ABSTRACTS
SA HEART® CONGRESS 2021

Characteristics of patients undergoing surgical repair of complete atrioventricular septal defects at the Chris Hani Baragwanath Academic Hospital over a 10-year period

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Background: Atrioventricular septal defects (AVSDs) are a rare form of congenital heart defect (CHD) with a prevalence rate of 3% - 5%. The Complete form (cAVSD) is the commonest with a high prevalence in patients with Down Syndrome (DS). Surgical repair should be undertaken at approximately 3 months of age in order to avoid pulmonary vascular disease.
Objectives: To compare the age at presentation and surgery and outcomes of the cAVSD in patients with DS and non-DS over a 10-year period.
Method: A retrospective, descriptive study at the Chris Hani Baragwanath Academic Hospital from January 2010 - December 2019. Data were extracted from the Paediatric Cardiology electronic database and hospital records.
Results: A total of 60 patients underwent repair, comprising 24 males (40%) and 36 females (60%). Nineteen patients were non-DS (31.66%) and 41 had DS (68.3%). Mean age at presentation in the non-DS group was 3 years and in the DS group 0.6 years. Mean age at surgical repair was 3.49 years in the non-DS group and 2 years in the DS group. The mean waiting time for surgical repair was 1 year for the non-DS group and 1.4 years for the DS group. Post-operative complications were: worse left atrioventricular valve regurgitation (LAVVR) in 31.7% of DS patients, death in 4.8%, and heart block requiring a pacemaker in 2.4%. Worse LAVVR was present in 36.8% of non-DS patients, heart block requiring a pacemaker in 10.5% and death in 5.2%.
Conclusion: Patients with DS undergo surgery earlier than patients with non-DS, possibly due to an awareness of the association with CHD and DS. Waiting time to surgery in patients with DS was longer, which may reflect resource limitation and prioritising children with normal karyotyping. Fewer patients with DS die, have post-operative complications such as AVVR or have a need for a pacemaker.

Profile of coronary artery disease patients in central South Africa: 2014 vs. 1994

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Background: Coronary artery disease (CAD) is the leading non-communicable cause of death in developed countries. Studies report that CAD in sub-Saharan Africa is rare but epidemiological data for this region are scanty. No CAD data exist for central South Africa.
Objectives: To document the profile of CAD in central South Africa and to determine if there was a change over 20 years.
Method: Retrospective, observational study comparing clinical records of patients with angiographically confirmed CAD from 2014 - 1994 in central South Africa.
Results: Acute coronary syndrome (ACS) increased significantly ($p<0.0001$). There was a notable increase in NSTEMI ($p<0.0001$) and STEMI ($p<0.0001$). African patients with STEMI increased significantly [1994: n=8 (8,5%); 2014: n=45 (29.4%); ($p<0.0001$)]. Caucasian patients with ACS decreased [1994: n=240 (92%); 2014: n=192 (56.8%); ($p=0,0015$)], but NSTEMI in this group increased significantly [1994: n=12 (75%); 2014: n=75 (65.8%); ($p<0.0001$)].
Conclusion: ACS rose significantly over time and STEMI is the most important presenting condition in African patients.

Cardiac manifestations of Multi-System Inflammatory Syndrome in Cape Town, South Africa

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Background: Multi-system Inflammatory Syndrome in Children (MIS-C) is an acute, severe disease related to SARS-CoV-2 – with shock, multi-organ failure and cardiac decompensation.
Objectives: Describe the cardiac manifestations of a cohort of patients with MIS-C presenting to Red Cross War Memorial Children's Hospital (RXH) in Cape Town, South Africa.

Method: Children with MIS-C admitted to RXH between 22 June 2020 and 31 March 2021 were recruited, with consent, to a prospective cohort. Demographic and clinical data were recorded, and cardiac investigations were performed at clinically appropriate intervals.
Results: Forty-one children with MIS-C were admitted to RXH with a median age of 7.4 years (IQR 3.7, 10.1) and a relative ethnic bias (63.4% Black African). Fifty-one percent of patients were female and 17% had non-cardiac comorbidities. Seventeen percent of patients had a confirmed SARS-CoV-2 contact. However, all patients had evidence of prior exposure with positive serology, while only 9.8% had a positive nasal swab PCR at the time of admission.
Tachycardia (97.6%) and hypotension (63.4%) were common presenting features, and 36% needed inotropic support. There was a median ejection fraction (EF) of 52% (IQR 43, 66), pericardial effusion in 22% and mitral regurgitation in 39%, with no coronary artery aneurysms recorded. Patients with hypotension had a significantly lower EF than those without hypotension (48% vs. 70%, p=0.001). The median maximum pro-BNP was 4 919ng/L (95% CI: 737, 10 148) and the median maximum troponin-T was 49ng/L (95% CI: 23, 62). Upon resolution, pro-BNP and EF returned to normal, with no cardiac sequelae recorded in the medium term. There were no mortalities.
Conclusion: In this cohort of children with MIS-C, there was significant cardiac pathology which resolved in the medium term. Further research is needed to delineate the cardiac pathogenesis, best treatment and long-term outcome of MIS-C in this population.

Stress-related cardiometabolic complications: Underlying mechanisms?

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Background: Cardiometabolic diseases (CMD) constitute a major global burden of disease. Of concern, psycho-social stress is an emerging risk factor for CMD onset. Although associations between psychological conditions and CMD are well established, the underlying mechanisms need further investigation. Oxidative stress is linked to both chronic stress and CMD progression and can elicit detrimental sequelae. For example, increased oxidative stress levels can augment PARP activity and thereby shunt glycolytic intermediates into the hexosamine biosynthetic pathway (HBP). Increased HBP flux can in turn lead to dysregulated O-GlcNAcylation of target proteins, thereby potentiating cardiometabolic complications. As excessive HBP flux is observed in a range of CMD, we hypothesised that increased oxidative stress and HBP activation play a key role in stress-mediated CMD onset and progression.
Objectives: To assess the degree of total protein O-GlcNAcylation and redox status of cardiac tissue.
Method: This preclinical study exposed male Wistar rats to 9.5 weeks of unpredictable, chronic mild stressors vs. non-stressed controls. Behavioural tests were initially conducted to assess the presence of depression and anxiety in the rats. Post-euthanasia, plasma corticosterone and epinephrine levels were evaluated, while myocardial redox state and HBP activation were also determined using collected rat heart tissues.
Results: Stressed rats displayed an anxious phenotype, with lowered plasma corticosterone levels (p=0.0394 vs. controls) and higher plasma epinephrine concentrations (p=0.0284 vs. controls). Our data revealed increased cardiac lipid peroxidation (p=0.0421 vs. controls) but without any alterations in enzymatic antioxidant defence systems (catalase and total glutathione). The degree of HBP activation is currently under investigation.
Conclusion: These data show that the stress protocol triggered an anxious phenotype together with increased myocardial oxidative stress. It is likely that the elevated oxidative stress may occur because of increased reactive oxygen species production, instead of an impaired antioxidant system.

Diagnostic performance of dobutamine stress echocardiography: A South African experience

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Background: Dobutamine stress echocardiography (DSE) is an accurate and well established modality for the diagnosis and risk-stratification of coronary artery disease (CAD). The use of DSE is not yet widespread in South Africa, and there are no locally reported diagnostic data. Since DSE is highly cost-effective, demonstrating its accuracy in a resource-constrained environment is imperative.
Objectives: To compare the sensitivity, specificity and safety of a South African DSE programme for the diagnosis of epicardial CAD – to larger, international series.
Method: All patients undergoing routine DSE from 2019 - 2021 at a single centre (SAEndovascular, Kuils River Netcare Hospital, South Africa) were included from an ongoing registry. Patients with non-diagnostic tests, implantable cardiac devices and DSE for any indication other than CAD diagnosis

(for example, viability testing) were excluded. Inducible ischaemia was identified by a new wall motion abnormality in ≥2 myocardial segments and CAD by a luminal narrowing of ≥50% on invasive coronary angiography.

Results: One hundred and six patients (mean age 61 ± 11 years, 68% male) were analysed. Seventy-eight patients (74%) had hypertension, 32 (30%) diabetes mellitus, 37 (35%) a first-degree family history of CAD, 9 (9%) were obese, and 27 (25%) were smokers. Thirty-six (34%) patients had received earlier coronary artery bypass surgery. The median interval between DSE and coronary angiography was 1 (IQR 0 - 13) month. Atropine was used in 69 (65%) patients, and 6 (6%) experienced chest pain during the test, while 4 (4%) developed an atrial arrhythmia. The sensitivity and specificity of DSE for detecting epicardial coronary stenosis were 77% and 74%, respectively. Sensitivity improved to 82% and specificity decreased to 72%, when excluding patients who had undergone coronary artery bypass surgery.

Conclusion: The sensitivity, specificity and safety of a South African DSE programme were comparable to larger international series. A successful DSE programme is possible in a local, resource-constrained environment.

Left atrial appendage occlusion: Experience in a resource-constrained environment

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Background: Patients with atrial fibrillation (AF) are at increased risk of systemic thromboembolism, particularly ischaemic stroke. Traditionally, anticoagulation with vitamin K antagonists (VKAs), for example warfarin, are used to reduce thromboembolic risk in AF. Left atrial appendage (LAA) occlusion (LAAO) or exclusion in AF is predicated on the fact that only a small percentage (<10%) of clinically relevant emboli in non-valvular AF originate outside the LAA. After excluding the LAA as an embolic source, additional thromboprophylaxis with a VKA or a novel oral anticoagulant (NOAC) can be avoided in patients who are intolerant of these medications (for example, those who have experienced life-threatening haemorrhage), are unwilling to take them, non-adherent, or have an unacceptably high bleeding risk. Only one case series prior to our study of percutaneous LAAO in the South African context has been published, and it provides limited data.

Objectives: Compare safety and efficacy outcomes of a South African percutaneous LAAO programme to larger international series.

Method: All patients undergoing percutaneous LAAO from 2013 - 2020 at a single centre were included from an ongoing registry. Survival analysis was performed with the Kaplan-Meier method.

Results: One hundred and one LAAO recipients (mean age 77 ± 10 years, 64% male) were analysed. Ninety patients (90%) had permanent AF, 1 (1%) persistent AF, and 9 (9%) paroxysmal AF. The commonest indication for LAAO was prior, severe bleeding (n=23, 23%). The mean device size was 23 ± 3mm and the procedural success rate was 98%. After a median follow-up of 21 (IQR 5 - 41) months, 6 patients (6%) experienced stroke or all-cause mortality. Four patients (4%) had a life-threatening procedural complication [tamponade n=2 (2%) and device embolisation n=2 (2%)]. These outcomes are comparable to large international series, such as PROTECT AF.

Conclusion: The safety and efficacy outcomes of a South African percutaneous LAAO programme were comparable to large international series. A successful percutaneous LAAO programme is possible in a southern African context.

Determinants of QRS duration in a diverse cardiomyopathy population of the Western Cape – implications for eligibility for cardiac resynchronisation therapy

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Background: Cardiac resynchronisation therapy (CRT) improves quality of life in heart failure patients who have a QRS duration ≥120ms. Relatively few patients presenting with heart failure to the Division of Cardiology at Tygerberg Hospital are candidates for CRT, mainly because of a QRS duration <120ms.

Objectives: The objectives of this study were to determine the QRS duration in a diverse cardiomyopathy population served by Tygerberg Hospital and to identify possible determinants of QRS duration in our cardiomyopathy population.

Method: Approval for this study was obtained from the University of Stellenbosch Health Research Ethical Committee (HREC) and Tygerberg Hospital and all patients signed informed consent. Patients with a LVEF <35% were recruited prospectively from our cardiac clinic. LVEF was determined by echocardiography using Simpson's Biplane method. QRS duration was measured on a standard 12 lead ECG.

Results: Two hundred patients were included. The mean age was 52 years (range 18 - 84). Self-identified ethnicity revealed 63% Coloured, 22% Black and 15% White patients. The mean QRS width was 105ms. On univariate analysis parameters associated with a QRS width ≥120ms included: ethnicity (White >Coloured >Black), ischaemic heart disease (p<0.01), age (p<0.01), left ventricular size (p=0.03) and male gender (p=0.05). After correcting for covariates in a multivariate analysis, ethnicity and sex were no longer predictive of a broad QRS.

Conclusion: Although it appeared on first evaluation that there was a gender and ethnic disparity in candidates for CRT, multivariate analysis revealed that this is more likely due to differences in age, ischaemic aetiology and LV size.

Urinary 1-hydroxy-pyrene (marker of Polycyclic aromatic hydrocarbon exposure) is associated with poorer endothelial function in a Cape Town study population

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Background: Polycyclic aromatic hydrocarbons (PAH) form during the incomplete combustion of organic materials (for example, vehicle exhaust fumes) and contribute to ambient air pollution. Exposure to PAH is associated with cardiovascular risk/disease. Urinary 1-hydroxy-pyrene (1-OH-pyrene) is a surrogate biomarker of PAH exposure. The effects of 1-OH-pyrene on vascular endothelial function are undescribed in the South African population.

Objectives: The current cross-sectional study set out to determine whether urinary 1-OH-pyrene is associated with endothelial function (% flow-mediated dilation of the brachial artery; %FMD).

Method: Healthy, volunteering participants were recruited from Elsies River, Bishop Lavis and Ravensmead. Demographic, lifestyle and socio-economic data were obtained via questionnaires. Urine samples were sent to the Flemish Institute for Technological Research (VITO) for 1-OH-pyrene quantification [Ultra-Pressure Liquid Chromatography (UPLC)]. FMD of the brachial artery was determined (Esaote MyLabTM Five portable ultrasound and expressed as %FMD). Linear regression analyses were performed and reported as standardised ß [95% confidence interval (CI)].

Results: The study population (n=93) was young (39.0 (19 - 70 years of age), mostly women [n=75 (81%)], with a high prevalence of smokers [n=66 (71%)]. Median (IQR) urinary 1-OH-pyrene concentrations were significantly higher in smokers vs. non-smokers [0.56 (0.33 - 1.03) vs. 0.22 (0.03 - 0.31) µg/L, p<0.001] and in warm season vs. cold season [0.64 (0.32 - 1.02) vs. 0.30 (0.03 - 0.52) µg/L, p<0.001]. Following linear regression analyses, 1-OH-pyrene was inversely associated with mean brachial artery diameter [-0.262 (-0.486 to -0.038), p=0.023] and %FMD [-0.275 (-0.534 to -0.015), p=0.036].

Conclusion: The current study found that the warmer season (September - February) and smoking were associated with increased 1-OH-pyrene. 1-OH-pyrene was also associated with narrower brachial artery diameter and poorer endothelial function, which may contribute to increased cardiovascular risk.

Chronic stress-related pathology: Exploring the role of the brain–heart axis

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Background: Although psycho-social stress is robustly linked to cardiovascular disease onset and progression, the underlying mechanisms driving this process require further investigation. Of note, there is increased focus on the role of the brain–heart axis in this context, with metabolic perturbations and oxidative stress emerging as key role-players. Here, increased diversion of glucose metabolism from mitochondrial oxidative phosphorylation into the hexosamine biosynthetic pathway (HBP) may be a putative link between metabolic alterations, oxidative stress and stress-mediated pathophysiology.

Objectives: We hypothesise that stress-induced HBP activation disrupts the intracellular antioxidant response via its impact on the Kelch-like, ECH-associated protein 1 (Keap1)/nuclear factor erythroid-2-related factor-2 (Nrf2) signalling pathway. We aim to investigate the: (a) redox state, (b) HBP activity, and (c) Nrf2 nuclear trafficking in the hippocampus and prefrontal cortex brain regions.

Method: The effects of 9.5 weeks of chronic, unpredictable mild stress were investigated in terms of depressive/anxiety-like characteristics in male Wistar rats (~290gr) vs. matched, non-stressed controls. Subsequently, redox assays and subcellular fractionation along with co-immunoprecipitation and immunoblotting were used to assess: (a) intracellular redox state perturbations, and (b) Nrf2 nuclear trafficking in the hippocampus and prefrontal cortex brain regions.

Results: Biochemical analyses revealed increased plasma epinephrine levels in stressed rats vs. controls (p=0.03), concurrent with decreased plasma corticosterone concentrations (p=0.04). Oxidative stress analyses showed no significant changes to pro-oxidant load or overall non-enzymatic anti-oxidant capacity. However, superoxide dismutase activity was elevated in the prefrontal cortex of stressed rats compared to controls (p=0.02). Nrf2 trafficking analysis is currently under investigation.

Conclusion: The corticosterone and epinephrine data reveal a dysregulated stress response – thereby confirming the successful induction of a chronic stress phenotype. The oxidative stress data indicate that chronic stress altered antioxidant capacity in the prefrontal cortex, thus suggesting that this brain region may be particularly susceptible to stress-related redox perturbations.

The contemporary study of acute myocarditis in South Africa – CAMISA

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Background: The aetiology and estimated incidence of acute myocarditis (AM) is still undefined in Africa. While CMR provides for a provisional non-invasive diagnosis, EMB, which is infrequently sought, is still the gold standard. The developed world has experienced a shift in the viral epidemiology of AM and the ESC's most recent position statement on myocarditis recommends both CMR and EMB as the standard of care in AM.

Objectives: To determine the nature of presentation, underlying aetiology, and outcomes of patients presenting with AM to Tygerberg Hospital.

Method: A cohort of patients from Tygerberg Hospital will be recruited from January 2018 - December 2022. All patients presenting to the centre with clinically suspected AM, and which are investigated according to the ESC recommendations on myocarditis, will be included.

Results: One hundred and two (mean age 42.2 ± 13 years, 64.7% male) cases of clinically suspected AM were identified between January 2018 and January 2021. AM was confirmed in 41 on CMR only, while 41 were confirmed on EMB. Four cases of sarcoidosis, 1 case each of eosinophilic myocarditis, amyloidosis and primary cardiac lymphoma, were diagnosed. The viral genome was isolated by PCR in 60 (59.8%). PVB19 (73.5%) was the most commonly identified virus in those with confirmed AM, followed by EBV (12.2%), HHV6 (4.1%) and Human Bocavirus (2%). Three were coinfected with PVB19/EBV, and 1 with PVB19/EBV/HHV6. PVB19 was isolated in 9 patients with no evidence of AM on CMR or EMB, but with lower median viral load compared to those with AM (198 copies/ml vs. 483 copies/ml, p=0.005). To date, 6 patients have died, with death related to AM in 4 patients.

Conclusion: To our knowledge, this is the first study to evaluate AM in Africa. It provides insight into the viral pathogens in our local setting, which appear similar to those reported in the developed world.

Acute myocardial infarction among young South Africans

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Background: acute myocardial Infarction (AMI) is a leading cause of death worldwide. However, little is known about the clinical profile and outcomes in South Africans with AMI under the age of 45 years.

Objectives: We aimed to compare the clinical profile and outcomes of patients younger and older than 45 years treated for AMI at a South African tertiary centre.

Method: We reviewed the hospital records of all patients admitted with AMI to the Coronary Care Unit at Groote Schuur Hospital, Cape Town, in 2016. Poor outcome was defined as death or readmission within 12 months with heart failure or an acute coronary syndrome.

Results: This study included 302 patients, of which 48 (15.9%) were younger than 45 years. A family history of premature coronary artery disease was more prevalent in the younger cohort (33.3% vs. 18.5%, p=0.020). In terms of metabolic risk factors, the older cohort was more likely to have hypertension (68.9% vs. 52.1%, p=0.024) and dyslipidaemia (49.6% vs. 31.2%, p=0.019). However, there was no significant difference between diabetes mellitus (27.1% vs. 40.6% in younger and older cohorts respectively) or smoking history (79.2% and 72.4% in younger and older cohorts respectively). The older cohort was more likely to have a poor outcome (27.2% vs. 6.2%, p=0.002), with significantly higher prevalence of death (10.1% vs. none, p=0.033) and readmission to hospital (18.9% vs. 6.2%, p=0.032).

Conclusion: In our study, mortality and readmission were shown to be less in patients younger than 45 years old. Younger patients still demonstrate many of the traditional metabolic risk factors for ischaemic heart disease (IHD). We propose that prevention strategies such as smoking cessation, weight loss, a healthy diet and primary health services – which play a major role in the prevention of AMI and the morbidity associated with it – should be implemented at earlier ages in South Africa.

Pericardectomy timing in tuberculosis-related pericardial constriction

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Background: In the developing world, tuberculosis (TB) is still one of the major causes of pericardial effusions and may complicate with constrictive pericarditis (CP). CP, if managed with prompt pericardiectomy, may have symptoms fully resolved. No RCTs evaluate the optimal timing for evaluation for CP in patients after anti-TB therapy initiation. Early surgery before the development of NYHA-III/IV symptoms and prior to the development of myocardial atrophy is suggested. Current recommendations based on expert opinion suggest waiting 6 - 8 weeks after anti-TB therapy initiation to identify patients who have developed CP who would benefit from pericardiectomy.

Method: We describe the clinical evolution of a TB-effusion in a 36-year-old, HIV-negative male and the utility of cardiac MRI (CMRI) in decision-making about the need for pericardiectomy.

Results: A patient presented with a 2-week history of dyspnoea with associated constitutional symptoms. Initial ECG and chest radiograph suggested a large pericardial effusion which was confirmed on echocardiography. Urgent pericardiocentesis confirmed an exudative effusion with an increased ADA. A clinical case definition of tuberculosis was met, and the patient was started on anti-TB therapy. On review 3 months after anti-TB therapy initiation, echocardiographic as well as clinical findings were in keeping with CP. CMRI revealed a thickened pericardium with significant pericardial oedema and late gadolinium enhancement. The patient then refused further investigation/pericardiectomy. Considering the patient's refusal to have surgery and the marked CMRI inflammatory signal, it was considered appropriate to continue anti-TB therapy and to assess interval change. At 6-month follow-up on completion of the anti-TB therapy, clinical evaluation revealed complete resolution of failure symptoms with no echocardiographic features of constriction.

Conclusion: This case highlights the paucity of data on optimal timing of pericardiectomy in tuberculous CP. Novel imaging modalities including CMRI and/or PET may identify patients with persistent pericardial inflammation who may benefit from anti-inflammatory therapy or a longer period of anti-TB therapy – before decisions about pericardiectomy are made.

Normal left ventricular systolic function with myocardial oedema in patients with pre-eclampsia complicated by pulmonary oedema, as assessed by cardiac MRI

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Background: Pre-eclampsia complicates 5% - 7% of pregnancies. When complicated by pulmonary oedema, it accounts for 50% of pre-eclampsia-related mortality. There is no clear consensus on the degree to which LV systolic dysfunction contributes to pulmonary oedema.

Objectives: Use CMRI to describe left ventricular volumes and mass, myocardial function and tissue characteristics in women with pre-eclampsia complicated by pulmonary oedema compared to pre-eclamptic and non-pre-eclamptic controls.

Method: Cases comprised women 18 years or older presenting with pre-eclampsia and pulmonary oedema. Two control groups were recruited: pre-eclampsia without pulmonary oedema and non-pre-eclamptic pregnant patients. All patients underwent echocardiography and 1,5T CMRI with native T1 and T2 mapping, with gadolinium contrast administered to cases only. CMRIs were reported by 2 independent reporters. Multiple blood, urine and placental samples were also collected. We report here on the CMRI findings.

Results: Twenty cases, 13 pre-eclamptic controls (5 complicated and 8 uncomplicated), and 6 non-pre-eclamptic controls were recruited. There were no significant differences in the baseline characteristics of the 3 groups. Left atrial sizes were similar across all groups. Patients with pre-eclampsia and pulmonary oedema had normal systolic function, with significantly increased LV mass. They also had elevated native T1 and T2 values in the absence of late gadolinium enhancement suggesting myocardial oedema. This finding was seen in all 25 patients with complicated pre-eclampsia – not only in those with pulmonary oedema. Those with uncomplicated pre-eclampsia had similar findings to the non-pre-eclamptic controls.

Conclusion: This is the first CMRI study detailing native T1 and T2 values in patients with pre-eclampsia complicated by pulmonary oedema. These patients have normal systolic function with myocardial oedema – findings which are universal to complicated pre-eclampsia. The pathogenesis of the myocardial and pulmonary oedema is still to be determined, but with normal LA sizes any haemodynamic component must be acute.

HIV and ART are independently associated with altered cardiometabolic and cardiac electrical activity in adults from the Western Cape, South Africa

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Background: The relationships among HIV and antiretroviral therapy (ART), cardiovascular risk and cardiac electrical activity remain controversial and poorly elucidated, especially in sub-Saharan African, HIV-positive adult populations – despite rising cardiovascular-related deaths.

Objectives: Investigate whether HIV and ART are associated with cardiometabolic and cardiac electrical activity alterations in adults from the Western Cape Province, South Africa.

Method: We cross-sectionally sampled HIV-free (n=24) and HIV-positive participants on ART (HIV+/ART+, n=63) and obtained demographic, lifestyle and medical history data. Subsequently, we performed anthropometric and clinical assessments. Fasting blood and urine samples were collected for biochemical analyses. Single channel electrocardiograms (ECGs) were digitally recorded, and multiple, stepwise, linear regression analyses were performed to determine independent associations among HIV, ART, cardiometabolic and ECG variable outcomes.

Results: HIV+/ART status independently predicted a lower BMI [-0.282 (-0.427 - -0.092), p=0.004] and elevated gamma-glutamyl transferase 0.333 (0.130 - 0.573, p=0.002) and alanine aminotransferase levels 0.427 (0.224 - 0.629, p<0.001) compared to HIV-free counterparts. HIV disease progression was inversely associated with haemoglobin levels [-0.373 (-0.649 - -0.097), p=0.009] and positively associated with high-sensitivity C-reactive protein [hsCRP: 0.510 (0.198 - 0.821), p=0.002]. Although no significant differences in ECG parameters were observed between HIV-free and HIV+/ART+ participants, viraemia was positively associated with P-wave duration [0.306 (0.018 - 0.594), p=0.038] and HIV duration (≥5 years) with ST interval [0.270 (0.003 - 0.537), p=0.047], after adjusting for confounding factors.

Conclusion: Our study showed that HIV and ART are independently associated with cardiometabolic and ECG variables. Although favourable effects in terms of body composition and blood pressure were observed in HIV+/ART+ compared to HIV-free participants, the use of 1st-line was associated with elevated hepatic transferases and systemic inflammation (hsCRP). Viraemia and a longer period of HIV infection were furthermore positively associated with ventricular and atrial electrical activity. Our findings suggest that HIV and ART are associated with an altered cardiometabolic/cardiac electrical activity, and therefore cardiovascular risk mitigation should be emphasised in this population.

Selenium deficiency as a risk factor for peripartum cardiomyopathy: A post-hoc analysis of PEACE registry results

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Background: North-west Nigeria has the highest burden of peripartum cardiomyopathy (PPCM) in the world. PPCM patients in Kano, north-west Nigeria, were found to have critically low serum selenium levels, and selenium supplementation improved the patients' symptoms and survival. However, the risk of selenium deficiency in PPCM was not previously quantified.

Objectives: This post-hoc analysis of PPCM in Nigeria (PEACE) registry data aimed to determine if selenium deficiency is an independent risk factor for PPCM.

Methods: PPCM patients and apparently healthy women who delivered within the previous 8 weeks, and who were recruited from 3 PEACE registry sites in Kano, Nigeria, were compared for selenium deficiency (<70µg/L) and other relevant socio-demographic and clinical characteristics. Selenium level was measured at recruitment for each subject. Independent predictors of PPCM were determined using logistic regression models.

Results: One hundred and fifty-nine PPCM patients and 90 controls were consecutively recruited. Selenium deficiency was present in 84.9% of patients and 3.3% of controls. Selenium deficiency increased the odds for PPCM 163-fold (p<0.001), while unemployment increased the odds by only 3.5-fold (p=0.014), after adjusting for pre-eclampsia. The customary birth practices in the form of regular hot water baths and the use of salt-enriched gruel previously implicated in north-west Nigeria, were not associated with PPCM.

Conclusion: Selenium deficiency was highly prevalent among PPCM patients in Kano, Nigeria, and significantly increased the risk of PPCM. Unemployment, an index of poverty, also independently increased PPCM risk in Kano, Nigeria.

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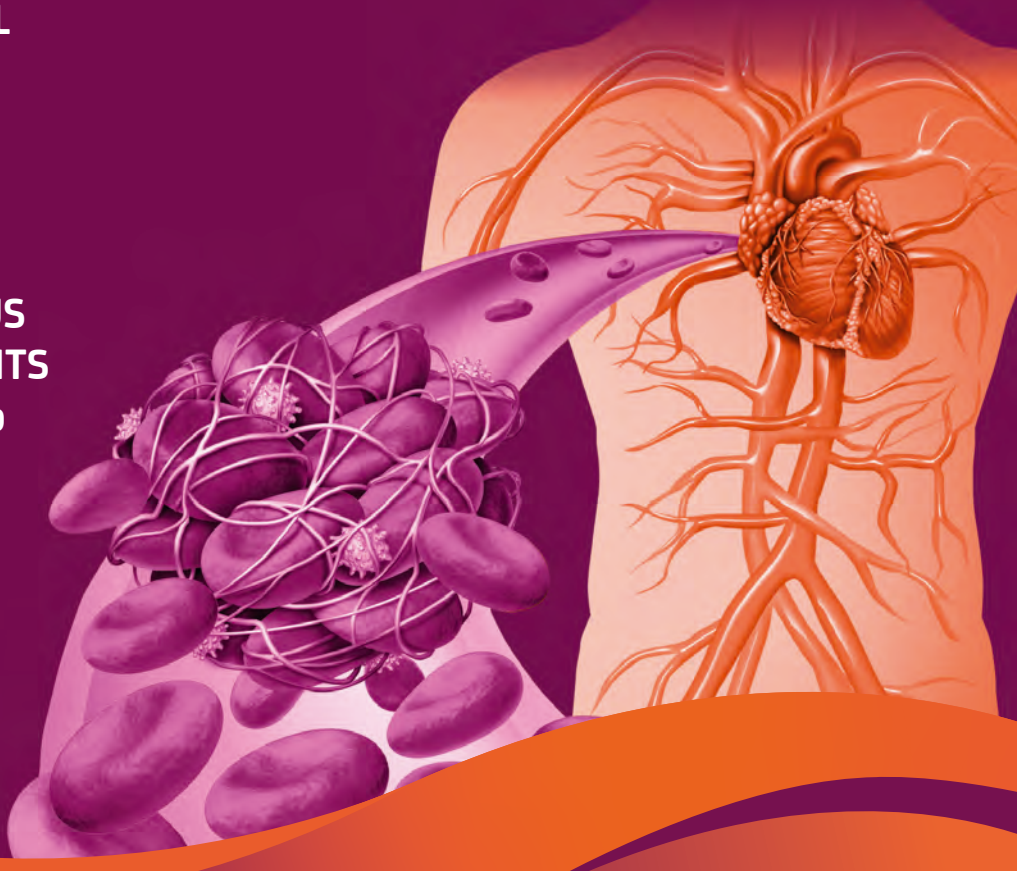

* Data from IMS MIDAS (Standard Units divided by recommended administration of each NOAC within 24 hours. Timeframe Q2 2020 to Q1 2021).

REFERENCES:
1. Data on file, IMS MIDAS, Patient treatment days prescribed Q1 2021 MAT.
2. ELIQUIS® Package Insert, Approved 20 March 2018.

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S4 **ELIQUIS®** 2,5 mg and 5 mg (Film-coated Tablets). Each film-coated tablet contains either 2,5 mg or 5 mg apixaban. Reg. no's: 47/8.2/0463 / 47/8.2/0464. **PHARMACOLOGICAL CLASSIFICATION:** A 8.2 Anticoagulants. **INDICATIONS: Prevention of VTE: elective hip or knee replacement surgery:** ELIQUIS is indicated for the prevention of venous thromboembolic events (VTE) in adult patients who have undergone elective hip or knee replacement surgery. **Prevention of stroke and systemic embolism: nonvalvular atrial fibrillation (NVAF):** ELIQUIS is also indicated to reduce the risk of stroke, systemic embolism, and death in patients with nonvalvular atrial fibrillation with one or more risk factors. **CONTRAINDICATIONS:** Hypersensitivity to the active substance (apixaban) or to any of the excipients. Clinically significant active bleeding. ELIQUIS is not recommended in patients with severe renal disease (CrCl < 15 ml/min). ELIQUIS is not recommended in patients with hepatic disease associated with coagulopathy and clinically relevant bleeding risk. ELIQUIS should not be administered with antiplatelet medicines other than aspirin (see WARNINGS AND SPECIAL PRECAUTIONS). **WARNINGS AND SPECIAL PRECAUTIONS: Haemorrhage risk:** Patients taking ELIQUIS are to be carefully observed for signs of bleeding. ELIQUIS is recommended to be used with caution in conditions with increased risk of haemorrhage, such as: congenital or acquired bleeding disorders; active ulcerative gastrointestinal disease; bacterial endocarditis; thrombocytopenia; platelet disorders; history of haemorrhagic stroke; severe uncontrolled hypertension; and recent brain, spinal, or ophthalmological surgery. ELIQUIS administration should be discontinued if severe haemorrhage occurs (see KNOWN SYMPTOMS OF OVERDOSAGE AND PARTICULARS OF ITS TREATMENT). In the event of haemorrhagic complications, treatment must be discontinued and the source of bleeding investigated. The initiation of appropriate treatment, e.g., surgical haemostasis or the transfusion of fresh frozen plasma, should be considered. If life-threatening bleeding cannot be controlled by the above measures, administration of recombinant factor VIIa may be considered. However, there is currently no experience with the use of recombinant factor VIIa in individuals receiving ELIQUIS. Standard anticoagulation tests cannot be used to monitor ELIQUIS (see INTERACTIONS). **There is no reversal medication for ELIQUIS. Temporary discontinuation of ELIQUIS:** Discontinue ELIQUIS, in the presence of active bleeding, elective surgery, or invasive procedures that place patients at an increased risk of haemorrhage. Restart ELIQUIS therapy 12 - 24 hours after the danger of haemorrhage has ceased. **Renal impairment:** ***Prevention of VTE: elective hip or knee replacement surgery:*** Because there is limited clinical experience in patients with creatinine clearance < 15 ml/min and there are no data in patients undergoing dialysis, ELIQUIS is not recommended in these patients. ***Prevention of stroke and systemic embolism: NVAF:*** ELIQUIS has not been studied in patients undergoing dialysis and is not recommended in these patients. **Hepatic impairment:** ELIQUIS is not recommended in patients with severe hepatic impairment. ELIQUIS may be used with caution in patients with mild or moderate hepatic impairment (Child Pugh A or B). **Interaction with inhibitors of both Cytochrome P450 3A4 (CYP3A4) and P-glycoprotein (P-gp):** ELIQUIS can be administered with caution in patients receiving concomitant systemic treatment with strong inhibitors of both Cytochrome P450 3A4 (CYP3A4) and P-glycoprotein (P-gp). These medicines may increase ELIQUIS exposure by 2-fold. **Interaction with inducers of both CYP3A4 and P-gp:** The concomitant use of ELIQUIS with strong CYP3A4 and P-gp inducers (e.g., rifampicin, phenytoin, carbamazepine, phenobarbitone or St. John's Wort) may lead to a ~50 % reduction in apixaban exposure. Use caution when coadministering ELIQUIS with strong inducers of both CYP3A4 and P-gp. **Interaction with other medicines affecting haemostasis:** The concomitant use of ELIQUIS with antiplatelet medicines increases the risk of bleeding. **Other platelet aggregation inhibitors or other antithrombotic medicines are not recommended concomitantly with ELIQUIS following surgery.** In patients with atrial fibrillation and a condition that warrants chronic use of aspirin, ELIQUIS may be used with due regard to increased risk of major bleeding. **Spinal/epidural anaesthesia or puncture: Prevention of VTE: elective hip or knee replacement surgery:** When neuraxial anaesthesia (spinal/epidural anaesthesia) or spinal/epidural puncture is employed, patients treated with antithrombotic medicines, such as ELIQUIS, for prevention of thromboembolic complications are at risk of developing an epidural or spinal haematoma which can result in long-term or permanent paralysis. The risk of these events may be increased by the post-operative use of indwelling epidural catheters or the concomitant use of medicines affecting haemostasis. When an indwelling epidural or intrathecal catheter is planned, ELIQUIS should be stopped 48 hours beforehand. Indwelling epidural or intrathecal catheters must be removed at least 6 hours prior to the first dose of ELIQUIS. The risk may also be increased by traumatic or repeated epidural or spinal puncture. Patients are to be frequently monitored for signs and symptoms of neurological impairment (e.g., numbness or weakness of the legs, bowel or bladder dysfunction). If neurological compromise is noted, urgent diagnosis and treatment is necessary. Prior to neuraxial intervention, the medical practitioner should consider the potential benefit versus the risk in anticoagulated patients or in patients to be anticoagulated for thromboprophylaxis. **Hip fracture surgery:** Safety and efficacy has not been established hence, ELIQUIS is not recommended. **Paediatric use:** The efficacy and safety of ELIQUIS in children below age 18 have not been established. **Effects on ability to drive and to use machines:** ELIQUIS has no or negligible influence on the ability to drive and use machines. **Lactose intolerance:** As ELIQUIS contains lactose, patients with the rare hereditary conditions of galactose intolerance e.g. galactosaemia, Lapp lactase deficiency, glucose-galactose malabsorption or fructose intolerance should not take ELIQUIS. Lactose may also have an effect on the glycaemic control of patients with diabetes mellitus. **INTERACTIONS: Effect of other medicines on ELIQUIS: Inhibitors of CYP3A4 and P-gp:** Coadministration of ELIQUIS with ketoconazole (400 mg once a day), a strong inhibitor of both CYP3A4 and P-gp, led to a 2-fold increase in mean ELIQUI S AUC and a 1,6-fold increase in mean apixaban C_{max}. The dose of ELIQUIS must not exceed 2,5 mg twice daily when used with these medicines. Active substances that are not considered strong inhibitors of both CYP3A4 and P-gp (e.g., diltiazem, naproxen, amiodarone, verapamil, quinidine) are expected to increase apixaban plasma concentration to a lesser extent. No dose adjustment for ELIQUIS is required when coadministered with less potent inhibitors of CYP3A4 and/or P-gp. **Inducers of CYP3A4 and P-gp:** Coadministration of ELIQUIS with rifampicin, and with other strong CYP3A4 and P-gp inducers (e.g., phenytoin, carbamazepine, phenobarbitone or St. John's Wort) may also lead to reduced ELIQUIS plasma concentrations. No dose adjustment for ELIQUIS is required during concomitant therapy with such agents, however strong inducers of both CYP3A4 and P-gp should be coadministered with caution. **Anticoagulants, platelet aggregation inhibitors, and NSAIDs:** After combined administration of enoxaparin (40 mg single dose) with ELIQUIS (5 mg single dose), an additive effect on anti-FXa activity was observed. Pharmacokinetic or pharmacodynamic interactions were not evident in healthy subjects when ELIQUIS was coadministered with aspirin 325 mg once a day. ELIQUIS coadministered with clopidogrel, ticagrelor or other antiplatelet medicines, except aspirin, are not recommended due to the resulting associated increased risk of major bleeds. Naproxen (500 mg), an inhibitor of P-gp, led to a 1,5-fold and 1,6-fold increase in mean ELIQUIS AUC and C_{max}, in healthy subjects, respectively. Corresponding increases in clotting tests were observed for ELIQUIS. No clinically relevant prolongation of bleeding time was observed after concomitant administration of ELIQUIS and naproxen. ELIQUIS should be used with caution when coadministered with NSAIDs (including aspirin) because these medicinal products typically increase the bleeding risk. Medicines associated with serious bleeding are not recommended concomitantly with ELIQUIS, such as: unfractionated heparins and heparin derivatives (including low molecular weight heparins (LMWH)), FXa inhibiting oligosaccharides (e.g.fondaparinux), direct thrombin II inhibitors (e.g., desirudin), thrombolytic agents, GPIIb/IIIa receptor antagonists, dipyridamole, dextran, sulfinpyrazone, vitamin K antagonists, and other oral anticoagulants. It should be noted that unfractionated heparin can be administered at doses necessary to maintain a patent central venous or arterial catheter. **Other concomitant therapies:** No clinically significant pharmacokinetic or pharmacodynamic interactions were observed when ELIQUIS was coadministered with atenolol or famotidine. Coadministration of ELIQUIS 10 mg with atenolol 100 mg did not have a clinically relevant effect on the pharmacokinetics of ELIQUIS. Following administration of the two medicines together, mean ELIQUIS AUC and C_{max} were 15 % and 18 % lower than when administered alone. The administration of ELIQUIS 10 mg with famotidine 40 mg had no effect on ELIQUIS AUC or C_{max}. Clotting tests (e.g., PT, INR, and aPTT) are affected as expected by the mechanism of action of ELIQUIS (see PHARMACOLOGICAL ACTION, Pharmacodynamic properties, Mechanism of action). Changes observed in these clotting tests at the expected therapeutic dose are small and subject to a high degree of variability (see PHARMACOLOGICAL ACTION, Pharmacodynamic properties). These parameters should not be used to monitor ELIQUIS therapy. **Paediatric population:** Interaction studies have only been performed in adults. **Effect of ELIQUIS on other medicines:** *In vitro* ELIQUIS studies showed no inhibitory effect on the activity of CYP1A2, CYP2A6, CYP2B6, CYP2C8, CYP2C9, CYP2D6 or CYP3A4 (IC50 > 45 µM) and weak inhibitory effect on the activity of CYP2C19 (IC50 > 20 µM) at concentrations that are significantly greater than peak plasma concentrations observed in patients. ELIQUIS did not induce CYP1A2, CYP2B6, CYP3A4/5 at a concentration up to 20 µM. Therefore, ELIQUIS is not expected to alter the metabolic clearance of coadministered medicines that are metabolised by these enzymes. ELIQUIS is not a significant inhibitor of P-gp. In studies conducted in healthy subjects, ELIQUIS did not meaningfully alter the pharmacokinetics of digoxin, naproxen, or atenolol. **PREGNANCY AND LACTATION:** Safety has not been established and ELIQUIS is not recommended. **DOSAGE AND DIRECTIONS FOR USE:** ELIQUIS can be taken with or without food. If a dose is missed, the patient should take ELIQUIS immediately and then continue with twice daily administration as before. **Recommended dosage:** ***Prevention of VTE: elective hip or knee replacement surgery:*** The recommended dose of ELIQUIS is 2,5 mg taken orally twice daily. The initial dose should be taken 12 to 24 hours after surgery. In patients undergoing hip replacement surgery, the recommended duration of treatment is 32 to 38 days. In patients undergoing knee replacement surgery, the recommended duration of treatment is 10 to 14 days. ***Prevention of stroke and systemic embolism: NVAF:*** The recommended dose of ELIQUIS is 5 mg taken orally twice daily. *Age, body weight, serum creatinine:* In patients with at least 2 of the following characteristics, age ≥ 80 years, body weight ≤ 60 kg, or serum creatinine ≥ 1,5 mg/dL (133 micromol/l), the recommended dose of ELIQUIS is 2,5 mg twice daily. **Renal impairment:** ***Prevention of VTE: elective hip or knee replacement surgery:*** In surgical patients no dose adjustment is necessary in patients with mild, moderate or severe (creatinine clearance 15 – 29 ml/min) renal impairment. Because there is limited clinical experience in patients with creatinine clearance < 15 ml/min and there are no data in patients undergoing dialysis, ELIQUIS is not recommended in these patients. ***Prevention of stroke and systemic embolism: NVAF:*** In patients with AF no dose adjustment is recommended in patients with creatinine clearance 15 to 29 ml/min, except as described under DOSAGE AND DIRECTIONS FOR USE, Prevention of stroke and systemic embolism: NVAF. Because there is no clinical experience in patients with creatinine clearance < 15 ml/min, a dosing recommendation cannot be provided. There are no data in patients undergoing dialysis, therefore, ELIQUIS is not recommended in these patients. **Hepatic impairment:** ELIQUIS may be used with caution in patients with mild or moderate hepatic impairment (Child Pugh A or B). No dose adjustment is required in patients with mild or moderate hepatic impairment. ELIQUIS is not recommended in patients with severe hepatic impairment (see WARNINGS AND SPECIAL PRECAUTIONS, Hepatic impairment and PHARMACOLOGICAL ACTION, Pharmacokinetic properties, Hepatic impairment). **Body weight:** ***Prevention of VTE: elective hip or knee replacement surgery:*** No dose adjustment required. ***Prevention of stroke and systemic embolism: NVAF:*** See DOSAGE AND DIRECTIONS FOR USE, Prevention of stroke and systemic embolism: NVAF. **Paediatric and adolescent:** The efficacy and safety of ELIQUIS in children below age 18 have not been established. No data are available. **Elderly:** ***Prevention of VTE: elective hip or knee replacement surgery:*** No dose adjustment required. ***Prevention of stroke and systemic embolism: NVAF:*** See DOSAGE AND DIRECTIONS FOR USE, Prevention of stroke and systemic embolism: NVAF. **Converting from or to parenteral anticoagulants:** In general, switching treatment from parenteral anticoagulants to ELIQUIS (and vice versa) can be done at the next scheduled dose. **Converting from or to warfarin or other vitamin K antagonists (VKA):** When converting patients from warfarin or other VKA therapy to ELIQUIS, discontinue warfarin or other VKA therapy and start ELIQUIS when the INR is below 2,0. When converting from ELIQUIS to warfarin or other VKA therapy, continue ELIQUIS for 48 hours after the first dose of warfarin or other VKA therapy. **Surgery and invasive procedures:** ELIQUIS should be discontinued 2 to 3 days prior to elective surgery or invasive procedures such as neuraxial regional anaesthesia. If surgery or invasive procedures cannot be delayed, exercise appropriate caution taking into consideration an increased risk of bleeding. This risk of bleeding should be weighed against the urgency of intervention. **SIDE EFFECTS: Clinical experience: Prevention of VTE: elective hip or knee replacement surgery:** Common adverse reactions were anaemia, haemorrhage, contusion, and nausea. The use of ELIQUIS may be associated with an increased risk of occult or overt bleeding from any tissue or organ. **Common treatment-emergent adverse reactions in post-surgery orthopaedic patients:** ***Blood and lymphatic system disorders:*** Anaemia (including postoperative and haemorrhagic anaemia, and respective laboratory parameters). ***Vascular disorders:*** Haemorrhage (including haematoma, and vaginal and urethral haemorrhage). ***Gastrointestinal disorders:*** Nausea. ***Injury, poisoning and procedural complications:*** Contusion. **Common treatment-emergent adverse reactions in NVAF patients:** ***Eye disorders:*** Eye haemorrhage (including conjunctival haemorrhage). ***Vascular disorders:*** Other haemorrhage, haematoma. ***Respiratory, thoracic and mediastinal disorders:*** Epistaxis. ***Gastrointestinal disorders:*** Gastrointestinal haemorrhage (including haematemesis and melaena), rectal haemorrhage, gingival bleeding. ***Renal and urinary disorders:*** Haematuria. ***Injury, poisoning and procedural complications:*** Contusion. **KNOWN SYMPTOMS OF OVERDOSAGE AND PARTICULARS OF ITS TREATMENT:** There is no antidote to ELIQUIS. Overdose of ELIQUIS may result in a higher risk of bleeding. Treatment should be symptomatic and supportive. **NAME AND BUSINESS ADDRESS OF THE HOLDER OF THE CERTIFICATE OF REGISTRATION:** Pfizer Laboratories (Pty) Ltd. Reg. No.: 1954/000781/07. 85 Bute Lane, Sandton, 2196, South Africa. Tel. No.: 0860 PFIZER (734937). PI Ref.: 20/03/2018. **BOTSWANA:** S2 **ELIQUIS®** 2,5 mg, Reg. No.: BOT 1402582C (60's); S2 **ELIQUIS®** 5 mg, Reg. No.: BOT 1402583D (60's). **NAMIBIA:** S2 **ELIQUIS®** 2,5 mg, Reg. No.: 13/8.2/0212; S2 **ELIQUIS®** 5 mg, Reg. No.: 13/8.2/0213. **ZIMBABWE:** PP10 **ELIQUIS®** 2,5 mg, Reg. No.: 2014/10.2/4896; PP10 **ELIQUIS®** 5 mg, Reg. No.: 2014/10.2/4897. Please refer to detailed package insert for complete prescribing information. PP-ELI-ZAF-0272.

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A case series of delayed presentation intra-cardiac trauma in the Eastern Cape

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Background: In certain situations a stab into the heart with intra-cardiac injury is not noticed initially and the patient may present at a later stage in cardiac failure. We present 3 cases with this scenario.

Objectives: Review at our institution, from 2018 - 2021, the clinical characteristics of 3 cases of a stab into the heart that later presented in cardiac failure due to intra-cardiac injury.

Method: We describe the clinical presentation, echocardiographic findings and surgical management of these patients.

Results: **Case 1:** 46-year-old male presented 2 weeks after a stab into the chest with pulmonary oedema, infective endocarditis, severe MR and large muscular VSD, which was treated conservatively. As the patient was in decompensated heart failure, emergent surgery was conducted and the muscular VSD was repaired via the right ventricular outflow tract stab site and a mitral valve replacement was done via the left atrial groove.

Case 2: 41-year-old male presented 8 weeks after a stab into the chest with congestive cardiac failure due to a large subaortic VSD and severe mitral regurgitation due to perforation of the anterior mitral valve leaflet. Elective surgery was performed on cardio-pulmonary bypass and the mitral valve was repaired via the left atrial groove and the VSD was repaired with a patch via an oblique aortotomy through the aortic valve.

Case 3: 30-year-old female presented 12 weeks after a stab into the left precordium in cardiac failure with NYHA II secondary to a large subaortic VSD and shortness of breath due to a large left apical haemothorax. Elective surgery was performed on cardio-pulmonary bypass and the VSD was repaired via the right ventricular outflow-tract false aneurysm and RVOT patch repair.

Conclusion: Delayed presentation of initially missed intra-cardiac stab wounds is uncommon. It may present at varied time intervals depending on the degree and location of the injury, in addition to the presence of infective endocarditis and the size of the intra-cardiac shunt.

A case series of cardiac hydatid disease in the Eastern Cape

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Background: Cardiac hydatid disease is a rare presentation of *Echinococcus granulosus* infestation in humans. The presentation varies in the literature from incidental finding on imaging through to acute decompensation due to intracardiac rupture of the hydatid cyst.

Objectives: Review of the clinical and imaging characteristics of three cases of cardiac hydatid disease presenting to the cardiothoracic service in the Eastern Cape.

Method: We describe the clinical presentation, echocardiographic and radiologic findings, and the surgical management of these patients.

Results: **Case 1:** 4-year-old male presented to one of our peripheral hospitals with acute haemodynamic decompensation and neurological deterioration, with echocardiographic features of a left ventricular hydatid cyst. The patient was to be transferred to the cardiothoracic service on an emergent basis; however, he acutely deteriorated with anaphylactic shock and died while in the care of the peripheral hospital.

Case 2: 22-year-old female with systemic lupus erythematosus presented with an incidental finding of a pericardial opacity on routine chest radiography. Echocardiographic and CT scan features suggested a pericardial cyst adhering to the right ventricle. Surgery identified a right ventricular epicardial hydatid. On cardio-pulmonary bypass the hydatid cyst was excised, and the cavity was removed.

Case 3: 20-year-old female presented with ventricular arrhythmias, with echocardiographic features of a cystic lesion in the left ventricular free wall. The patient had urgent surgical intervention on cardio-pulmonary bypass, with the heart arrested. The LV hydatid was excised and the fibrous capsule was removed, as in the previous case.

Conclusion: Cardiac hydatid disease is rare and the presentation varies depending on size, location and complications of the cyst. Rupture of a myocardial hydatid cyst has catastrophic consequences, with anaphylactic shock and embolisation. Epicardial cysts may rupture and cause tamponade, while those that impinge on the cardiac conduction pathways can cause arrythmias.

A public–private partnership providing heart valve surgical services in the North-West Province of South Africa: A case study

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Background: Only 15% of the 3.8 million people in the North-West Province have medical aid cover and public patients needing heart valve surgery receive cardiac surgical services in the public facilities in Gauteng.
Objectives: Our case report aims to provide new knowledge on the various aspects of the delivery of heart valve surgical services in a context of public–private collaboration.
Method: This study describes the steps taken to implement a heart valve surgery service through public–private collaboration. It reviews the cost of conducting heart valve surgery in a public–private partnership set up in the North-West Province. It uses negotiated pricing for the various aspects of valve surgery. The model identified several areas in the private sector where the cost could be reduced to maximise output on a limited budget.
Results: There are multiple service providers that support cardiac surgical services in the private sector. The model reduced the cost of heart valve surgery by about 63% of its cost in the private sector. The cost reduction was achieved by public sector contribution to the service and negotiated capitated rates for private sector contribution. While private sector costing can be quantified by the rates charged by the various providers, the overall cost of the public sector contribution is difficult to quantify because of the multiple public service systems that operate to provide the service. Our model was also shown to promote a range of developments in clinical service delivery, accessing potential education and training platforms and developing research and innovation.
Conclusion: There is potential to develop cost-effective partnerships for heart valve surgery with the implementation of models for cost sharing in a public–private collaboration. There is a need to develop more intensive management systems to give direction to and control of the various aspects of the public–private partnership system.

The role of echocardiography training in the cardiothoracic surgical practice

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Background: Echocardiography is the strength of the cardiology service. However, skills in echocardiography are essential for the screening and clinical management of traumatic cardiac injury. A cardiothoracic service with surgeons trained in echocardiography may be advantageous for the diagnosis and management of cardiothoracic trauma and postcardiac surgery ICU care.
Objectives: Review the impact and role of echocardiography training in the management of cardiothoracic trauma and post cardiac surgery ICU care at the Livingstone/PE Provincial Hospital Cardiothoracic Unit in the Eastern Cape.
Method: We retrospectively reviewed the changes in clinical practice achieved by echocardiography training of cardiothoracic medical officers in the cardiothoracic surgical service.
Results: We provided hands-on training in echocardiography for cardiothoracic medical officers in trans-thoracic and trans-oesophageal echo-cardiography. As part of the hands-on training, they needed to undertake pre-operative and post-operative echocardiography under the guidance of a trained echocardiographer for one year. We retrospectively evaluated the changes in clinical practice before and after the training period with regard to diagnostic work-up of patients in the trauma and non-trauma settings of the cardiothoracic service. Before the training period, medical officers were not confident in making a diagnosis of pericardial effusion post trauma. After the training period, patient evaluation in the chest trauma setting routinely received a FAST-echocardiogram by the medical officers and the diagnosis of haemorrhagic effusions post stab to the chest were made timeously for appropriate surgical interventions. The impact of this training in the cardiothoracic ICU setting was protocol-driven echocardiographic assessments in the immediate post-operative period for the evaluation of haemodynamic disturbances, with appropriate ICU management being instituted.
Conclusion: Echocardiography is essential for providing cardiothoracic surgical services. Echocardiography training for the cardiothoracic surgeon is important for the early diagnosis and management of traumatic cardiac injury and post-cardiotomy ICU management, and should form part of the formal cardiothoracic registrar training curriculum.

Impact of the COVID-19 pandemic on acute coronary syndrome patients admitted to an urban academic hospital in Soweto, South Africa

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Background: Recent data from the developed world across Europe and North America reveals a concerning decline in the number of acute coronary syndrome (ACS) and percutaneous coronary intervention (PCI) procedures during the COVID-19 pandemic. We suspected a similar trend in Chris Hani Baragwanath Academic Hospital (CHBAH).

Objectives: To evaluate the impact of the COVID-19 pandemic on ACS patients admitted to the cardiac care unit (CCU) at CHBAH.

Method: A retrospective, observational analysis was done to evaluate all patients with ACS admitted to CCU at CHBAH in the pre-COVID-19 era (November 2019 - March 2020) and during the COVID-19 period (April 2020 - August 2020).

Results: The study comprised 182 patients with a mean age of 57.9 (10.9) years (22.5% females). We noted reduction in numbers of ACS admissions and percutaneous coronary intervention (PCI) procedures during COVID-19. These reductions were not statistically significant compared to the pre-COVID period (p>0.05). During pre-COVID-19, ST-elevation myocardial infarction (STEMI) was 42.99% (46), non-ST elevation myocardial infarction (NSTEMI) was 39.25% (42), and unstable angina (UA) was 18.52% (20). In the COVID-19 period, STEMI was 50% (37), NSTEMI was 43.24% (32), and unstable angina was 6.76% (5), with 95% CI 7% (2.1% - 6.7%, p=0.32) and 95% CI 4% (9.6% -17.6%, p=0.56) for STEMI and NSTEMI, respectively. A minority of the patients with STEMI received thrombolysis during the pre- and post-COVID-19 period (30.4% vs. 37.8%, p=0.47). The number of PCI done in the pre-COVID-19 period was 78.7% (85) compared to 72.97% (54) in the COVID-19 period (p=0.371). There was a trend towards lower left ventricular ejection fraction (48.6% (36) vs. 34.2% (37), p=0.05), higher heart block (5.4% (4) vs. 0.9% (1), p=0.06) during the COVID-19 period compared to the pre-COVID-19 period. In contrast, more arrhythmias were noted in the pre-COVID-19 period compared to the COVID-19 period (8.3% (9) vs. 0%, p=0.011).

Conclusion: There was no difference in ACS admissions during the COVID-19 and non-COVID-19 periods. During both periods only a third of patients with STEMI received fibrinolysis and no difference in PCI was noted.

Exploring the mechanism responsible for afterload mismatch in severe aortic stenosis

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Background: Afterload mismatch (AM) in aortic stenosis (AS) is defined as severe aortic stenosis with high transvalvular gradients but low ejection fraction (EF). The high transvalvular gradient implies some preservation of systolic function despite the low EF. The mechanism behind the diminished EF is controversial. To assess the mechanism responsible for AM, loading factor independent measures of the determinants of EF (preload, afterload and contractility) are needed. Pressure volume loops (PVLs) allow for detailed assessment of cardiac haemodynamics. The current mechanistic research is a first in African implementation of PVL loops in clinical practice – to better characterise cardiac haemodynamics.

Objectives: A detailed loading factor independent assessment of the various determinants of EF, to define the process that correlates best with diminished EF in afterload mismatch.

Method: A prospective comparative analysis of haemodynamic parameters of 10 patients with severe AS and preserved EF vs. 10 patients with severe AS and reduced EF. Each patient received a detailed haemodynamic assessment with invasive PVL recording. Loading factor independent determinants of EF are compared with measured EF, as well as between the 2 study groups.

Results: An interim analysis of the first 7 cases allowed for accurate collection and graphic depiction of these novel data, including loading factor independent determinants of contractility (End Systolic Pressure – Volume Relationship; Preload Recruitable Stroke Work; Starling Contractile Index).

Conclusion: Implementation of PVL is a novel technology in the South African clinical domain that is currently being used successfully to assess the mechanism responsible for AM. This preliminary report is proof that PVL can be used by clinicians outside of laboratory-based research in the South African healthcare sector.

Demographic, clinical, electrocardiographic and echocardiographic characteristics of patients hospitalised with COVID-19 and cardiac disease at a tertiary hospital in South Africa

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Background: Coronavirus disease (COVID-19) is associated with high morbidity and mortality in patients with cardiovascular disease. There is a paucity of data regarding COVID-19 and cardiac disease in Africa.

Objectives: To describe the demographic, clinical, electrocardiographic and echocardiographic characteristics of patients with COVID-19 and cardiac disease at a tertiary hospital in South Africa.

Method: This was a retrospective, cross-sectional, descriptive study (August 2020 - March 2021) of 200 patients with COVID-19 and confirmed cardiac disease, conducted at Chris Hani Baragwanath Hospital. Demographic, clinical, electrocardiographic and echocardiographic characteristics of patients with COVID-19 and cardiac disease were collected.

Results: Most (86%) patients were Africans, with a mean age of 56.4 ± 15.6 years (57.5% females). Fifty-three percent were unemployed and 28% were pensioners. Main comorbidities were hypertension (69.5%), diabetes mellitus (31.5%) and HIV (22.5%). Most patients were overweight or obese (65.5%). Dyspnea on admission was noted in 88.5% of patients. Seventy-nine percent of patients had an abnormal chest x-ray. An often-noted electrocardiography finding was sinus tachycardia (63%), with atrial fibrillation noted in 7% of patients. The most common indication for echocardiography was heart failure (30%). Severe left ventricular dysfunction was noted in 21.5%. Features of pulmonary hypertension were present in 45.5%. The right ventricle was enlarged in 59% of patients, and functional tricuspid regurgitation was noted in 54.5%. The commonest diagnoses were hypertensive heart disease with preserved ejection fraction (35.8%), cardiomyopathies (20%), Cor-pulmonale (15.7%), acute coronary syndrome (6.5%), infective endocarditis (5.5%) and valvular heart disease (2.5%). Echocardiography changed or modified management in 53% of cases. An in-hospital mortality of 17.5% was noted. On multivariate logistic regression analysis, sinus tachycardia was the most important independent predictor of mortality (OR 2.52, 95% CI 1.08 - 5.85, p=0.03).

Conclusion: Most of the patients were female with multiple co-morbidities, and cardiac abnormalities were common. Mortality among patients hospitalised with cardiac disease and COVID-19 was high.

Clinical profile and outcomes of young patients treated with implantable cardioverter defibrillators at a South African tertiary hospital: A review of two decades of implantable cardioverter defibrillator implantation and follow-up

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Background: In young patients, without atherosclerosis coronary artery disease, the aetiology of SCD has been described in Europe and North America. However, there are important regional variations and limited data on the aetiology and outcome of SCD in South Africa.

Objectives: To determine the clinical profile and outcomes of young patients treated with implantable cardioverter defibrillators at a South African tertiary hospital.

Method: This study was designed as a retrospective review of patients aged ≤35 years implanted with ICDs at Groote Schuur Hospital from 1 January 1998 - 31 December 2020.

Results: Thirty-eight patients younger than 35 years were implanted with ICDs. The mean (SD) age at ICD implantation was 25.1 (7.6) years, and 63.2% were male. A secondary prevention ICD was implanted in 57.9% of the patient population, and primary prevention in the remaining 42.1%. Patients with secondary prevention ICDs presented with VT (59.1%), VF (31.8%) and CPR (9.1%). ARVC was the leading cause of SCD in the secondary prevention patient population (36.4%), followed by repaired congenital heart disease (22.7%). Idiopathic dilated cardiomyopathy accounted for 50% of the primary prevention patient population. After a median (IQR) follow up of 32 (14 - 90) months, 7.9% died and 5.2% received a heart transplant. Of the study population, 42.1% received appropriate ICD shock therapies, and 18.4% received inappropriate shock therapies. There was no mortality difference between the patients that received primary prevention ICD and those that received secondary prevention ICD, 6.3% vs. 9.1%, log rank p value = 0.87.

Conclusion: In this single centre study from South Africa, ARVC and repaired congenital heart disease are the leading causes of SCD patients younger than 35 years treated with secondary prevention ICDs. Primary prevention ICDs are often implanted for idiopathic dilated cardiomyopathy.

Profile, presentation and outcomes of prosthetic valve endocarditis in a South African tertiary hospital: Insights from the Groote Schuur Hospital Infective Endocarditis Registry

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Background: The clinical patient profile and outcomes of patients with prosthetic valve endocarditis in South Africa are unknown.

Objectives: To determine the profile and outcomes of PVE in a South African tertiary unit.

Method: Prospective observational study of patients assessed at Groote Schuur Hospital with definitive or probably infective endocarditis from 1 January 2017 - 31 December 2019.

Results: One hundred and thirty-five patients received a diagnosis of possible and definitive IE. Of these, 18 patients had PVE and 117 patients had NVE. Therefore, PVE accounted for 13.3% of the overall IE cohort. PVE patients had a mean (SD) age of 39.1 (14.6) years, and 56.6% were male. PVE occurred within 1 year of valve surgery in 50% and the Duke's modified diagnostic criteria for definitive IE was met in 94.4% of the PVE cohort. Prosthetic valves in the aortic position were affected in isolation or in combination with prostheses in the mitral area in 66.7%. Furthermore, tissue prosthetic valves were affected in 61.1% of the PVE cases. Of the PVE cases, 55.6% were healthcare-associated. On transthoracic echocardiography, vegetations (61.1%), prosthetic valve regurgitation (44.4%) and abscess (22.2%) were discovered. *Staphylococcus* species and *Streptococcus* species accounted for 38.8% and 22.2% of PVE cases, respectively. Of the cases, 27.8% were blood culture negative. Valve surgery was performed in 38.7% of PVE patients. Of the PVE patients, 55.6% died during the index hospitalisation. The secondary analysis indicated that the PVE patients were sicker, with more septic shock and heart block than the NVE patients, 22.2% vs. 7% p=0.02 and 27.8% vs. 12% p=0.04, respectively. In addition, in-hospital mortality was higher in PVE patients than in NVE patients, 55.6% vs. 31.6% p=0.04.

Conclusion: Although PVE is uncommon, it affects younger patients and has high morbidity and mortality.

Echocardiographic and clinical correlation in children with dilated cardiomyopathy in central South Africa

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Background: Paediatric dilated cardiomyopathy (DCM) is the most common form of cardiomyopathy in African children, a major cause of morbidity and mortality, and a common indication for heart transplantation.

Objectives: To profile the echocardiographic and clinical characteristics of children presenting with dilated cardiomyopathy in central South Africa (CSA).

Method: A prospective, descriptive study, including a study group and a control group that is age and gender matched, was conducted in CSA. Routine echocardiographic and clinical tests were performed. Paired data were obtained after 3 months. In selected patients, endomyocardial biopsy was performed.

Results: Twelve cases of children aged 6 months to 14 years were recruited, with a median age of 9.5 years. DCM prevalence was higher in females (83%) compared to males (17%). The echocardiographic investigations demonstrated dilated left ventricles (LV) (median LV Z-score = 3.7) with predominant impaired systolic function, which correlated with impaired clinical parameters. Endomyocardial biopsies indicated the possibility of genetic disease in 3 patients.

Conclusion: DCM children in CSA presented at a median age of 9.5 years. Patients with signs of heart failure had a high Ross score and a reduced 6-minute walk distance. A good correlation was demonstrated between simple clinical heart failure measurement tools and echocardiographic systolic function.

Evaluation of aortic wall strength in HIV-associated thoracic aortic aneurysm

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Background: HIV-associated aortopathy is associated with considerable morbidity and mortality. Its pathophysiology has been under-investigated. Aortic wall strength in HIV thoracic aortic aneurysm (TAA) has not been investigated.
Objectives: To determine whether there are differences in tensile strengths of diseased and non-diseased aortic walls in patients with confirmed HIV-associated TAA.
Method: This was a prospective sub-study conducted at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) and Chris Hani Baragwanath Academic Hospitals (CHBAH) (2019 - 2020) of patients with HIV-associated TAA who underwent surgery as part of their routine management. All patients underwent review and detailed echocardiography at CHBAH by an experienced cardiologist prior to referral to CMJAH for surgery. We compared aortic wall strength in aneurysmal and non-aneurysmal aortic tissue in TAA with regard to hydroxyproline concentration and reviewed the histology. These data were analysed to identify potential relations with aortic aneurysm formation and the mechanical properties of the aortic wall.
Results: The study included 12 patients (75% females, mean age of 47 ± 15 years and all African ethnicity). They were all HIV reactive on HAART and were virally suppressed. Ninety-one percent had severe aortic regurgitation with mean ascending aortic size of 60mm and preserved ejection fraction. A common operative procedure was a composite graft. A total of 33 samples were investigated (14 abnormal, 13 seemingly normal aortic tissue, and 6 aortic leaflets). Average hydroxyproline concentration of dry tissue was 20.21884µg/mg for abnormal aortic tissue, 21.20797µg/mg for seemingly normal tissue, and 17.79534 µg/mg for aortic valve leaflets. Histology showed fragmentation of elastin fibres in 50% of the cases.
Conclusion: No change in collagen quantity in the aneurysmal and non-aneurysmal aortic tissue was noted in TAA. However, most of the aneurysmal tissue had fragmentation of elastin fibres on histology.

The establishment of a retrospective registry of patients presenting with cardiac arrhythmia at a tertiary academic hospital in South Africa

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Background: Cardiac electrophysiology (EP) is a growing field worldwide. Data from international registries have described the clinical characteristics, prevalence, success and complication rates of EP procedures. Minimal similar data are available for South Africa. Tygerberg hospital (TBH) is a tertiary hospital serving around 2.4 million people.
Objective: The aim of this registry is to describe clinical characteristics, prevalence, success and complication rates of EP procedures during the first year of a newly established service at TBH.
Methods: A retrospective study was undertaken on adult patients referred to the TBH EP service in 2019. After obtaining ethical approval from the University of Stellenbosch, data from 84 patients referred to the EP service were screened and 73 patients with tachyarrhythmias were included. Data at initial and first follow-up visit were analysed.
Results: The mean age was 49.5 ± 14.4 years, and 53% were males. Thirteen patients were treated medically and 60 were offered EP study (EPS) ± ablation. Three patients declined intervention. Of the 57 patients undergoing EPS, 8 had diagnostic studies only, and 49 underwent ablation. Twenty-one (38.9%) had atrial flutter (AFL) and 29 (53.7%) patients had supraventricular tachycardia (SVT) – of which 13 (24.1%) had atrio-ventricular nodal re-entry tachycardia, 15 (27.8%) had atrio-ventricular re-entry tachycardia (one had both), and 2 (3.7%) had atrial tachycardia. One patient (2.0%) had ventricular tachycardia. Two (3.7%) patients had atrioventricular-nodal ablation for atrial fibrillation. The overall procedural success rate was 95.9%. One patient had a complication (left atrial thrombus post procedure).
Conclusion: Our study showed that referral for tertiary arrhythmia management was infrequent, with 73 patients referred in 2019. The most common arrhythmia was SVT, followed by AFL. Ablation procedures were safe and effective. Reasons for the low referral are likely to be multifactorial, including lack of awareness on the part of patients and physicians, as well as logistical aspects.

A rare case of truncus arteriosus with agenesis of the right pulmonary artery with small MAPCAs supplying the right lung: A case report

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Background: Persistent truncus arteriosus is one of the rarer congenital heart defects (CHD) and occurs in fewer than 1% of all CHDs. In the Van Praagh's type A3 sub-type, the truncal vessel gives rise to a single pulmonary artery (PA), commonly the RPA, while the contralateral lung is perfused.
Objectives: We present a rare case of truncus arteriosus with the unilateral LPA, left-sided aortic arch and a small MAPCA supplying the right lung.
Method: A retrospective review of all patients' hospital records.
Results: A 3-month-old female infant presented with cyanosis at birth. She also had a rectovaginal fistula. A baby gram showed mesocardia and decreased pulmonary vascular markings on the right lung. A cardiac diagnosis of truncus arteriosus was made based on 2D echocardiography. Furthermore, the truncal vessel gave rise to the LPA, while the RPA could not be visualised. There was 60% truncal override, a 6mm perimembranous ventricular septal defect (VSD), a mildly regurgitant tri-leaflet truncal valve, left-sided aortic arch with no coarctation, normal ejection fraction of 78%, and no PDA. Following a chest CT angiogram, the diagnosis of Van Praagh type A3 truncus arteriosus (truncus arteriosus with agenesis of the RPA with a small MAPCA supplying the right lung) was made. A diagnostic cardiac catheterisation was done to further delineate the cardiac anatomy and the blood supply of the right lung, and to calculate the pulmonary vascular resistance and reversibility in the left lung. On further discussion with a multi-membered congenital cardiac team, the patient was considered to be inoperable.
Conclusion: In this subgroup of truncus arteriosus, a different criterion must be used to assess the feasibility of a surgical repair. Early diagnosis of these patients can lead to better care and outcomes.

Short-term outcomes of patients admitted with heart failure: Findings from a public hospital-based registry in Zimbabwe

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Background: The burden of non-communicable diseases like heart failure (HF) is on the increase in developing countries. The prognostic impact of HF in Zimbabwe is unknown.
Objectives: The aim was to describe the 90-day mortality and readmission rates of HF patients at Parirenyatwa Hospital. The objectives were to identify factors associated with mortality and to assess functional status at 30 days and 90 days after admission.
Method: This was a prospective cohort study of patients drawn from the HF registry at Parirenyatwa Hospital. Patients were followed up throughout their hospital stay and subsequently a telephone follow-up was done at 30 days and 90 days, with special interest in mortality, readmission and functional status.
Results: A total of 225 Black African patients (mean age, 54 years; 66.2% women) were enrolled between 1 July 2013 and 28 February 2014. Hypertensive heart disease was the commonest cause of HF. The in-hospital mortality rate was 12%, with 30- and 90-day mortality rates of 21.3% and 35.1% respectively. The mean duration of hospital stay was 8.1 days. Readmission rates at 30 and 90 days were 19% and 30.7% respectively. The commonest NYHA functional class at day 30 was class III (44%) and that at day 90 was class II (28%) and class III (27.6%). Patient characteristics associated with mortality were: duration of hospital stay greater than 7 days ($p<0.001$), NYHA class III and IV ($p<0.05$), presence of atrial fibrillation ($p<0.001$), and underlying rheumatic heart disease ($p<0.005$).
Conclusion: Heart failure at Parirenyatwa Hospital is associated with worse short-term outcomes than that observed in other African HF registries.

Determining the background prevalence of Parvo B19 in the myocardium of a South African cohort – A pilot study in patients undergoing open heart surgery

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Background: Parvovirus B19 (PVB19) DNA is found in the hearts of patients with acute myocarditis, dilated cardiomyopathy, and peri-partum cardiomyopathy. However, in first world countries, a high background prevalence of PVB19 has been demonstrated in the hearts of individuals without myocarditis. Consensus has therefore not been reached on the clinical significance of Parvo B19 in viral myocarditis, so affecting the treatment strategy for PVB19 in patients with myocarditis. Given the unknown background prevalence of the virus in South Africa and the high cost of targeted anti-viral therapy (intravenous immunoglobulin/IVIG), it is imperative that we determine the prevalence to guide management decisions in our resource-limited setting.
Objectives: To determine the prevalence of Parvovirus B19 (PVB19) in the myocardium of South African patients by screening patients undergoing open heart surgery.

Method: Patients undergoing elective cardiac surgery requiring cardiopulmonary bypass without evidence of myocarditis were prospectively recruited between May 2021 and July 2021. Atrial tissue excised during right atrial cannulation for venous drainage during cardiopulmonary bypass was collected and quantitative polymerase chain reaction (PCR) for PVB19 was performed on the specimens.
Results: A total of 48 patients (mean age 51, 50% female) were recruited. Twenty-nine (60%) of the patients had valvular surgery, while 19 (40%) had coronary artery bypass surgery. Eighty-five percent (41/48) of patients tested positive for PVB19.
Conclusion: The results demonstrate a high background prevalence of PVB19 in patients without myocarditis, similar to the developed world. To determine the clinical significance of PVB19 in myocarditis, further quantification of viral load is necessary to differentiate between acute viral infection and viral persistence.

The prevalence, profile and prognosis of heart failure with preserved ejection fraction: A South African tertiary hospital experience

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Background: There are limited data on heart failure with preserved ejection fraction (HFpEF) in sub-Saharan Africa. We therefore aimed to describe the prevalence, profile and outcomes of HFpEF patients admitted to a South African tertiary hospital.
Objectives: We aimed to describe the prevalence, profile and outcomes of HFpEF patients admitted to a South African tertiary hospital.
Method: We retrospectively reviewed all consecutive de novo heart failure admissions to Groote Schuur Hospital in Cape Town between January 2016 and December 2017. The socio-demographic profile, clinical characteristics and outcomes were analysed. Poor outcome was defined as death or re-admission to hospital within the first 12 months after the index diagnosis.
Results: Of the 315 admissions for de novo acute heart failure, 42 patients (13.3%) had HFpEF. This female preponderant (81.0%) cohort had a median age of 55.5 years (interquartile range (IQR) 47 - 66 years). Hypertension (85.7%), chronic kidney disease (CKD) (40.5%) and diabetes (40.5%) were common comorbidities. The most frequent electrocardiographic (ECG) abnormalities included abnormal T wave inversion (38.1%), left ventricular hypertrophy (LVH) (16.7%), and left bundle branch block (LBBB) (11.9%). Atrial fibrillation (2.4%) and atrial flutter (2.4%) were uncommon. The main echocardiographic abnormalities were concentric LVH (81.0%), left atrial enlargement (45.2%), and evidence of diastolic dysfunction (92.9%). During the first year after diagnosis, 35.7% of patients were re-admitted to hospital for heart failure and 11.9% died.
Conclusion: The prevalence of HFpEF in our population was much lower than what has been reported elsewhere. In this cohort, HFpEF mainly affected middle-aged females with hypertension, diabetes and CKD. Almost half of the cohort (47.6%) had a poor outcome during the first year after diagnosis.

Right atrial strain in a normal adult African population and its correlation with age

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Background: The right atrium (RA) is a relatively neglected chamber, and for a decade the RA was not considered essential for overall cardiac performance. RA volume has conventionally been used as a predictor of morbidity and mortality in cardiovascular diseases with right ventricular dysfunction. The RA peak longitudinal strain (RALS) values help to define RA subclinical dysfunction in several cardiovascular disorders, prior to changes in RA volumetric parameters. There is a paucity of data regarding RALS in an African population.
Objectives: To establish normal values for RA volume and strain, and its correlation with age in a sub-Saharan Black African population.
Method: This was a retrospective, cross-sectional study of 100 normal individuals (recruited as controls for another study) performed at Chris Hani Baragwanath Hospital (2017 - 2019). RA volumes were measured by biplane Simpson's method, and RA peak longitudinal strain was measured using Philips QLAB 9 (Amsterdam, The Netherlands) speckle-tracking software.
Results: Median age was 37.5 years (IQR 26 - 46), with 60% being female. The mean RA volume was 19.5 ± 5.7mL/m^2 and the mean RALS was 32.7 ± 10.5%. Males had a tendency towards higher RA volume and RALS measurements compared to females (20.8 ± 6.3mL/m^2 and 18.7 ± 5.2mL/m^2, p=0.07: 34.6 ± 9.6% and 31.4 ± 10.9%, p=0.141, respectively). There was a trend towards decreasing RALS with age (RALS had a negative correlation with age, r=-0.153 and p=0.129). Body mass index (BMI) was an independent predictor of RALS on multivariate linear regression analysis.
Conclusion: The data establish the normal reference values for RA volumes and strain in a Black population. Aging was associated with a decrease in RALS, and BMI was an independent predictor of RALS.

Differences in adipocyte morphology and gene expression in cardiac, visceral and subcutaneous fat in an experimental model of type 2 diabetes

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Background: Cardiac fat (CF) has emerged as an important player in cardiovascular health. Moreover, the importance of adipose depots rather than total fat mass in the deterioration of metabolic health is increasingly reported. Different adipose depots are acknowledged to contribute differently to the pathogenesis of metabolic diseases like type 2 diabetes (T2D) that increase cardiovascular disease risk.

Objectives: This study compares morphological and gene expression differences in CF, visceral and subcutaneous adipose depots, using an established experimental model of T2D.

Method: CF, retroperitoneal (RF) and inguinal (IF) fat, representing visceral and subcutaneous fat respectively, were collected from 18-week-old male db/db mice and non-diabetic littermates. Morphological and gene expression differences between fat depots were evaluated using haematoxylin and eosin staining and quantitative real-time PCR, respectively.

Results: Db/db mice were obese and presented with impaired glucose tolerance. Adipocyte hypertrophy was clear in all adipose depots of db/db mice, although smaller, multilocular adipocytes were observed in CF compared to RF and IF. The expression of uncoupling protein 1 (UCP1) was higher in CF compared to RF and IF independent of diabetes status and was upregulated in IF of db/db mice compared to non-diabetic mice. Uncoupling protein 2 (UCP2) was increased in IF and RF of db/db mice compared to non-diabetic mice. The expression of adenosine 5' monophosphate-activated protein kinase (AMPK), nuclear factor erythroid 2-related factor (NRF2), fatty-acid-binding protein (FABP4) and glucose transporter type 4 (GLUT4) was increased, while glutathione S-transferases (GST) were decreased in IF of db/db mice compared to non-diabetic mice. Tumour necrosis factor alpha (TNFα) expression was increased in RF of db/db mice compared to non-diabetic mice.

Conclusion: Adipocyte morphology and gene expression differed according to adipose depot in an experimental model of T2D. The increased expression of UCP1 in CF highlights its unique thermogenic characteristics and potential cardioprotective role.

The safety and efficacy of percutaneous transcatheter closure of small to moderate sized perimembranous and muscular VSDs in children at SBAH

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Background: Percutaneous transcatheter closure (PTC) of VSDs is a relatively novel treatment modality at SBAH. It has been undertaken as an alternative to surgical closure of small and moderate sized ventricular septal defects (VSDs) of the muscular and peri-membranous types, for the past 6 years. Worldwide, this treatment modality has been available since its introduction by Lock, et al. in 1988.

Objectives: To show that percutaneous closure of carefully selected VSDs is safe and effective.

Method: Data for this retrospective, descriptive study were collected from all available enrolled patients' hospital records, for the period December 2014 - October 2019. A diagnostic cardiac catheterisation was preceded by TEE or TTE. Following diagnostic cardiac catheterisation, the device was later closed percutaneously, if this was still indicated. The study was approved by the MMed committee of the University of Pretoria (UP) and consent was obtained from the Research Ethics Committee of UP and the Paediatric Medical Manager of SBAH via the NHRD.

Results: Forty-six patients, of which 26 were male, met the criteria for inclusion in the study. The youngest patient and the lowest weight for which PTC of a VSD was done, were 11 months and 7kg, respectively. The total procedure duration was 50 - 375, while the fluoroscopic screening time was 9.2 - 254.2 minutes. Various types of devices from the Occlutech and Amplatzer were utilised. The smallest VSD that was successfully closed was a 2.5mm muscular VSD, while an attempt to close a large, 10mm muscular VSD was unsuccessful. The 1-month closure rate had improved from 20 (53%) to 33 (87%). All 16 adverse events were minor, and none called for device removal or replacement.

Conclusion: Percutaneous transcatheter closure of small and moderate sized peri-membranous VSDs is safe and effective and may be undertaken as a first-line treatment option in patients with a similar type and size of VSDs.

The prevalence, characteristics, associated comorbidities and medical management of patients with atrial fibrillation in a tertiary setting in the Western Cape

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Background: Atrial fibrillation (AF) is a supraventricular tachycardia characterised by uncoordinated atrial activation and subsequently less than optimal atrial contraction resulting in stasis and thromboembolic risk. The prevalence of AF in developed countries is high, with less known in developing countries, where patients display different cardiovascular risk factors including rheumatic heart disease. Migration from rural to urban areas increases the prevalence of risk factors associated with thromboembolic events. The applicability of international guidelines based on first world data in the setting of a different patient profile is also questionable, especially as the availability of novel medication is limited in government-funded institutions in South Africa (SA).

Objectives: The aim of the study was to determine the prevalence, characteristics, management, associated risk factors and comorbidities of patients with AF across all disciplines in a tertiary setting in South Africa, compare the management of these patients with current international guidelines, and generate setting-appropriate recommendations.

Methods: The study was an observational, descriptive study, using a retrospective record review. Ethics approval was obtained (U19/10/043).

Results: 13 414 electrocardiograms captured from 1 June 2018 - 30 June 2019 at Tygerberg Academic Hospital across all disciplines were screened – reporting an AF prevalence of 3.5% (n=475).

Conclusion: Preliminary data analysis yielded a prevalence (3.5%) which is in keeping with published international data (3% - 5%), but is lower than what was found in the Heart of Soweto study among cardiology admissions only (4.6%). Comprehensive data analysis will be presented. (Sliwa K, et al. Heart. 2010;96:1878-82).

Pulse wave velocity demonstrates increased aortic stiffness in newly diagnosed, anti-retroviral naïve, HIV-infected adults

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Background: Increased aortic stiffness (AS) is an important predictor of cardiovascular disease (CVD). Pulse wave velocity (PWV) is the gold standard for AS measurement and can detect subclinical pathology. It remains controversial whether HIV-infected persons have increased AS compared with uninfected persons.

Objectives: We evaluated AS using PWV in an antiretroviral (ART)-naïve cohort.

Methods: Eighty-five newly diagnosed adults without known CVD were recruited from health facilities in South Africa (43 female; median age 32, IQR 27 - 37 years). Median CD4 count was 285, IQR 155 - 393cells/μL. An additional 16 HIV-uninfected controls were recruited (8 female; median age 32, IQR 27 - 37). PWV was measured using the Vicorder module (Skidmore Medical). Aortic distensibility was calculated as 3.57/PWV2. Statistical analysis was performed using SPSS version 27 (IBM Corporation) using independent samples t-test and Spearman Rho correlation.

Results: The HIV-infected group's mean PWV measured 15% higher than the controls (5.88 vs. 5.1m/s; p=0.006). Aortic distensibility in HIV-infected persons was 53% lower than control values (0.4 vs. 0.62mmHg-1; p=<0.001). No difference was demonstrable between the 2 groups' sex, race, age, smoking status, pulse pressure, heart rate, and 6-minute walk test distance. High sensitivity C-reactive protein was higher in the HIV-infected group (12.5 vs. 4.1ng/l; p=0.04) but did not correlate with increased PWV. Mean arterial blood pressure (MAP) measured 6mmHg higher in controls trending towards a significant difference (p=0.08). A weak positive correlation between PWV and MAP was demonstrated (rs=0.33; p<0.001). The haematocrit, fasting glucose, and high-density lipoproteins were lower in the HIV-infected group (p=<0.001, p=0.16, and p=0.01), but did not correlate with PWV.

Conclusion: HIV infection was an independent risk factor for increased AS in this ART-naïve cohort. The cohort's young age and recent HIV diagnosis makes atherosclerosis an unlikely explanation for the difference. Alternative explanations that require further research include vasomotor tone abnormalities and endothelial dysfunction.

Two-year outcomes of TAVR/TAVI implantation in South Africa from the SHARE-TAVI registry

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Background: SA Heart® Registry projects focus on specific disease- or procedure-related registries, in order to provide locally relevant data.

Objectives: The web-based, prospective, multi-centre, observational SHARE-TAVI registry aims to provide local outcomes data on all TAVIs in South Africa, to support local evidence-based policy evaluations.

Methods: All 16 TAVI centres comply voluntarily and capture >93% of implants nationally. From September 2014 - June 2021, 1 870 patients had pre-TAVI clinical evaluations entered, which led to 1 277 TAVIs. Eight hundred and thirty-two implant records from 13 sites are available for the period ending 30 June 2019. Six hundred and two records are used here for the 2-year outcomes, as follow-up was interrupted by various factors during the Covid lockdown, and 230 incomplete records are excluded. This 2-year outcomes cohort of 602 records has complete complications (VARC-2 criteria), 30d, 1- and 2-year annual follow-up. Devices were a combination of earlier generation Corevalve and Sapien XT (in 54.5% of the 602 patients), and the remainder of the implants were Corevalve EvolutR and SapienS3.

Results: Demographics and risk factors (n=602): Average age 80.03 ± 7.33 years, male gender 53.5%, prior CABG 24.8%, prior CVA/TIA 7.3%, diabetes mellitus 24.3%, COPD 18.6%, and renal function requiring dialysis 2.99%. Local data show all-cause peri-operative, 30-day, 1- and 2-year mortality of 3.49% (n=21), 7.64% (n=46), 17.28% (n=104) and 25.25% (n=152) respectively – with a ratio of 36.2% non-cardiac to 63.8% cardiac mortality. Transfemoral access is preferred (91.03% patients). Procedural success is 93.7%, stroke occurred in 6.31%, and new pacemaker implantation in 11.3%. Bleeding and vascular complications occurred in 6.31% and 7.14% of patients, respectively.

Conclusions: The availability of local data to benchmark against international guidelines is possible, as the demographics and risk profile of the patients are similar to other registry and trial data. However, the outcomes comparison is currently confounded by incomplete data where capture has been disrupted due to personnel restraints during the Covid pandemic and patients' fear of attending follow-up visits.

Profile and management of Acute Coronary Syndromes (ACS) at primary and secondary level healthcare facilities in Cape Town

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Background: The burden of coronary artery disease is increasing in developing countries. However, little is known about the clinical profile and management of patients with Acute Coronary Syndromes (ACS) in the South African public sector.

Objectives: We aimed to study the demographics, clinical profile and management of patients presenting with ACS to a secondary-level healthcare facility in Cape Town.

Method: We conducted a retrospective study of patients presenting with ACS to a secondary-level healthcare facility in Cape Town between 1 January and 31 December 2016, in order to study the clinical profile and management of these patients.

Results: Among the 214 patients in this cohort, 48 (27.5%) had STEMI, 43 (24.7%) NSTEMI, and 83 (47.7%) UAP. The study population had a male preponderance (59.2%) and a median age of 59.5 (interquartile range 50 - 68) years. We identified high rates of >12-hour delays in first medical contact (FMC) after symptom onset (46%) and inaccurate ECG diagnosis of STEMI (29.2%), which were associated with low rates of thrombolysis (39.6%). Fifteen patients (8.6%) with ACS were referred for urgent PCI. The in-hospital death rate was 1.7%. Two thirds of patients with STEMI (62.5%) reported non-adherence to medication. After discharge, 47 patients (27.0%) represented to the emergency unit with a repeat episode of ACS, 10 (5.7%) with STEMI, 5 (2.8%) with NSTEMI, and 32 (18.3%) with UAP.

Conclusion: This study highlights several challenges in ACS management: non-adherence to medication, significantly delayed FMC, ECG diagnostic inaccuracy, and high rates of reoccurrence of ACS. Thrombolysis is often not offered to those with STEMI, due to delayed presentation or missed ECG diagnosis. To address the challenges highlighted by this study, we propose optimisation of primary prevention practices, improved access to emergency medical services, patient education, and continued medical education (CME) of healthcare professionals.