present a unique blood loss estimation challenge as their physiological reserves are less than adult patients. The aim of this study was to assess the level of agreement of blood loss estimation of the gravimetric and haemoglobin dilution methods compared to actual blood loss.

**Methodology:** An in vitro, experimental study was conducted using packed red cells to mimic blood loss. Fifty samples, ten samples each of volumes of 1ml, 2ml, 4ml, 8ml and 16ml were obtained. Blood loss was determined with the gravimetric and haemoglobin dilution techniques.

**Results:** Analysis of variance showed a statistically significant difference between the three groups (p<0.001). The gravimetric method correlated better (Pearson’s r = 1.000) with the absolute blood loss than the haemoglobin dilution method (r = 0.994). Lin’s concordance correlation coefficients were 1.00, 0.984 and 0.983 when comparing actual volume with the gravimetric method, actual volume with the haemodilution method and haemodilution method with gravimetric method respectively. Bland-Altman analysis of the gravimetric technique showed a bias of -0.054 (-0.233 to 0.125) when compared to actual blood loss. Agreement was poorer with the haemoglobin dilution method with bias of 0.406 (-1.209 to 2.021). Bias between the gravimetric and haemoglobin dilution methods was 0.460 (-1.236 to 2.157).

**Discussion:** We found the gravimetric method more accurate than the haemodilution method at estimating blood loss. This agrees mostly with the literature but was the first study to compare these techniques in the blood loss range of paediatric patients. Future studies should include in vivo techniques as well as point-of-care devices used at the bedside.

**Conclusion:** Taking into consideration the fragile nature of the paediatric patient population, the gravimetric technique is the more accurate method of blood loss estimation and should be used as the preferred method of estimating blood loss.
Abstract Detail

Effectiveness of a diabetes nutrition education programme on clinical status and dietary behaviours in adults with type 2 diabetes at a tertiary healthcare setting

Background: Limited data on the impact of a diabetes nutrition education programme (NEP) on health outcomes in people with type 2 diabetes (T2DM) in South African tertiary healthcare exists.

Aim: To evaluate the effectiveness of an adapted NEP on clinical and dietary parameters of adults with T2DM at a tertiary setting.

Setting: Diabetes outpatient clinic (tertiary academic hospital).

Method: A NEP, that was adapted to meet the needs of the tertiary setting, was implemented among uncontrolled T2DM patients over 12 months, using a randomised controlled trial design. Adults (40-70 years) with T2DM duration of at least one year, eligible in English and HbA1c levels ≥ 8% participated. The control group (n=38) received education materials. The intervention group (n=39) received the same education materials plus a workbook, 7-monthly group education sessions, 2-bimonthly follow-up sessions and a 15-minutes individual session. The NEP aimed to improve HbA1c (primary outcome) and other clinical (lipid profile, BMI, blood pressure) outcomes through improved dietary behaviours. Outcomes were measured at baseline, 6-months and 12-months using standard procedures and two 24hr diet recalls. Intention-to-treat analysis was conducted. Analysis of covariance (ANCOVA) or Rank ANCOVA compared the groups on measured outcomes using baseline values adjusted for age and gender (P<0.05). Changes in diabetes medication was also assessed. [Ethical approval: FHS, Research Ethics Committee, UP (no. 4/2016)].

Results: 62% of 77 participants completed the study. Differences in HbA1c were -0.53% (P=0.10) at 6 months and -0.02% (P=0.96) at 12 months in favour of the intervention group. The intervention group in comparison with the control group had lower: i) systolic blood pressure at six (P=0.049) and 12 months (P=0.004), ii) diastolic pressure at 12 months (P=0.02), iii) total cholesterol (P=0.029), LDL-cholesterol (P=0.048) and energy intake at six-months (P=0.042), iv) starchy food intake at 12 months (P=0.04), and v) increase in insulin units at six (P=0.04) and 12 months (P=0.009).

Conclusions: The NEP was not efficacious on HbA1c, despite clinically meaningful results in the short-term. Greater impact of the NEP appeared to be on blood pressure. Lower need for insulin increase indicates cost savings potential of the NEP.

Key words: Type 2 diabetes, nutrition education, effectiveness, South Africa, outcomes
ADDED VALUE OF FDG-PET/CT IN THE ACCURATE STAGING OF TREATMENT-NAÏVE WOMEN WITH LOCALLY ADVANCED CARCINOMA OF THE CERVIX

Introduction: Clinical examination with endoscopic and radiologic modalities is routinely used in the staging of carcinoma of the cervix (Cacx). The disease is staged according to the recommendations of the International Federation of Gynecology and Obstetrics (FIGO). Florine-18 fluorodeoxyglucose positron emission tomography with computed tomography (FDG-PET/CT) is a metabolic imaging technique that has been shown to have better accuracy in the staging of different human solid tumors. This study aimed to evaluate the added value of FDG-PET/CT in the initial staging of locally advanced Cacx.

Methods: Women with histologically confirmed locally advanced Cacx were staged according to the FIGO classification using the standard of care procedures. Patients subsequently had FDG-PET/CT imaging. Based on the findings on FDG-PET/CT, we reviewed the FIGO classification of the disease. We determine the proportion of patients who had a change in the FIGO classification of their disease. We obtained the FDG-PET metabolic metrics of the primary tumor (SUVmax, SUVmean, MTV, and TLG) and determined their abilities to predict distant metastasis.

Results: A total of 126 women were included (mean age=48.05 ± 11.80 years). Seventy-three patients (57.9%) were positive for human immunodeficiency virus (HIV) infection (median CD4 count=480 cells/μL, range:49 – 1190; viral load=132.50 copies/mL, range: 21.0 – 13388.0). Following FDG-PET/CT, regional or distant metastases were seen in 88 patients. Disease was upstaged in 65 patients (51.59%) while 61 patients maintained their pre-FDG-PET/CT FIGO staging. Among 65 patients who were upstaged by FDG-PET/CT, disease was upstaged to FIGO IVB in 32 patients due to the identification of previously unknown sites of distant metastases on FDG-PET/CT. No significant difference was seen in the proportion of patients upstaged by FDG-PET/CT between HIV-infected and HIV-uninfected women (p=0.549). The proportion of patients with metastases and the sites of metastases were not significantly different between HIV-infected and HIV-uninfected women, p>0.05. All FDG-PET metabolic parameters were significant predictors of distant metastases (p<0.05) in univariable logistic regression analyses. Using receiver operating characteristics curves, SUVmax, SUVmean, MTV and TLG performed well in predicting the presence of distant metastasis with the area under the curves of 0.80, 0.79, 0.84 and 0.82, respectively.

Conclusions: Inclusion of 18F-FDG-PET/CT in the pre-therapy assessment of cervical cancer improves the accuracy of staging in about half of the patients. The metabolic parameters of the primary tumor perform well in predicting the presence of distant metastases.
EATING BEHAVIOUR AND LEVEL OF MINDFUL EATING AMONG UNDERGRADUATE DIETETIC STUDENTS AT UNIVERSITY OF PRETORIA

**Background:** Mindful eating is the application of “non-judgemental acceptance” to the emotional and physical sensations within eating environments. Mindless eating frequently results in unconscious over-eating and underestimation of portion size. It is associated with overweight, obesity and unhealthy lifestyles. Mindful eating is predicted to have positive nutritional and behavioural effects. It may promote weight loss, improve eating and food behaviour, and decrease problematic eating behaviours.

**Objectives:** To determine the Body Mass Index (BMI) and to assess and describe eating behaviour and level of mindful eating of undergraduate dietetic students at the University of Pretoria (UP).

**Setting:** The Hatfield and Prinshof campuses at the UP.

**Methods:** A quantitative, descriptive design was used. A convenience sample of all willing undergraduate dietetic students, enrolled in 2019, was obtained (N=86).

Weight and height were measured according to standard procedure, using a calibrated Seca scale and height meter respectively, and used to calculate BMI. Eating behaviour was measured using the validated Rapid Eating Assessment for Patients (REAP). Mindful eating was measured using the validated Mindful Eating Questionnaire (MEQ).

**Results:** The mean BMI of the BDietetic students was 22.6 kg/m². The fourth-year group had the highest mean BMI, and the third-year group had the lowest mean BMI.

The fourth years were noted to have better eating behaviours in regard to: meal pattern, grains, vegetables and dairy intake, fat and saturated fat intake and physical activity. The mean level of mindful eating amongst dietetic students was moderate. The first, second and fourth-year groups displayed a similar mean level of mindful eating, scoring 2.9 out of 4. In comparison, the third-year group displayed a slightly lower mean level of mindful eating, scoring 2.8 out of 4.

**Conclusion:** Dietetic students had a moderate level of mindful eating. The fourth years practised better eating behaviour compared to the other year groups, probably due to having had longer exposure to nutrition education. Mindful eating principles should be incorporated into the BDietetic curriculum to improve the understanding of mindful eating and its principles amongst dietetic students, as these principles can be used to facilitate eating behaviour change in clients.
Presenting Author: FC du Toit (SEMLI)

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Abstract Detail

RISK FACTORS ASSOCIATED WITH OVERUSE CYCLING INJURIES IN RECREATIONAL CYCLISTS - A SAFER STUDY IN 21824 CYCLING ENTRANTS

Purpose: Risk factors associated with overuse cycling injuries (OCIs) in recreational cyclists have not been well-studied. Therefore the purpose of this study was to determine risk factors associated with OCIs in recreational cyclists participating in mass community-based cycling events.

Methods: A cross-sectional study of 35914 race entrants from the 2016 Cape Town Cycle Tour. 27349 completed an online pre-race medical screening questionnaire, and 21824 consenting cyclists (60.8%) were studied. 617 cyclists reported OCIs. We report the crude unadjusted prevalence ratio (PR; with 95%CI) of cyclists with a history of OCIs age group, and gender, cycling training/racing history, history of main categories of chronic disease, and regular use of any prescription medications, and analgesic anti-inflammatory medication (AAIM) medication usage during training and racing.

Results and Conclusion: Prevalence ratio (PR) of OCIs was similar in male and female cyclists, but the age groups differed significantly, with the >50 years age group being the highest (PR=1.6 vs. <30yrs; PR=1.5 vs. 31 to <40yrs; PR=1.4 vs. 41 to <50yrs; p<0.0001 vs. age categories). Risk factors associated with a higher PR of OCIs were: increased years of participation in distance cycling events longer than 2 hours (PR=1.13; p<0.0001), increased average weekly training/racing frequency in the last 12 months (times per week) (PR=1.12, p<0.0001), increased average weekly cycling distance in the last 12 months (PR=1.08; p<0.0001), increased years of recreational cycling (years) (PR=1.08; p<0.0001), and increased average racing speed category (PR=1.06, p<0.0001); any symptoms of CVD (PR=4.0; p<0.0001), followed by any nervous system/psychiatric disease (PR=2.8; p<0.0001), and any GIT disease (PR=2.3; p<0.0001). In addition, any respiratory disease (PR=2.2; p<0.0001), any kidney or bladder disease (PR=2.1; p=0.0009), any endocrine disease (PR=1.8; p=0.0050), any allergies (PR=1.7; p<0.0001), any history of CVD (PR=1.7; p=0.0130), and any risk factor for CVD (PR=1.5; p<0.0001), and the use of both regular prescribed medication for chronic disease (PR=1.7; p=0.0001) and use of any AAIM use in the week before or during racing (PR=6.3; p=0.0001). The results of the study show that cycling training/racing history, history of main categories of chronic disease, and regular use of any prescription medications, and AAIM usage during training and racing are risk factors associated with OCIs in recreational cyclists, and need to be considered when implementing prevention programs.
Presenting Author: AH Mdlophane (Nuclear Medicine)

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Abstract Detail

THE RADIOSYNTHESIS AND PRECLINICAL EVALUATION OF 68GA-LABELLED CDP1 BIOCONJUGATES AS POSITRON EMISSION TOMOGRAPHY INFECTION IMAGING AGENTS

Introduction: Antimicrobial peptides (AMP) such as the cathelicidin-derived peptide (CDP1), are used as targeting vectors for imaging infection due to their selectivity for bacterial cell membranes in the innate immune system response. Infection imaging provides a solution for misdiagnosed, complicated infections and monitoring of therapy.

Aim/Methods: The aim of this study was to validate the radiosynthesis of 68Ga-NODAGA-CDP1 and 68Ga-DOTA-CDP1, to investigate bacterial binding and mammalian cell toxicity; and to establish the pharmacokinetic profile in healthy mice using positron emission tomography (PET). The synthesis of 68Ga-NODAGA-CDP1 and 68Ga-DOTA-CDP1 were optimised for pH, molarity, incubation time and temperature, and product purification. 68Ga-DOTA-CDP1 integrity and protein binding were compared to 68Ga-chloride and 68Ga-DOTATATE the controls. DOTA-CDP1 cytotoxicity was investigated in mammalian cells. 68Ga-DOTA-CDP1 bacterial cell binding with/without excess DOTA-CDP1 was determined in Escherichia coli (EC), Mycobacterium smegmatis (MS) and Staphylococcus aureus (SA). 68Ga-DOTA-CDP1 pharmacokinetic profiling in healthy mice employed dynamic and 1 to 2 h static PET imaging and subsequent ex vivo biodistribution.

Results: 68Ga-DOTA-CDP1 was highly bound to serum protein (97± 1%) and exhibited better integrity at ambient temperature than 68Ga-NODAGA-CDP1 (p<0.02). DOTA-CDP1 was non-toxic in both cell-lines with 86-89% 68Ga-DOTA-CDP1 remaining unbound. Greater tracer binding at 0 h (p<0.01) and 1 h (p<0.003) seen in EC than MS, as well as in comparison to SA in 1h (p<0.02). PET imaging showed moderate blood pool clearance of 68Ga-DOTA-CDP1 over 1h with decreased heart uptake comparing 1h (2.53±0.5) and 2h (1.5 ± 0.3; p<0.01). Ex vivo bio-distribution showed lower liver and lung accumulation for 68Ga-DOTA-CDP1 compared to 68Ga-chloride and significantly higher accumulation in the heart, blood and brain. In conclusion, 68Ga-NODAGA-CDP1 exhibits better labelling properties than 68Ga-DOTA-CDP1 however, 68Ga-DOTA-CDP1 exhibits good stability. Increased product yield would benefit from improved purification methods. Bacterial binding with a degree of selectivity was demonstrated without cytotoxicity in mammalian cells at the same concentrations. Further studies in infected mice will determine the impact of protein binding and slow clearance on lesion targeting.
Presenting Author: C Huyser (Steve Biko Academic Hospital)

Authors: C Huyser (Steve Biko Academic Hospital), L Boyd (UP)

Abstract Detail

PHENOTYPIC APPEARANCE OF EMBRYOS AT THE FOUR-CELL STAGE CORRELATES WITH OPTIMAL EMBRYO DEVELOPMENT.

**Introduction:** Embryo developmental capacity can be affected by various factors, such as treatment protocols, patient population, and in vitro culturing. Time-lapse evaluation provides the ability to analyze embryonic development in detail, such as a qualitative measure in the form of intercellular contact points (ICCPs). Several studies indicated that ICCPs and the spatial arrangement of blastomeres at the four-cell stage of an embryo plays an important role in blastulation, implantation and live birth rates.

**Aim:** To determine whether the number of ICCPs at the four-cell stage of embryo development correlates with blastocyst quality on day 5 (116±2hrs) of culture.

**Method:** Oocytes (n=461 oocytes) from conventional in vitro fertilization and intracytoplasmic sperm injection patient cycles (n=85 cycles) from January 2017 to September 2018 at Steve Biko Academic Hospital were investigated. Selection was based on embryos derived from normal fertilized oocytes, cultured in the Embryoscope™ time-lapse system (TLS) up to the blastocyst stage of development. The Embryoscope™ TLS with EmbryoViewer® software (Vitrolife A/S Denmark) was utilized to view the spatial arrangements of the four-cell stage embryo on day 2 (44±1hr after insemination) and the eight-cell embryo on day 3 (68±1hrs). Day 5 assessments involved blastocyst development (116±2hrs), quality and utilization rate.

**Results:** Of 461 four-cell embryos, 78 (17%) failed to achieve six ICCPs; 383 of 461 (83%) established six ICCPs before subsequent division. Embryos with fewer than six ICCPs at the end of the four-cell stage had significantly lower good quality embryos on day 3 (eight-cell stage embryo) (55% vs 81%; p<0.001), and developed less frequently into good quality blastocyst on day 5 (72% vs 87%; p=0.002) when compared to embryos achieving six ICCPs. Embryos with six ICCPs and a tetrahedral four-cell configuration had a significantly higher utilization rate (88% vs 72%; p=0.001) when compared to non-tetrahedral embryos with fewer than six ICCPs.

**Conclusion:** The use of time-lapse monitoring increased the opportunity to observe abnormal biological events enabling analyses of novel parameters related to embryo quality. The advantage of documenting qualitative measures is independent of cleavage timings. These measurements could aid in the development of a deselection algorithm.
THE ASSOCIATION BETWEEN ANTHROPOMETRIC MEASURES AND PHYSICAL PERFORMANCE IN BLACK ADULTS OF THE NORTH WEST PROVINCE, SOUTH AFRICA

**Introduction:** Due to urbanisation and socio-economic status more people are moving to the urban areas. This in turn affects their lifestyle as they adopt the living conditions of the urban areas. Obesity has become a major health problem causing an increase in the incidence and prevalence of various non-communicable diseases. Physical activity (PA) has been shown to be associated with a lower fat mass and an increase in muscular strength and function. Furthermore PA has also been recognised as a key lifestyle factor to prevent and delay muscle loss and obesity during ageing. Increasing or maintaining PA levels may decrease the decline of age-associated physical performance. There is a paucity of data on the association between anthropometric measures and the physical performance of black adults in Southern Africa.

**Aim:** The aim of this longitudinal study was to examine the association between anthropometric measures and the physical performance of rural and urban black South African adults in the North West Province. Stratified random sampling was used to select participants from four communities to participate in the PURE-SA study in 2005. Follow-up visits were done in 2010 and 2015. Anthropometric measurements, demographic and PA information were collected. Physical performance tests were added in 2015. Participants who were HIV positive, incomplete data and pregnant women were excluded in 2005. Data of 1 428 participants were then available. In 2015, 926 individuals returned for a follow up and 774 participants remained after people living with HIV were excluded.

**Results:** The combined overweight/obesity prevalence of both men (p=0.02) and women (p<0.001) increased significantly over time. Physical activity decreased gradually in both men and women (p<0.0001). Statistically significant differences in handgrip strength (HGS) between the tertile groups of calf circumference were found in men (p=0.002) and women (p<0.0001). Calf circumference was positively associated with HGS even after adjusting for potential confounders. This study has shown that the prevalence of being overweight or obese among black South African adults is increasing, particularly in women in the North West Province. Calf circumference may be a useful predictor of physical performance in black men and to a more limited extent in women.
IMPACT OF TYPE AND DURATION OF DIALYSIS ON THE NUTRITIONAL STATUS OF ADULTS WITH END-STAGE RENAL DISEASE

Introduction: Protein-energy wasting (PEW) is common in patients with end-stage renal disease (ESRD) and in those who are receiving hemodialysis (HD) or peritoneal dialysis (PD). PEW in dialysis patients is strongly associated with morbidity, mortality and poor clinical outcomes. The objective of this study was to determine and compare the nutritional status of adults (through anthropometric assessments, biochemical investigations, and subjective global assessment), who had been on HD or PD for less than two years with those on HD or PD for two years or more.

Methods: A non-randomised, observational cross-sectional descriptive study with an analytical component was conducted. The nutritional status of 132 patients, 72 on HD and 60 on PD, was assessed and compared between the type and duration of dialysis.

Results: The HD group had significantly more moderately malnourished patients compared to the PD group (p=0.044) with significantly lower median values in the following nutritional parameters: oedema free body weight (59kg; p=0.0129), body mass index (21.9 kg/m2; p=0.0129), and body fat percentage (18.4%; p=0.048). Significant differences in biochemical values were found in serum urea (HD:26.8mmol/l; PD: 19mmol; p<0.001), serum potassium (HD:5.3mmol; PD:4.3mmol/l; p<0.001), serum albumin (HD:28g/L; PD:25g/L; p=0.001) and serum cholesterol (HD:2.9mmol/l; PD:4.5mmol/l; p<0.0001). The arm muscle area and the body fat percentage were significantly higher in those who had been on PD for more than two years (p=0.032 and p=0.032 respectively). The serum albumin was significantly higher in participants who had been on HD for more than two years (p=0.035).

Conclusion: The results demonstrated that the nutritional outcomes may vary according to the type of dialysis, as well as the duration of dialysis received. Overall, those who had been on PD and those who had been on dialysis for more than two years had a better nutritional status compared to those who had been on dialysis for less than two years.

Conflict of Interest: None. Keywords: hemodialysis, peritoneal dialysis, protein-energy wasting, nutritional parameters.
Abstract Detail

COMPARING OUTCOMES BETWEEN ENHANCED RECOVERY AFTER SURGERY AND TRADITIONAL PROTOCOL IN TOTAL KNEE ARTHROPLASTY

**Background:** Knee replacement surgery was traditionally associated with prolonged recovery and rehabilitation programs in hospital. Enhanced Recovery After Surgery protocols (ERAS) are cost effective and does not compromise patient safety. Despite this proven efficacy; ERAS has not been widely adopted in South African orthopaedic practices.

**Methods:** 119 patients undergoing elective total knee arthroplasty was included in the study. They were divided into two cohorts. The first were treated with the traditional protocol and included 59 patients. The ERAS protocol was implemented in March 2015; following this 60 consecutive patients were included in the ERAS group.

Functional outcome was assessed using the Oxford knee score (OKS). The 30 day- readmission rate was used to assess safety of early discharge. Length of stay and patient demographics were also collected to match the cohorts.

**Results:** The length of stay was significantly decreased in the ERAS group; with a mean of 2.3 days and 5.0 in the traditional group (P <0.001). Two sample T test was used to compare OKS and 30 day- readmission rates. The mean OKS for traditional group was 59.1 and for the ERAS group 58.7. The readmission rate was 5 in the traditional group and 6 in the ERAS group. No clinical significant difference was present with regards to OKS and readmission rate.

**Conclusion:** With the implementation of ERAS protocols in elective total knee arthroplasty; the length of stay can be significantly reduced without compromising patient safety or functional outcome.
Abstract Detail

A COMPARISON OF HYBRID DECOY-DATABASE AND SEMI-TRYPTIC SEARCHES ON HEPATOCYTE PROTEIN DISCOVERY RATES

**Background:** The proteome of various in vitro hepatotoxicity models has been assessed previously. Strategies to remove false-positive protein identifications (IDs) include target-decoy database searches. Parameter adjustment in enzymatic digestion method and post-processing filtering of protein IDs is also common. This study established the degree of variability in protein identification related to variations in these practices.

**Methods:** Quantitative hepatocyte proteome data, collected using a nanoflow-liquid chromatograph coupled Fusion Orbitrap mass spectrometer were re-evaluated against variations in decoy-database (reversed (RDB) and shuffled (SDB)) and tryptic search (full-tryptic (FT), or semi-tryptic (ST)). Filtration for proteins identified by ≥2 validated peptides (A. unique or B. non-unique) and present in biological replicates (C. all three or D. ≥2). The hundred most intense peaks were selected (MSConvert) for protein IDs (SearchGUI, X!Tandem, MS-GF+ and Comet, two missed cleavages) and validation (PeptideShaker). One-way Analysis of Variance and Tukey’s Post-Hoc test were performed in R Studio.

**Results:** The B_D protein filtering method was the most inclusive, obtaining 1846 ± 108 more proteins than alternate filtering methods (A_C, A_D, and B_C) employed across decoy-database and tryptic searching methods (RDB_FT, RDB_ST, SDB_FT, SDB_ST). Approximately 400 more proteins were identified by the RDB over SDB method. ST analysis required extensive run-times yet yields an unavoidable decrease in unique protein IDs, which appears counter intuitive. However, assuming low abundance proteins are detected with fewer spectral counts, fewer validated peptide-spectrum-matches (PSMs) and/or a lower percentage of protein sequence coverage, then the RDB_ST_BD and the SDB_BD methods (ST and FT) were more sensitive for detecting the low abundance proteins (p<0.001).

**Conclusion:** Stricter parameter options in open-source proteomics tools eliminate protein hits with lower confidence at the cost of low abundance proteins (spectrum counts ≤1, protein coverage ≤2%). The biologist needs to consider this influence on biological inferences from data.
REAL TIME POLYMERASE CHAIN REACTION VERSUS CONVENTIONAL CULTURE METHOD TO DETECT RESPIRATORY PATHOGENS IN SUBJECTS WITH NON-CYSTIC FIBROSIS BRONCHIECTASIS.

Background and aims: Non-cystic fibrosis bronchiectasis (NCFB) is an important cause of chronic lung disease in children. It is marked by acute exacerbations, which results in lung function decline. Clinicians are interested in rapid and sensitive tests which will assist in instituting treatment on time. The aim of this study was to compare polymerase chain reaction (PCR) with conventional culture method (CCM) to detect respiratory pathogens in subjects with NCFB. Also important is the trade-off of cost increase from CCM to PCR versus the expected proposition of improved findings using PCR. Methods: This was a cross-sectional study, using sputum from subjects attending a follow-up bronchiectasis clinic. Each specimen was subjected to PCR analysis and routine culture. The data observed was translated into a binominal outcome e.g. success if PCR identifies more organisms than CCM and failure if it identifies at most or as many organisms as CCM. The proportion of successes (PCR improved CCM) was assessed using an exact binominal test, and was also be reported along its 95% confidence interval.

Results: Forty patients were enrolled. Sixty percent were male, the median age was 10 years. For PCR, 79% had a positive result and 21% had normal flora, this is in contrast to CCM with 66% positive results and 34% normal flora. This indicates that PCR yielded more pathogens and the McNemar’s test for symmetry was significant (p=0.035), with PCR detecting more positive results when CCM detects normal flora than the reverse. The median turn-around time for PCR was shorter than CCM (McNemar’s test p<0.001; 2 vs 4 days). The costs of PCR were higher than CCM (R1333 vs R247), however faster turn-around times are generally associated with reduced hospital stay and reduced overall cost.
Presenting Author: L Kuhn (UP)

Authors: L Kuhn (UP), Friede Wenhold, Prof. Una MacIntyre (Human Nutrition)

Abstract Detail
MIND DIET SCORE OF LOWER INCOME SOUTH AFRICAN ELDERLY

**Introduction:** High prevalence of dementia (47.5 million people worldwide) contributes to the need for preventative measures, including diet as a lifestyle factor. The Mediterranean-DASH Intervention for Neurodegenerative Delay (MIND) diet progressed from combining the Mediterranean diet with the Dietary Approach to Systolic Hypertension (DASH) diet and adding specific brain supportive food categories. The MIND diet emphasises dietary categories and servings thereof linked to neuroprotection and dementia prevention.

**Objective:** To describe the usual diet of lower income South African elderly in terms of an adjusted version of the MIND diet.

**Methods:** This cross sectional study formed part of the baseline assessment for a randomised controlled trial exploring the effect of dietary intervention on cognition. The MIND diet was adapted by substituting expensive monounsaturated fats with local, more affordable options. An interviewer-administered study-specific food frequency was used to gain information on the usual diet of independent living elderly of a resource-limited (income <R3500/mo) retirement centre in Kempton Park (N = 66; 17 (26%) male; mean age: 72 ±7 years). This information was used to score 15 food categories on the adjusted MIND diet, based on frequency of consumption and serving size. A food category was scored as 0, 0.5 or 1 to indicate support of cognitive function in ascending order. Data were analysed with descriptive statistics.

**Results:** The mean total MIND diet score was 7.46 (±1.55) indicating that compliance with the MIND diet was about 50%. Between 60 - 80% of participants complied with white meat consumption, while 48% complied with red meat intake recommendations. Only 20% of participants complied with recommended restriction in cheese intake, with the rest of detrimental foods (high fat; refined) ranging between 51 – 73%. Monounsaturated fatty acid intake is met by less than 35% of participants. Less than 15% of participants met recommendations for whole grains, legumes, green leafy vegetables and berries.

**Conclusion:** The MIND diet score indicated potential for improvement of the usual diet in this resource-limited setting to support cognition.
FOOD FOLATE VERSUS FORTIFICANT FOLIC ACID: DOES DIFFERENTIATION MATTER?

Introduction: The bioavailability of fortificant folic acid added to maize meal and bread flour is estimated to be 35% greater than that of natural food folate. It is therefore recommended that folate intakes be expressed as µg dietary folate equivalents (DFE) where 1 µg folic acid = 1.7 µg food folate. The current South African Food Composition Database (SAFOODS) presents folate as µg/100g without differentiating between food folate and fortificant folic acid. It is unknown how expressing folic acid as µg DFE will affect total folate intakes of a population, such as that of the Vhembe region, where maize meal and bread are staple foods.

Objective: To compare folate intakes of men in the Vhembe Region and the proportion at risk of folate deficiency without and with differentiation of food folate and fortificant folic acid.

Methods: As part of an environmental health study in the Vhembe region, dietary intakes were assessed by two non-consecutive 24-hour recalls during 2016 and 2017 (n=238). Folate intakes were reported as µg folate by the MRC Biostatistics Unit using SAFOODS. Folic acid (µg) was converted to µg DFE using the factor 1.7. Total folate intake (µg DFE) was calculated as the sum of food folate and fortificant folic acid. Median (interquartile range) µg folate, µg DFE and percent total µg DFE from fortificant folic acid were calculated. Intakes reported as µg folate and µg DFE were compared using the Wilcoxon test and the percentage participants with intakes below the Estimated Average Requirement (EAR) with the Chi2 test (α=0.05).

Results: Median folate intake reported by SAFOODS (603 (441;771) µg) was significantly lower than that calculated as µg DFE (933 (678;1200) µg DFE) (p<0.0001). Fortificant folic acid provided 72 (58;82)% total µg DFE, of which 57 (36;77)% was from fortified maize meal. Significantly fewer participants (4.6%) had intakes below the EAR when calculated as µg DFE than when reported as µg folate (10.5%) (p=0.023).

Conclusion: Failure to account for the higher bioavailability of fortificant folic acid when reporting folate intakes may underestimate intakes and overestimate the proportion at risk of deficiency in the target population.
Presenting Author: E Ghabrial

Authors: E Ghabrial

Abstract Detail

SURGICAL TREATMENT EFFECT ON DENTAL ARCH RELATION FOR PATIENT’S BORN WITH UNILATERAL CLEFT LIP AND PALATE USING GOSLON YARDSTICK INDEX

Objectives: To score dental arch development using the GOSLON yardstick index, following primary surgery in patients with a complete unilateral cleft lip and palate, and to compare the outcomes with the GOSLON rating of Cleft Care UK (CCUK) as well as with the Clinical Standard Advisory Group (CSAG United Kingdom).

Methods: Study models of patients average age of 12 years old with a non-syndromic complete unilateral cleft lip and palate, who had been surgically treated at the Facial Cleft Deformity of the University of Pretoria Oral Health Center (UPFCD) were assessed using the GOSLON yardstick index by raters from the Dental School in Dundee, Scotland. The models were numbered randomly, marked in pencil before scoring and the models were rated twice on separate days.

Results: The mean outcome ratings were calculated from the first scoring of the 27 sets of plaster models. The other rounds of scoring were used to calculate intra- and inter-observer agreement using Cohen’s weighted kappa and Fleiss’s multi-rater kappa. Results: There was strong intra- and inter-observer agreement, with a weighted kappa of 0.92. The FCD clinic data showed a good treatment outcome with a mean GOSLON rating of 2.85 in comparison with a rating of 3.2 for the CSAG and 2.62 for the CCKU cohort studies.

Conclusions: The FCD clinic of the University of Pretoria, displayed good treatment outcomes rating like the Cleft Care UK cohort and better than the CSAG results.

Keywords: Non-syndromic, clefting, Golson yardstick, treatment outcome audit cleft lip and palate
Presenting Author: G Oosthuizen

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Abstract Detail

THE IMPORTANCE OF HEALTH AND SKILL-RELATED FITNESS IN THE INCIDENCE OF SHOULDER INJURIES OF ELITE LEVEL RUGBY UNION PLAYERS

Introduction: Rugby is the third most popular contact sport in the world and has one of the highest reported incidencies of injuries. Characterising these injuries may help develop preventative methods to reduce absence rugby at professional and amateur levels. Shoulder injuries are responsible for up to 46% of days lost to participation at a professional level. Player specific factors possibly having an influence on shoulder injury risk in rugby are: forces, proprioception, isokinetics, forces, mass, running speed, aerobic ability, previous injury and laxity. Sport specific factors having an influence are: timing, speed of play, physical and mental fatigue. Rugby teams currently use the latest technology (global positioning system [GPS]) to monitor and evaluate physical demands of training and games on their players.

Methods: This is a cross sectional study where all players’ medical history, injury data, GPS information, health and skill related fitness data will be analysed to identify and investigate specifically the incidence of shoulder injuries and the physical demands during 2014-2019 of elite level Vodacom Bulls rugby players.

Potential Results, Discussion and Conclusion: With the variety of shoulder injuries that a rugby player can possibly sustain it appears to be important to identify which players are at greater risk of sustaining these injuries and how they can be prevented or at least the severity decreased. Potentially we can conclude that there will be a relationship between the incidence of shoulder injuries and the health or skill related fitness of elite level South African rugby players.
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Abstract Detail

EVALUATION OF WHOLE-BODY VIBRATION LEVELS DURING TRANSIT ON A HIGH-SPEED BOAT

**Background:** High speed boat operators and passengers are exposed to severely increased vibration levels characterised by repeated shock, primarily owing to their operational conditions on sea amongst other reasons. This is evident in marine personnel whose jobs require rapid responses to rescue missions which are often time sensitive. Excessive exposure to whole-body vibration results in the occupants of the high speed craft being susceptible to short-term and long-term adverse health effects. The most prevalent and highly reported condition is the occurrence of lower back pain. While control strategies aimed at mitigating excessive vibration exposure exist, there is paucity of data regarding the effectiveness of these strategies. Thus, the primary aim of this study was to measure and evaluate the levels of vibration and the repeated shock experienced by marine personnel during transit on high speed crafts during laden and unladen conditions of operating. The secondary aim of this study was thus to evaluate the attenuation capability of the seats using the Seat Effective Amplitude Transmissibility (S.E.A.T) factor. Lastly, recommendations were proposed to assist in the reduction of excessive exposure to vibrations.

**Method:** Vibration measurements on the seat surface were captured in three orthogonal directions; namely x-, y-, z-directions as well as only the z-direction for hull vibrations, using calibrated accelerometers. The measurement positions were located at the front and rear of the boat for both the laden and unladen conditions. These remained the same positions in both cases.

**Results:** The results indicated the presence of shock-type vibrations in the front and rear of the boat as was indicated by Crest Factor values greater than 9. Consequently, the effects of the vibrations were interpreted using the Vibration Dose Values (VDVs). The measured VDVs ranged from as low as 2.79 m/s^1.75 to as high as 38.44 m/s^1.75. The recommended safe exposure vibration limit stipulated by the ISO 2631-1:1997 in order to evade adverse health effects is VDVs below 8.5 m/s^1.75. The highest observed values were for the unladen conditions and for both tested operating conditions, the vibration levels were the highest at the front of the boat. Subsequent evaluations of the S.E.A.T factor revealed that the seats were ineffective at reducing vibration transmission to the occupants of the boat.

**Conclusion:** There is an increased risk of lower back pain which could potentially result in chronic back pain for the occupants of the boat and other musculoskeletal disorders associated with WBV exposure.

**Recommendation:** it was highly recommended that the seats of the boat be replaced with seats that are more effective at reducing vibration transmission to the occupants of the boat.