

# ABSTRACTS

## SA HEART® CONGRESS 2022

### **Strengthening management and support for rheumatic heart disease patients in underserved communities in Brazil**

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**Background:** Rheumatic heart disease (RHD) affects over 30 million people globally, causing at least 310 000 premature deaths annually. Reach's mission is to promote the health of vulnerable populations through technical support to local, regional and global efforts to prevent and control rheumatic fever and RHD.

**Objectives:** To develop and implement a series of low-literacy patient and community education flipcharts in the state of Minas Gerais, Brazil.

**Method:** A flipchart for newly diagnosed RHD patients and another for pregnant women were developed over a 2-year period and subsequently taught to health workers in Belo Horizonte from January - December 2021. Training methods included small in-person and virtual workshops. Facilitators distributed a 7 question Google survey before and after each training session.

**Results:** In total, 187 health workers received flipchart training, most of them community health workers (46%) or in nursing (30%), while the remainder were a variety of other health workers (24%). 70 trainees completed the evaluation. Compared to 56% before training, 86% after training identified rheumatic fever as the cause of RHD. Benzathine Penicillin G treatment was correctly identified by 50% before training and 97% after training. Before training, 32% were able to correctly identify the frequency of antibiotic treatment which increased to 90% following training. 70% of respondents reported having zero to little knowledge of rheumatic fever or RHD, with 30% reporting moderate to expert level knowledge; after training, 82% reported moderate to expert level knowledge.

**Conclusion:** Preliminary results from this ongoing programme show that flipcharts serve a dual purpose by providing health workers with education and as a tool for guiding their interaction with RHD patients. Approximately 2 000 underserved patients are expected to benefit from the health workers training.

### **Paediatric cardiac tumours: A retrospective study in a tertiary hospital**

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**Background:** Cardiac tumours are benign or malignant neoplasm of the heart and they can be primary or metastatic. Primary Cardiac Tumours (PCT) are rare in children and are associated with genetic syndromes. Majority are benign. Rhabdomyoma is the commonest in foetal and childhood and associated with tuberous sclerosis. Clinical presentation includes asymptomatic, cardiopulmonary instability and sudden death. Echo, CT scan and MRI are the main non-invasive diagnostic tools. Prognosis ranges from good for primary benign to extremely poor for primary malignant tumours.

**Objectives:** To describe all cases of paediatric cardiac tumours managed at the IALCH between 2013 and 2021.

**Method:** The IALCH Paediatric Cardiology Electronic Database was searched for "Tumours between 2013 and 2021". The case note for each case was reviewed and data captured. Descriptive statistics were generated from the data.

**Results:** There were 17 cases of PCT. The earliest age of diagnosis was the day of birth. Majority of the tumours were Rhabdomyomas (76.5%). The others included fibroma (11.8%), teratoma (5.9%) and neuroblastoma (5.9%). The location were right ventricular (41.2%) and left ventricular wall (41.2%). 47.1% were referred from the neurologist. Tuberous sclerosis is the commonest associated genetic syndrome (47.1%). 23.4% were identified on foetal ultrasound. Management included watchful waiting, Everolimus for 2 cases of Rhabdomyoma and chemotherapy for neuroblastoma. There was no documented mortality.

**Conclusion:** Paediatric cardiac tumours are rare at the IALCH. The commonest is Rhabdomyoma, which is associated with tuberous sclerosis. Prognosis is generally good with most resolving spontaneously.

## Impact of COVID-19 on a paediatric cardiac service

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**Background:** The Western Cape paediatric cardiology and cardiothoracic surgery service is in general under-resourced and any interruption to this service may have long-term effects.

**Objectives:** We aimed to quantify the impact of COVID-19 (C19) regulations on the paediatric cardiology service of the Western Cape and the paediatric division of the Chris Barnard Division of Cardiothoracic Surgery.

**Method:** An uncontrolled retrospective pre-post study of patients presenting to the service over 2 1-year periods; the pre-C19 period (1 March 2019 - 29 February 2020) and the peri-C19 period (1 March 2020 - 28 February 2021). Measures include the number and type of surgical procedures, cardiac catheterisations, admissions and out-patient consultations.

**Results:** Admissions decreased by 40% from 625 in the pre-C19 period to 378 in the peri-C19 period. Similarly, out-patient visits decreased from 4 241 to 3 921. There was no significant change in presentation-age or diagnosis, however, admission-duration was significantly longer ( $p < 0.001$ ), 3 days (IQR:1-9) pre-C19 vs. 6 (IQR:2-14) peri-C19.

Cardiac surgeries decreased by 29% from 298 to 213, with significant changes in the proportion of urgent (Prevalence Ratio [PR]:5.84; 95% CI:3.55-9.63,  $p < 0.001$ ) and elective cases (PR:0.73, 95% CI:0.66-0.82,  $p < 0.001$ ). Median age at surgery was significantly lower; 0.6 years (IQR:0.2-1.7) peri-C19 vs. 0.9 years (IQR:0.4-4.1) pre-C19, related to a significant increase in neonatal procedures (PR:2.48, 95% CI:1.52-4.06,  $p < 0.001$ ) and decrease in patients aged 5 to 12 (PR:0.57, 95% CI:0.37-0.90,  $p < 0.05$ ). Risk Adjustment for Congenital Heart Surgery (RACHS-1) severity scores were similar across periods.

Cardiac catheterisations decreased by 42% (175 to 102) with no significant change in procedure-age, urgency or the proportion of interventions.

**Conclusion:** The number of cardiac procedures was significantly reduced in the peri-C19 period which will have implications on an already overburdened service and ultimately, patient outcomes. Although RACHS-1 was similar between periods, the higher proportion of urgent cases, neonatal procedures, and increased admission-duration indicates a higher proportion of severe or complicated cases. This together with reduced caseloads may have implications on training.

## Continued genetic analysis of a South African congenital heart disease cohort reveals further novel causes of disease

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**Background:** Congenital heart disease (CHD) is the most common birth defect in the world, with a prevalence of 9 / 1 000 live births. CHD refers to structural defects of the heart and / or blood vessels at birth and remains a significant cause of morbidity and mortality worldwide. The Partnerships in CHD in Africa (PROTEA) study aims to better understand the epidemiology and genetic architecture of CHD in sub-Saharan Africa. Preliminary analysis of a subset of the PROTEA cohort (102 participants) revealed genetic causes of disease in 20% of South African CHD patients.

**Objectives:** In this investigation, exome sequencing was used to investigate a further 60 CHD patients for disease-causing genetic variation.

**Method:** The cohort consisted of 60 patients with CHD: 48 with isolated disease and 12 with syndromic CHD. Exome sequencing was conducted using the Illumina platform. Sequencing data were filtered for rare (<1%), damaging variants in established CHD genes. Variants were interpreted using American College of Medical Genetics pathogenicity criteria.

**Results:** We found a total of 12 pathogenic or likely pathogenic variants in 11 patients from the cohort, yielding a mutation detection rate of 18.3%. These included 3 known mutations: 2 known to cause CHARGE syndrome and Rubinstein-Taybi syndrome, both in patients with similar clinical phenotypes, and a third mutation described to cause diverse CHD phenotypes in a patient with right-sided CHD. Other variants in the cohort were novel. We also observed potential new genotype-phenotype correlations between FBN1 mutations and Tetralogy of Fallot and left-sided lesions, and a double-mutation patient with loss of HAND1 and SMAD6 with coarctation of the aorta.

**Conclusion:** Combined with the results of our preliminary investigation, we report a mutation detection rate of 19.8% in the PROTEA cohort. Notable findings include the high rate of novel variation and the new genotype-phenotype relationships we can describe in our setting.

## Heterogeneous myocyte repolarisation in the myocardial infarction border zone: Implications for ventricular arrhythmias

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**Background:** Ventricular arrhythmias are a major cause of morbidity and mortality after myocardial infarction (MI). The infarct border zone (BZ) are the dominant source of arrhythmias. We postulated that abnormal repolarisation due to heterogeneous myocyte remodelling in the BZ underlie arrhythmia substrate mechanisms.

**Objectives:** To examine regional spatial repolarisation variability in vivo and related cardiomyocyte remodelling profiles in vitro.

**Method:** Anterior-septal MI was induced in 13 domestic pigs by 120 minute ischaemia-reperfusion injury. After 1 month, electro-anatomical mapping was performed: 2 048 non-contact electrograms distributed over the LV (EnSite Precision™) were recorded to determine local activation-recovery-intervals (ARIs). Arrhythmia testing was performed by programmed electrical stimulation. Cardiomyocytes were isolated from BZ and remote regions. Cellular action potential duration (APD) was optically recorded using Di-8-Annepps (stimulation at 1 Hz, 37°C). Expression of cardiomyocyte genes were assessed by single nuclear RNA sequencing (10x Genomics).

**Results:** In vivo, ARIs in the BZ tended to be longer than remote (BZ-remote:  $11.0 \pm 7.3$ ms,  $P=0.0810$ ), with increased heterogeneity, ( $3.5 \pm 1.3$ ms vs. remote:  $2.0 \pm 0.5$ ms,  $P=0.036$ ). VT was inducible in all animals and the ease-of-induction, a surrogate for arrhythmogenicity, correlated strongly with BZ ARI heterogeneity ( $R^2=0.786$ ,  $P=0.003$ ). Cellular population studies demonstrated longer APD in the BZ ( $489.4 \pm 47.9$ ms vs. remote:  $415.4 \pm 33.3$ ms,  $P=0.0018$ ). Ncells=635-862 cells / region) with higher heterogeneity than remote ( $105.9 \pm 17.0$ ms vs. remote:  $73.9 \pm 8.6$ ms,  $P=0.001$ ). Cellular APD heterogeneity correlated with in vivo ARI heterogeneity ( $R^2=0.67$ ,  $P=0.002$ ). Sequencing revealed cell-cell expression heterogeneity quantified by nuclei Euclidean distances (BZ:  $3.3 \pm 0.8$  vs. remote:  $2.3 \pm 0.7$ ,  $P=0.018$ ). Unique profiles of differentially expressed genes corresponded with regional myocyte remodelling. We identified significant genes for hypertrophy (NPPB) and repolarisation (KCNT2, SCN3B and KCNJ5) as key to the BZ myocyte profile.

**Conclusion:** Cardiomyocyte remodelling in the BZ is heterogeneous, driven by altered gene expression, and translates to heterogeneous repolarisation and arrhythmia vulnerability in vivo.

## Functional and pathophysiological characterisation of valve lesion in RHD using CMR

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**Background:** Rheumatic heart disease (RHD) associated with chronic valvular damage, heart failure, arrhythmias and pulmonary hypertension is a leading cause of cardiovascular mortality and morbidity in the young, particularly in low- and middle-income countries.

**Objectives:** In this study, we aimed to assess the relationship of valve lesions in RHD with cardiovascular magnetic resonance (CMR) tissue characteristics.

**Method:** Using a 3T Siemens Magnetom Skyra scanner, we evaluated 47 individuals ( $42 \pm 12.8$  vs.  $39 \pm 12.1$  years), with female predominance (62% vs. 53%) with advanced RHD, awaiting valve replacement, confirmed on echocardiography, and matched with 30 healthy controls. CMR parameters were derived from the following acquisitions: Cine imaging of the short and long axes, T1 mapping (MOLLI, 5(3)3), late gadolinium enhancement (LGE) imaging, and estimation of extracellular volume fraction (ECV).

**Results:** Mitral valve was commonly involved, with mitral regurgitation (MR=76%) and mitral stenosis (MS=67%), followed by aortic regurgitation (AR=49%) and aortic stenosis (AS=45%), respectively. Isolated MR was most common (10.6%), compared with AS and MS (4.2% and 2.1%). MAVD was most predominant (51%) compared with MMVD and MMAVD (28% and 4.2%). LVEF, LGE, Native T1, and ECV were similar when compared among the mixed and isolated lesions. However, significantly elevated native T1 was observed in MMAVD compared to the isolated lesion ( $P=0.04$ ).

**Conclusion:** We report the distribution of isolated and mixed valve lesions in RHD using CMR. CMR clearly stratified the valvular lesions in RHD and can adequately complement echocardiography results.

## Characterising the phenotype of subclinical cardiovascular disease in systemic lupus erythematosus using multiparametric cardiovascular magnetic resonance imaging

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**Background:** Cardiovascular disease (CVD) is a leading cause of mortality in systemic lupus erythematosus (SLE) but pathophysiological mechanisms have not been fully elucidated and data from Africa are lacking.

**Objectives:** We embarked on a cross-sectional study to characterise subclinical cardiovascular (CV) involvement in SLE using cardiovascular magnetic resonance (CMR).

**Method:** 49 SLE patients without known CVD were recruited from rheumatology clinics and compared to 24 matched controls. All participants underwent multiparametric CMR at 3T, including cine, T2-weighted, late gadolinium enhancement (LGE), native and postcontrast T1 mapping, ECV quantification and strain imaging. Clinical data, including disease activity and damage scores, were recorded.

**Results:** 90% of SLE patients enrolled were women (mean age:  $35 \pm 9$  years) and majority were of mixed ancestry (69%) or black African (27%) race. Mean SLE disease duration was  $5.6 \pm 3.9$  years and 70% of patients had mild-moderate disease activity and low damage scores. A third of patients had CV risk factors of smoking and hypertension, 8% had dyslipidaemia but none had diabetes mellitus. LVEDVi, LVESVi, LVMi were significantly increased compared to controls but remained within normal limits. While the mean LVEF was normal ( $57 \pm 7\%$ ), 37% of SLE patients had a LVEF < 55%. T2 signal-intensity ratio was similar between groups but native T1 mapping and ECV fraction were significantly increased in SLE ( $p < 0.0001$  for both) indicative of myocardial fibrosis and oedema. Focal fibrosis detected by LGE imaging was present in 79% of SLE patients compared to 43% of controls ( $p = 0.003$ ). Myocardial strain was significantly reduced in SLE (peak longitudinal strain in SLE - 15.4 vs. 17.4 in controls;  $p < 0.0001$ ) and correlated with LVEF and tissue characteristics.

**Conclusion:** We demonstrate substantial subclinical CV involvement in a group of young ethnically diverse SLE patients. While the presence of LGE is known to be a powerful predictor of mortality in the context of heart failure, outcome studies in SLE are needed.

## A rare case of interventricular membranous septal diverticulum in a symptomatic middle-aged female

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**Background:** Interventricular membranous septal diverticulae are rare and most of the reported cases are monitored clinically and with imaging to assess the development of symptoms including arrhythmias, cardioembolic phenomena, size progression or effect on systolic function.

**Objectives:** To describe the imaging findings of an interventricular membranous septal diverticulum in a symptomatic female.

**Method:** We discuss the imaging findings of a symptomatic interventricular membranous septal diverticulum with 128-slice CT coronary angiogram and transthoracic echocardiography.

**Results:** A 54-year-old female presents with 1 - 2 episodes per month of severe chest pain, palpitations and dyspnoea over a 6 month period. There is no prior history of hypertension or other metabolic risk factors. A resting ECG demonstrated sinus rhythm, devoid of ischaemic features. There was an episode of supraventricular tachycardia and subsequent cardioversion during general anaesthesia for laparoscopy. Cardiac enzyme levels were normal and ambulatory ECG did not show further dysrhythmia.

CT coronary angiogram was performed with a low-pretest probability of ischaemic heart disease and demonstrated a small, finger-like diverticulum within the interventricular septum, membranous segment communicating with the left ventricle and similarly contracting with the ventricle during systole. Coronary artery origins and patency were normal, CAD-RADS 0.

Echocardiogram confirms a tubular diverticulum into the interventricular septum at the base of the left ventricle. There was no flow across the diverticulum to indicate a septal defect. Left ventricular systolic function was preserved.

Discussion regarding surgical excision of interventricular septum diverticulum is ongoing, presently the patient declined cardiac surgical intervention. Current medical management is beta blockade, symptomatic relief as required and annual imaging surveillance.

**Conclusion:** We have presented the imaging findings of an interventricular septum diverticulum with CT coronary angiogram and transthoracic echocardiogram. CT allowed reconstruction and 3D visualisation of the diverticulum and communication with the left ventricle.

## An evaluation of mitochondrial dynamics and mitophagy in an in vitro and in vivo model of obesity

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**Background and aim:** Ataxia Telangiectasia Mutated protein kinase (ATM) is activated by mitochondrial oxidative stress but its role in mitochondrial dynamics and mitophagy are still largely unknown. This study aimed to determine whether the inhibition of ATM influences oxidative phosphorylation and mitophagy in an obese male Wistar rat model, which was further evaluated in a novel in vitro cardiomyoblast model of obesity.

**Methods:** Hearts from chow-fed (Cnt) and diet-induced obese (DIO) male Wistar rats were perfused ex vivo (n=6-9/group) ± the specific ATM inhibitor; KU60019 (3µM) or insulin (10nM) prior to mitochondrial isolation and oxidative phosphorylation measurements (Clarke-type electrode). The mitophagy markers, PINK and Parkin and autophagosome markers, LC3 and p62 were investigated with Western blotting. H9c2 cells were treated with a combination of 100nM oleic and 200nM palmitic acid for 24 hours to mimic obesity and induce insulin resistance. Mitochondrial dynamics and mitophagy were analysed with ImageJ and Western blotting.

**Results:** Inhibition of ATM significantly decreased: (i) active (State 3) and the oxphos rate (ADP/O × QO2 State 3) (p<0.05). In contrast, stimulation of hearts with insulin increased mitochondrial respiration parameters that, in turn, were reversed by inhibition of ATM. Parkin is significantly increased in obesity and when ATM is inhibited (p0.005). Inhibition of ATM significantly decreased LC3-II levels and Drp I levels. Fatty acid treatment in H9c2 cells rendered the cells insulin resistant and induced mitochondrial fission, whereas inhibition of ATM increased fusion.

**Discussion:** ATM is required for mitochondrial oxidative phosphorylation and mitophagy, and the absence thereof may contribute to mitochondrial dysfunction in insulin resistance. Insulin resistance can be induced in cardiomyoblast cells (H9c2) treated with fatty acids allowing for the evaluation of mitochondrial dynamics, potentially providing a valuable model for small molecule screening, as demonstrated with KU60019 in this study.

## Elevated blood pressure levels in sub-Saharan Africa: A systematic review

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**Background:** Despite a high burden of hypertensive heart disease in sub-Saharan Africa, there remains a paucity of data on the pattern of hypertension among people living throughout the region.

**Objectives:** To use systematic review to provide estimates of the distribution and cohorts of elevated blood pressure studies among people living in sub-Saharan Africa.

**Method:** We searched PubMed to identify articles published from 1 January 2011 - 31 December 2021. Each study was independently reviewed for methodological quality. We used location-based distribution to summarise the included studies. We identified relevant clinical and occupational cohorts.

**Results:** We included 630 studies from 35/49 sub-Saharan African countries in the systematic review reporting data of a pooled sample of 1 582 910 people. However, the top 3 countries, Nigeria (132), Ethiopia (115), and South Africa (75) accounted for over 51% (322/630) of total studies. We identified 163 studies for the clinical cohort. Ten studies on hypertensive heart disease. Thirty nine studies on hypertension and pregnancy. Forty five studies on hypertension and communicable diseases. 69 studies on hypertension and non-communicable disease. We also identified 21 studies for the occupational cohort. Data on the reported blood pressure levels and prevalence of hypertension will be reported and analysed for each group and overall on a sex-specific basis – a full report of which will be presented at the conference.

**Conclusion:** These data suggest a paucity of representative from many countries. There is urgent need to comprehensively map the pattern of normative and elevated blood pressure across the region and develop proactive screening and health care programmes for sub-Saharan Africans at high risk of developing cardiovascular disease.

## Elevated blood pressure levels among adolescents in sub-Saharan Africa: A systematic review and meta-analysis

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**Background:** Despite a high burden of hypertensive heart disease among relatively young adults, there remains a paucity of data on the pattern of hypertension among adolescents in sub-Saharan Africa.

**Objectives:** To use systematic review and meta-analyses to provide estimates of the prevalence of elevated blood pressure and blood pressure levels (when reported) among male and female adolescents living throughout the region.

**Method:** We searched PubMed to identify articles published from 1 January 2011 - 31 December 2021. Each study was independently reviewed for methodological quality. We used a random-effects model to estimate the prevalence of elevated blood pressure and mean systolic / diastolic blood pressure across studies. Heterogeneity ( $I^2$ ) was assessed via the  $\chi^2$  test on Cochran's Q statistic. This review is registered with PROSPERO, number CRD42022297948.

**Results:** We included 15 studies from 8/49 Sub-Saharan African countries in the systematic review and in the meta-analysis reporting data of a pooled sample of 10 646 adolescents aged 10 – 19 years. Study quality was high with only one medium-quality. Prevalence of elevated blood pressure varied widely (range 0.2 – 21.2%). The pooled prevalence of elevated blood pressure for adolescents was 10.6% (95% CI 7.0 – 14.1). The pooled mean systolic / diastolic blood pressure for adolescents was 113.5/68.4mmHg. Meta-analyses of 10 studies showed that adolescent males were 1.17 times (95% CI 0.83 – 1.65) more likely than adolescent females to have an elevated blood pressure.

**Conclusion:** These data suggest up to 1 in 10 adolescents in sub-Saharan Africa have elevated blood pressure, with slightly more males than females affected. With a paucity of representative and standardised data from many countries, there is urgent need to comprehensively map the pattern of normative and elevated blood pressure across the region and develop proactive screening and health care programmes for adolescent Africans at high risk of prematurely developing cardiovascular disease.

## Endothelial dysfunction and Body Mass Index: Is there a role for plasma peroxynitrite?

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**Background:** Endothelial function is dependent on the balance between vasoconstrictive and vasodilatory substances. The endothelium ability to produce nitric oxide is one of the most crucial mechanisms in regulating vascular tone. An increase in inducible nitric oxide synthase contributes to endothelial dysfunction in overweight persons, while in underweight persons, oxidative stress contributes to the conversion of nitric oxide to peroxynitrite (measured as nitrotyrosine in vivo).

**Objectives:** The objective of this study was to elucidate the interaction of body composition and oxidative stress on vascular function and peroxynitrite.

**Method:** This was done through an experimental design with 3 weight groups (underweight, normal weight and overweight), with 4 treatment arms in each. Plasma nitrotyrosine levels were measured 15 - 20 hours post lipopolysaccharide (LPS) treatment, as were aortic ring tension changes. Acetylcholine (ACh) and sodium nitroprusside (SNP) challenges were used to observe endothelial dependent and independent vascular relaxation after pre-constriction of aortic rings with phenylephrine.

**Results:** Nitrotyrosine levels in saline-treated rats were similar among the weight groups. There was a significant increase in nitrotyrosine levels between saline-treated rats and those treated with the highest lipopolysaccharide doses in each of the weight groups. In response to ACh challenge, Rmax (percentage reduction in aortic tension) was lowest in overweight rats (112%). In response to SNP, there was an insignificantly lower Rmax in the underweight (106%) compared to the normal weight (112%). Overweight rats had a significant decrease in Rmax (83%) in response to SNP, signifying involvement of a more chronic process in tension reduction changes. A lower Rmax accompanied an increase in peroxynitrite after acetylcholine challenge in all weight groups.

**Conclusion:** Endothelial dysfunction, observed as an impairment in the ability to reduce tension, is associated with increased plasma peroxynitrite levels across the spectrum of body mass. In higher BMI rats, an additional role is played by vascular smooth muscle in the causation of endothelial dysfunction.

## Arterial stiffness is associated with oxidative stress and endothelial activation among persons with treated HIV in Zambia

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**Background:** Cardiovascular disease (CVD) prevalence is rising among persons with HIV (PLWH) in sub-Saharan Africa. Oxidative stress and endothelial activation, resulting in reduced vascular compliance, are contributors to CVD risk. However, there is a paucity of vascular health data in this population.

**Objectives:** To assess the relationships of oxidative stress and endothelial activation with vascular stiffness among PLWH.

**Method:** 54 PLWH on antiretroviral therapy >5 years and 57 HIV-negative controls, all aged 18 - 45 years, were enrolled from the University Teaching Hospital, Lusaka, Zambia. Oxidative stress was measured by nitrotyrosine, a peroxynitrite biomarker; and endothelial activation by soluble intercellular adhesion molecule-1 (sICAM-1) plasma levels. Vascular compliance was measured using carotid-radial pulse wave velocity (crPWV) and arterial stiffness index (crASI).

**Results:** PLWH had higher sICAM-1 levels (median 345ng/mL) compared to controls (275ng/mL,  $p < 0.01$ ), as well as higher nitrotyrosine levels (297 vs. 182nM;  $p = 0.02$ ). Median crPWV was similar between the groups, but PLWH had higher crASI (2.4 vs. 2.2cm/ms;  $p < 0.05$ ). After adjusting for age, fat mass, and blood pressure, the estimated effect of a 1 unit increase in nitrotyrosine on crPWV were twofold higher in the PLWH, but neither reached significance. In a model pooling all participants, there were significant differences in the relationship of nitrotyrosine with crPWV and crASI by HIV status.

**Conclusion:** PLWH in sub-Saharan Africa had significantly greater oxidative stress and endothelial activation compared to HIV-negative individuals. These factors may contribute to increased arterial stiffness and higher CVD prevalence in this population.

## Percutaneous balloon mitral valvuloplasty BMV in “unsuitable” mitral valves: Lessons learnt in pregnant patients

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**Background:** Percutaneous balloon mitral valvuloplasty (PBMV) provides a non-surgical option for treating severe symptomatic mitral stenosis (MS), provided that the mitral valve (MV) anatomy is suitable. Suitability is most often assessed by the Wilkins, Cormier, and calcium commissural scores. Valves with a Wilkins score of  $>10$  are usually considered unsuitable. In the setting of pregnancy, PBMV is the preferred treatment given the excess foetal risk that surgery poses. For that reason, PBMV is periodically performed during pregnancy, despite unsuitable Wilkins scores.

**Objectives:** We aimed to investigate features identifying successful outcome with PBMV despite Wilkins scores  $>10$  by studying a cohort of pregnant patients at Tygerberg Hospital from 1994 - 2022.

**Method:** Retrospective data analysis from patients undergoing PBMV at Tygerberg Hospital from 1994 - 2022. Valve suitability was assessed by transthoracic, transoesophageal echocardiogram and fluoroscopy. Immediate procedural success was a final MV area  $\geq 1.5\text{cm}^2$  (or doubling of the MV area) on planimetry without severe mitral regurgitation (MR).

**Results:** 41 patients had PBMV during pregnancy with a mean age of  $28.8 \pm 4.5$  years, at average gestation of  $25.7 \pm 3.7$  weeks. The mean Wilkins score was  $8 \pm 1.3$ . 7 patients had a score of  $\geq 10$  and commissural calcium score of  $\geq 3$ . Immediate procedural success occurred in 90.4%. There were no maternal deaths. Four patients developed haemodynamically well tolerated severe MR all in the setting of asymmetrical commissural calcium regardless of Wilkins scores. There were 2 perinatal deaths due to complicated pre-eclampsia following successful PBMV.

**Conclusion:** Valve assessment prior to PBMV is a meticulous process that generally predicts outcome well. In the setting of pregnancy less than ideal valve morphology is not an absolute contraindication for PBMV. The increase in valve area achieved, even at the expense of developing significant MR, allows for successful completion of pregnancy with good maternal and foetal outcomes.

## The incidence and outcomes of high-risk acute coronary syndromes in the Western Cape Province of South Africa: A prospective cohort study

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**Background:** Tygerberg Hospital (TBH), a tertiary care hospital in the Western Cape, South Africa, serves a large, low- to middle-income (LMIC) population with centralised advanced cardiac care. Acute coronary syndrome (ACS) remains the principal cause of death locally, despite a high burden of communicable diseases, including HIV.

**Objectives:** We sought to describe the incidence and mortality rates of ST elevation myocardial infarction (STEMI) and high-risk non-ST elevation ACS (HR-NSTEACS) in the region and identify population-based risk characteristics and comorbidities.

**Methods:** Tygerberg Acute Coronary Syndrome Registry (TRACS) is a prospective database that captures all STEMI and HR-NSTEACS patients in the TBH referral network. Patients older than 18 years, presenting with STEMI or HR-NSTEACS, were included prospectively over a 9 month surveillance period. Patients' demographic and risk factor profiles, in hospital therapies and 30 day mortality rates were collected.

**Results:** 586 were enrolled (64.5% male) with incidence rates of STEMI and HR-NSTEACS of 14.7/100 000 and 15.6/100 000 respectively. Mean patient age was 58.1 years with STEMI patients younger than those with HR-NSTEACS (56 years vs. 58 years;  $p=0.01$ ). Coronary artery disease (CAD) risk factors were overall prevalent with hypertension (79.8% vs. 68.3%;  $p<0.01$ ), and pre-existing CAD (29% vs. 7%;  $p=0.03$ ), more prevalent in the HR-NSTEACS group. HIV was present in 12.6% of patients tested, similar to the background population rate. The 30 day all-cause mortality was 6.1% with in-hospital mortality rate 3.9% and was similar for STEMI (6.7%) and HR-NSTEACS (5.7%,  $=0.83$ ). HIV positivity did not impact mortality.

**Conclusions:** A contemporary approach to treating ACS in a LMIC setting yields mortality rates comparable to high income countries. However, the lower-than-expected overall incidence rates in a young population with relatively high proportion of STEMI and high-risk factor burden suggests potential under recording of CAD in the region. CAD outcomes in people living with HIV (PLHIV) was similar to those without, suggesting traditional risk factors drive CAD outcomes in the region.



## Six month hospitalisation rate and associated factors in stable heart failure patients at a tertiary hospital in Botswana

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**Background:** Heart failure (HF) is a prevalent condition with significant morbidity and mortality across countries despite advances in treatment. Hospitalisation for HF has a high risk of short-term and long-term mortality. There is evidence that addressing factors associated with hospital hospitalisations reduces the cost of care and mortality in patients with HF. This study aimed to determine the frequency of heart failure admissions and associated factors within the first 6 months of enrolment into the HF registry at Princess Marina Hospital.

**Methods:** The study involved patients with heart failure at Princess Marina Hospital, a tertiary hospital in Gaborone, Botswana. Patients with HF based on the European Society of Cardiology guidelines have been enrolled in the HF registry run by the cardiology clinic since 2018. We assessed the proportion of patients with at least any hospitalisation in 6 months since enrolment in the registry for the current study. We also evaluated the association of these hospitalisations with demographic, clinical, laboratory and echocardiographic data collected as part of the registry.

**Result:** The study involved 198 patients with HF whose mean (SD) age was 59.5 (17.6) years. The majority were female (58.6%) and in NYHA class I-III (57.1%). The median (IQR) Left Ventricular Ejection Fraction (LVEF) was 36 (24,53), and 54% of patients had HF with reduced LVEF. Hypertension (52.0%) and diabetes mellitus (21.2%) were the commonest comorbidities, and over two-thirds of the patients were on beta-blockers (65.6%), angiotensin-converting enzyme inhibitors or angiotensin receptor blockers (73.2%), and mineralocorticoid antagonist (67.7%). Within 6 months of follow-up, hospital admission occurred in 44 out of 198 participants (22.2%). Low sodium ( $p=0.044$ ), presence of right ventricular dysfunction ( $p<0.001$ ) and presence of pulmonary hypertension ( $p=0.027$ ) were significantly associated with a higher risk of hospitalisation within 6 months of enrolment.

**Conclusion:** Almost a quarter of stable patients with HF are hospitalised after 6 months of follow up. Hyponatremia, right ventricular dysfunction, and the presence of pulmonary hypertension are the important elements in hospital admissions of heart failure. Addressing these factors may likely reduce hospitalisation.

## Direct and indirect cost of managing stroke in a prospective observational cohort of 50 acutely hospitalised cases in Maputo, Mozambique

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**Background:** Stroke is an often-deadly condition responsible for substantive great physical, social and economic limitations for survivors and their family globally. In LMIC, Unfortunately, there is a paucity of data describing its economic impact in sub-Saharan Africa.

**Objectives:** Our study aimed to evaluate the cost of stroke-related management and care during and post-hospitalisation in Mozambique.

**Method:** A prospective, cost-of-illness study addressing the direct (provider perspective) and indirect costs (patient perspective) of acute presentations of stroke to a first referral urban public hospital in Maputo, Mozambique between June - December 2019 was conducted. Applying a bottom-up approach, direct costs were derived from medical records to estimate the cost of hospital care. Similarly, indirect costs were derived from structured interviews with patients or their caregiver during the index hospitalisation and 28 days post-discharge to estimate their additional expenditure (travel to hospital) and loss of productivity due to disability / death. All cost estimates were calculated for 2019 in US dollars.

**Results:** Overall, 50 of 80 patients admitted with an acute stroke were consecutively recruited during the study period. Median age was 61 (IQR 38 to 68) years, 28 (56%) were women and 22 (44%) had a diagnostic of haemorrhagic stroke. Median hospital stay was 7.0 (IQR 4.0 - 8.0) days. Within 28 days post-discharge, 10 (20%) patients had died. The total estimated direct cost of hospital care (hospital stay, medication and investigations), was US\$35 302.52, representing a median cost of US\$706. Total indirect costs during hospitalisation was US\$68 880.00 (1129,18) and 28 days post-discharge were estimated to be total US\$22.00 and US\$35.58 respectively, loss of productivity was very high in the informal sector, and quality of life in all five dimensions were seriously compromised.

**Conclusion:** This study revealed the cost implications of stroke in the low-income sub-Saharan African country of Mozambique is particularly high considering the relatively young age of affected cases. Consequently, there is urgent need to apply more preventative initiatives in the region that are likely to be highly cost-effective given the age profile of stroke cases.

## Earlier antiretroviral initiation is independently associated with better arterial stiffness in children living with perinatally acquired HIV with sustained viral suppression in Mozambique

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**Background:** Cardiovascular disease is a major driver of morbidity and mortality in adults living with HIV. The drivers of cardiovascular disease in children living with perinatally acquired HIV (PHIV) with sustained HIV viral suppression are unclear.

**Objectives:** We explored the contribution of HIV-specific risk factors to arterial stiffness independently of traditional risk factors (metabolic syndrome [MetS]) in prepubertal children with PHIV with sustained viral suppression in a low-income country in Africa.

**Method:** For this cross-sectional analysis, arterial stiffness was assessed by pulse wave velocity z-score (PWVz), measured using a Vicorder device. Metabolic syndrome components were measured. We retrospectively collected the antiretroviral therapy (ART) exposures, HIV stage, CD4 count and HIV viral load. A multivariate linear regression model was constructed for MetS components, retaining age and gender as obligatory variables. We then added HIV-related metrics to assess whether these had an independent or additive effect.

**Results:** We studied 77 virally suppressed children with PHIV without evidence of cardiovascular disease (from medical history and physical examination). In the initial model, the PWVz was independently associated with each MetS component. The PWVz was higher in participants with proportionally greater visceral fat (waist / height ratio), elevated lipids (triglyceride / high-density lipoprotein ratio) and insulin resistance (log homeostatic model assessment [HOMA]). The addition of age at ART initiation increased the model R<sup>2</sup> value from 0.36 to 0.43. In the resulting model, younger age at ART initiation was independently associated with a better PWVz ( $p < 0.001$ ).

**Conclusion:** Earlier ART initiation was independently associated with lower large artery stiffness. This effect was independent of the effect of elevated lipids, visceral fat and insulin resistance.

## Screening for arrhythmogenic mitral valve prolapse

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**Background:** Mitral valve prolapse (MVP) is associated with sudden cardiac death (SCD). Identified high risk features are electrocardiographic (ECG): T wave inversion in the inferior leads and complex ventricular ectopy (ventricular couplets, non-sustained ventricular tachycardia (NSVT) and polymorphic ventricular ectopy), echocardiographic: Spiked configuration of the lateral annular velocities (Pickelhaube sign) and mitral annular disjunction (MAD).

**Objectives:** We aimed to describe the SCD risk profile of MVP patients attending Tygerberg Hospital.

**Methods:** The Tygerberg echocardiography database was reviewed from 1 September 2020 - 31 December 2021 for patients with MVP. Patients with severe mitral regurgitation or coronary artery disease were excluded. Patients were contacted for enrolment into the study which included a clinical evaluation, ECG, exercise ECG, 48-hour Holter ECG and transthoracic echocardiogram looking for risk factors for SCD.

**Results:** 39 were enrolled. No patients had previously documented ventricular fibrillation (VF), ventricular tachycardia (VT), cardiogenic syncope or survived cardiac arrest. 66% of patients complained of frequent palpitations. 10% had inferior T wave inversion. 53% had ventricular couplets, 18% had polymorphic ventricular ectopy and 15% had NSVT. 15% had exercise-induced couplets / NSVT. No VT or VF was found. The burden of ventricular ectopy was low with a single patient with burden of 5%. 58% of patients had MAD. 15% of patients had Pickelhaube sign. 92% of patients had at least a single high risk feature.

**Conclusion:** This cohort of patients with MVP appeared to be at low risk for SCD after standard assessment. However, described high risk features were found to be common. No evidence-based guidelines exist regarding SCD risk stratification in MVP. The recommended approach is based on expert opinion. Given how common single high risk features were in our cohort the need for evidence based guidelines is highlighted. In their absence there is potential for over-assessment and over-treatment of SCD risk in these patients.

### Epidemiology of AHA Strep A samples: An AFROStrep follow-up study

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**Background:** A previous study has reported the prevalence of *Streptococcus pyogenes* (Strep A) to be 21% amongst children presenting with a sore throat at local clinics in South Africa.

**Objectives:** Knowledge of local prevalence is essential to guide resources, awareness campaigns amongst communities and training of health care workers. This research, representing a follow-up to an earlier study conducted 15 years previously, investigates Strep A infection in participants at high risk for rheumatic heart disease.

**Method:** The study is a prospective longitudinal evaluation of Strep A-positive throat cultures in participants aged 5 - 17 years in Vanguard, Cape Town, collected over a 3-year period. Participants were evaluated at baseline and every 2 months, over a 24-month period of observation, with serial throat cultures taken for emm-typing.

**Results:** 256 participants have been enrolled and 858 throat cultures were collected, from whom 124 positive  $\beta$ -haemolytic *Streptococcus* (14.5%) were isolated. 21% of participants had Strep A on enrolment with a further 29 GAS isolates recovered from asymptomatic participants during the follow-up period. Characterisation of isolates revealed 27 different emm types: emm1 (n=10), emm12 (n=7) and emm49 (n=6) and emm clusters E3 (n=19), A-C3 (n=10) and E6 (n=8). The putative 30-multivalent vaccine would grant protection for only 61.8% (n=42) of Strep A isolates; however, due to cross protection this would increase to 70.6% (n=48).

**Conclusion:** Of interest, while the prevalence of GAS in pharyngitis remains the same, these results show a different pattern in terms of emm-type distribution observed in the previous study.

### Cardiovascular risk in people living with HIV: Is retinal microvascular geometric morphology a marker of effect?

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**Background:** Cardiovascular disease in people living with HIV has become of great concern. Human immunodeficiency viral factors and antiretroviral therapy (ART) toxicity have been implicated. Retinal microvascular geometric features such as retinal vessel calibres, network features, and branching features may be potentially useful markers of these effects.

**Objectives:** We aimed to investigate whether retinal microvascular geometric features are markers of HIV and / or ART in a study population from the Western Cape Province, South Africa.

**Method:** The study followed a cross-sectional (HIV-free: n=88 and HIV+ART: n=122) study design. Demographic, lifestyle, socioeconomic and anthropometric data were collected. Fasting blood and urine samples were sent to the NHLS for biochemical analyses. Retinal images were obtained (Canon CR-2 camera) and vessel features quantified (MONA REVA 2.1.1 software). Linear stepwise regression analyses were applied, and statistical significance was set at  $p < 0.05$ .

**Results:** The study population was relatively young (HIV-free:  $44.06 \pm 11.09$  and HIV+ART:  $40.35 \pm 8.94$  years) and mostly women (>60%). The baseline median  $\pm$  SD / mean (range) viral load (VL), CD4 cell count and ART-duration were 50 (10 to 675032) copies mRNA/mL,  $539 \pm 237$  cells/mm<sup>3</sup> and 166 (1 to 707) weeks respectively. BMI was significantly lower in HIV+ART vs. HIV-free ( $24.50 \pm 6.65$  vs.  $28.25 \pm 7.68$  kg/m<sup>2</sup>,  $p < 0.001$ ). HDL-cholesterol ( $1.59 \pm 0.74$  vs.  $1.39 \pm 0.45$  mmol/L,  $p = 0.019$ ) and gamma-glutamyl transferase ( $43.5$  (14 to 494) vs.  $27.0$  (11 to 814) U/L,  $p < 0.001$ ) were significantly higher in HIV+ART vs. HIV-free. HIV+ART status independently associated with CRVE ( $-0.146$  ( $-0.280$  to  $-0.012$ ),  $p = 0.033$ ). VL ( $-0.198$  ( $-0.025$  to  $-0.001$ ),  $p = 0.037$ ) and ART-duration ( $0.188$  ( $0.001$  to  $0.024$ ),  $p = 0.047$ ) were independently associated with arteriolar-venular ratio.

**Conclusion:** HIV+ART appeared to have a more favourable cardiovascular risk profile vs. HIV-free. Various markers of HIV and ART were associated with retinal vessel features. These results indicate that retinal vessel geometric features may be potential markers of the effects of HIV and ART in the current study population.

## Role of ARBs in HF management in light of emerging therapies: Expert consensus from East Africa

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**Background:** Several newer therapies of heart failure (HF) have emerged in the past decade. The Big 4 of medical management of HF now includes ARNI, beta-blockers, MRAs, and SGLT2 inhibitors. However, owing to cost and accessibility implications, physicians are expected to continue to use RAAS inhibitors in general and ARBs in particular in HF patients. In fact, the updated guidelines uphold the role of RAASi in the management of HF.

**Objectives:** The objective of this study was to develop a regional consensus from East Africa regarding the role of ARBs in managing heart failure patients with different phenotypes, and comorbidities and for achieving positive outcomes related to HF.

**Method:** A panel of 10 expert physicians was identified for this process. A modified 2-step Delphi method was adopted to generate consensus. Based on the literature review and case discussions the panel provided their arguments / practice options in favour of or against the patient profiles and scenarios. The level of agreement was predefined at  $\geq 70\%$  for achieving consensus.

**Results:** The expert group achieved a LoA of  $\geq 70\%$  for patients with HF with reduced ejection fraction (EF), HF with comorbid hypertension, atrial fibrillation, diabetes, chronic kidney disease and as alternative to ARNI due to cost. In terms of the outcomes, the expert group achieved 100% consensus regarding the role of ARBs in reducing HF related hospitalisations, CV mortality, all-cause mortality and to improve quality of life. The 2 points which lacked consensus included HF patients with electrolyte disturbances and those with persevered EF.

**Conclusion:** Despite new therapies being available for HF, experts agree that ARBs continue to have a major role in improving HF related outcomes, particularly in patients with HF with reduced EF and those presenting with comorbidities.

## Investigating the relationship between angiographic measurements of coronary reperfusion and myocardial recovery in patients presenting with ST-elevation myocardial infarctions treated with a pharmaco-invasive strategy

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**Background:** The therapeutic goal in ST-elevation myocardial infarction (STEMI) is rapid restoration of blood flow maximising myocardial viability. The pharmaco-invasive reperfusion strategy is an acceptable alternative in a population without rapid access to primary percutaneous coronary intervention (PCI). Thrombolysis in Myocardial Infarction (TIMI) flow and myocardial blush (MB) grade as angiographic measures of successful reperfusion, together with ECG findings and time to reperfusion have not been used to predict myocardial viability in a South African population.

**Objectives:** To determine the correlation between myocardial viability and angiographic measurements of coronary reperfusion, ECG evolution and time to reperfusion following pharmaco-invasive treatment of STEMI patients.

**Method:** A retrospective study of 32 STEMI patients undergoing angiography and cardiac MRI for viability assessment was performed. Patients were assessed for success of thrombolysis, delays in treatment and ECG evolution using the last ECG prior to angiography. Angiographic assessment included TIMI scores and MB grades.

**Results:** 32 STEMI patients were included in this study. 94% of patients had no viability on CMRI. The angiographic variables, TIMI flow and MB grade, showed no correlation with myocardial viability. Successful thrombolysis correlated with increased initial TIMI flow and MB grade but not with viability. There was no correlation between delayed reperfusion and myocardial viability. Patients with an evolved infarct on ECG showed no correlation with myocardial viability, however they did show a correlation with microvascular obstruction.

**Conclusion:** This study demonstrated no correlation between angiographic markers of reperfusion and myocardial viability. Moreover, there was no correlation between time to reperfusion or perceived success of reperfusion prior to angiography and viability. There was, however, a correlation between evolved infarcts on ECG and microvascular obstruction. It appears patients were referred for MRI to confirm clinically presumed non-viability. For this reason, a prospective evaluation of the correlation between angiographic markers of reperfusion and viability in an all-comers STEMI cohort is required.

## Continuity of health care for chronic illnesses during the state of emergency: Results of a telephone survey

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**Background:** The continuous access to healthcare for chronic patients is extremely important for prevention of complications. The restriction of movement imposed by the state of health emergency at the beginning of the COVID-19 pandemic resulted in inability to follow up these patients in person.

**Objectives:** The present study aimed to determine the feasibility of following up on a cohort of chronically ill patients by telephone, and to describe their access to healthcare during a state of emergency.

**Method:** From a cohort of 7 809 individuals in a prospective study of the incidence of risk factors in chronic diseases in hospitals in Maputo, Beira and Nampula cities, 441 adult participants from Maputo city with non-communicable disease were eligible for a standardised telephone survey (excluding trauma and psychiatric illness) between April and June 2020. General practitioners performed consultations over the telephone using an electronic data form (Google Form). 3 contact attempts were made before considering loss of follow-up. For statistical analysis, data were converted to Excel format. Participants provided verbal informed consent.

**Results:** 441 eligible participants, 229 were contactable, which 11 refused informed consent, 20 died and 13 were absent. Since it's possible to carry out the survey with only 185 participants, of these 13 (7.03%) reported at least one symptom of COVID-19. 67 (36.2%) patients had disease in need of continuous treatment. More than half 34 (50.7%) lost clinical follow-up and 18 (26.9%) did not have access to medication due to the restrictions of the state of emergency.

**Conclusion:** The follow-up of chronic patients through telephone surveys is feasible, allowing to assess the need for consultation and the difficulties in maintaining continuous care.

## A retrospective audit of young adults who received permanent pacemakers

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**Background:** While most pacemaker implantations occur in older individuals, younger patients also receive pacemakers. In these individuals, degenerative conduction system disease is less likely to be the cause of atrioventricular block (AVB) with other diseases being more common. There is, however, a paucity of data on this group regarding the indication for pacemaker implantation.

**Objectives:** The objectives of the study were to investigate first time adult permanent pacemaker recipients 60 years or younger and to determine their clinical profile, indication for pacemaker implantation and underlying pathologies identified.

**Method:** This was a retrospective record review, conducted in the Division of Cardiology at Tygerberg Hospital, Cape Town, South Africa. We included 148 adult patients between the ages of 18 and 60, who received permanent pacemakers between 2010 and 2020.

**Results:** The mean age was 50 years. Third degree AVB was the most common indication (n=114;77%). A specific etiology of the bradyarrhythmia was not determined for the majority of patients (n=108;73%). Identifiable etiologies included prosthetic valve implantation and / or valve repair (n=14;9.5%); coronary artery bypass grafting (n=3;2%); previous arrhythmia ablation (n=2;1.4%); atrial myxoma removal (n=1;0.7%); myocardial infarction (n=6;4.1%); cardiac sarcoidosis (n=5;3.4%); muscular dystrophy (n=2;1.4%); congenital heart disease (ventricular septal defect / atrioventricular septal defect) (n=2;1.4%); sick sinus syndrome (n=1;0.7%); acute myocarditis (n=1;0.7%); planned AV node ablation (n=2;1.4%); and following a previous stab in the chest (n=1;0.7%).

**Conclusion:** In this retrospective cohort, the most common cause for pacemaker implantation was complete AVB. A specific underlying etiology was found in 27% of patients, potentially identifying these patients as needing other medical therapy or more frequent follow-up. As access to advanced diagnostic tools improves, this percentage may increase.

## Rheumatic fever and rheumatic heart disease, community awareness flipchart training workshop in Tanzania: A prospective observational study

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**Background:** Rheumatic fever and rheumatic heart disease is preventable through advocacy and awareness focused on the road map to control rheumatic heart disease.

**Objectives:** The objective of the pilot study was to analyse the overall understanding of the health care workers in the region on the knowledge and assessment of the patients diagnosed with rheumatic fever and rheumatic heart disease.

**Method:** The methodology used towards the training was the observational through provided feedback questionnaires after the training which was conducted consecutively for a period of 4 days for all the attended health care workers participated throughout the training.

**Results:** A total of 32 health professionals, comprising nurses, physicians, medical officers, and a hospital attendant, were trained at the Dareda Mission Hospital. Only 24 health care professionals were able to give feedback which was resoundingly positive.

**Conclusion:** The community awareness flipchart training workshop in Babati, Manyara, was conducted as a pilot study and emphasised the need for such a tool to support the prevention of rheumatic fever and rheumatic heart disease through awareness raising among at-risk communities.

## Role of cardiovascular magnetic resonance in differentiating peripartum cardiomyopathy from pregnancy unmasking of underlying cardiomyopathy

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**Background:** Peripartum cardiomyopathy (PPCM) is a rare form of heart failure associated with pregnancy; it may be a life-threatening disease, and considered a diagnosis of exclusion.

**Objectives:** Study the CMR phenotypes of patients presenting with peripartum heart failure due to cardiomyopathy with incomplete recovery of their LV function. Determine if there are CMR features that distinguish PPCM from other DCM phenotypes.

**Method:** We evaluated cardiovascular magnetic resonance (CMR) scans on 6 patients with PPCM and incomplete recovery.

**Results:** CMR showed an increase in left ventricular volumes and impairment of left ventricular ejection fraction (6% - 39%) in all patients. Right ventricular dysfunction was present in 5 patients. Linear mid-wall late gadolinium enhancement was present in all cases. Two patients had PPCM, 1 had dilated cardiomyopathy (DCM) with hypertrophy, 2 had DCM with left ventricular non-compaction (>6 months postpartum), and 1 had familial DCM. CMR is useful in distinguishing PPCM from other DCM phenotypes.

**Conclusion:** PPCM requires prompt diagnosis and treatment to improve outcomes. It is important to consider the differential diagnosis in patients that fail to recover their LV function. CMR is an important diagnostic tool to aid in the diagnosis, risk stratification and clinical management of patients presenting with cardiomyopathy in the peripartum period.

## Impact of hypertension on transvalvular gradients in aortic stenosis

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**Background:** Aortic stenosis (AS) and hypertension often coexist. The influence of hypertension on the diagnostic assessment of AS severity is unclear. To clarify the effect of hypertension on transvalvular gradient, requires a better understanding of the impact that blood pressure (BP) change has on left ventricular systolic pressure (LVSP). Also, the effect of mean flow rate and intrinsic left ventricular contractile function (elastance) on this interaction, needs clarification.

**Objectives:** To evaluate the impact of hypertension on the diagnostic assessment of AS.

**Method:** A validated, zero-dimensional electro-hydraulic analogue computer model of the cardiovascular system was used to evaluate the impact of hypertension and BP changes on LVSP and transvalvular gradients at various flow rates and left ventricular elastances.

**Results:** In AS, systolic arterial pressure changes are mirrored by directionally similar changes in the LVSP. Flow rate remains remarkably stable over a range of afterloads (flow rate reserve intact), followed by an inflection point where mean flow rate falls for subsequent increases in afterload (flow rate reserve exhausted). The magnitude of the change in LVSP per unit change in systolic arterial pressure is dependent on the presence / absence of left ventricular flow rate reserve. However, changes in systolic arterial pressure, even when mean flow rate reserve is absent, results in a clinically negligible change in the mean transvalvular gradient across a spectrum of LV elastances.

**Conclusion:** In the presence of severe AS, any change in mean transvalvular gradient due to a change in BP is mediated via change in mean flow rate. The magnitude of the impact that change in BP has on flow rate and transvalvular gradient (even at exhausted flow rate), is negligible and of doubtful clinical relevance. Transvalvular gradient is therefore a robust parameter of aortic stenosis severity that is not impacted by hypertension in a meaningful way.

## Hypertension care for people living with HIV in Mozambique

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**Introduction:** Integrated service delivery models support continuity of care for non-communicable diseases, including hypertension (HTN) care. Aim: To assess patterns of HTN care for people living with HIV (PLHIV) in southern Mozambique.

**Methods:** A service delivery assessment tool was built including direct observation, consultation of routine data collection tools and questionnaire to primary health centres (HC) leadership to assess infrastructure, human resources, equipment, consumables, laboratory / pharmacy services, availability of integrated services. 16 high-volume HC in the Maputo metropolitan area were assessed between November - December 2021.

**Results:** The HC assisted 112,913 PLHIV providing a mixed model of care for PLHIV and HTN led by either mid-level professionals (MLP) working alone (7 HC), MLP who refer to doctors in the same HC (4 HC) or doctors and MLP working together (10 HC). Overcrowding was found with clinicians sharing the same room (10 HC). There was high caseload of PLHIV (mean 30/clinician/day) and low BP screening rates (12.5%). No HC had point-of-care testing for metabolic risk markers, hampering prompt assessment and adequate management; collected samples were transferred to referral hospitals. 12 did both consultations in the same room, and used a single patient file; however, only 4 allowed HIV and HTN management during the same visit / day. Regarding to the number of patient ID cards 8 HC used 2 cards (1 for each condition), 6 used 2 ID numbers in the same card, and 2 only had a card for HIV follow-up. HC did not share HIV archiving with HTN files. While there was free availability of antiretroviral drugs in all HC, all HTN medicines need to be purchased.

**Conclusion:** Integration of care for HTN management in PLHIV is needed to reduce the burden on patients and the health services, as well as to address the changes required to reduce COVID-19 transmission.

## A review of congenital heart defects in children with Trisomy 21 over a 5-year period at Charlotte Maxeke Johannesburg Academic Hospital

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**Background:** In the first decade of life, mortality in Trisomy 21 (T21) is associated with Congenital Heart Defects (CHDs). There is a lack of local data regarding the prevalence, management and outcomes of CHDs in children with T21.

**Objectives:** Describe the above characteristics and review interventions in the T21 population at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH).

**Method:** Retrospective review of 128 participants between 2013 and 2017. Data collected from the database and clinical records included: Demographics, echocardiographic diagnosis, details of Diagnostic (DCC) and Interventional (ICC) Cardiac Catheterisation and surgery, age at diagnosis and intervention and survival post-surgery.

**Results:** There were 128 participants with confirmed T21. The majority were female (56.0%) and African (97.0%). Median age at presentation was 6 (IQR 9.75) months. The prevalence of CHDs was 77/128 (60.2%) and 58/77 (75.3%) had a single CHD. Most had an AVSD (39%) followed by PDA (27%), VSD (22%), ASD (9%) and TOF (2%). DCC was required in 60/77 (77.9%) and 25/60 (41.6%) were performed. The median age at DCC was 15

(IQR 15) months. 1 participant underwent successful ICC for PDA closure at 17 months. Surgery was required in 60/77 (77.9%) participants, while 15/60 (25.0%) were performed. Many DDCs (40%) and surgeries (45%) were not performed due to loss to follow-up. The median age at first surgery was 31 (IQR 24) months. The most performed surgery was an AVSD repair (73%). Post-surgery survival was 93.3% at hospital discharge and 86.7% after 1 year. **Conclusion:** The prevalence, type and frequency of CHDs in the CMJAH T21 population is comparable to global data. The later age at presentation was not optimal for early intervention best done before 6 months of age. There were further delays in catheterisation and surgery. Survival post-surgery compares favourably with other centres despite a later age at time of surgery.

## Prevalence, clinical characteristics and echocardiographic parameters of arrhythmias among patients with rheumatic heart disease attending Jakaya Kikwete Cardiac Institute

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**Background:** Tanzania has a high prevalence of rheumatic heart disease, but the related arrhythmias are poorly recognised.

**Objectives:** We aimed at determining the prevalence and characterisation of arrhythmias among rheumatic heart disease patients.

**Method:** This was a hospital-based cross-sectional study that was conducted among 390 patients with an echocardiography diagnosis of RHD aged 18 years and above attending Jakaya Kikwete Cardiac Institute. Demographic and clinical information was documented. Echocardiography, a resting and 24 hours ambulatory Holter monitoring ECG were done. Logistic regression analysis was done to determine the association between arrhythmias with clinical characteristics and echocardiographic parameters, a p-value of <0.05 was considered statistically significant. The receiver operating curve was used to determine the critical point for left atrial diameter beyond which arrhythmias develop.

**Results:** The median age of the study population was 39 years IQR (30.52). Females were 65.9%. Arrhythmias were found in 276 (70.77%) patients, of which 193/390 (49.5%) patients were from resting ECG and 83/197 (44.7%) patients from Holter ECG. The commonest arrhythmia on resting ECG was atrial fibrillation which accounted for 110 (57%) and the commonest arrhythmia on the Holter ECG was premature ventricular contractions which accounted for 48 (40.5%) patients. Factors that were independent predictors for arrhythmias in multivariate logistic regression were New York Heart Association (NYHA) functional class III&IV (aOR 4.67, 95% CI 1.82-12.00 p=< 0.01) and severe left atrial diameter enlargement (aOR 7.28, 95% CI 3.17-16.70 p=< 0.01). The critical point beyond which arrhythmias develop was found to be left atrial diameter >48mm.

**Conclusion:** We found a high prevalence of arrhythmias among patients with RHD. NYHA functional class and left atrial dilatation were significantly associated with arrhythmias. We recommend close monitoring for the presence of arrhythmias among RHD patients with higher NYHA functional class and severe dilated left atrium presenting with sinus rhythm on resting ECG.

## Fontan procedure in low- to middle-income country

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**Background:** Single ventricle palliation in low- to middle-income countries is not documented. We reviewed our outcomes with the Fontan procedure. 25 patients in the last 7 years were reviewed.

**Objectives:** Look at outcomes of single ventricle palliation.

**Method:** 25 patients underwent Fontan procedure in 7 years.

**Results:** Mean age 6.2 years. Mean weight 20.7kg. 7 patients were older than 7 years. Tricuspid atresia was the commonest diagnosis. 1 early death. No late deaths.

**Conclusion:** Fontan procedure was performed at a later age in our setting. Early and late results are comparable to results in the literature.



### Aortic arch interruption with left ventricular obstruction

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**Background:** Management option for aortic arch interruption with left ventricular obstruction.

**Objectives:** Can it be managed effectively to avoid residual lesions?

**Method:** Comparison between a single stage and two stage Yasui procedure. Selection of the type of Norwood procedure.

**Results:** Initially a Norwood Sano procedure. Added a B-T shunt for suboptimal oxygenation. Has done well, is thriving.

**Conclusion:** In our setting a 2 stage Yasui is the treatment of choice.

### Outcome of the Ross / Ross-Konno procedure in a low- middle-income country: RCWMCH

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**Background:** Congenital left ventricular outflow tract (LVOT) stenosis presents a surgical challenge. The Ross / Ross-Konno operations are the procedures of choice when aortic valve replacement, with possible enlargement of the LVOT, is indicated. Advantages include somatic growth, excellent haemodynamics, no anticoagulation requirement, and durability. Concerns exist about the availability and quality of conduits for the reconstruction of the right ventricular outflow tract (RVOT).

**Objectives:** More than a decade ago we started a Ross programme, and we aim to describe our experience of the Ross / Ross-Konno procedure.

**Method:** Between June 2008 - October 2019, we did 27 Ross / Ross-Konno procedures. The median age at surgery was 92 months, and 15 % were 3 months or less. 67% have had surgical procedures before a Ross / Ross-Konno. Clinical, echocardiographic, and haemodynamic data were reviewed, and routine statistical analysis was performed.

**Results:** Isolated aortic valve stenosis was an indication for surgery in 6 patients and 1 patient had a hypoplastic aortic arch, ventricular septal defect, and complex left ventricular outflow tract obstruction. The remaining 20 patients had various lesions, including endocarditis and aortic stenosis with insufficiency. 3 patients died in hospital and 2 during subsequent follow-up. Survival was 84% at 2 years and remained the same at 8 years. No reintervention of the pulmonary autograft was required, whilst 2 had reintervention on the RVOT. Freedom from reintervention was 85% at 5 and 10 years.

**Conclusion:** The Ross / Ross-Konno procedures offer a good outcome for neonates and children with complex congenital LVOT obstruction and remain the best option, even during the neonatal period. Preoperative imaging is essential to define the exact coronary anatomy. These complex operations are highly reproducible if done by a dedicated surgical team.

### Rheumatic mitral valve surgery: Initial experience of the newest cardio-thoracic centre in sub-Saharan Africa

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**Background:** The mitral valve (MV) is the most deteriorated structure in rheumatic heart disease, and many require surgery. The feasibility of cardiac surgery is not straightforward in developing countries.

**Objectives:** Describe the initial experience of rheumatic MV surgery in the newest public cardio-pulmonary centre in sub-Saharan Africa.

**Method:** Analyse our database that was filled prospectively during the first 6 months (2 December 2021 - 13 June 2022) of the Complexo Hospitalar de Doenças Cardio-Pulmonares Cardeal Dom Alexandre do Nascimento, Luanda, Angola.

**Results:** A total of 73 surgeries were performed during the study period; 40 (55%) were MV, 35 (87.5%) were female with a mean age of 29-year-old (9 - 52 years), 18 (45%) had MV regurgitation, 7 (17.5%) were mixed, and 2 (5%) had MV stenosis. 13 (32.5%) had other(s) valve involved. The mean EF was 63.2% (48% - 82%). 33 (82.5%) underwent the first intervention, and 7 (17.5%) were redo. Most patients had severe PAH (30; 75%) with a mean of 62.5mmHg (30 - 118mmHg). 30 patients (75%) had Mean-to-Very High EUROSCORE II with a mean of 2.16% (0.69 - 10.5). 27 (67.5%) were single-valve approach (MV), 8 (20%) underwent 2 valves and 5 (12.5%) 3 valves approach. 4 (10%) underwent MV repair, and 36 (90%) underwent MR replacement. For the MV replacement group, mechanical and biological were divided into 50%. The mean CPB was 94 min (27 - 176 min) with a mean cross-clamping time of 77 min (24 - 151 min). Most patients were extubated in the operating room (26; 65%). The mean ICU and hospital lengths of stay were 3 (1 - 7 days) and 12 (5 - 42 days), respectively. In-hospital mortality was 5% (2 patients).

**Conclusion:** Rheumatic MV surgery in the newest cardio-thoracic centre in sub-Saharan Africa is feasible and safe with excellent results.

## Separation anxiety: Thoraco-omphalopagus twins

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**Background:** Thoraco-omphalopagus twins are rare, occurring in 1 in 50 to 200 000 live births. It is even more rare to encounter thoraco-omphalopagus twins delivered with no antenatal diagnosis in the rural setting.

**Objectives:** To accurately determine the cardiac anatomy of a set of thoraco-omphalopagus twins born in the rural setting.

**Method:** Echocardiogram was the first modality used to determine the cardiac anatomy of the twins, followed by CT angiogram and post-mortem done after the twins demised.

**Results:** The twins were found to have a single pericardial sac, and shared 2 ventricles with a ventricular septal defect, as well as atria but had 2 separate aortas.

**Conclusion:** Thoraco-omphalopagus twins born in the rural setting, deemed inoperable due to shared thorax and upper abdomen.

## Efficacy and safety of Aspirin and Warfarin association for the prevention of thrombo-embolism in mechanical heart valve patients: The experience of Salam Centre for Cardiac Surgery

*Franco Masini*

Salam Centre for Cardiac Surgery, Emergency NGO, Khartoum, Sudan

**Background:** In 2013 a Cochrane review documented a significant reduction of the thrombosis and mortality and an increased risk of bleeding through the association of antiplatelets to Vitamin K antagonists in patients with mechanical heart valve. In 2014 the AHA included this principle in the guidelines and in 2017 the Salam Centre for Cardiac Surgery adopted these guidelines.

**Objectives:** We analyse the haemorrhagic and thrombotic events observed in patients on VKA therapy for mechanical heart valve and their association with the Aspirin association.

**Method:** The management of oral anticoagulant therapy (OAT) of patients in follow-up at the Salam Centre for Cardiac Surgery is carried out by the Department of Anticoagulation Clinic. A dedicated computer system (PARMA GTS) is used for the dose prescription and for clinical events recording. Among these, the major bleeding (classified according to the ISTH criteria) and thrombotic events, including valve thrombosis, represent the side effect and failure of OAT.

**Results:** Between August 2018 and September 2019, we studied 3 647 patients (mean age 25,1; female 53,9%). 2 932 (80,4%) patients were treated both with Warfarin and Aspirin (100 - 75mg/die). We recorded 70 thrombotic event (1,82% p-y, 7 fatal) of which 46 (65%) valve thrombosis and 85 major bleeding episodes (2,16% p-y, n. 9 fatal), 16 cerebral, 19 gastrointestinal, and 32 menorrhagia. The risk of thrombosis is not significantly reduced by Aspirin treatment (OR 1.76, 95%CI 0.84-3.68; p value=0.135). Aspirin is significantly associated with bleeding risk (OR 1.8, 95%CI 1.0-3.4; p value =0.05)

**Conclusion:** In our patients Aspirin doesn't protect against the thrombosis. This could be related to new generation bileaflet prostheses. Furthermore, our population is young and has a low athero-thrombotic risk that could benefit from Aspirin. Aspirin increases the bleeding risk in young females because of menorrhagia.

## Comparison of different thrombolytic treatment for prosthetic mechanical valve thrombosis: The experience of Salam Centre for Cardiac Surgery

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**Background:** Prosthetic mechanical valve thrombosis (PVT) is a potentially life-threatening complication of mechanical valve replacement associated with high morbidity and mortality. The best treatment strategies for prosthetic valve thrombosis are controversial.

**Objectives:** We aimed to investigate the efficacy and safety of slow infusion of low-dose (25mg) tissue-type plasminogen activator (t-PA) for PVT and the comparison with the fast infusion (t-PA 15mg bolus followed by 0.75mg/kg and then 0.5mg/kg in 60 minutes).

**Method:** From February 2020 - June 2022, we recruited 121 patients treated with t-PA whose surgical mortality was considered to be high (mean age 29.3; female 51%). 57 (47%) patients were treated with fast thrombolysis, 64 (53%) with slow infusion of low-dose t-PA. There were 81 cases of mitral PVT (67%), 26 cases of aortic PVT (21%) and 14 cases involved in both valves (12%). All patients were confirmed by clinical symptoms, transthoracic echocardiography and X-ray fluoroscopy.

**Results:** The overall mortality was 7.0% (9/121): Fast 5% (6 patients) and slow 2% (3 patients); however, all patients who died were classified as NYHA IV. While the morbidity was 16.5% (20/121): 15.7% fast and 17.0% slow. We recorded 6 episodes (5%) of intracranial haemorrhage (7% fast and 3% slow); 5 episodes (4%) of ischemic stroke (7% fast and 2% slow); 9 episodes (7%) of non-fatal minor complications (2% fast and 13% slow). Our experience showed 36 patients (56.2%) successfully treated with single dose of slow protocol; of these 23 patients (64%) showed decreased the gradient across the valve and 13 (36%) with completely unblocked valve.

**Conclusion:** In our experience the single dose slow protocol of thrombolysis was successful in term of opening the PVT and decreasing the gradient across, with less mortality rate but was still higher non-fatal minor complications.

## Two-dimensional echocardiographic and strain values of the proximal thoracic aorta in a normal sub-Saharan African population

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**Background:** Aortic dilatation is a key predictor of morbidity and mortality in aortic and cardiovascular disease (CVD). Currently, there is need for data regarding normal thoracic aorta parameters in an African population.

**Objectives:** To establish normative values for proximal aorta dimension and strain in a healthy sub-Saharan African population.

**Methods:** A prospective cross-sectional study involving 91 participants was conducted at Chris Hani Baragwanath Hospital (2017 - 2019). Aortic measurements were obtained as per standard guidelines using a Philips iE33 system. Circumferential strain (CS) of the ascending aorta (AAO) was measured using Philips QLAB 9 two-dimensional speckle-tracking software (Amsterdam, Netherlands).

**Results:** Mean age was  $37.22 \pm 10.79$  years (41% male). The diameter at the aortic annulus, sinuses, Sino-tubular junction (STJ) and AAO were  $19.11 \pm 2.38$ mm,  $27.40 \pm 6.11$ mm,  $25.32 \pm 3.52$ mm and  $25.36 \pm 3.38$ mm, respectively. Males had a larger aortic diameter at the level of the sinuses when compared to females ( $16.32 \pm 2.10$ mm/m<sup>2</sup> vs.  $12.67 \pm 3.41$ mm/m<sup>2</sup>,  $p < 0.001$ ). The mean aorta CS was  $11.97 \pm 5.05\%$ . There was no significant difference in CS based on gender ( $12.19 \pm 5.04\%$  vs.  $11.51 \pm 5.02\%$ ,  $p = 0.267$ ).

On multivariate linear regression analysis, male gender was the most significant predictor of increased diameter at the level of the aortic annulus ( $r = 1.54$ ,  $p = 0.003$ ) and body surface area was the most significant predictor of increased diameters at the sinuses ( $r = 3.96$ ,  $p = 0.003$ ), STJ ( $r = 5.76$ ,  $p = 0.001$ ) and AAO ( $r = 5.85$ ,  $p < 0.001$ ). There was a negative correlation between age and aortic CS ( $r = -0.17$ ,  $p < 0.001$ ). Ascending Aorta (AAO) diameter was the most important independent predictor of aorta CS on multivariate analysis ( $r = -0.41$ ,  $p = 0.017$ ).

**Conclusions:** This study provides normal reference ranges for dimensions of the proximal aorta and CS in an African population. It serves as a platform for future studies and for risk stratification of CVD in a black population.

## Pacing in rural South Africa

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**Background:** Pacemaker implantation is a life-saving procedure used to treat patients presenting with various types of heart blocks and sinus nodal disease. Pacemakers also improves the quality of life of these patients. Pacemaker implantation is usually performed in a cardiac catheterisation lab, done under strict sterile conditions. Due to the absence of cardiac catheterisation labs in the rural areas, many patients are transferred to the tertiary hospitals in urban provinces.

**Objectives:** To establish a pacing unit in a rural hospital. To improve access to cardiac pacing and follow ups for patients in rural areas. To reduce the hospital length of stay for patients requiring pacing in rural hospitals. To initiate the collaboration and training of semi-skilled physicians from rural areas, to learn basic pacing. To provide safe basic pacing for patients in rural areas using minimal available resources.

**Method:** We report a series of pacemaker implantations done in a rural hospital using an analogue X-ray C arm in a surgical theatre in a rural hospital.

**Results:** Between June 2020 and April 2022, a total of 21 pacemakers were implanted, of which 20 were dual chamber pacemakers. The common indication for pacing was complete heart block. Left arm venogram was performed in all cases and the axillary or subclavian cannulation was performed under fluoroscopy. 1 patient had an occluded left subclavian vein, and the pacemaker was implanted from the right subclavian vein. All patients received a single dose of Kefzol 2g at least 15 minutes prior to incision.

Patients who had a complete heart block with wide complex bradycardia and rate less than 40 beats per minute had a temporary pacemaker lead implanted prior to permanent pacemaker implant. One patient had a pneumothorax during the procedure, that was treated with an intercoastal drainage. None of the patients had cardiac arrest during the procedure, and no wound sepsis has been documented. The average hospital length of stay was 3 days.

**Conclusion:** In resource limited institutions, pacemaker implantation can be safely performed using a mobile analogue C-arm X-rays. Basic theatre sterility measures must be adhered to, to mitigate the risk of sepsis.

## The use of D-Dimer assay to exclude left atrial thrombus in patients undergoing cardioversion for atrial fibrillation / flutter or interventions via the left atrium

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**Background:** Patients with arrhythmias such as atrial fibrillation / flutter (AF/AFL), or structural heart disease such as mitral stenosis are at risk of left atrial thrombus (LAT) formation. This risk for thromboembolism is especially high in peri-procedural circumstances such as cardioversion, or with catheter manipulation in the left atrium (LA) in procedures such as mitral balloon valvuloplasty or AF ablation. To limit the risks of thromboembolism, all these patients undergo transoesophageal echocardiography (TOE) prior to these procedures. The diagnostic use of D-Dimer assay in these patients is unclear in South Africa.

**Objectives:** The objective was to assess the utility of the D-Dimer assay as a surrogate to detect or exclude LAT prior to cardioversion or LA interventions.

**Method:** After ethics and institutional approval, informed consent was obtained from consecutive patients presenting for TOE from 2 December 2021 - 9 June 2022. Blood samples for D-Dimer levels were collected within 48 hours of the TOE procedure.

**Results:** 32 patients were recruited prospectively. The mean age was 53 years (range 24 - 77). 11 (31%) of these patients were male. The patients had a high thrombo-embolic risk with a mean CHADS-VASc score of 3.25. 2 patients had LAT, both with elevated D-Dimer levels (mean of 0.61 mg/L). Of the 30 patients without clot, spontaneous LA echo contrast (LASEC) was present in 5 individuals. These 5 patients had a mean D-Dimer level of 0.41 mg/L. The remaining patients had clear LA with a mean D-Dimer level of 0.39 mg/L. No patient with a normal D-Dimer level (<0.25 mg/L; n=19) had LASEC or LAT present.

**Conclusion:** In this small cohort, elevated D-Dimer levels alone were not able to distinguish patients with or without LAT. However, the absence of LAT and LASEC in patients with D-Dimer levels <0.25 mg/L suggests that the negative predictive value of this finding should be explored with a larger cohort.

## CYP2C19 genetic variation among acute coronary syndrome patients at Tygerberg Hospital, Cape Town

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**Background:** Clopidogrel requires conversion to its active form through metabolic activation by CYP2C19. It is postulated that loss of function CYP2C19-variants are likely to result in increased stent thrombosis, while gain of function variants may benefit from use of clopidogrel at the expense of bleeding.

**Objectives:** We set out here to evaluate the extent of CYP2C19 genetic variation among patients presenting with acute coronary syndrome (ACS) to Tygerberg Hospital (TBH) and assessed the cohort for associations of CYP2C19 genotypes with clinical outcomes.

**Method:** We prospectively recruited 226 ACS patients placed on dual antiplatelet therapy (DAPT) during 2019 - 2020. Medical records were accessed for clinical and demographic information. Each participant provided 5ml blood sample in EDTA-coated tubes for DNA extraction. Genetic characterisation was carried out for 5 CYP2C19 SNPs, CYP2C19\*2 (rs4244285), CYP2C19\*3 (rs4986893), CYP2C19\*9 (rs17884712), CYP2C19\*17 (rs12248560) and CYP2C19\*35 (rs12769205). Genotypes were analysed to identify associations with available clinical outcomes.

**Results:** A total of 226 participants enrolled in the study. The mean age (+SD) of the patients was 57.2 (+10.9). The prevalence of CYP2C19 allelic variants among the Mixed Ancestry, European Ancestry and African patients, respectively, were as follows: CYP2C19\*2 (0.18, 0.15, and 0.23), CYP2C19\*3 (0, 0, and 0), CYP2C19\*9 (0.01, 0.01, and 0), CYP2C19\*17 (0.14, 0.13, and 0.23) and CYP2C19\*35 (0.21, 0.19, and 0.21). CYP2C19\*17/\*17 genotype was associated with significantly higher number of stents (P=0.0088) compared to, CYP2C19\*1/\*1 and CYP2C19\*1/\*17.

**Conclusion:** This study shows that CYP2C19 exhibits genetic variation in this South African cohort. The results could indicate a role for CYP2C19\*2, \*17 and \*35 impacting on the prognosis of acute coronary syndrome (ACS) patients. To provide evidence that informs drug choice and dosage in ACS patients, would require a pharmacokinetic study to evaluate the effects of these polymorphisms on clopidogrel metabolism as well as a prospective study looking at hard clinical endpoints.

## The outcome of surgical repair of Tetralogy of Fallot in KwaZulu-Natal, South Africa

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**Background:** Surgical repair of Tetralogy of Fallot (TOF) is recommended during infancy. Late patient presentation, coupled with limited surgical and intensive care services in our setting results in late repair; potentially worsening patient outcomes.

**Objectives:** To analyse the clinical characteristics and outcome of patients undergoing complete TOF repair at Inkosi Albert Luthuli Central Hospital (IALCH).

**Method:** Hospital records of all TOF patients who had complete surgical repair from January 2005 - December 2017 were analysed following ethical approval (BREC/00000476/2019).

**Results:** 292 patients had surgical repair; most (91%) were operated at  $\geq 12$  months of age. Preoperatively, 5 patients had infective endocarditis, 1 presented with a brain abscess and 1 suffered a cardiac arrest from a severe hypercyanotic spell. Early mortality occurred in 15 patients (5.1%). These were associated with age at repair  $< 12$  months ( $p=0.017$ ), wasting ( $p=0.031$ ), prolonged cardiopulmonary bypass ( $p=0.004$ ), prolonged aortic cross-clamping ( $p=0.001$ ) and culture proven post-operative infection ( $p=0.026$ ). 18 (6%) suffered major post-operative morbidities, predominantly central nervous system (CNS) complications. 118 (40.4%) children were lost to follow up.

**Conclusion:** Most patients at IALCH had late repair and a significant number were lost to follow-up. Age at repair, nutritional status, duration of bypass and infections significantly influenced early mortality.

## Ubiquinone (CoQ) ameliorates mitochondrial bioenergetics and apoptosis in an in vitro model of doxorubicin-induced cardiotoxicity

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**Background:** The clinical significance of doxorubicin (Dox), a potent chemotherapeutic agent is limited by its cardiotoxicity. Dexrazoxane (Dex) is used as a cardioprotective agent but is associated with haematological toxicities. Therefore, alternative preventive therapies are required against Dox-induced cardiotoxicity (DIC). Coenzyme Q10 (CoQ10), an endogenous antioxidant, existing in an oxidized (ubiquinone - CoQ) or reduced (ubiquinol - CoQH<sub>2</sub>) form alleviates DIC. The premise is that mitochondrial abnormalities contribute to the etiology of DIC. However, the mechanism by which CoQ10 attenuates Dox-induced mitochondrial dysfunction is unclear.

**Objectives:** We aim to establish if CoQ supplementation can ameliorate DIC using an H9c2 cardiomyoblast model.

**Method:** H9c2 cardiomyoblasts were cultured in Dulbecco's Modified Eagle's Medium (DMEM) and pre-treated with either CoQ (2 $\mu$ M and 3 $\mu$ M) or Dex (10 $\mu$ M) for 2 days. On day 2, cells were treated with either Dox (0.25 $\mu$ M or 0.5 $\mu$ M) or co-treated with 0.25 $\mu$ M Dox + CoQ (2 $\mu$ M or 3 $\mu$ M) or Dex or 0.5 $\mu$ M Dox + CoQ (2 $\mu$ M or 3 $\mu$ M) or Dex for 4 days. Cells treated with media were the vehicle control. After 6 days, oxidative stress (DCFH-DA and GSH / GSSG assay), mitochondrial bioenergetics (Seahorse assay), mitochondrial membrane potential (JC-10), and apoptosis (caspase 3/7 and annexin-V and propidium iodide staining) were assessed.

**Results:** CoQ (2 $\mu$ M & 3 $\mu$ M) attenuated Dox-induced oxidative stress by increasing total glutathione content, whilst preserving mitochondrial integrity. The percentage of apoptotic cells were lower in the co-treatment groups when compared to Dox alone. Furthermore, co-treatments of Dox + CoQ were comparable to the Dox + Dex controls, across all parameters tested.

**Conclusion:** CoQ mitigated DIC by down-regulating oxidative stress while improving mitochondrial function, and cellular apoptosis in an in vitro H9c2 model. These findings support the therapeutic use of CoQ supplementation against DIC to maintain cardiovascular health.

## No-touch saphenous vein harvesting: Advancing the workhorse

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**Background:** Coronary artery bypass grafting (CABG) is the only surgical treatment for ischaemic heart disease, the leading cause of death globally. The saphenous vein is the most frequently used conduit in CABG patients. Maintaining saphenous vein long-term patency is one of the most crucial challenges in cardiac surgery. This situation led to the development of the no-touch saphenous vein harvesting technique, where the vein is entirely harvested with its pedicle of surrounding tissue. Several studies report a superior long-term patency rate, slower progression of atherosclerosis, and better clinical outcomes while employing the no-touch harvesting technique. Studies have also shown an increased incidence of leg harvest site infections. The technique's success is multifactorial, including the decreased risk of trauma and graft spasm, the need for manual distension, preservation of the vaso vasorum and an intact endothelium, reducing neointimal hyperplasia and subsequent atherosclerosis. Furthermore, the intact perivascular tissue, including the surrounding cushion of fat, may act as a "natural external stent", providing mechanical support preventing the graft from kinking. The use of arterial grafts, combined with the no-touch saphenous vein graft, may significantly improve the results of CABG results.

**Objectives:** This study aimed to ascertain early morbidity such as leg wound infections and major adverse cardiac events (MACE) after no-touch saphenous vein harvesting in CABG.

**Method:** A retrospective observational study of 7 patients undergoing CABG was undertaken using the no-touch saphenous vein harvesting technique. Patients were monitored for leg wound complications and postoperative MACE.

**Results:** Three patients were females, and 4 had diabetes mellitus. No patients had harvest site infections or postoperative MACE.

**Conclusion:** Increasing evidence supports using no-touch saphenous vein harvesting over the conventional skeletonised technique to improve vein graft patency. The low incidence of harvest site infections should encourage surgeons to use the no-touch saphenous vein technique.

## Early outcomes following mitral and aortic valve repair for rheumatic heart disease in KwaZulu-Natal

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**Background:** In developing countries, rheumatic fever constitutes a significant health problem. Patients are usually younger, childbearing, socioeconomically poor, uneducated, have low compliance to Warfarin, and access to medical care may be difficult. In these circumstances, the rate of complications associated with valve replacement is significantly increased. When feasible, repair of rheumatic heart valves may be the procedure of choice in an underprivileged population.

**Objectives:** To ascertain the early outcomes of rheumatic valve repair.

**Method:** A retrospective review of surgical techniques and early outcomes in rheumatic mitral and aortic valve repair at a single institution in KwaZulu-Natal was done between March - May 2022. Data collection included demographics and peri-operative echocardiographic features. Patients were followed up at 1 month.

**Results:** Six patients underwent isolated mitral valve repair, 3 for severe mitral valve regurgitation, and 3 for severe mitral valve stenosis. One patient underwent mitral and aortic valve repair. One patient with severe mitral regurgitation had neochordae inserted for anterior leaflet prolapse. In contrast, 2 patients with severe mitral valve regurgitation had posterior leaflet augmentation with treated autologous pericardium for posterior leaflet restriction and neochordae insertion for leaflet prolapse. A patient with infective endocarditis of the mitral valve with severe mitral regurgitation and moderate aortic valve regurgitation had infected mitral valve leaflet tissue resected and leaflet reconstruction with autologous pericardium done while the aortic valve was repaired with cuspal and commissural techniques. Three patients with severe mitral stenosis were repaired with bilateral commissurotomies, leaflet thinning procedures, papillotomies, decalcification, and neochordae insertion. Ring annuloplasty was implanted in all patients. There was no operative mortality. All patients had markedly improved echocardiographic features at discharge and 1 month follow up.

**Conclusion:** The evolution of surgical techniques and greater surgeon experience has contributed to continuous improvement in valve repair rate with improved results.

## Aortic valve replacement with aortic root enlargement should be done more frequently for future Valve in Valve Transcatheter aortic valve implantation

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**Background:** Surgical aortic root enlargement (ARE) during aortic valve replacement (AVR) allows for larger prosthesis implantation, thus minimising prosthesis patient mismatch (PPM). In addition, ARE can also assist in allowing a larger prosthesis for possible future Valve in Valve Transcatheter aortic valve implantation (ViV TAVI) in cases of bioprosthesis failure. However, surgical ARE has not been widely adopted, likely because of a possible increase in morbidity and mortality.

**Objectives:** To evaluate the early outcomes of patients undergoing AVR with or without ARE at Inkosi Albert Luthuli Hospital.

**Method:** A retrospective review was undertaken between May 2021 and May 2022 of patients undergoing conventional AVR and AVR with ARE. ARE was undertaken when a larger internal diameter and effective orifice area of a prosthesis was required for the calculated patient body surface area (BSA).

**Results:** Two patients underwent AVR with ARE with a 23mm bioprosthesis implanted to prevent PPM. One patient underwent redo AVR and ARE due to a dysfunctional mechanical aortic prosthesis implanted in a small aortic root following aortic and mitral valve replacements. There was no peri-operative or 30-day mortality, stroke, reoperation for bleeding or myocardial infarction in the AVR with ARE group. These results compared favourably to patients undergoing conventional surgical AVR.

**Conclusion:** Surgical enlargement of the aortic root was not associated with an increased risk of adverse events or mortality. Surgeons should carefully consider the patient's age, the complexity of the surgery, BSA, the internal orifice of the chosen valve size, and the suitability for future ViV TAVR at the time of surgical AVR.

## The role of invasive functional assessment in coronary artery bypass graft surgery

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**Background:** Percutaneous coronary intervention is beneficial in stable coronary artery disease if the lesion is deemed significant by invasive functional assessment using fractional flow reserve (FFR). Recent studies have shown that a revascularisation strategy using instantaneous wave-free ratio (iFR) is non-inferior to FFR in patients with intermediate-grade stenosis. The decision to perform coronary artery bypass grafting (CABG) is usually based on a visual anatomic assessment of stenosis severity by coronary angiography. The data on the role of invasive functional assessment in guiding surgical revascularisation are limited.

**Objectives:** To discuss patients who underwent invasive functional assessment by instantaneous wave-free ratio followed by coronary artery bypass surgery and the issues surrounding the topic of invasive functional assessment in CABG.

**Method:** Review patients that underwent invasive functional assessment followed by CABG over a period of 1 year from May 2021.

**Results:** One patient underwent iFR on the left main stem-left anterior descending artery following an angiogram which showed a 40% stenosis. The iFR was positive with the following values: 0,85; 0,82; 0,83. CABG was subsequently done.

**Conclusion:** In terms of graft patency, data from the Impact of Preoperative FFR on Arterial Bypass Graft Functionality trial, contradict the findings from FARGO and GRAFFITI trials. Occlusion rate in the 2 prospective randomised trials reached 16% - 20% at 1 year without difference between the 2 groups, whereas in the full arterial grafting trial, it was 3% when FFR was <0.78. The explanation for this significant difference is probably related to the difference in the types of graft used in the different trials. Regarding clinical outcomes - knowing that the 2 trials were vastly underpowered with significant bias - no clinical benefit of FFR-based CABG was observed. FFR is an important tool to help decide whether an arterial or venous conduit should be used.

## Multi and total arterial coronary artery revascularisation: An individualised approach

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**Background:** Various observational studies and meta-analyses have shown that patients who receive multiple arterial grafting (MAG) and total arterial grafting (TAG) have better long-term survival than patients who receive single arterial grafting (SAG) and saphenous vein grafting. SAG occurs in over 90% of patients as safety concerns and technical complexity are often used to justify the low rate of MAG.

**Objectives:** To analyse MAG and TAG at a single academic institution.

**Method:** We analysed the early outcomes of MAG and TAG between May 2021 - May 2022 at IALCH. Conduits and grafting strategies were chosen based on the patient's age, comorbidity and degree of coronary stenosis. Primary endpoints were major adverse cardiac events in the postoperative period, at 1 month follow-up and morbidity such as deep sternal wound infections (DSWI).

**Results:** 65 patients underwent multivessel CABG, 40% underwent MAG and 20% underwent TAG. The left internal mammary artery (LIMA) was deployed in all cases. Grafting strategies included LIMA (85% of patients) or right internal mammary artery to the left anterior descending artery. 15% of patients had composite T or Y grafting. Sequential grafting was undertaken in certain cases. Bilateral internal mammary arteries were used in 25% of patients. The radial artery was deployed in the majority of cases. The gastro-epiploic artery was deployed in 5% of patients. 15% of patients had diabetes and BIMA grafting with no incidence of DSWI. 4 patients developed a post-operative pneumonia. There were no major adverse cardiac events during the postoperative period and at 1 month follow-up.

**Conclusion:** CABG should be individualised based on patient characteristics and degree of coronary stenosis. Surgeon expertise and institutional experience should be considered in decision making on the best treatment for patients with coronary artery disease.

## Posterior pericardiotomy prevents new onset atrial fibrillation after cardiac surgery: A single centre experience

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### Background

Atrial fibrillation (AF) is one of the most common complications after cardiac surgery and is associated with adverse events, including death and stroke. Postoperative AF (POAF) incidence ranges between 15% - 40%. Shed mediastinal blood presenting as a pericardial effusion might have a pivotal role in developing atrial fibrillation. Observational studies show that surgical drainage of the pericardium could reduce the incidence of POAF.

**Objectives:** To ascertain if posterior pericardiotomy reduces the risk of POAF.

**Method:** A retrospective study where adult patients undergoing elective surgical procedures on the coronary arteries or aortic valve was undertaken. The primary outcome was the incidence of atrial fibrillation during the postoperative in-hospital stay. 10 patients underwent posterior pericardiotomy, and 10 patients with similar profiles, such as age, sex, operation, and co-morbidities, in the control group did not undergo the procedure. All patients in the posterior pericardiotomy group underwent the same surgical technique, which consisted of a 4 - 5cm longitudinal incision of the posterior pericardium, parallel and posterior to the left phrenic nerve, thus allowing drainage of the pericardial fluid into the drained left pleural space.

**Results:** No patients in the posterior pericardiotomy group developed POAF. Two patients in the control group developed POAF. There were no complications related to the surgical procedure.

**Conclusion:** Posterior pericardiotomy is a simple and safe technique to reduce POAF.

## The use of an IALCH modification of del Nido cardioplegia for adult cardiac surgery

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**Background:** Cardiac surgery usually involves cardiopulmonary bypass and cardiac arrest by a cardioplegic solution. The traditional del Nido cardioplegia, developed for paediatric surgery, reduces aortic cross-clamp duration, cardiopulmonary bypass time, and required volume. However, in many countries, the unavailability of Plasma-Lyte A (base substrate solution) precludes the use of traditional del Nido cardioplegia.

**Objectives:** To evaluate myocardial preservation and clinical outcomes using a locally made modified del Nido cardioplegia at Inkosi Albert Luthuli Hospital.

**Method:** An observational study was undertaken to evaluate myocardial preservation and clinical outcomes using a local modification of del Nido cardioplegia compared with our institute's standard blood cardioplegia strategy. The institution's modified del Nido cardioplegia contained a base substrate solution with potassium, mannitol, magnesium sulphate, sodium bicarbonate, and lignocaine added. Clinical data and outcomes were compared.

**Results:** IALCH modified del Nido cardioplegia was used in 8 adult patients that underwent cardiac surgery between August 2021 and January 2022. Procedures included 4 CABGs, one aortic valve replacement, 1 mitral valve repair, 1 modified Bentall operation, and 1 double valve replacement. Troponin levels were lower in the del Nido group on postoperative day 1. In addition, the del Nido group exhibited a lower total volume of cardioplegia administered, fewer doses with an average duration of 94 minutes between the first and second dose, and a decreased incidence of ventricular fibrillation after cross-clamp removal. No mortality was observed, and clinical outcomes were similar between the 2 groups.

**Conclusion:** Our institution's modified del Nido cardioplegia modification appears to be highly efficient in myocardial protection, allows for a more uninterrupted operation, and from an economic point of view.



## Surgical outcome of infective endocarditis at Tygerberg Hospital from 2010 - 2019: A retrospective review

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**Background:** A thesis presented on the operative outcome of patients undergoing left-sided cardiac valve surgery for infective endocarditis, within the setting of Tygerberg Hospital during January 2010 - December 2019.

**Objectives:** It is hypothesised that differences in burden of disease, timing to surgery, organism prevalence and co-morbid disease distribution may show a poorer outcome compared to internationally expected standards.

**Method:** The study was conducted as a retrospective research project to evaluate the outcome of heart valve surgery with confirmed or suspected infective endocarditis. The final cohort (n=160) was assessed looking at various demographic, operative and admission related parameters. The primary outcome is to measure the early (<30 day) mortality, mortality after 30 days, and the long-term survival of these patients.

**Results:** During the follow-up period 77.5% (n=124) of the cohort were still alive, 8.8% (n=14) demised within 30 days, and 13.1% (n=21) demised more than 30 days after surgery. In the early post operative period a higher mortality was observed with increased age (p=0.04), critical illness (p<0.001) and a higher urgency of intervention (p<0.001). The EuroScore II scoring system was an important predictor of early post-operative mortality (p<0.001), but the accuracy thereof waned significantly after 30 days. A strong association with peri-operative organ failure could also be demonstrated as a risk factor; with cardiac failure (p=0.025), acute renal failure (p=0.016) and respiratory failure (p<0.001) contributing significantly to both early and late mortality.

**Conclusion:** Infective endocarditis remains a major burden in South Africa and is a common indication for cardiac valve surgery. The outcome of these patients depends on a multitude of factors. Goal directed medical management and clinical optimisation prior to surgical intervention were shown to be the most important adaptable factors attributing to better surgical outcome.

## Quantifying Parvo B19 viral counts in the myocardium of a South African cohort: Comparing raw counts with normalised counts

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**Background:** Parvovirus B19 (PVB19) DNA is found in the hearts of patients with acute myocarditis but the high background prevalence of the virus in the myocardium of patients without myocarditis limits its diagnostic use in this setting. Assessing PVB19 viral load (VL) has been proposed to separate acute infection from background prevalence. Quantification of PVB19 VL is labour intensive and expensive. There is a need, in our resource limited setting, to determine the requirement to normalise absolute viral counts for DNA content rather than rely on the raw counts in biopsy specimens.

**Objectives:** Determining PVB19 VL in myocardial biopsies: Comparing absolute counts with counts normalised for DNA content in patients undergoing heart surgery.

**Method:** Patients without myocarditis undergoing elective cardiac surgery prospectively recruited between May - July 2021. Atrial tissue excised during right atrial cannulation during cardiopulmonary bypass was collected and polymerase chain reaction (PCR) for PVB19 was performed on the specimens. Absolute viral load was determined then also normalised against the number of human cellular diploid genomes in the sample with an assay amplifying the cellular CCR5 gene, a method established in our laboratory for cell-input normalisation.

**Results:** A total of 50 patients underwent cardiac surgery. 43 (86%) patients tested PCR positive for myocardial PVB19. There was an excellent correlation between the VL raw counts and normalised counts (Pearson  $r=0.935$ ,  $r^2=0.874$ ,  $p<0.001$ ).

**Conclusion:** The detection of B19 DNA by PCR technology in myocardial tissue requires careful interpretation and is not proof of a causal relationship between PVB19 infection and cardiac disease. High copy numbers of PVB19 DNA in the myocardium could indicate a causal relationship. Non-normalised PVB19 VL correlates well with a normalised VL providing a less expensive method of quantifying PVB19 VL as a first step in assessing the diagnostic role of PVB19 in myocarditis.

## A prospective study on adherence to secondary prophylaxis for rheumatic fever using benzathine penicillin G in Mozambique

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**Background:** Delivery of regular long-acting intramuscular benzathine penicillin G (BPG) injections is the most effective method for secondary prophylaxis to prevent recurrence of acute rheumatic fever (ARF). We aimed to assess the adherence rates to BPG regimens for prevention of ARF in a low-income setting.

**Objectives:** We aimed to assess the adherence rates to BPG regimens for prevention of ARF in a low-income setting.

**Method:** Between November 2017 and October 2018 we profiled a cohort of patients with RHD on secondary prophylaxis at 2 hospitals in Mozambique; then we prospectively assessed adherence to secondary prophylaxis using monthly BPG injections. Cultures obtained from throat swabs collected at the 12th month of prophylaxis on 78 patients selected randomly, and were examined by gram stain, catalase test and CAMP test to detect Group A Streptococcus

**Results:** We enrolled 121 patients, mostly adolescents (mean age 20.8 years; SD 5.9) and females (77; 63.6%). Isolated or combined mitral regurgitation was the commonest lesion (107 patients; 88.4%), followed by aortic regurgitation (54; 44.6%) and mitral stenosis (21; 17.4%). The mean follow up was 19 months. The adherence rate was 86.8%, corresponding to 2 228 injections applied out of the 2 555 expected; only 1 708 (66.8%) were administered at the expected date and 59 patients (49%) were fully compliant. Testing for GAS throat colonisation in patients randomly selected on month 12 was negative. One fatal event occurred in relation to BPG injection, not fulfilling criteria for anaphylaxis. ARF incidence during follow-up was 5.82 (95% CI 0.25 – 25.8) cases / 1 000 patients per annum.

**Conclusion:** RHD patients on secondary prophylaxis in urban hospitals in Mozambique had good adherence and acceptable compliance to monthly BPG injections. The incidence of ARF during follow-up was low and no classic anaphylaxis occurred. Further research is warranted to address gaps in delivery of secondary prophylaxis.

## The modified Duke / European Society of Cardiology 2015 clinical criteria for infective endocarditis: Time for an update?

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**Background:** The diagnosis of infective endocarditis (IE) is based on the modified Duke / ESC 2015 clinical criteria. The sensitivity of the criteria is unknown in South Africa, but high rates of blood culture negative endocarditis (BCNIE), coupled with a change in the clinical features of IE, may limit the sensitivity.

**Objectives:** To assess sensitivity of the current modified Duke / ESC 2015 clinical criteria in a South African cohort of patients with definite IE by pathological criteria.

**Method:** The Tygerberg Endocarditis Cohort (TEC) study prospectively enrolled patients with IE between November 2019 and June 2021. A standardised protocol for organism detection, with management of patients by an endocarditis team, was employed. Patients with definite IE by pathological criteria were analysed to determine the sensitivity of the current clinical criteria.

**Results:** 80 consecutive patients with IE were included of which 45 (56.3%) had definite IE by pathological criteria. In patients with definite IE by pathological criteria, 26/45 (57.8%) of patients were classified as definite IE by clinical criteria. BCNIE was present in 25/45 (55.6%) of patients and less than three minor clinical criteria were present in 32/45 (75.6%) of patients. The elevation of Bartonella serology to a major microbiological criterion of the modified Duke / ESC 2015 clinical criteria would increase the sensitivity (57.8% vs. 77.8%; p=0.07).

**Conclusion:** The sensitivity of the modified Duke / ESC 2015 clinical criteria is lower than expected in patients with IE in South Africa, primarily due to the high rates of Bartonella-associated BCNIE. The elevation of Bartonella serology to a major microbiological criterion, similar to the status of *Coxiella burnetii* in the current criteria, would increase the sensitivity. The majority of patients with definite IE by pathological criteria had less than 3 minor criteria present.

### Characteristics and outcomes of infective endocarditis in South Africa: A retrospective cohort study

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**Background:** Infective endocarditis (IE) remains a disease with significant morbidity and mortality for a predominantly young group of patients in South Africa. There is a paucity of data assessing contemporary outcomes of IE in South Africa, limiting our ability to institute strategies to improve the outcome of patients with IE in South Africa.

**Objectives:** Identify patients with definite or suspected IE referred to the Division of Cardiology for assessment as per ESC criteria and establish a patient profile. Characterise the disease entity by evaluating: Presenting clinical features, imaging findings and medical / surgical management.

**Method:** A retrospective cohort of patients with IE was established from healthcare records for the period of 1 January 2017 - 31 December 2018. A profile of clinical, laboratory, microbiologic, echocardiographic, surgical and morbidity and mortality data was compiled for each patient.

**Results:** A total of 75 patients with definite IE were included in this study. The mean age was 39.6 years with a male preponderance (68%). Mortality at 6 months (all cause) was 34.7% and embolic complications were common, especially cerebral embolism (21%). Rheumatic heart disease (RHD) was present in 28% of the cohort. A high rate of blood culture negative IE (BCNIE) was present (62.7%). In patients with a positive blood culture, *Staphylococcus aureus* (43%) and the viridans group of streptococci (32%) were the most common causative organisms.

**Conclusion:** IE in South Africa remains a disease with a significant mortality rate despite the young age of the patients affected. The high rate of BCNIE is a likely contributor to the associated adverse outcomes. Some of the features of IE in South Africa have evolved to resemble a profile of disease similar to cohorts from high-income countries with a Staphylococcal predominance and a reduction in underlying RHD as predisposing risk factor.

### Altered cardiac structure and function in newly diagnosed persons living with HIV: A prospective cardiovascular magnetic resonance study after ART initiation

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**Background:** Human immunodeficiency virus associated cardiomyopathy (HIVAC) is a poorly understood disease group. The influence of modern antiretroviral therapy (ART) on HIVAC remains unstudied.

**Objectives:** We set out to evaluate the presence of subclinical HIVAC in a group of persons newly diagnosed with HIV and study the evolution of cardiac abnormalities after ART is initiated.

**Method:** We recruited 66 ART naïve persons with HIV and a healthy age- and sex-matched, HIV uninfected group (n=22). All participants underwent comprehensive cardiovascular evaluation, including cardiovascular magnetic resonance imaging. The HIV group was started on ART and re-evaluated 9 months later. The cardiovascular parameters of the study groups were compared at diagnosis and after 9 months.

**Results:** The ART naïve group's left- and right-end diastolic volume for height were larger compared with controls (p<0.03). The left ventricular mass for height was on larger in the naïve group compared with controls (p=0.04). The ART naïve group had decreased left- and right-ventricular ejection fraction (p<0.03) and significant negative, non-linear associations with high HIV viral load (p=0.02 respectively). The left ventricular size increased after 9 months (p=0.04), while the systolic function remained unchanged. The HIV group had high rates of small, but non-resolving pericardial effusion (67% at diagnosis vs. 65% at 9 months).

**Conclusion:** HIV-infected persons demonstrate structurally and functionally altered ventricles with high rates of pericardial effusion at diagnosis. High HIV viral load was associated with left- and right-ventricular dysfunction. Cardiac morphology, function and pericardial effusion prevalence did not show improvement with ART. Conversely, a concerning trend of increase was observed with left ventricular size. This may be due to persistent myocardial inflammation. These subclinical cardiac abnormalities may represent a stage on the continuum of HIVAC that can progress to symptomatic disease if the causes are not identified and addressed.

## Evolution of myocardial oedema and fibrosis in HIV-infected persons after the initiation of antiretroviral therapy: A prospective cardiovascular magnetic resonance study

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**Background:** The myocardium of HIV-infected individuals may be abnormal before antiretroviral treatment (ART) is initiated. These abnormalities may represent subclinical HIV-associated cardiomyopathy (HIVAC). The influence of ART on subclinical HIVAC is not known.

**Objectives:** We prospectively evaluated multiparametric, myocardial tissue characteristics using cardiovascular magnetic resonance.

**Method:** Newly diagnosed, ART naïve persons with HIV infection were consecutively enrolled along with HIV uninfected controls. All participants underwent a contrasted cardiovascular magnetic resonance study, including multiparametric mapping. The HIV group was started on ART and re-evaluated 9 months later. Cardiac tissue characterisation was compared in, and between the groups.

**Results:** Compared with controls (n=22), the global native T1, global T2, and the prevalence of pericardial effusion were significantly higher in the HIV infected group (n=73) at diagnosis (p<0.02). Global native T1 and extracellular volume (ECV) decreased significantly after 9 months on ART (p<0.001) and were associated with a decrease in the HIV viral load, decreased systemic inflammation, and improvement in the CD4 count (p<0.001). Replacement fibrosis was significantly higher in the HIV infected group (p=0.02). The prevalence of LGE did not change significantly over the 9 month study period (p=0.4).

**Conclusion:** Subclinical HIVAC may already be present at the time of HIV diagnosis, as suggested by the combination of subclinical myocardial oedema and fibrosis found to be present before ART was initiated. ART led to improvement in CD4 counts, viral suppression, and decreased systemic inflammation that was associated with improvement in imaging-markers of myocardial oedema in the short term. Systolic function did not improve on ART, suggesting non-reversible myocardial injury or ongoing myocardial inflammation. It is therefore not clear whether the underlying pathological mechanism is halted by ART, or merely slowed. Mid- to long-term prospective studies are needed to evaluate subtle myocardial changes over time and to assess the significance of subclinical myocardial fibrosis.

## SHARE-TAVI national registry 5-year outcomes, and the influence of malignancy and frailty on late outcomes

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**Background:** The SA national prospective multicentre observational SHARE-TAVI registry aims to provide local outcomes data on all TAVIs in State and Private sectors.

**Objectives:** To support local evidence-based policy evaluations, comparing local outcomes to international data and identifying local variations, to improve patient care.

**Method:** All 20 implant centres voluntarily capture all-comers data into the web-based registry. 2 442 patients from 1 September 2014 - 10 July 2022 had pre-TAVI clinical evaluations and 1 623 proceeded to TAVI and had procedural data and complications (VARC2 criteria), 30 day and annual follow-up recorded. The 5 year cohort of 358 patients have clinical history, profile similar to international data.

**Results:** Procedural success of 94.13% and 1 year mortality of 14.53% in the 5 year cohort (STS score 7.91%) are similar to reported international data in early TAVI programmes. All-cause mortality at 5 years is 48.3% (in PARTNER 1 - 67.8%, PARTNER 2.0 - 46.0%), non-cardiac causes make up 31.79% of the all-cause mortality. Outcomes measures in a more recent 2020 patient cohort (n=223, success 98.65% and 1 year mortality 12.56%, STS score 5.349%) have improved compared to the 5 year cohort. Patients with "prior or current malignancy" (POCM) at TAVI evaluation have increased mortality in both the 1 year outcome (n=731) cohort, 20.19% 1 year mortality vs. 12.12% in those without POCM, and same trend in the 2 year outcome cohort n=497 (33.75% 2 year mortality vs. 21.82% without malignancy). Frail patients with POCM in the 2 year cohort have substantially higher mortality at 2 years, 39.1% than frail patients without POCM 24.4%.

**Conclusion:** POCM may predict poorer long-term mortality for frail TAVI patients. More comprehensive appraisal of frailty when evaluating TAVI futility may be considered important in these patients in SA's severely constrained healthcare resource environment. 5 year outcomes in SA are comparable to international data, procedural outcomes have improved further in more recent cohorts, as to be expected with maturation of the programme and technology.

## Vascular and cardiometabolic changes in people living with HIV: Longitudinal data from the EndoAfrica study

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**Background:** People living with HIV (PLWH) have a 2-fold greater cardiovascular disease (CVD) risk vs. the general population. The relationship between HIV-associated immunovirological and cardiometabolic factors, and vascular changes is poorly described in South African populations.

**Objectives:** We investigated whether HIV-related immunovirological and cardiometabolic variables are associated with vascular outcomes and whether there is an interaction with 18 month follow-up.

**Methods:** Longitudinal study of PLWH and HIV-free participants from the Western Cape. Health data and cardiovascular-focused measurements (blood pressure, anthropometry, flow-mediated dilatation (FMD), retinal microvessel calibers (central retinal arteriolar and venular equivalent; CRAE and CRVE) and carotid intima-media thickness (c-IMT)) were collected. Biochemical analyses were performed at the NHLS. Mixed-model ANOVA was performed (Statistica™, Version 14).

**Results:** Study population: N=307, with HIV Negative (HIVNeg): N=104, PLWH without ART at baseline (HIV+ART-): N=47, and PLWH with ART (HIV+ART+): N=156. The population was young (~39 years), predominantly female (~74%) and ~63% were smokers. Virological failure presented in ~78% of HIV+ART- participants at baseline, and ~41% at follow-up (post-ART commencement); whilst remaining stable (~14-16%) in HIV+ART+ (p<0.01). There was a high hypertension prevalence (HIVNeg: ~51%; HIV+ART-: ~25%; HIV+ART+: ~37%; p<0.01), whilst the Framingham 10 year CVD risk (1.7(1.13 - 1.15)) and Vascular Age (38.6 ± 16.2) were lowest in baseline HIV+ART- (p<0.05). Mixed-model ANOVA showed group differences for FMD (p=0.02), CRVE (p=0.04) and c-IMT (p=0.02), with significant group: time interactions observed for CRVE (p<0.01). FMD of high CVD risk HIV+ART- participants improved over time (p=0.02), which was not observed in HIV+ART+. Retinal calibers associated with blood pressure in all groups. Significant haemoglobin: time interactions (p=0.05) were observed for CRVE in HIV+ART+, and similarly high-sensitivity CRP: time in HIV+ART- (p=0.01).

**Conclusion:** Vascular outcomes were affected by HIV status during the 18 months' assessment period. We also show that CVD risk and other cardiometabolic variables associated with vascular outcomes, with time interactions observed for retinal calibers in PLWH.

## Assessment of vascular stiffness and relation to cardiovascular risk factors in patients with SLE

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**Background:** Cardiovascular disease is a major cause of morbidity and mortality in SLE patients. Accurate risk stratification would require a simple, non-invasive index integrating all traditional and emerging risk factors. Vascular stiffness fulfils these requirements and has better predictive value for cardiovascular events than traditional risk factors in hypertensives and patients with coronary artery disease.

**Objectives:** Determine whether arterial stiffness is increased in SLE patients compared to healthy controls.

**Method:** Patients were recruited from Rheumatology department of Cairo University while the study done in Cardiology department. This study included 100 subjects divided into 50 SLE patients and 50 age- and gender-matched healthy individuals. All individuals underwent standard clinical evaluation. Assessment of aortic stiffness was performed by calculation of aortic elastic indices using M-mode transthoracic echocardiography (TTE). Endothelial function was assessed using brachial flow mediated dilation (FMD). Carotid duplex ultrasound was performed to measure quality arterial stiffness (QAS) parameters using Esaote MyLab 60. We calculated carotid-femoral pulse wave velocity (cf-PWV) as the carotid-femoral travel distance divided by the transit time ( $\Delta L/\Delta t$ ).

**Results:** SLE patients had higher median aortic stiffness index (SI) and lower strain and distensibility, compared to controls. SLE patients had significantly impaired FMD compared to controls. Regarding QAS parameters, SLE patients had significantly lower median carotid distension, distensibility coefficient, and compliance coefficient, with higher median carotid SI, carotid pulse wave velocity (PWV), and augmentation index (AI). SLE patients had a higher median cf-PWV 6.5m/sec (4.8 - 11.8), compared to a median of 4.6m/sec (3.8 - 6.9) in controls.

**Conclusion:** SLE patients have significantly impaired FMD and increased arterial stiffness compared to healthy controls. SLE is an independent cardiovascular risk factor. SLE duration is an important predictor of arterial stiffness. These findings emphasise the need for early diagnosis of SLE and aggressive risk factors modification.

## Subclinical left ventricular dysfunction in patients with active systemic lupus erythematosus: A speckle tracking echocardiography study with follow-up

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**Background:** Cardiovascular disease is a major cause of morbidity and mortality in systemic lupus erythematosus (SLE) patients. The use of speckle tracking echocardiography (STE) is currently proposed as a more sensitive and reproducible approach to detect subtle myocardial systolic dysfunction compared to conventional LV EF.

**Objectives:** Investigate myocardial deformation parameters by STE in patients with active SLE disease compared to controls, with follow-up 3 - 6 months later when disease activity is controlled.

**Method:** This prospective observational case-control study included 113 subjects divided into 63 patients with active SLE and LV EF $\geq$ 50% and 50 age- and gender-matched healthy individuals. 50 survived SLE patients were followed up after 3 - 6 months following activity remission.

All subjects underwent comprehensive echocardiographic examination with pulsed wave Doppler measurement of the mitral inflow, tissue Doppler imaging (TDI) and speckle tracking echocardiography (STE) including strain parameters (global longitudinal strain [GLS] and global circumferential strain [GCS]), rotation, twist and torsion.

**Results:** Our study included 63 patients with active SLE (89% females), median age (IQR) 26 years (21, 31) and 50 age- and gender-matched healthy individuals. Active SLE patients showed significantly worse strain parameters compared to controls (respective values for mean GLS and GCS  $-19.9\% \pm 2.1$  in patients vs.  $-22.7\% \pm 1.3$  in controls and  $-21.2 \pm 2.5\%$  vs.  $-25.1 \pm 1.7\%$ ;  $p$ -value $<0.001$  for each). LV basal and apical rotation, twist and torsion were significantly reduced in active SLE cases compared to controls ( $p$ -value $<0.001$  for all). Diastolic function and deformation parameters were not significantly different between patients with mild-moderate and severe activity. Deformation parameters, but not diastolic function ones, improved during follow-up.

**Conclusion:** STE is a simple, non-invasive tool useful for early identification of cardiac dysfunction in patients with active SLE and follow-up of disease activity and could be incorporated into SLE activity scores.

## Time to thrombolysis and factors contributing to delays in patients presenting with ST-segment elevation myocardial infarction at Chris Hani Baragwanath Academic Hospital

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**Background:** Acute Coronary Syndrome is a public health burden both worldwide and in South Africa (SA). Guidelines recommend thrombolysis within 1 hour of symptom onset and 30 minutes of hospital arrival for ST-elevation myocardial infarction (STEMI) patients in order to decrease morbidity and mortality. There is paucity of data pertaining to delays to thrombolysis of STEMI patients in SA.

**Objectives:** To elucidate the time to thrombolytic therapy, establish the reasons for delays to therapy and to calculate the loss of benefit of thrombolysis for delays in treatment pertaining to patients presenting with STEMI at Chris Hani Baragwanath Academic Hospital (CHBAH).

**Method:** A prospective observational study was conducted at CHBAH involving 100 consecutive STEMI patients (2021 - 2022).

**Results:** The mean age was 55.6 ( $\pm 11.6$ ) years with male predominance of (78.0%). Thrombolytic therapy was administered to 51 (51%) patients with a median time to thrombolysis of 6 hours (IQR 4.3-12.8), 10 (19.6%) of whom received a thrombolytic within 30 minutes of arrival to hospital. The median time from symptom onset to calling for help and subsequent arrival to hospital was 60 minutes (IQR 30-240) and 114 minutes (IQR 48-468) respectively. The median in-hospital delay to thrombolysis after arrival was 105 minutes (IQR 45-240). Numerous reasons that led to delay in therapy were identified, however; the most frequent reason for delay were pre-hospital delays related to patient factors. Late presentations resulted in 20 (40.8%) patients not receiving thrombolytic therapy. 5 (5%) patients died in hospital and 43 (43%) suffered from acute heart failure. 30 per 1 000 patients could have been saved had they received thrombolytic within 1 hour from onset of chest pain.

**Conclusion:** Pre-hospital and hospital related factors played a significant role in delays to thrombolysis which led to increased morbidity and mortality of patients with STEMI.

### Percutaneous intervention for Infantile Scimitar Syndrome

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**Background:** Scimitar syndrome (SS) is a rare congenital malformation with an estimated prevalence of 1 to 3 per 100 000 births. It is characterised by partial or total anomalous venous drainage of part or entire right lung typically into the upper portion of the inferior vena cava, right lung hypoplasia and variable systemic arterial supply of the right lung. Clinical presentation largely depends on associated congenital heart defects (CHD) and varies from heart failure (HF) in infancy to asymptomatic presentation in childhood and adulthood.

**Objectives** To determine whether percutaneous occlusion of systemic collateral arteries improves symptomatology in Infantile Scimitar Syndrome.

**Method:** We present 2 patients who attended our facility within the last year.

**Results:** One was a 4-day-old neonate who presented with an anorectal malformation requiring surgery. The patient had refractory pulmonary hypertension and cardiac failure. Cardiac catheterisation and percutaneous occlusion of the anomalous vessels arising from the aorta with vascular plugs allowed the patient to be weaned off O<sub>2</sub> and discharged from the NICU. Signs of cardiac failure and pulmonary hypertension subsequently completely resolved. The second was a 3-month-old who presented with RSV pneumonia again with refractory heart failure, pulmonary hypertension and oxygen dependence which improved dramatically following embolisation of the abnormal vessels. In both these patients the X-ray and echocardiographic findings coupled with CT angiography allowed appropriate diagnosis and facilitated percutaneous intervention.

**Conclusion:** Percutaneous intervention for Infantile Scimitar Syndrome may be considered as an alternative to early surgical intervention particularly in severely symptomatic patients.

### Point-of-care NT-proBNP for the screening of pregnancy-related heart failure: The PREG-HF Study

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**Background:** Cardiac disease is an important cause of maternal mortality worldwide. However, diagnosing heart failure (HF) during pregnancy remains challenging. Although the measurement of NT-proBNP has been recommended as a cost-effective screening test for HF, its value in predicting underlying structural heart disease on echocardiography during pregnancy is unclear.

**Objectives:** To evaluate the accuracy of point-of-care (POC) NT-proBNP to predict echocardiographic evidence of structural heart disease in pregnant women.

**Method:** All consenting pregnant women with symptoms of HF, who underwent echocardiography at a tertiary hospital in Cape Town, South Africa, between 1 March 2021 and 29 March 2022 were compared with asymptomatic pregnant women. Demographic and obstetric data were collected, as well as clinical, echocardiographic parameters and POC NT-proBNP measurement.

**Results:** We included 132 women with a median age of 31.3 years (IQR 24.9-36.4) and a median gravidity of 3 (2-4), mostly in their third trimester of pregnancy (76.9%). Symptomatic women (66.9%) presented mainly with dyspnoea (90.8%). Overall, the median POC NT-proBNP was 108pg/ml (60-470) but was not statistically different between symptomatic and asymptomatic participants. NT-proBNP levels were significantly elevated in those with left ventricular (LV) dilatation (395 [86-1668] vs. 80.5 [60-303],  $p=0.001$ ), left atrial enlargement (417 [98-1211] vs. 78 [59-167],  $p<0.001$ ), LV systolic dysfunction (539 [94-2582] vs. 80 [60-323],  $p<0.001$ ), diastolic dysfunction (300 [77-1450] vs. 80 [60-322],  $p=0.038$ ), mitral regurgitation (247 [60-794] vs. 84 [60-323],  $p=0.027$ ) and pericardial effusion (448 [84-1487] vs. 80 [60-303],  $p<0.001$ ). An NT-proBNP of  $<250$ pg/ml had the highest negative predictive value (79.3%) to rule out structural heart disease (AUC 0.66 [0.57-0.74]).

**Conclusion:** POC NT-proBNP identified pregnant patients with structural heart disease with acceptable discrimination. POC NT-proBNP testing might be particularly useful as a screening test in settings where pregnant women do not readily have access to echocardiography.

## Cardiovascular risk differs by abnormal glucose tolerance etiology: $\beta$ -cell failure or insulin resistance – insights from the Africans in America study

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**Background:** Abnormal-glucose tolerance (Abnl-GT) leads to cardiovascular disease (CVD) and is due to an imbalance between  $\beta$ -cell function and insulin resistance (IR). In sub-Saharan Africa,  $\beta$ -cell failure is emerging as an important cause of Abnl-GT (Abnl-GT- $\beta$ -cell failure). Visceral adipose tissue (VAT) and hyperlipidemia are major contributors to CVD risk in Abnl-GT due to IR (Abnl-GT-IR). The CVD-profile associated with Abnl-GT- $\beta$ -cell failure is unknown.

**Objectives:** In 450 African-born Blacks (Male: 65%; Age:  $39 \pm 10$  years; BMI  $28 \pm 5$  kg/m<sup>2</sup>), living in America we: (a) determined Abnl-GT prevalence and etiology; (b) assessed by Abnl-GT etiology, associations between CVD risk factors: (i) subclinical myocardial damage (high-sensitivity-troponin-T (hs-cTnT)); (ii) neurohormonal regulation (N-terminal-pro-Brain-natriuretic-peptide (NT-proBNP)); (iii) coagulability (fibrinogen); (iv) inflammation (high-sensitivity-C-reactive-protein (hsCRP)), including HbA1c, Cholesterol / HDL-ratio and VAT.

**Method:** Glucose tolerance status was determined by the OGTT. IR was defined by the lowest quartile for the Matsuda Index ( $\leq 2.97$ ). Abnl-GT-IR required both Abnl-GT and IR. Abnl-GT- $\beta$ -cell-failure was defined as Abnl-GT without IR. VAT was assessed by CT-scan. For both the Abnl-GT- $\beta$ -cell-failure and Abnl-GT-IR groups, four separate multiple regression models were performed for hs-cTnT; NT-proBNP; fibrinogen and hsCRP, as dependent variables, and HbA1c, Cholesterol / HDL and VAT as independent variables.

**Results:** Abnl-GT occurred in 38% (170/450). In Abnl-GT,  $\beta$ -cell failure occurred in 58% (98/170) and IR in 42% (72/170). VAT and Cholesterol / HDL were significantly lower in Abnl-GT- $\beta$ -cell failure vs. Abnl-GT-IR (both  $p < 0.001$ ). In the Abnl-GT- $\beta$ -cell failure group: Significant associations existed between hscTnT, fibrinogen, hs-CRP, and HbA1c (all  $p < 0.05$ ), and none with Cholesterol / HDL or VAT. In Abnl-GT-IR: hs-cTnT, fibrinogen and hsCRP significantly associated with Cholesterol / HDL (all  $p < 0.05$ ) and NT-proBNP inversely related to fibrinogen, hsCRP, HbA1c, Cholesterol / HDL, and VAT (all  $p < 0.05$ ).

**Conclusion:** The CVD risk profile differed based on Abnl-GT-etiology. In Abnl-GT- $\beta$ -cell failure CVD risk involved subclinical-myocardial damage, hypercoagulability and increased inflammation, without hyperlipidemia or visceral adiposity. For Abnl-GT-IR, CVD risk related to subclinical myocardial damage, neurohormonal dysregulation, inflammation including hyperlipidemia and visceral adiposity.