

ABSTRACTS

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Pattern of cardiovascular risk factors and fate in patients over 80 years presented with acute coronary syndromes

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Introduction: Elderly patients presenting with acute coronary syndrome (ACS) are at higher risk for morbidity, complications and early mortality than younger patients. However, they are under-represented in clinical trials and observational studies. We aimed to identify cardiovascular risk profile and the fate of ACS patients aged over 80 years.

Methods: A descriptive multi-centre worldwide study conducted on 190 patients in 27 tertiary care hospitals in 7 countries on patients admitted with ACS between January 2011 and December 2016, to determine the most frequently encountered cardiovascular risk factors, initial laboratory data, and in-hospital complications.

Results: Of the 190 patients, 80 (42.1%) were males with a mean age of 85 years. Non-ST-elevation myocardial infarction (NSTEMI) was encountered in 124 (65.3%), while ST-elevation myocardial infarction (STEMI) was encountered in 66 (34.7%). Regarding risk factors, 116 (61.1%) were hypertensive, 114 (60%) were diabetics, 85 (44.7%) were smokers, 55 (28.9%) had dyslipidaemia, 32 (16.8%) had a family history of CAD, 38 (20%) had chronic renal impairment at presentation, and 19 were alcoholics (10%). With respect to laboratory findings, mean haemoglobin level was 11.9g/dl, mean creatinine level was 1.12mg/dl, mean total cholesterol level was 149.5mg/dl, mean low-density lipoprotein (LDL) level was 87.1mg/dl, mean triglycerides level was 144.4mg/dl, and mean hemoglobin A1C (HbA1C) level was 6.71%. Sixty three patients (33.2%) underwent primary percutaneous coronary intervention (PPCI), 110 (57.9%) underwent elective PCI, 9 (4.7%) underwent coronary artery bypass graft (CABG) surgery, while 8 (4.2%) were maintained on conservative medical therapy, and none received fibrinolytic therapy. In-hospital mortality was only 3.7% (7 patients), cerebrovascular stroke occurred in 4 patients (2.1%), and recurrent infarction occurred in only 2 patients (1.1%).

Conclusion: In patients over 80 years, female sex, hypertension and diabetes were the main frequently encountered cardiovascular risk factors, with more frequent presentation of NSTEMI than STEMI, and in-hospital mortality of 3.7%.

Screening for depression and anxiety among medical students in Egypt: What can we do to prevent these conditions?

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Introduction: Medical students have higher levels of anxiety and depression than the general population. These issues are likely to influence their progress in medical school and future health status – especially given that studying in medical school is challenging.

Aim: To screen for hypertension and examine the mental health status in first year freshman students of Benha University medical faculty.

Methods: Four Hundred freshman Benha medical faculty students were targeted, but only 150 students completed the study (including 88 males and 62 females). Full medical exam, weight, height and body mass index were assessed and interpreted using Egyptian growth standards. Students were assessed for anxiety and depression using standard scales.

Results: Only 2.7% of students were obese or overweight. The mean anxiety score was 37.95 ± 12.48 . There was a statistically significant difference in the anxiety score between males and females at $p=0.4$. Around one half of the population (57.3%) had a moderate degree of anxiety. Severe and extreme cases of anxiety constituted 24.7% and 0.7% respectively. The depression score was 15.9 ± 5.57 . Cases with moderate, severe and extreme depression were 10.7%, 0.7%, and 0.7% respectively. The mean suicide score was 5.8 ± 3.18 , with no significant difference between males and females. The anxiety score was highest among smokers (40.75 ± 12.93) at $p<0.03$ and with family dysfunction (46.13 ± 6.98) $p<0.03$. Depression was highest among those who were exposed to violence (17.07 ± 5.00) $p<0.04$, and lowest among those playing sport (12.34 ± 5.78) $p<0.03$.

Conclusion: Early detection of mental health disorders such as depression and anxiety – while encouraging sport, anti-smoking campaigns and family counseling – are recommended for freshman medical students.

Trends in deaths from rheumatic heart disease versus congenital heart disease and cardiomyopathy in the eastern Mediterranean region

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Introduction: The burden of death from congenital heart disease (CHD) versus rheumatic heart disease (RHD) and other cardiomyopathies (CM) is a challenge for the Eastern Mediterranean Region (EMR), which is facing chronic emergencies and political instability.

Aim: To present and compare changing trends in the burden of death from RHD versus CHD in the EMR.

Methods: We compiled data from global WHO data and the World Bank for deaths from RHD, CHD and CM for 22 EMR countries. The data were analysed by sex and age groups over the years 2000, 2005, 2010 and 2015. The ratio of RHD to CHD and RHD to CM was estimated by age group and sex over these periods.

Results: Trends in the RHD to CHD death ratio remained constant from 2000 - 2015 (0.5). RHD to CM decreased from 0.89 in 2000 to 0.67 in 2015, being higher in females than males, but the difference was insignificant, i.e. RHD remained predominant in females over all periods. In 2000, the ratio of RHD to CHD was low and in the age groups 1 - 59 months (0.5) and 5 - 14 (0.32), and then rose to 1.4 in the 15 - 29, 4.1 in the 30 - 49, 21.6 in the 50 - 59, 27.5 in the 60 - 69 and 22.4 in the 70+ age groups. The trends decreased mildly from 2000 - 2015, remaining higher in females. The ratio of RHD to CM followed a different trend, being below 1 in those under 29 years of age and >1 in those over 30 years of age in both sexes and over the age groups.

Conclusions: Although CHD is highest in early childhood, still RHD is prevalent in all age groups and rises more in adulthood especially and is especially prevalent among females. Hence early detection can prevent the rising burden in adulthood. The burden of CM is high in all age groups and is probably linked to the high CHD in early childhood and high RHD in adulthood.

Is death from rheumatic heart disease linked to malnutrition? A review of 52 countries in Africa

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Introduction: Malnutrition continues to prevail in regions of the world where rheumatic heart disease (RHD) is prevalent. Increased cytokines in RHD and malnutrition may create a catabolic state causing the progression of RHD.

Aim: To identify relationships between deaths from malnutrition and RHD in African countries.

Methods: We compiled data for age standardised death rates (ASDR) per 100 000 from RHD and malnutrition for 52 countries in Africa – using data from WHO, the World Bank, UNESCO, and country databases. Countries were divided into high middle-income countries (HMIC) (8), low middle-income countries (LMIC) (17), and low-income countries (LIC) (28) using the World Bank classification, and were analysed using frequency distribution and Spearman's correlation coefficient.

Results: Total deaths from RHD were 43 095 of which 37.65% were from LIC, 56.9% from LMIC, and 9.4% from HMIC. ASDR/malnutrition in LIC (44.57 ± 25.05) was more than double that in LMIC (17.21 ± 14.71) and HMIC (18.84 ± 33.69). ASDR/RHD in LIC (8.19 ± 2.85) was higher than LMIC (5.12 ± 2.04) and HMIC (3.49 ± 0.31) $P < 0.05$. ASDR from RHD correlated with malnutrition within all HMIC, LMIC and LIC groups (r0.43, r0.045, r0.88 respectively) at $p < 0.05$. Socio-economic indices correlated with ASDR from RHD differently by income group. In HMIC, fertility rate and population growth correlated with ASDR/RHD (r0.79 and r0.84) at $p < 0.01$ respectively. In LMIC ASDR from RHD correlated with unemployment, and negatively with life expectancy and health life expectancy (r0.47, r-0.42, r-0.46) respectively at $p < 0.05$. On the other hand, in LIC ASDR from RHD correlated with total literacy, male and female literacy (r0.4, r0.4 and r0.38 respectively) at $p < 0.05$. GDP per capita was negatively correlated with ASDR from RHD in HMIC and to a lesser degree in LMIC (r-0.46 and r-0.37) – but not with LIC $p > 0.05$.

Conclusions: Malnutrition and RHD are interlinked. Identifying and remedying social and development indices can help reduce the burden of RHD.

Dilated aortic root sinuses with thrombus formation

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Introduction: Dilated aortic root sinuses are frequently seen in cases of aortopathy, but it is unusual to have 3 dilated sinuses with a thrombus in the non-coronary sinus well organised and formed.

Methods: A 55-year-old man presented with palpitations, and examination revealed a murmur of severe aortic regurgitation, and TTE and TEE showed dilated aortic root sinuses with a well organised layered thrombus in the non-coronary sinus. CT aortography confirmed the same finding with the normal rest of aorta. CT angiography showed a tight, proximal LAD lesion.

Results: A Bentall procedure was done with thrombus removal and LIMA to LAD.

Conclusion: A rare finding of 3 dilated sinuses of valsalva with a well organised and calcified thrombus on the non-coronary sinus with a tight proximal LAD lesion.

Partnerships for congenital heart disease in Africa (the PROTEA Study): The first 800 patients reveal key insights into our CHD cohort

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Background: Congenital heart disease (CHD) is the most common birth defect world-wide, affecting 8/1 000 live births. Yet, the reported prevalence of CHD in Africa is significantly lower than in developed economies, likely reflecting missed diagnoses and the poor early prognosis in resource-limited environments. Partnerships for Congenital Heart Disease in Africa (The PROTEA Study) aims to address these gaps in evidence in CHD epidemiology.

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

Methods: PROTEA is a collaborative multi-disciplinary prospective registry that plans to enroll 1 200 participants from three tertiary hospitals: Tygerberg (TBH), Groote Schuur (GSH) and Red Cross War Memorial Children's Hospitals (RCH) following funding from MRC-UK.

Results: As of 29 May 2018 there are 806 patients enrolled in the database, 727 paediatric patients from RCH and TBH, 65 from the Adult Congenital Heart Service and 14 from the Cardio-Obstetric Combined Clinic. The median age of the participants is 3.8 years and are born to mothers with a median age of 32 years, 51% of which had not completed secondary school, 59% unemployed and 37% of those that were employed, earned under R2 500/month. A third were current smokers. Collectively these patients have 974 recorded diagnoses, 3261 echocardiograms, 271 catheterisations and 322 electrocardiograms. In total, 161 blood samples have been stored in the DNA biobank and whole exome sequencing has been performed on the first 50 specimens.

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

The role of preparticipation cardiac examination before gymnasium admission

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Introduction: The most important aim for heart disease screening overall, is to prevent sudden, unexpected death. The most important time to screen subjects intending to do physical exercise is preparticipation. Accordingly, potential medical problems can be identified. We aimed to evaluate the usefulness of cardiac screening before gymnasium admission in apparently healthy subjects.

Methods: Three hundred and twenty one subjects intending to participate in regular gymnastic sports in some health centres, were consecutively studied. All subjects underwent a cardiovascular evaluation consisting of history taking, cardiac examination, electrocardiography (ECG), and echocardiography.

Results: The ECG abnormalities included: first degree heart block (7.48%), signs of left ventricular hypertrophy (4.98%), right bundle branch block (4.05%), left bundle branch block (1.56%) and Brugada syndrome pattern (0.93%). The echocardiography abnormal findings included: non-obstructive hypertrophic cardiomyopathy (6.55%), arrhythmogenic right ventricular dysplasia (1.25%), mitral valve prolapse (0.31%), and atrial septal defect (0.31%).

Conclusion: An ECG and echocardiography should be performed before participation in any sports to detect fatal cardiac abnormalities and to manage them accordingly.

The real-life differences between the use of ticagrelor and clopidogrel in ST-elevation myocardial infarction

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Introduction: The preference for the use of ticagrelor versus clopidogrel in patients with ST elevation myocardial infarction (STEMI) in the current European Society of Cardiology (ESC) guidelines, is based mainly on many inconclusive results and sub-analyses of many clinical trials. Few data are available on the real-life effects of ticagrelor after many years of application.

Methods: A retrospective study based on the analysis of data of 369 STEMI patients admitted from January 2014 - December 2017 was done. The patients were divided into 2 groups. The clopidogrel group comprised 198 patients who received an initial loading dose of clopidogrel 600mg followed by 75mg once daily, and the ticagrelor group comprised 171 patients who received an initial loading dose of ticagrelor 180mg followed by 90mg twice daily.

Results: Comparing the 2 groups regarding the demographic data, risk factors, past history, clinical examination and laboratory data – there was no significant difference between the 2 groups. Regarding early perfusion before PPCI represented by TIMI II-III flow, there was a significant difference between the 2 groups (51.5% in ticagrelor group vs. 28.3% in clopidogrel group, $p=0.041$). Regarding the use of glycoprotein IIb/IIIa inhibitors, there was no significant difference between the 2 groups. Regarding the in-hospital all cause death and in-hospital cardiovascular death, there was a significant difference between the 2 groups (0.6% in ticagrelor group vs. 4.5% in clopidogrel group, $p=0.022$ and 0.6% in ticagrelor group vs. 4% in clopidogrel group, $p=0.049$) respectively.

Conclusion: In the setting of STEMI, the use of ticagrelor rather than clopidogrel was associated with improved early perfusion assessed by TIMI flow before PPCI and a lower incidence of in-hospital cardiovascular and all-cause mortality after PPCI.

Regional heterogeneity during β -adrenergic stimulation underlies the ventricular arrhythmia triggers and substrate after myocardial infarction

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Introduction: Lethal ventricular arrhythmias frequently complicate myocardial infarction (MI). The initiation and propagation of post-MI arrhythmias are not fully understood. Local differential remodeling and heterogeneity, as could result from altered adrenergic innervation, may contribute. Studying regional electrical properties, calcium handling and responses to β -adrenergic stimulation after MI, may provide mechanistic insights. We investigated regional action potential (AP) heterogeneity as an arrhythmogenic substrate and afterdepolarizations (ADs) as arrhythmogenic triggers during β -adrenergic stimulation in a pig MI model.

Methods: Anterior MI ($10 \pm 2\%$ of left ventricular mass) was induced in 8 domestic pigs (27 ± 3 kg) by coronary flow-limiting stent implantation (7 controls underwent a sham procedure). After 5 weeks, in vivo regional monophasic APs were recorded with $4 - 12$ nM Isoproterenol (ISO) infusion. At 6 weeks, cardiomyocytes were enzymatically isolated from the peri-infarct and remote regions (and matched regions in sham). In the whole-cell current-clamp at 37°C , APs were recorded at 2Hz and 1Hz with 10 nM ISO superfusion.

Results: In vivo, during ISO, MI exhibited more peri-infarct delayed ADs/minute (0.70 ± 0.12 vs. remote 0.24 ± 0.09 , $p<0.01$), ventricular extrasystoles/minute (5.5 ± 0.83 vs. sham: 0.6 ± 0.04 , $p<0.05$), and beat-to-beat variability of repolarisation (BVR) (8.0 ± 3.8 ms vs. sham: 2.6 ± 0.4 ms, $p<0.05$). In isolated myocytes, baseline APs and BVR were not different between regions or MI and sham. In response to ISO, MI peri-infarct myocytes exhibited more AP heterogeneity, with shortening, lengthening, and divergence, and increased BVR (27 ± 3.6 ms vs. remote 8 ± 1.7 ms, $p<0.001$). MI-matched sham regions exhibited consistent AP shortening and low BVR (sham "peri-infarct" 9.1 ± 1.3 ms vs. "remote" 5.7 ± 1.0 ms, $p>0.05$). MI peri-infarct myocytes had more ADs/minute (2.1 ± 4.8 vs. remote 5 ± 0.6 , $p<0.001$), and triggered APs/minute (4.7 ± 0.82 vs. remote 0.6 ± 0.04 , $p<0.001$).

Conclusion: The peri-infarct region is more prone to triggered spontaneous APs in a substrate of AP heterogeneity and increased BVR during β -adrenergic stimulation. These results suggest a mechanistic role for regional heterogeneity of β -adrenergic signaling in post-MI arrhythmogenesis.

Venous thromboembolism risk, prophylaxis and outcome in admitted patients to the medical wards of Tikur Anbessa Specialized Hospital, Addis Ababa, Ethiopia

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Introduction: Venous Thromboembolism (VTE) is a medical condition that is the collective term for deep vein thrombosis and pulmonary embolism, which are important causes of disability and death in the hospitalised patient. The aim of this study is to assess VTE risk, prophylaxis and outcome in hospitalised patients in medical wards of Tikur Anbessa Specialized Hospital (TASH).

Methods: A retrospective cross-sectional study involving patients' chart review for those who were admitted in medical wards of TASH from 1 July 2016 - 31 December 2016 (6 months) was done. The systematic random sampling method was used as a sampling technique to review 200 patient charts using a structured data abstraction format to collect data on patient socio-demographic characteristics, VTE risk assessment, contraindication, thromboprophylaxis, and VTE outcome. Data were entered by EPI Info 7 and then exported to SPSS 21 version software database for analysis.

Results: Out of 200 medically admitted patients, 119 were male and the mean age was 41.17 ± 16.069 years. More than half of the 102 patients (51%) were in the highest risk category for VTE occurrence. There were 186 (93%) patients who were at risk of developing VTE, while 75 (40%) patients received VTE prophylaxis. Forty three patients had a contraindication for prophylaxis, but 4 of them took prophylaxis despite that. Among the total population, in 61 (30.5%) of the patients who received prophylaxis VTE was prevented. Eleven (5.5%) of the study population developed VTE.

Conclusion: In this study, there were 186 patients who were at risk of developing VTE, and from these only 75 (40.32%) patients received thromboprophylaxis, which shows underutilisation of thromboprophylaxis in TASH for patients at risk of developing VTE. It is difficult to know the status of VTE outcome, since such information was not documented clearly on patient charts.

Patterns and prevalence of cardiovascular diseases among pregnant mothers attending antenatal care at Saint Paul's Hospital Millennium Medical College, Addis Ababa

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Introduction: Cardiovascular disease (CVD) is one of the leading causes of non-obstetric maternal death during pregnancy. There have been a limited number of studies done to assess the prevalence of CVD during pregnancy in our set-up.

Methods: A total of 398 pregnant mothers who were on follow-up at ANC clinic were randomly selected for clinical and echocardiographic evaluation in their 3rd trimester of pregnancy. The sociodemographic, relevant clinical and obstetric data were extracted using a structured questionnaire. Standard echocardiography was done for all of them by using a GEVivid E9 echocardiography machine.

Results: In general 10.6% (n=42) pregnant mothers had cardiovascular disease with clinical evaluation and echocardiography. Thirty three (8.3 %) of the mothers have at least 1 echocardiographic abnormality, out of which 2.3% (n=9) had significant rheumatic valvular heart disease. Isolated moderate and severe mitral valve regurgitation were the most common rheumatic lesions at 1.0% (n=4), followed by moderate and severe mitral stenosis at 0.75 % (n=3). There were 2 pregnant mothers who were having a combination of moderate to severe degrees of aortic valve regurgitation, mitral valve regurgitation, and mitral valve stenosis. Four (1.0%) of the mothers have moderate-severe pulmonary hypertension. Grade I diastolic dysfunction occurred in 3.2% (n=13). Eight (2.1%) mothers were found to have some form of hypertensive disorder: 7 (1.8%) of the pregnant mothers were found to have a pericardial effusion.

Conclusion: The study revealed a fairly high prevalence of rheumatic heart disease among pregnant mothers in our set-up. Primary care providers of pregnant mothers at ANC should be vigilant in their clinical evaluation, in order to detect such problems in a timely manner.

An unusual cause of cardiac tamponade

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Introduction: A 72-year-old female, known type 2 diabetic, and HIV negative, presented with symptomatic right heart failure with a 1-week history of bilateral leg swelling and worsening dyspnoea and no constitutional symptoms or cough suggestive of TB. She had previously been diagnosed with TB pericarditis 8 years ago and treated in private. Clinical examination showed grade 2 pedal oedema, clear chest, and cardiovascular examination revealed a raised jugular venous pressure, impalpable apex beat, soft heart sounds, and no audible murmurs.

Methods: See results and conclusion.

Results: ECG showed small complexes and electrical alternans. Echocardiography demonstrated a 30mm pericardial effusion circumferentially and right atrial and ventricular diastolic collapse. Pericardiocentesis was performed, 950ml of milky white fluid was drained and biochemistry revealed exudative characteristics, a negative bacterial culture, and TB PCR GeneXpert and auramine stain. Pericardial fluid triglycerides were reported as $>10\text{mmol/L}$, with fluid cholesterol at 3.1mmol/L , while serum triglycerides were 1.43mmol/L and serum cholesterol was 3.92mmol/L . This was in keeping

with chylous pericardial effusion. Subsequently, pericardial fluid TB cultures were also negative, as was cytology and flow cytometry. On review 2 weeks later, fluid had reaccumulated rapidly and on repeat pericardiocentesis 800ml was drained. The patient was placed onto somatostatin but repeat echo 3 weeks later showed a 20mm circumferential effusion. CT scan of the chest/abdomen only revealed a very small pleural effusion, no lung masses or CT significant lymphadenopathy. Lymphoscintigraphy was performed, to try to elucidate a thoracic duct blockage, which was negative. A PET/CT scan was performed and this study showed highly active mediastinal lymphadenopathy – suggesting this as clue for the cause.

Conclusion: Presentation to cardiothoracic surgery and pericardial window and biopsy as well as mediastinoscopy and lymph node biopsy are pending, which should distinguish between our differential diagnoses which are non-benign lesion, idiopathic chylothorax, and TB.

Diphtheria myocarditis in children

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Introduction: Diphtheria is a communicable disease caused by toxigenic strains of *Corynebacterium diphtheriae*, with significant morbidity and mortality. Local and systemic effects caused by the exotoxin include local tissue invasion, inflammation and focal necrosis in remote organs such as cardiac, nervous and renal systems. Despite widespread immunisation programmes, outbreaks have occurred. Diphtheria re-emerged in KwaZulu-Natal (KZN) between March and June 2015, with 15 reported cases (11 aged <15 years), 4 of whom died. In March 2018, KZN experienced another outbreak – 1 adult and 2 children. Both children died. Myocarditis is common in diphtheria, presenting with clinical or subclinical cardiac dysfunction. The conduction system is particularly vulnerable. In children, incomplete immunisation and late or lack of administration of diphtheria anti-toxin (DAT) appears to be a significant risk factor for myocarditis and mortality.

Methods: We report on 3 cases of diphtheria myocarditis that presented to Paediatric Cardiology at Inkosi Albert Luthuli Central Hospital, Durban, South Africa in 2015.

Results: Three patients (aged 9 - 10 years) were assessed after confirmation of infection. Two had overt cardiac failure with decreased ventricular function and mitral regurgitation (1 manifested early, 1 during “recovery” phase). One patient had sinus bradycardia only. ECG changes included first degree heart block, sinus tachycardia, global T wave inversion, LV strain pattern and sinus bradycardia. All 3 had neurological manifestations and 1 patient had nephritis. Two patients subsequently received diphtheria anti-toxin - 1 early, 1 late. Early DAT administration resulted in resolution of cardiac and neurological symptoms. No significant long-term cardiovascular sequelae were reported. Average duration of follow-up was 2 years.

Conclusion: Diphtheria myocarditis is an important complication of *Corynebacterium diphtheriae* infection. Cardiac symptoms may appear early or late, following clinical improvement in other systems. Formal cardiac evaluation is necessary.

Unplanned pregnancies and birth outcomes in women with a mechanical heart valve in Princess Marina Hospital, Gaborone

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Introduction: Pregnant women with a mechanical heart valve are at an increased risk of thrombotic events and warfarin-related maternal and foetal complications. Despite preconception counselling, a considerable number of women with mechanical valves report unplanned pregnancies. We sought to describe the frequency of unplanned pregnancies and associated outcomes among women with mechanical valves.

Methods: This cross-sectional study was performed among women with mechanical heart valves at Princess Marina Hospital in Botswana between September 2017 and January 2018. We enrolled women aged ≤45 years at the time of valve replacement. We collected information on history of conception, the anticoagulation used during pregnancy, and pregnancy outcome. The level of education, monthly income, and marital status were also documented.

Results: We enrolled 75 patients whose mean (SD) age was 36 (13) years. The most common (82.4%) operation was the replacement of mitral valve. Seventeen (22.7%) patients presented with unplanned pregnancies. Patients who conceived were more likely to be younger than those who did not (26.3 vs. 39 years; $p=0.002$). The level of education, monthly income, and marital status were not associated with unplanned pregnancy. Six (35%) patients presented during the first trimester and their anticoagulation was switched from warfarin to low molecular weight heparin (LMWH). Of the 10 patients who presented in the second trimester, 6 (35%) patients were switched from warfarin to LMWH, and 4 patients continued with warfarin throughout their pregnancy. One patient presented in the third trimester and continued with warfarin throughout the pregnancy. Nine patients had uneventful pregnancies. Abortion, stillbirth and severe postpartum hemorrhage occurred in 5, 2 and 1 patients respectively.

Conclusion: A substantial proportion of women with mechanical valves present with unplanned pregnancies. Efforts to improve preconception counselling are needed for female patients of reproductive age that have mechanical valve needs in our setting.

Unravelling the role of healthcare system factors for continuing care of adolescents with congenital or rheumatic heart disease: Rationale and methods of the international Adole7C-project

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Introduction: Although lifelong follow-up is recommended for most people with congenital heart disease (CHD) or rheumatic heart disease (RHD), up to 76% present with care gaps that are associated with increased morbidity and healthcare utilisation. Prior research on predictors was limited to patient-related factors, leaving hospital-related and healthcare system-related predictors unaddressed. The Adole7C-project (AdolesCents reCeiving Continuous Care for Childhood-onset Chronic Conditions) is an international research project that aims to: (i) investigate the prevalence of care gaps in adolescents with CHD and RHD in South Africa, Sweden and Belgium; (ii) identify hospital-related and healthcare system factors that predict discontinuation of cardiac follow-up; and (iii) determine the impact of care gaps on mortality, morbidity, and healthcare utilisation.

Methods: We employ an integrative study, combining quantitative and qualitative research approaches. The quantitative study comprises an international, multi-centre study in 2 centres in South Africa (Cape Town, Port Elizabeth), 7 centres in Sweden (Gothenburg, Lund, Stockholm, Umeå, Uppsala, Linköping, Örebro), and 2 centres in Belgium (Leuven, Gent). Patients are selected from the paediatric cardiology outpatient clinic visit lists 2005 - 2011. Overall, 1 500 patients will be included. Patient data on predictors and outcomes are collected through patient hospital registers and medical files. If data are missing, a personal contact with the patient will be made. For hospital and healthcare system factors, a dedicated research form will be completed by the heads of the paediatric cardiology departments. Multilevel analyses will be undertaken. The qualitative study comprises an ethnographic approach, using individual interviews and focus-group discussions with patients who either presented with care gaps or not, to understand the barriers and facilitators for continuing medical follow-up. The study will be completed in 2019.

Results: Expected in 2019.

Conclusion: The Adole7C-project is designed to provide evidence on the impact of healthcare system factors on continuing cardiac care for adolescents with CHD or RHD.

Determinants of carotid intima-media thickness (CIMT) in a Western Cape study population with and without HIV infection

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Introduction: In a resource-limited country such as South Africa (SA), the rates of cardiovascular diseases are on the rise. Carotid artery intima-media thickness (CIMT) is a surrogate marker of sub-clinical atherosclerosis, which has been shown to predict future cardiovascular events in the general population. This study aims to investigate the relationship between CIMT and an array of cardiovascular risk factors and other control variables in study participants with and without HIV infection.

Methods: The cross-sectional study was conducted in a population sampled from patients visiting healthcare clinics in Cape Town and Worcester. Anthropometric (BMI; waist-hip-ratio) and cardiovascular (lipid profile; blood pressure [BP]; plasma glucose) measures were obtained from 261 participants (HIV+, n=136; HIV-, n=125). Qualitative data, including medical history, and lifestyle and healthcare information was obtained from personal interviews. CIMT was measured according to international standardised guidelines via ultrasound using QIMT® software. The relationship between selected control variables (including cardiovascular risk factors) and CIMT was analysed using pair-wise correlations, and advanced linear and forward stepwise regression models.

Results: The median CIMT in the cohort (mean age, 39 ± 9.97) was 0.625mm. Age, waist circumference, systolic and diastolic BP, LDL cholesterol as well as HBA1c% positively correlated with CIMT (p<0.05). Smoking status, alcohol intake as well as HIV-dependent parameters (HIV status, disease duration, and antiretroviral therapy (ART) status) did not significantly impact CIMT. However, both systolic and diastolic hypertension, as well as high LDL cholesterol correlated with IMT (p<0.05). Upon regression analysis, age strongly associated with CIMT (p<0.01).

Conclusion: In this Western Cape study population, CIMT values are associated with cardiovascular risk factors, independent of HIV-related factors. The study confirms that age, waist circumference, systolic and diastolic BP, HBA1c% as well as serum LDL cholesterol levels, are determinants for increased CIMT. This study further concludes that age is an independent predictor of sub-clinical atherosclerosis.

Human immunity to potential group A streptococcal vaccine antigens in subjects at high risk for rheumatic heart disease

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Introduction: Previous studies have documented the epidemiology of group A Streptococcus (GAS) infection in Cape Town – reporting a GAS prevalence of 21% among children presenting with sore throat at local clinics. Vaccine prevention of GAS infections is considered by many to be the most promising long-term approach to the prevention of acute rheumatic fever (ARF) and rheumatic heart disease (RHD).

Understanding immune responses to GAS infection will serve to inform the incorporation of appropriate targets into the development of a safe, effective, and affordable vaccine to prevent GAS infections.

Methods: The study is designed as a prospective longitudinal assessment of GAS-positive throat cultures and antibody responses following new GAS acquisitions in 300 participants aged 5 - 17 years. Participants will be evaluated at baseline and every 2 months, over a 24-month period of observation, with serial throat cultures for GAS and serum samples for immunological studies. GAS will be emm-typed using standard methods. Serum antibody levels against a panel of GAS antigens will be assessed by ELISA.

Results: This project is designed to determine the GAS antigen-specificity and kinetics of human immune responses, following pharyngeal acquisition of the organism. Furthermore, the ELISA results will be correlated against specific GAS emm types – thus allowing for the determination of the antigenicity of GAS strains.

Conclusion: This study provides a unique opportunity to obtain data on potentially protective immune responses following natural infection in school-aged children from a population at high risk for the development of ARF and RHD. The results of this study will be used to inform the design and development of a broadly protective vaccine that could ultimately be deployed globally.

Pathogenesis of rheumatic heart disease: Rationale and design of a longitudinal study to explore microbial determinants of strep A active and latent infection

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Introduction: Group A Streptococcus (GAS), also known as Streptococcus pyogenes, is a gram-positive bacterial pathogen that causes a range of infections, including pharyngitis and post-infectious auto-immune diseases including rheumatic heart disease (RHD). While penicillin has been described as the primary treatment of choice for GAS infection, rheumatic fever and rheumatic heart disease remain highly prevalent globally, especially in low-resourced areas. Studies in Cape Town, South Africa, have reported a GAS prevalence of 22% among children with pharyngeal infection at clinics and 3% GAS carriage in asymptomatic individuals from an endemic RHD community. We are seeking to better understand: (i) the transmission dynamics of GAS, and (ii) how the organism persists undetected (“carrier state”), being able to evade the host’s immune system and/or antibiotic treatment.

Methods: The proposed study is designed as a longitudinal evaluation of GAS isolated from throat cultures following new GAS acquisitions in participants aged 5 - 17 years. Participants will be followed up with throat cultures at 2-monthly intervals; positive GAS isolates during active and latent infection, will be subjected to molecular analysis. GAS clonality will be assessed by whole genome sequencing, while gene expression (transcriptome analysis) will be evaluated by RNA sequencing. Results will be correlated with immune response status to a panel of known GAS antigens.

Results: This project will provide insight into the transmission dynamics of GAS (strain type and strain distribution) within communities in South Africa. RNA expression profiles, correlated with specific strain type and clinical symptoms, will shed light on the nature of protein expression in active vs. latent infection.

Conclusion: Together, the data will contribute to GAS vaccine development efforts.

The effect of a fixed-dose combination ART regimen on retinal microvascular calibres in a South African HIV-infected study population

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Introduction: The retinal microvasculature is known to be a surrogate marker of vascular endothelial function and atherosclerosis (arteriolar narrowing and/or venular widening); however, the effects of HIV and antiretroviral therapy (ART) remain under investigated. This study aimed to investigate the effects of a fixed-dose combination ART regimen on retinal microvascular calibres in a South African HIV-infected study population.

Methods: HIV-free and HIV-infected participants receiving ART (efavirenz 600mg, emtricitabine 200mg, and tenofovir 300mg) were recruited from health clinics in Cape Town. Data were collected via health questionnaires, anthropometry, and biomarker analyses. Retinal images were captured, and microvascular calibres (central retinal arteriolar equivalent (CRAE) and central retinal venular equivalent (CRVE)) were determined.

Results: The total study population (n=295: HIV-free: n=143; HIV+ART: n=152) had a mean age of 39.7 ± 10.3 . HIV+ART participants showed significantly decreased mean body weight, BMI and waist circumference. Blood and urine creatinine levels were 28% and 6% lower respectively in HIV-infected groups ($p < 0.05$), whereas the albumin/creatinine ratio, hs-CRP and GGT levels were higher (60%, 37% and 48% respectively; $p < 0.05$). HIV+ART showed decreased CRVE ($225.6 \pm 22.5 \mu\text{m}$ vs. HIV-free: $238.8 \pm 21.2 \mu\text{m}$, $p < 0.01$) and an increased CRAE/CRVE ratio (0.648 ± 0.061 vs. HIV-free: 0.668 ± 0.062 , $p < 0.01$). CRVE was negatively correlated with ART ($r = -0.130$; $p = 0.030$), and positively correlated with viral load ($r = 0.279$; $p < 0.001$), whereas CRAE/CRVE ratio correlated negatively with viral load ($r = -0.183$; $p = 0.029$). Stepwise regression analysis (controlling for age, gender, BMI and blood pressure), showed that HIV+ART negatively predicted CRVE (β -coefficient: -0.123 , $p = 0.037$).

Conclusion: HIV-infected participants receiving a fixed-dose combination ART showed reduced CRVE and increased CRAE/CRVE ratios – indicative of a healthier retinal microvascular status.

Detection of thrombogenicity induced by radiofrequency catheter ablation

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Introduction: The incidence of thromboembolic complications of radiofrequency catheter ablation (RFA) is 0.6% - 1.3%. Thrombogenesis is provoked by endothelial disruption, coagulation necrosis, electrical injury, mechanical damage in the vessel wall, and heating of circulating blood elements by radiofrequency energy.

Objective: The aim of this study is to determine the independent and incremental procoagulant effect of RF ablation by assessing a biochemical marker of thrombogenicity. The biochemical marker which was used throughout the study is D-dimer (DD).

Methods: This study included 40 patients divided into 20 patients referred to do radiofrequency transcatheter ablation with AVNRT and 20 patients with left accessory pathway. Four blood samples were taken for D-dimer. Initially, a blood sample is obtained immediately after insertion of the venous sheaths and before introduction of the electrode catheters (baseline measurements). Subsequently, a blood sample is taken on completion of EPS and mapping, just before application of the first RF ablation (post-EPS measurements). The third sample is taken after completion of the RF procedure (post-RF measurements) and before sheath removal. At 36 - 40 hours later and before discharge from the hospital, a fourth blood sample was obtained.

Results: Regarding the D-dimer level at the different stages of the procedure, it showed that both a right-sided and left-sided ablation procedure is associated with significant elevation of the D-dimer, and that there was no significant difference between the 2 groups ($p > 0.05$).

Conclusion: In both right-sided ablation and left-sided ablation, the D-dimer level in patients with VNRT increased significantly ($p < 0.001$) after EPS. The levels increased after ablation and, in spite of decreasing significantly before discharge, remained higher than the baseline level.

Cardiomyopathy in children in the Western Cape: Initial findings of the IMHOTEP registry

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Introduction: Despite major advances in paediatric cardiology over the last 3 decades, cardiomyopathy remains a significant cause of morbidity and mortality in children – especially in developing countries where mechanical circulatory support and transplantation are not readily available. To date, the characteristics of cardiomyopathies in African children have not been systematically described. IMHOTEP is a prospective, open-ended registry of prevalent and incident cases of cardiomyopathy in children and adults in Africa. From pilot sites in Cape Town, it is planned to expand to other centres in South Africa and subsequently the whole continent, in order to accurately characterise cardiomyopathies in Africa. This report summarises the experience to date from the first paediatric sites.

Methods: Commencing August 2016, all incident cases of cardiomyopathy or myocarditis presenting to Red Cross Children's and Tygerberg Hospitals, were enrolled into an OpenClinica registry (IMHOTEP African Cardiomyopathy Registry). Data captured include demographics, history, physical examination, blood investigations, genetic screening, chest X-ray, ECG, echocardiogram features, and outcome variables (adverse events, hospitalisations, death).

Results: As of May 2018, 45 children have been recruited. The median age at presentation was 22 months (IQR 4 - 44 months), and 19/45 (42%) presented as infants. Seven of 45 (16%) were peri-natally HIV exposed, but all tested negative by PCR. The predominant cardiomyopathy phenotype is dilated cardiomyopathy 27/45 (60%), followed by acute myocarditis (biopsy-proven, suspected clinically or on CMR) 10/45 (22%).

Morbidity and mortality has been substantial – 9 deaths (mortality 20%), 24/45 (53%) presenting in modified Ross class IV, with average hospitalisations 3.8/patient, average ICU admissions 1.1/patient, and mean number of days in hospital 33.7 (SD 23).

Conclusion: The paediatric limb of the IMHOTEP African Cardiomyopathy Registry is proving to be a powerful tool to characterise childhood cardiomyopathy in Africa, with the ultimate aim of improving the prevention, management and outcomes of this often devastating condition in children.

Management of atrio-ventricular septal defects in a developing country: Red Cross Children's War Memorial Hospital

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Introduction: Since 2009, our approach to the surgical management of atrio-ventricular septal defects (AVSDs), has changed in favour of definitive correction as opposed to one of palliation. Our aim is to evaluate early outcomes of a group of patients who have undergone primary repair of complete AVSDs.

Methods: A retrospective review was done of 173 consecutive patients who underwent definitive correction of complete AVSDs between January 2009 and March 2017. The mean age and weight at time of surgical correction was 11.55 ± 17.07 months and 6.40 ± 7.83 kg. The endpoints of the study included mortality, reoperation, morbidity, and post-operative hospital and ICU stay. Hospital and ICU admissions prior to surgery were recorded.

Results: The hospital mortality was 3.5% (n=6), and the late mortality was 15.6% (n=27). There were 22 (12.7%) reoperations, 17 (9.8%) of which were within the same admission. Seven (4%) patients required a permanent pacemaker. The mean number of hospital and ICU admissions, prior to surgical intervention, were 2.13 ± 2.14 , and 0.32 ± 0.68 times respectively. The corresponding pre-operative total patient days and total ICU patient days equaled 4 941 and 591 days respectively. The mean age of first hospital admission was 5.31 ± 11.30 months.

Conclusion: Definitive AVSD repair can be achieved with good early outcomes. However, these patients are still operated on very late, and spend a long period of time in hospital prior to surgery. We postulate that prioritising earlier surgery would reduce hospital burden, further improve surgical outcomes, and that the cost saving will be substantial.

The contribution of the hypertensive disorders of pregnancy to peripartum cardiomyopathy in an African cohort

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Introduction: Controversy exists about inclusion of patients with hypertensive disorders of pregnancy in the case definition of peripartum cardiomyopathy (PPCM). Some authors postulate that they are risk factors for PPCM, yet others argue that they are independent causes of peripartum heart failure. We sought to compare the clinical characteristics and outcomes between patients who had hypertension in pregnancy and those who did not, in a cohort of PPCM patients in Zimbabwe.

Methods: Patients with a diagnosis of PPCM were recruited prospectively and followed up for 6 months. Assessments included New York Heart Association (NYHA) functional class, clinical examination, and echocardiograms at baseline and at 6 months. Baseline characteristics and outcomes between participants diagnosed with hypertensive disorders of pregnancy and those who were not, were compared.

Results: Out of 138 patients with PPCM, 53 (38.4%) had hypertension in pregnancy. There was no significant difference in the mean age, blood pressure, median parity, time of onset of heart failure, gestation type, and functional status at presentation between the 2 groups. Baseline left ventricular ejection fraction (LVEF) ($30.9 \pm 8.7\%$ vs. $29.8 \pm 9.4\%$; $p=0.53$), left ventricular diastolic diameter (56.7 ± 6.7 mm vs. 58.3 ± 6.2 mm; $p=0.19$) and interventricular septum thickness (10.3 ± 2.8 mm vs. 9.7 ± 2.6 mm; $p=0.28$) were not significantly different between the hypertensive and non-hypertensive groups respectively. Mortality was 11.5% in the hypertension group, compared with 17.3% in the non-hypertensive group ($p=0.37$). LVEF improved significantly to $41.9 \pm 12.4\%$ in the group who had hypertension in pregnancy and to 39.76 ± 15.2 in the group without hypertension ($p<0.05$). There was no significant difference in the improvement in LVEF between the 2 groups at 6 months $p=0.39$.

Conclusion: There was no significant difference in baseline characteristics and clinical outcomes between patients with PPCM who had hypertension in pregnancy and those who did not. Patients with hypertensive disorders of pregnancy should be included in the case definition of PPCM.

Aortapulmonary window: A case report of a near miss diagnosis

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Introduction: An aortapulmonary window (APW) is a congenital heart lesion that results from the incomplete fusion or malformation of the conotruncal rings between the 5th and 8th week of gestation, creating a communication between the ascending aorta and the main pulmonary artery spanning from just above the semilunar valves to the right pulmonary artery. It can occur in isolation or can be associated with other cardiac anomalies. This rare defect can result in severe morbidity and rapidly progressive pulmonary hypertension. Thus it becomes imperative that a clinician is aware and highly suspicious of this type of defect.

Methods: This is a clinical case report.

Results: A simple Type II APW was diagnosed in a 7-week-old female on a follow up echocardiogram for assessment of a continuous murmur during an admission for respiratory distress. She was previously diagnosed to have a haemodynamically insignificant atrial septal defect at 2 weeks of age. She subsequently developed a nosocomial pneumonia requiring respiratory support, following which she became ventilator dependent. A CT scan done to confirm the AP window showed bilateral lung changes consistent with pulmonary oedema. She was considered to be high risk for conventional cardiopulmonary bypass surgery and although a palliative approach in the form of bilateral banding of the branch pulmonary arteries was considered, she eventually underwent a complete repair using Johansson's sandwich technique. An undiagnosed patent ductus arteriosus (PDA) was also ligated.

Conclusion: The presentation and complications of an APW are dependent on the size of the lesion and its association with other cardiac anomalies and co-morbidities. Cardiac catheterisation can be considered to assess reversibility of pulmonary vascular resistance. Successful outcomes can be achieved with surgical or percutaneous device closure of the APW within the first year of life.

Cardiac manifestations of *Staphylococcus aureus* infection in children: A case series

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Submission: Despite the availability of appropriate anti-staphylococcal antibiotics, the morbidity and mortality from *Staphylococcus aureus* infections remains high, especially with regard to cardiac complications – the most common being infective endocarditis and purulent pericarditis. This case series describes 3 male children who were diagnosed with methicillin-sensitive *Staphylococcus aureus* bacteraemia, septic arthritis and osteomyelitis – all of whom developed cardiac complications following prolonged hospitalisations and treatments to eradicate the *Staphylococcus* organism.

Case 1: A 4-year-old boy who presented with septic arthritis of the left hip and was found to have a large purulent pericardial effusion which required open surgical drainage.

Case 2: A 19-month-old boy manifested with an acute septicaemia after sustaining a soft tissue injury to his right ankle. An echocardiogram revealed a thickened pericardium and a vegetation in the right ventricle. He later developed constrictive pericarditis which resolved with antibiotics and steroid therapy.

Case 3: An 8-year-old boy presented in septic shock after sustaining a soft tissue injury to his left ankle. A routine electrocardiogram in the ICU illustrated changes consistent with stage I pericarditis. An echocardiogram showed a thickened pericardium that progressed to constrictive pericarditis, which was treated with steroids. He developed a left hemiplegia secondary to a right basal ganglia haemorrhage. A follow-up echocardiogram prior to discharge showed a large loculated pericardial effusion and a left ventricular pseudo-aneurysm. Two fistula-like communications with “to and fro” colour doppler flow were present connecting the left ventricular cavity with the effusion. The patient has been scheduled for cardiac surgery pending the healing of a residual chronic osteomyelitis lesion of his tibia.

These 3 cases emphasise the devastating consequences of a *Staphylococcus aureus* infection and the importance of having a high index of suspicion for cardiac complications.

Delayed myocardial rupture after NSTEMI treated with PCI

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We describe a case of a 74-year-old patient with delayed left ventricular free wall rupture (LVFWR). He had mitral valve repair 10 years ago. He initially presented with NSTEMI and was treated with primary PCI to CXA and DAPT. However, he presented with progressive symptoms of acute coronary syndrome 7 days later. His initial echocardiography at presentation did not reveal pericardial effusion. Coronary stenosis in CXA was noticed on angiography performed 3 hours later and was treated with a 3rd stent in the area between 2 earlier implanted stents. However, the patient remained hypotensive though coronary flow had improved after PCI. The correct diagnosis of LVFWR was made by performing repeat echocardiography and was confirmed by CT scan. The patient has survived because myocardial rupture was contained and successfully corrected by surgery.

Conclusion: Although LVFWR is unexpected after revascularisation, recurrence of chest pain and persistence of haemodynamic instability should alert toward this diagnosis. Thus, performing an echocardiography in an unstable patient with acute and especially relapsing coronary syndrome should be considered a must. Contained tamponade could be expected and requires careful echocardiographic study in such a patient, in the case of previous cardiac surgery causing pericardial adhesions.

Atrial flutter ablation through the azygous continuation in a patient with mirror image dextrocardia and interrupted inferior vena cava: A case report

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Introduction: Arrhythmias are a frequent reason for hospitalisation in adult congenital heart disease (ACHD). Macroreentrant intra-atrial reentry tachycardias (IARTs), with cavotricuspid isthmus (CTI)-dependent atrial flutter (AFL) are the most common circuit, followed by circuits around surgical incisions and/or patches. Radiofrequency catheter ablation (RFCA) is the treatment of choice. Linear radiofrequency (RF) applications are required; usually via a femoral approach from the inferior vena cava (IVC).

Methods: We describe CTI-dependent AFL ablation by the femoral approach in a patient with repaired ACHD and interrupted IVC.

Results: A 22-year-old man with mirror-image dextrocardia, repaired ASD and PS was referred for ablation. Systemic examination was unremarkable apart from dextrocardia. An ECG showed AFL with variable atrioventricular (AV) block. Mirror-image dextrocardia, no residual intracardiac shunt, mild PS/PR, normal dimensions and function of both the RV and LV on echocardiogram. Interrupted IVC was not previously reported or appreciated. On RA angiography, IVC interruption with azygous continuation was noted. A duo-decapolar catheter was placed around the tricuspid valve annulus (TVA), a decapolar CS catheter in the high RA (used as a reference for mapping), and an ablation catheter in the CS. An activation map showed clockwise AFL in RAO, a mirror image of the usual LAO view. There was an atriotomy scar (surgical incision into the right atrium made by the surgeon to access the interatrial septum) and ASD patch scar - where the actual ASD was repaired. Entrainment confirmed CTI-dependent macroreentrant RA tachycardia, terminated during CTI-line ablation, so - confirming the diagnosis. To prevent further intra-atrial reentry tachycardias an ablation line was drawn connecting the ASD scar to the SVC and block was confirmed across the atriotomy scar and CTI line by differential pacing. On follow-up, he remains in an atrial/junctional rhythm.

Conclusion: AFL ablation with azygous continuation has been reported, mostly ablated via an approach from the internal jugular veins. To our knowledge, ablation via the femoral approach has been reported in 3 other cases; and only once in association with dextrocardia. RFCA is the treatment of choice in AFL and should be attempted even in the face of challenging anatomy.

Degree of blood pressure elevation is not a differentiating factor in patients with pre-eclampsia presenting with and without pulmonary oedema: Findings from the LV IMPACT study

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Introduction: The cause of acute pulmonary oedema in patients presenting with pre-eclampsia (PET) is not known, and is likely multifactorial. It has been hypothesised that acute afterload mismatch due to the severity of blood pressure elevation is a significant contributing factor.

Methods: Patients presenting to Tygerberg Hospital with PET and pulmonary oedema between February 2016 and February 2017 were prospectively enrolled in the LV IMPACT Study. Pre-existing cardiac disease, chronic hypertension, or an alternative cause for pulmonary oedema were exclusion criteria. Clinical information was gathered as soon as possible after enrolment - including blood pressure at time of enrolment, highest recorded blood pressure from presentation to enrolment, and transthoracic echocardiography. A control cohort of patients presenting with PET without pulmonary oedema was simultaneously enrolled.

Results: Twenty one patients were enrolled with PET and pulmonary oedema (cases), and 21 were enrolled with PET without pulmonary oedema (controls). Mean ages for the groups were 28.3 years and 26.7 years respectively (p-value 0.081). Patients were enrolled at a median time of 24 hours post-delivery for cases, and 35 hours post-delivery for controls (p-value for difference 0.241). Mean systolic and diastolic blood pressures at enrolment were 146/81mmHg for cases, and 140/84mmHg for controls (p-values 0.655 [systolic] and 1.00 [diastolic]). Mean highest recorded blood pressures were 177/106mmHg for cases, and 180/114mmHg for controls (p-values 0.200 [systolic] and 0.191 [diastolic]). Cases were more likely to be receiving intravenous nitrates, and controls were more likely to be receiving oral calcium channel blockers. There were no other differences in medication being administered.

Conclusion: The degree of blood pressure elevation is not a differentiating factor in patients presenting with pre-eclampsia, with or without pulmonary oedema.

The RADIAL trial (radial artery dilatation to improve access and lower complication rates during coronary angiography)

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Introduction: Trans-radial access is preferred over trans-femoral access during coronary angiography, but poses a greater technical challenge and comes with novel complications. It may require multiple puncture attempts, and cannulation failure rates are higher. Complications include radial artery spasm (RAS), radial artery pulsation loss (RAPL) and radial artery occlusion (RAO). We explored prolonged occlusion flow mediated dilatation (PO-FMD) to dilate the radial artery prior to cannulation, in order to reduce puncture attempts and increase cannulation success.

Methods: Three hundred and fifty patients undergoing trans-radial coronary angiography were enrolled and randomised into PO-FMD and sham-PO-FMD groups. PO-FMD was achieved by 10 minute inflation of a blood pressure cuff on the upper arm to above systolic pressure, followed by deflation with resultant radial artery dilation. In the sham-PO-FMD group, the blood pressure cuff on the upper arm was not inflated. The cardiologists performing the angiogram were blinded to the intervention. The number of attempts, success of cannulation, time to cannulation and complications were recorded. The radial artery was assessed by ultrasonography before/after the procedure.

Results: One hundred and seventy six patients were randomised to the sham-PO-FMD group and 174 to the PO-FMD group. The radial artery diameter prior to cannulation was $2.27\text{mm} \pm 0.45\text{mm}$ in the sham-PO-FMD group and $2.24\text{mm} \pm 0.45\text{mm}$ in the PO-FMD group. The number of puncture attempts needed was reduced with the use of PO-FMD, with the median number attempts being 1 in the PO-FMD group and 2 in the sham-PO-FMD ($p=0.013$). Cannulation failure was also reduced ($p=0.014$). The time to cannulation was $124\text{s} \pm 129\text{s}$ in the sham-PO-FMD group and $98\text{s} \pm 94\text{s}$ in the PO-FMD group. Complication rates were low (RAS 8.4%, RAPL 3.8% and RAO 5.8%), with no significant difference between groups.

Conclusion: PO-FMD decreases puncture attempts and increases cannulation success during coronary angiography. The impact of this benefit on complication rates is the subject of an ongoing study.

Acute myocarditis: A case series from Tygerberg Hospital

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Introduction: The aetiology and estimated incidence of acute myocarditis (AM) remains undefined in South Africa. While cardiac magnetic resonance (CMR) provides for a provisional non-invasive diagnosis, endomyocardial biopsy (EMB), which is infrequently clinically sought, remains the gold standard. The developed world has experienced a shift in the viral epidemiology of AM and the European Society of Cardiology's most recent position statement on myocarditis recommends both CMR and EMB as the standard of care in suspected cases. Peripheral blood viral serology is of limited utility in the diagnosis of viral myocarditis. We report on 14 cases of AM investigated at Tygerberg Hospital, as of August 2017.

Methods: All 14 patients had the following blood tests: C-reactive protein (CRP), high sensitivity troponin T (hs-Trop T), HIV, hepatitis c serology, and anti-nuclear factor in females. They also underwent detailed transthoracic echocardiograms (TTE) and coronary angiography to exclude other cardiac pathology. After diagnosis of AM by CMR (Lake Louise criteria), EMB was performed under real-time TTE and fluoroscopic guidance, targeting areas of late gadolinium enhancement defined at CMR.

Results: Eight patients presented with symptoms of acute coronary syndrome, 4 with arrhythmia (3 with ventricular tachycardia and 1 with heart block) and 2 with heart failure. At index presentation, 8 had an elevated hs-Trop T. CRP was elevated in 6 of these, and in isolation in another 2. Acute myocarditis was confirmed on histology with immunohistochemistry in 8 patients. Eleven were polymerase chain reaction (PCR) positive for a cardiotropic virus: 6 for Parvovirus B19, 2 for Epstein-Barr (EBV), 2 for human herpes virus-6, and 1 for Parvovirus B19 and EBV.

Conclusion: This small case series demonstrates the heterogeneity in presentations and provides insight into the possible viral pathogens within our local setting, which appears to be similar to those reported in the developed world.

Distributive justice in paediatric cardiac surgery in South Africa

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Introduction: In our service we operate on over 350 children with congenital heart disease (CHD) annually, and yet reliable studies suggest we should be doing 3 times as many for the population we serve. We believe the situation is worse in other provinces. Being a state service, most of our patients are from an indigent background.

Methods: In addition to severely limited access to tertiary cardiac services, our median age at surgery for CHD is 1.1 years, being significantly older – with consequent different pathophysiological situations – when compared with most units in developed countries.

Results: Many factors contribute to poor access and late presentation. Some are on the side of the patient's family circumstances, and some are within the healthcare system. A high prevalence of co-morbidities in terms of communicable diseases and malnutrition exacerbates the problem. Extreme wealth disparity, unemployment, migrancy of job seekers, and single-parent families are added issues.

Conclusion: This distributive injustice in terms of access as reflected in our paediatric cardiac services demands attention. What factors are modifiable? Clearly socio-economic conditions remain the core problem – something typically considered unmodifiable by clinicians. Perhaps it is time to reconsider that attitude.

Idiopathic left main coronary artery aneurysm

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Introduction: This case presents a 41-year-old female with a history of an incidental cardiac lesion diagnosed at age 14. She has been asymptomatic with 3 uneventful pregnancies and was recently started on enalapril 5mg PO BD by her primary healthcare provider for hypertension. She currently presents for cardiology review with a progressive 6-month history of dyspnoea (NYHA functional class II), accompanied by intermittent palpitations and atypical left sided chest pain independent of exertion. Praecordium examination showed a soft ejection systolic murmur left praecordium, and all pulses and four-limb BP measurements were within normal limits. No clinical features of collagen vascular disease or vasculitis were found.

Methods: ECG showed a normal sinus rhythm with normal axis. A transthoracic echocardiogram was performed with the following findings: an aneurysmal chamber arising from the left coronary cusp measuring 17mm in diameter at the ostium with high velocity flow and no evidence of a communication with the cardiac chambers. The aneurysm follows the distribution of the left main and left anterior descending coronary artery. A normal left ventricle was observed with preserved left ventricular function and no pulmonary hypertension or aortic regurgitation.

Results: A diagnosis of idiopathic left main coronary artery aneurysm was made based on echocardiogram awaiting CT coronary angiography and diagnostic coronary angiogram. She was started on aspirin 75mg PO OD and enalapril 5mg PO BD.

Conclusion: Coronary artery aneurysms are a rare finding and are usually associated with atherosclerosis and/or an autoimmune vasculitis. In this case there was no clearly defined aetiology.

Rheumatic heart disease in a “low risk” community: Are other risk factors at play?

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Introduction: There is a dearth of screening data documenting the prevalence of subclinical RHD in South African children of school-going age. Three recent South African published series documents cite “definite” RHD prevalence among high-risk RHD communities at 2.3 - 6.9 per 1 000 cases. There are no published screening data documenting the “definite” RHD prevalence in low-risk cohorts in South Africa.

Methods: All consenting schoolchildren attending a secondary school in an affluent suburb of Cape Town (annual fees - R24 500) were screened for RHD according to the echocardiographic diagnostic criteria of the World Heart Federation (WHF). All positive screened cases in the field were re-read by a cardiologist with expertise in RHD identification.

Results: We screened 577 children; 348 (60.3%) were female and the mean age was 15.5 ± 1.2 years.

Five cases of “definite” RHD were identified, corresponding to a prevalence of 8.8 cases per 1 000 (95% CI 3.7 - 20.3). Four out of the 5 cases had access to private medical aid. None had a previous diagnosis of acute rheumatic fever.

Conclusion: We present unprecedented findings of RHD in a presumed low-risk population in South Africa. This finding challenges the long-held understanding that RHD is prevalent only in communities living in poor socio-economic circumstances with inadequate access to healthcare. Further investigation is warranted in other low-risk populations in South Africa to determine whether alternative risk factors could be responsible for the development of RHD.

Screening for rheumatic heart disease: A common normal variant of the posterior mitral valve leaflet resembles WHF-borderline rheumatic disease

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Introduction: The 2012 World Heart Federation (WHF) criteria for the echocardiographic diagnosis of subclinical rheumatic heart disease (RHD) is a significant step towards the standardization of reporting from RHD control programmes around the world. However, the incorporation of Doppler-based criteria to identify WHF-pathological mitral regurgitation (MR) can erroneously misclassify non-rheumatic cases with mild MR as WHF-borderline RHD. We have recently described inter-scallop separations (ISS) of the posterior mitral valve leaflet (PMVL), a benign normal variant of the mitral valve, as an important underlying mechanism of MR in cases classified as borderline RHD by current WHF criteria.

Methods: All consenting schoolchildren from an affluent community, attending a private secondary school in the Cape Winelands (annual fees – R1 10 000) were screened for RHD according to the echocardiographic diagnostic criteria of the World Heart Federation (WHF). Care was taken to determine the underlying mechanism of any MR identified. ISS-related MR was defined as MR seen to originate through a slit-like defect between adjacent PMVL scallops.

Results: Among the first 200 school children screened thus far; 104 (52%) were female and the mean age was 15.5 ± 1.3 years. Fourteen cases (7%) met all WHF Doppler criteria for pathological MR. No morphological features of RHD were present in these cases. Comprehensive echocardiography confirmed that the underlying mechanism of MR in 10 (71%) of these cases was attributable to an ISS.

Conclusion: ISS is a common cause of WHF-pathological MR in this low-risk RHD population. This entity is unrelated to the rheumatic process and should be actively sought in screened cases identified with isolated "pathological" MR. Refocusing the mitral regurgitation assessment in RHD screening to include an assessment of mechanism, may improve the identification of true RHD.

BDNF and attenuated inflammation as a defence response to cardiac stress and cognitive interference in black men: The SABPA prospective study

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Background: Down-regulated brain derived neurotrophic factor (BDNF) is associated with hypertrophic remodelling of the carotid artery and may be involved with microcirculatory ischaemia leading to myocyte injury. Previously, myocyte injury was coupled with inflammation associated with myocardial stress in black men. Indeed, inflammation can alter vascular function and lead to an increase in cardiac wall stress through pathways related to myocardial remodelling. We aimed to determine whether % changes (Δ) in cardiac stress risk markers (troponin T and N-terminal-pro-B-type natriuretic peptide) are associated with BDNF, tumor necrosis factor-alpha (TNF- α) and cognitive interference in a bi-ethnic cohort, over a period of 3 years.

Methods: This SABPA prospective sub-study was conducted in a bi-ethnic sex cohort (aged 20 - 65 years) from South Africa. Ambulatory blood pressure and fasting blood samples for cardiac troponin T (cTnT), N-terminal brain natriuretic peptide (NT-proBNP), BDNF, and TNF- α were obtained. The STROOP colour-word conflict test was applied to assess cognitive interference.

Results: In black men, no changes occurred in cTnT, but BDNF ($p < 0.001$) and NT-proBNP ($p = 0.009$) increased over the 3-year period. In turn, TNF- α decreased in these men. In black men only, chronic raised cTnT levels was associated with Δ BDNF ($\beta = 0.25$; 95% CI 0.05 - 0.45; $p = 0.02$), Δ NT-proBNP ($\beta = 0.29$; 95% CI 0.09 - 0.49; $p = 0.006$), and Δ TNF- α ($\beta = 0.24$; 95% CI 0.04 - 0.44; $p = 0.02$). Again in black men, chronic raised cTnT inversely associated with baseline cognitive interference ($\beta = -0.33$; 95% CI -0.53 - -0.12; $p = 0.003$).

Conclusions: Central neural control mechanisms upregulated BDNF and down-regulated TNF- α in black men as a way to protect against myocardial stress progression and to improve inhibition of cognitive interference. However, the increased BDNF seems insufficient to prevent escalation of myocardial stress and to decrease myocyte injury in black men.

Interrelationship between changes in glucose metabolism, myocardial distress and cognition in Black males: The SABPA prospective study

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Background: Disrupted glucose control (hyperglycaemia) due to insulin resistance (IR) is an independent risk factor for cardiovascular disease development. Impaired insulin signalling and glucose metabolism may also lead to neurodegenerative disease through induction of synaptic dysfunction and loss, resulting in impaired cognition. The aim of this study was to determine whether changes (Δ) over time in cardiac and metabolic biomarker status, as well as in cognition were interrelated and specific for race or sex.

Methods: Black and White participants (n=338, aged 20 - 65 years) of the Sympathetic Activity and Ambulatory Blood Pressure in Africans study were monitored over a 3-year period. Fasting blood samples were obtained for cardiac troponin T (cTnT) and N-terminal brain natriuretic peptide (NT-proBNP), glycated haemoglobin and the homeostatic model assessment for insulin resistance. The STROOP colour-word conflict test was applied to assess cognitive interference.

Results: Black males revealed persistently higher cTnT levels, moderate IR and more prevalent hyperglycaemia. Chronic hyperglycaemia was associated with Δ NT-proBNP (Adj R2 0.28, β =0.26; 95% CI 0.05 - 0.48; p=0.02) and IR (Adj R2 0.28, β =0.43; 95% CI 0.22 - 0.64; p<0.001) in Black males only. Furthermore, the change in cognitive interference score was inversely associated with chronic high cTnT levels (Adj R2 0.24, β = -0.36; 95% CI -0.57 - -0.15; p=0.001) and IR (Adj R2 0.24, β = -0.28; 95% CI -0.49 - -0.06; p=0.01) in these men.

Conclusions: Black males appear to have a propensity towards myocardial distress and sub-optimal cognitive function in the presence of deranged glucose metabolism.

Uhl's anomaly in an 11-year-old boy: A case report

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Introduction: Uhl's anomaly is a rare abnormality affecting the right ventricle. There is total absence of the myocardial layer of the right ventricle, which is replaced by fibroelastic tissue producing the colloquial term "parchment heart" with apposition of the endo and epicardium. The left ventricular and septal myocardium are not affected. The anomaly often presents in infancy.

Methods: TB is an 11-year-old boy from Port St. Johns in the Eastern Cape. He had a 2-week history of shortness of breath, and had an unremarkable past medical history and had been otherwise well until his recent admission to hospital. He was admitted with symptoms of right heart failure at the referring centre, where he had been placed on diuretics. ECG showed an atrial flutter.

Results: An echocardiogram and MRI revealed a massively dilated right heart with spontaneous echogenic contrast. The tricuspid valve was not displaced. Upon cardiac catheterisation, pulmonary hypertension in the absence of a significant shunt was found. Nuclear imaging confirmed the presence of pulmonary micro-emboli. He is currently on anti-failure treatment and warfarin. As he is not a candidate for heart transplant due to socio-economic concerns, he will be scheduled for a staged single ventricle repair should pulmonary pressures improve after treatment of the pulmonary emboli.

Conclusion: We present a case of Uhl's anomaly, a rare condition that to our knowledge has not previously been reported in Africa. Timing of presentation, pulmonary hypertension as a complication of thromboembolic events, as well as the surgical intervention planned are topical in this patient.

Percutaneous pericardioscopy in a population with a high prevalence of tuberculous pericarditis – Improving the diagnostic yield and advancing the time to diagnosis

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Introduction: Establishing a definite diagnosis of tuberculous (TB) pericarditis via direct detection of Mycobacterium tuberculosis (MTB) is challenging and not always possible using conventional investigations. Previous studies have demonstrated a low yield using either direct microscopy or mycobacterial culture on pericardial fluid alone. We evaluated the potential advantage of minimally invasive percutaneous pericardioscopic biopsy of the pericardium in the diagnosis of TB pericarditis.

Methods: Patients presenting with a moderate to large pericardial effusion were offered pericardiocentesis via a standard procedure, followed by percutaneous pericardioscopy and pericardial biopsy. Pericardial fluid evaluation included biochemistry, cell count, smear microscopy, and TB culture. Pericardial biopsy specimens underwent direct smear microscopy for acid fast bacilli (AFBs), TB culture, and histological examination. Definite TB pericarditis was defined as at least 1 specimen positive for AFBs, MTB culture, or presence of granulomas on histology.

Results: One hundred patients participated; 59 were males, mean age 37.9 ± 13.5 years, and 60 were HIV-infected (mean CD4 = 192.7 cells/ μ L). Pericardial biopsy could be obtained in 82 participants, and 54 (65.8%) of these had definite pericardial TB. The yield by examining pericardial tissue was significantly higher than by examining pericardial fluid (96.3% (52/54) vs. 72.2% (39/54); $p < 0.05$). Thirty four tissue samples were positive by smear and/or histology (11 AFB positive, 12 had granulomas, and 11 had both), while 15 tissue samples were only culture positive. Of the 39 culture positive fluid samples, 10 were smear positive.

Conclusion: Histological and microbiological examination of pericardial tissue resulted in a significantly higher yield than examination of pericardial fluid – with 15 of the 54 confirmed cases (27.7%) identified only on examination of pericardial tissue. In contrast to the assessment of pericardial fluid where a definite diagnosis of TB mainly depended on culture, pericardial biopsy enables a more rapid diagnosis by microscopy or histology.

Severe symptomatic aortic stenosis due to a unicuspid unicommissural aortic valve

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Introduction: Aortic stenosis is the most common disease affecting native valves in the developed world. This usually takes the form of degenerative aortic valve disease, largely affecting the elderly. However, as the age at presentation decreases, the likelihood of an underlying congenitally abnormal aortic valve increases, suggesting that congenitally abnormal valves degenerate earlier.

Methods: Case report: A 13-year-old boy presented with symptomatic severe aortic stenosis. His echocardiogram revealed a Schone's complex variant with a unicuspid, unicommissural aortic valve. The aortic valve area was $0.6 \text{ cm}^2/\text{m}^2$ indexed to body surface area. In the presence of symptoms, intervention was indicated. Due to his pre-pubescent state, he was at increased risk of developing prosthesis-patient mismatch. Percutaneous balloon commissurotomy was successfully undertaken as a bridge to surgery, resulting in a final indexed orifice area of $1.1 \text{ cm}^2/\text{m}^2$.

Results: Not applicable.

Conclusion: When aortic stenosis presents in young patients, a congenital abnormality of the valve is likely. Due to the low incidence of unicuspid unicommissural aortic valves, there are no robust data to guide therapy. The trend in the paediatric literature is towards percutaneous commissurotomy, which proved successful in our case.

Tuberculous effusive constrictive pericarditis; assessing short-term outcomes with medical therapy

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Introduction: Effusive constrictive pericarditis (ECP) is a syndrome where pericardial constriction physiology is present following drainage of a large pericardial effusion. Patients with ECP are thought to be at higher risk of developing constriction. We sought to investigate the effect of treatment with anti-tuberculous medication, on the outcome of tuberculous effusive constrictive pericarditis at 3 months of therapy.

Methods: Patients with moderate to large pericardial effusions were screened. A diagnosis of ECP was made on echocardiography (Mayo criteria) after complete pericardial aspiration. Diagnosis of tuberculous pericarditis was made on pericardial fluid or tissue samples. Patients diagnosed with ECP were enrolled as cases, and those without as controls. Standard anti-tuberculous therapy was commenced in both groups. At 3 months, patients were reassessed clinically and echocardiographically for constriction physiology.

Results: A total of 23 patients were enrolled, 14 (60.9%) cases and 9 (39.1%) controls; 17 (73.9%) were males with a mean age of 35 years; 17 (73.9%) were HIV-positive. Cases had more strands ($p=0.002$), longer strands ($p=0.009$) and had more organised material ($p=0.04$) in the pericardial space. At 3 months, 8 of the cases had complete resolution of ECP (57.1%). One case (4.3%, $p=0.61$) developed overt constriction and 1 (4.3%) ECP. Two (8.6%) patients required pericardiectomy; both from the among the cases. No pre-defined clinical parameter was associated with constriction or persistent ECP at 3 months, i.e. a positive HIV status ($p=0.16$), ascites ($p=0.16$), oedema (0.09), and NYHA class >2 . On echocardiography, the presence of organised material in the pericardial space was associated with increased risk of new or persistent ECP ($p=0.03$).

Conclusion: In this cohort, two-thirds of patients with moderate-to-large tuberculous pericardial effusions had ECP. There was good resolution of constrictive physiology at 3 months. Rates of established constriction were low. The presence of organised material in the pericardium is a possible prognostic marker to non-resolution of constrictive physiology at 3 months.

Outcomes of 562 echocardiographically guided pericardiocenteses over a 10-year period in a low-to-middle income country tertiary referral centre

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Introduction: Echocardiographically-guided percutaneous pericardiocentesis (EGPP) is well established as a safe procedure with a low rate of minor and major complications in high-income countries. Its feasibility and safety is poorly described in resource-limited regions. The primary objective of this study was to evaluate the major and minor complications associated with EGPP in a large South African tertiary referral centre, and to compare the rate of complications with the internationally accepted standard. Secondary objectives included evaluating the optimal route of access and identifying potential risk factors for procedure-related complications.

Methods: All EGPP performed between 01/01/2008 and 31/12/2017 were included. Pericardiocentesis procedural reports and clinical notes were evaluated to determine the aetiology of the pericardial effusion, pericardial access site, procedural success, volume of fluid aspirated, and procedure-related minor and major complications.

Results: During the 10-year study period, 562 EGPP were performed on 502 patients (mean age: 40 ± 14 years). The leading aetiology was tuberculous pericarditis (82.5%); iatrogenic, cardiac catheterisation-related effusions comprised only 1.7%. Overall, EGPP procedural success rate was 95%, with a total procedure-related complication prevalence of 6.99% (95% CI: 4.9 - 9.7%); (major: 1.98%; minor: 5.01%), compared to a complication rate of 4.7% (major: 1.2%; minor: 3.5%) in the largest series from the Mayo Clinic. The preferred site of access was the trans-apical route (66%). After adjusting for confounding variables in a multivariate analysis, pericardiocentesis in low-volume effusions (<300mL) was associated with procedure-related complications [Odds Ratio 2.23, (95% CI: 1.01 - 4.98)]. There was no significant association between adverse outcomes and alternate (subxiphisternal/parasternal) routes of access.

Conclusion: EGPP is associated with a low prevalence of complications in our centre (in a resource-limited African country), with a major procedure-related complication prevalence comparable to that of a leading centre from a high-income country. Low-volume effusions were independently associated with an increased risk of procedure-related complications.

Prevalence, aetiology, predictors and outcomes of non-tuberculous pericardial effusions in high-HIV, high-TB prevalence settings: An IMPI sub-study

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Introduction: There are limited data regarding non-tuberculous pericardial effusions (non-TBPE) in high-HIV, high-TB prevalence settings. We implemented a comprehensive diagnostic strategy, including clinical and pericardial fluid (PF) diagnostics, to evaluate the prevalence, aetiology, predictors and outcomes of non-TBPE patients.

Methods: Consecutive, consenting patients with moderate to large pericardial effusions were enrolled in the Investigation of Management of Pericarditis in Africa (IMPI) diagnostic sub-study (2009 - 2014), and underwent pericardiocentesis. PF diagnostic testing included adenosine deaminase (ADA), lactate dehydrogenase (LDH), cell counts, cytology, TB microscopy and liquid culture, unstimulated interferon gamma ($\text{uIFN}\gamma$), and Xpert MTB/RIF.

Results: Included were 151/172 screened participants; 19.2% (29/151) were classified as non-TBPE, 49.0% (74/151) as definite-TBPE, and 33.1% (50/151) as probable-TBPE; 74% (105/142) were HIV-infected [median (IQR) CD4 count 139 (81 - 249)]. Non-TBPE participants were significantly older [mean (IQR) age 52 (34 - 60) vs. 33 (27 - 38), $p < 0.001$], less likely to be HIV-infected (28% vs. 80 - 82%, $p < 0.001$), and had greater cardiac functional disability (86% NYHA III and IV vs. 25 - 41%, $p < 0.001$). On diagnostic evaluation, non-TBPE participants had smaller pericardial effusions ($p < 0.001$), lower PF ADA levels ($p < 0.001$), lower PF LDH levels ($p = 0.02$), less lymphocytic-predominant effusions ($p < 0.001$), higher serum haemoglobin levels ($p = 0.004$), and higher serum white cell counts ($p < 0.001$). The predominant aetiology of the non-TBPE was malignancy (13/29, 44.8%), followed by bacterial pericarditis (6/29, 20.7%), heart failure (3/29, 10.3%), idiopathic pericarditis (3/29, 10.3%), systemic lupus (2/29, 6.9%), renal failure (1/29, 3.4%), and miscellaneous (1/29, 3.4%). The clinical findings that best predicted non-TBPE aetiology were age > 50 years, HIV negativity, and absence of night sweats. Mortality at 1 year for non-TBPE was 24% (7/29) vs. 7% (5/74) for definite TBPE.

Conclusion: In high-HIV, high-TB prevalence settings, non-TBPE is predominantly caused by malignancy and has a poor 1-year prognosis. A clinical prediction tool utilising the variables age > 50 years, HIV-uninfected status, and the absence of night sweats, offers excellent pre-investigatory differentiation between non-TBPE and definite TBPE.

The impact of female hormones on cardiomyocyte hypertrophy in vitro

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Introduction: The hormonal environment during pregnancy might determine significant modifications of the cardiovascular system. However, the responsiveness of a target cell to a hormone depends on the hormone's concentration, the abundance of the target cell's hormone receptors, and influences exerted by other hormones. It has been demonstrated that progesterone ablates the cardioprotective effect of oestrogen. There is a gap of knowledge on the cross talk of the 3 pregnancy hormones (oestrogen, progesterone and prolactin) and their involvement in cardiac remodelling. We aim to study the interaction of pregnancy hormones on cardiac hypertrophy – an important step of cardiac adaptation during pregnancy.

Methods: H9C2 cardiomyocytes between passage 18 and 21 were treated with isoproterenol to induce cardiac hypertrophy. The cells were also treated with varying doses of oestrogen in order to determine the role of this hormone on cardiomyocyte size. After 24 hours of treatment, cells were stained with phalloidin immunofluorescent dye. Using a fluorescence microscope, 9 pictures were randomly captured on each coverslip and cell sizes (long and short axis) were measured by Image J software. The experiments were conducted in triplicate and 3 independent experiments were done.

Results: Isoproterenol induced cardiac hypertrophy of H9C2 cells in a dose-dependent manner. Increasing dose concentration from 10uM - 100uM also increased the cell size. Increased mortality was observed with the 100uM dose. Oestrogen doses (1nM - 50nM) reduced cardiomyocyte size. Similar to isoproterenol, high mortality was observed with doses higher than 30nM. To further explore the hormonal interaction, we will test the dose-dependent effect of progesterone and prolactin and then test the interaction of oestrogen, progesterone and prolactin on myocyte hypertrophy.

Conclusion: Isoproterenol induced cardiomyocyte hypertrophy in a dose-dependent manner. However, higher doses cause cell death. Moderate levels of oestrogen alleviate cardiac hypertrophy, but high levels may exacerbate and induce mortality.

Cardiac magnetic resonance imaging vs trans-oesophageal echocardiography to detect left atrial thrombi before percutaneous balloon mitral valvotomy for mitral stenosis: A pilot study

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Introduction: Detection of left atrial (LA) and LA appendage (LAA) thrombus prior to percutaneous balloon mitral valvotomy (PBMV) is critical to prevent thrombo-embolism. Trans-oesophageal echocardiography (TOE) is the gold standard for detecting atrial thrombi, but its interpretation remains challenging in some cases. Cardiac magnetic resonance imaging (CMRI) is considered the gold standard modality for tissue characterisation, including thrombus identification, elsewhere in the heart. However, it is poorly studied in the setting of LAA thrombus detection, and particularly so in the setting of mitral stenosis pre-PBMV.

Methods: Prior to PBMV, patients underwent both TOE and CMRI within 48 hours of each other, assessing for the presence or absence of LA/LAA thrombus. TOE was performed in accordance with the British Society of Echocardiography guideline for a comprehensive study. All patients received CMRI at 1.5 Tesla utilising sequences appropriate for detecting thrombi, and incorporating systematic thin slices taken through the LAA in 3 image planes. All results were independently reported by the respective operators.

Results: Twenty one patients have been included to date. TOE reported the presence of thrombus in 7 cases, absence of thrombus in 11 cases, and suspected thrombus in 3 cases. CMRI reported presence of thrombus in 9 cases, and absence of thrombus in 12 cases. In 16 cases, there was agreement between TOE and CMRI. Five cases of discrepancy were reviewed by the investigators and consensus was reached ("gold standard"). In 3 cases where TOE reported suspected thrombus, CMRI confirmed the presence of thrombus. Both TOE and CMRI reported only 1 case each differing from the consensus opinion. All patients in whom thrombus was excluded underwent successful PBMV without thrombo-embolic events.

Conclusions: Both TOE and CMRI identify or exclude thrombus with a high degree of certainty. CMRI offers a safe, non-invasive adjunct to TOE, adding value in difficult TOE cases.

Valvular atrial fibrillation outcomes associated with the Cox maze procedure at Charlotte Maxeke Johannesburg Academic Hospital from 2000 - 2015

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Introduction: Outcomes data on the efficacy of the Cox maze procedure for the treatment of valvular atrial fibrillation largely originates from developed countries, with a paucity of data from the developing world. The primary objective of this study was to determine Cox maze procedural outcomes for valvular atrial fibrillation (AF) in a state tertiary academic centre in Johannesburg, where electrophysiological therapeutic alternatives are scarce.

Methods: We retrospectively reviewed inpatient and outpatient records of adult patients who had the Cox maze procedure for valvular atrial fibrillation from January 2000 - December 2015. The study data collected included the primary indications for cardiac surgery, peri-operative complications, and follow-up outcomes data on the successful treatment of AF outcomes and restoration of sinus rhythm.

Results: We reviewed 144 patient records of which 98 (68%) were females and the mean age was 45 (SD \pm 12) years. Prior to surgery 117 (83%) of the study participants were in NYHA class III, with a mean ejection fraction of 55% (SD \pm 12). Rheumatic mitral stenosis was the indication for surgery in 73 (50.7%) participants. Immediately post-operation, sinus rhythm was restored in 106 (74%) patients. After a mean duration of 6 years (SD \pm 3), 106 (73.6%) were in sinus rhythm. On multivariate analysis none of the study variables were significantly associated with sinus rhythm restoration.

Conclusion: Our findings suggest that the Cox maze procedure is effective in the management of symptomatic valvular atrial fibrillation – especially in clinical settings with limited electrophysiological therapies.

Factors affecting coronary atherosclerosis progression

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Introduction: The coronary atherosclerosis clinical presentation depends on the composition of the atherosclerotic plaque and the changes occurring on this plaque. These changes can be detected by coronary MDCT.

Methods: The study was conducted on 40 patients that underwent repeated coronary MDCT. History of risk factors was noted. Baseline and follow-up cardiac CT scans were performed. Detected atherosclerotic plaques were evaluated using these parameters: (i) QCA-like parameters: (a) Minimum lumen diameter; (b) diameter stenosis %. (ii) IVUS-like parameters: (a) Atheroma volume %; (b) total atheroma volume; (c) % change in total atheroma volume; and (d) area stenosis %.

Results: Among the 40 patients, 85% were males. The mean age was of 60.5 years. As for risk factors, 47.5% had DM, 77.5% had HTN, 55% were current smokers, and 65% were dyslipidaemic. The mean duration between the baseline MDCT and the follow-up one was 25.9 months. Sixty eight plaques were detected, evaluated using MDCT in both settings, and then compared to each other. To insure the accuracy of the change in plaque characters we considered that this change was significant when observed in 2 of 3 characters (the 3 characters were % DS, % AS and % change in TAV). Therefore, we obtained 39 plaques that had progressed, 24 plaques had no change, and 5 plaques had regressed. These changes were analysed according to risk factors. Calcium deposits were observed in 17.9%, 50% and 80% of the progressed, stable and regressed plaques, respectively. Therefore, there was a significant association between plaque stabilisation and the presence of calcium deposits ($p=0.001$).

Conclusion: MDCT can be used for non-invasive monitoring and follow-up of coronary atherosclerosis. Our study showed that DM and dyslipidaemia were the main risk factors associated with coronary artery atherosclerosis progression. Calcium deposits were associated with plaque stabilisation.

Paediatric dilated cardiomyopathy caused by glue sniffing: A case report

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Introduction: Inhalation of glue for the purpose of recreational self-intoxication to gain euphoria is a common public-health problem among teenagers and young adults. The main volatile component of super-glue called "Toulene" has been shown to have toxic effects on various organs and systems in the body. The cardiovascular system can be directly affected by the cardiotoxic effects of Toluene, leading to cardiac arrhythmias, dilated cardiomyopathy, and sudden sniffing death syndrome. We report a case of dilated cardiomyopathy in a paediatric patient with a history of glue sniffing.

Methods: A 13-year-old male with a history of glue sniffing over a protracted period of time presented with symptoms and signs of congestive heart failure (CHF). In addition, he was known to have attention deficit hyperactivity disorder (ADHD), was on Ritalin, and was suspected to have Fetal Alcohol Syndrome (FAS). There was no history of alcohol or other recreational drug intake. He had dysmorphic features suggestive of FAS, an irregular heartbeat and clinical features of a dilated cardiomyopathy and CHF on physical examination. The electrocardiogram (ECG) showed a heart rate of 132bpm, retrograde P waves, wide regular, irregular and bizarre looking QRS complexes. A chest X-ray was remarkable for cardiomegaly. Echocardi-

ography showed dilated heart chambers, with left ventricular systolic and diastolic dysfunction, and a large thrombus in the left ventricle. He was treated with furosemide, digoxin, enalapril, amiodarone, carvedilol, heparin and warfarin. His ECG appearance changed to a bigeminal rhythm a few days after starting treatment, which resolved after digoxin was stopped – suggesting digoxin toxicity. His CHF symptoms, dysrhythmia and left ventricular function subsequently improved and he was discharged from hospital. He was re-admitted to hospital 12-months later with CHF and an arrhythmia, after disclosing that he had resumed his glue sniffing habit following hospital discharge, despite attempts at psychosocial intervention.

Cytoprotective effects of a dietary melatonin isomer against simulated ischaemic injury

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Introduction: The presence of melatonin in wine contributes to the cardioprotective effect of regular and moderate consumption of wine against lethal ischaemia/reperfusion injury. Recently, the presence of melatonin isomers has been identified in red wine, but whether these isomers confer any physiological properties is unknown. The aim of our study was to establish a cell culture model of simulated ischaemia to study and explore the cytoprotective effects of both dietary melatonin and a melatonin isomer against an ischaemic insult.

Methods: H9C2 cells were subjected to simulated ischaemia with 1mM H₂O₂, following a 30 minute pretreatment with 75ng/L melatonin or/and 75mg/L melatonin isomer. To determine the role of melatonin receptors, cells were pretreated with the melatonin receptor inhibitor, luzindole (10μM) for 1h prior to H₂O₂ treatment. At the end of the simulated ischaemic insult, cell viability was assessed using trypan blue staining. Mitochondrial cell respiration was measured using the Oroboros Instrument after a 30 minute treatment with either melatonin or the melatonin isomer.

Results: A simulated ischaemic insult with 1mM H₂O₂ reduced cell viability from 92.9 ± 1.5% to 28.4 ± 1.4% (p<0.001 vs. control). Pre-treatment with melatonin or the melatonin isomer improved the cell viability (74.4 ± 3.1%, 73.9 ± 2.7%, p<0.001 vs. H₂O₂, respectively). A combined pre-treatment of melatonin and the melatonin isomer did not add further cytoprotective benefit. Luzindole fully abolished the cytoprotective effect of dietary melatonin (29.7 ± 2.4%, p<0.001 vs. H₂O₂ + melatonin), but only partially abolished the cytoprotective effect of the melatonin isomer (41.4 ± 3.6%). Both melatonin and the melatonin isomer did not affect mitochondrial respiration in permeabilised H9C2 cells.

Conclusion: Our findings suggest that the melatonin isomer confers cytoprotection against a simulated ischaemic insult – an effect which is mediated, at least in part, via the activation of melatonin receptors. Both melatonin and melatonin isomers may be considered as possible safe and inexpensive therapies against ischaemic heart disease.

Seven-year experience of transcatheter aortic valve implants (TAVI) in a Western Cape private healthcare setting

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Introduction: The rapid expansion of TAVI device technology and international implantation expertise is hampered in South Africa by resource constraints. We report our experience with 244 successive TAVI implants – the largest South African TAVI outcome report to date for a single heart valve team.

Methods: Two hundred and forty four patients underwent TAVI (October 2009 - September 2016) at 2 hospitals in the Western Cape. Outcome data were recorded and used to compile this report. Transcatheter devices used included the Edwards Sapien, Edwards Sapien XT, and the Medtronic CoreValve. All endpoints are in accordance with the VARC 2 consensus report definitions.

Results: The average age of patients was 80 years, with a slight male preponderance (55% males). The majority of patients had significant comorbidities, with a mean STS score and log EuroSCORE of 7.89% and 26.5% respectively. The femoral access route was preferred (75%), followed by the transapical and transaortic route (14% and 11%). Device implantation success was achieved in 89.3% of cases. One year survival rate was 81%. This was accompanied by a valve area increase from 0.7cm² to 1.6cm², a decrease in mean aortic valve gradients from 46mmHg to 10mmHg, and a significant increase in effort tolerance (NYHA dyspnea grading: Pre-procedural 65% NYHA 3; Post-procedural 50% NYHA 1). Comparable to the existing literature, we report a procedural mortality rate of 3.68%. Life threatening bleeding and major vascular complications were found in 4.5% and 5.73% respectively. Lower rates of vascular complications were seen with second-generation devices and growing experience of the heart valve team.

Conclusion: Despite obvious constraints, we have shown outcome data in line with international reports. Furthermore, we have shown an improvement in patient outcomes with growing expertise and device development. This, along with other South African-based TAVI registry reporting, ought to fuel local funding and interest in this rapidly evolving field.

The outcome of ECMO in patients with reversible pulmonary disease on maximum ventilatory support and still being hypoxic

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Introduction: The outcomes of extra corporeal membrane oxygenation in patients with reversible pulmonary disease on maximum ventilation and still being hypoxic.

Methods: The purpose of the study is to observe the outcomes of extra corporeal membrane oxygenation (ECMO) in patients with reversible pulmonary disease on maximum ventilation and still being in respiratory failure. The damaging effect of high volume and pressure on the lung can be prevented. The patient on ECMO is ventilated with low settings of the ventilator; and the lung is allowed to rest and heal so that it can recover and be able to ventilate again. A retrospective study will be done in the Milpark Cardiothoracic intensive care unit. The files of the patients admitted to the ICU for ECMO will be collected and analysed. The number of days in ICU, the number of days on ECMO, the number of days on the ventilator; and the diagnosis of the patients will be studied.

Results: • 54% chance of ECMO survival. • The numbers are increasing per year. • Outcomes are better in young patients than in adults. • 50% chance of survival for males and females. • ECMO is more prevalent in June.

Conclusion: Young patients inserted ECMO early have better outcomes. Old patients and prolonged ventilation have worse outcomes.

Wolff-Parkinson-White Syndrome presenting with dilated cardiomyopathy and subsequent right accessory pathway radiofrequency ablation

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Introduction: Ventricular pre-excitation through accessory pathways is being recognised as causing dilated cardiomyopathy possibly due to dysynchrony. Radiofrequency ablation is the treatment of choice for pre-excitation and may reverse the left ventricular (LV) dysfunction.

Methods: Records of 2 paediatric patients with Wolff-Parkinson-White Syndrome (WPW) and dilated cardiomyopathy (DCM) were analysed for demographic data, clinical presentation, diagnosis, management and outcomes.

Results: Two paediatric patients with WPW presented with left ventricular dysfunction. Electrocardiograms (ECGs) showed pre-excitation (short PR interval, wide QRS complex and Delta waves). Echocardiography showed severe left ventricular dysfunction in both patients. One of the patients also has type A Ebstein's anomaly. Both patients were treated with anti-failure medication and had successful ablation of the right anterolateral accessory pathways.

Conclusion: Wolff-Parkinson-White Syndrome with right anterolateral pathway is rare. Paediatric patients with WPW can also present with dilated cardiomyopathy. The treatment of choice for WPW is radiofrequency ablation, and it may reverse the left ventricular dysfunction.

Cardiac troponin, chronic stress and cardiovascular risk: The SABPA prospective study

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Introduction: Serum cardiac troponin T (cTnT), raised above 4.2ng/L, was associated with norepinephrine downregulation. Both raised cTnT and retinal vein widening were associated with cortisol hypo-activity or depression. Norepinephrine release is inhibited by α_2 -adrenergic receptor activity to protect retinal glia, ganglion cells and vasculature. Whether neural control of norepinephrine and cortisol may (i) disturb the retinal vasculature (neurovascular coupling), and (ii) facilitate cardiomyocyte injury, is not clear, and was investigated.

Methods: Based on concentration, downregulated norepinephrine motivated stratification of a prospective teachers' cohort (n=275, 45 \pm 9 years) into norepinephrine:creatinine (NE:Cr) tertiles at baseline. Prospective 24 hour blood pressure (24 hour BP), 24h urinary NE:Cr; serum cTnT, cortisol and depression (Patient-Health-Questionnaire-9; PHQ-9 \geq 10) data were obtained. At 3 year follow-up, salivary cortisol (sC) and α -amylase (sAA) (adrenergic activity marker) were obtained prior to digital image quantification of retinal calibres in the mydriatic eye.

Results: Neural and vascular changes (p \leq 0.05) were only apparent in the low-tertile (44% black; 64% men). NE:Cr upregulated with 189.6% over 3 years, whereas 24 hour hypertension and depression prevalence remained unchanged. Both cortisol and cTnT decreased over 3 years. Positive associations existed between chronic cTnT levels and sAA, while retinal arteriole narrowing was also associated with sAA. Retinal vein widening, a stroke risk marker, was associated with hypo-active sC and chronic depression (Odds ratio 1.7; p=0.03).

Conclusion: Low norepinephrine concentrations facilitated homeostatic reflexes with upregulation of norepinephrine via inhibition of α_2 -adrenergic receptor activity. Chronic neuronal hyperactivity disturbed neurovascular coupling due to excessive catecholamine and vasoconstrictive effects, which may be damaging to retinal vessels. Chronic neuronal hyperactivity enhanced myocardial demands and possible downregulation of cTnT concurrently with cortisol hypo-activity, reflecting chronic stress. Susceptibility for cardiovascular events increases during chronic stress, irrespective of the vascular bed.

Assessment of aortic deformation using strain imaging in HIV-associated aortopathy

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Introduction: Increased arterial stiffness is an important marker of cardiovascular mortality. Strain imaging of the has been used as a tool to measure vascular stiffness. Two dimensional (2D) speckle tracking echocardiography (STE) for measurement of circumferential strain (CS) of the ascending aorta in HIV aortopathy, has not been described. Thus we sought to assess thoracic ascending aortic deformation using 2D STE in patients with HIV aortopathy.

Methods: Twenty five (15 females) HIV aortopathy patients and 15 controls underwent echocardiography. Peak global CS was measured from short axis images of the ascending aorta and timed to aortic valve closure. Philips Qlab 10.1 software was used to perform CS analysis. Additionally, the β_2 index was measured using the formula $\beta_2 = \ln(\text{Systolic blood pressure}/\text{Diastolic blood pressure})/\text{Aorta CS}$.

Results: The mean age of the study population was 47 ± 11 years. The ascending aorta was enlarged compared to controls ($47.4 \pm 10.4\text{mm}$ vs. $23.1 \pm 3.68\text{mm}$, $p=0.0002$). Peak global CS was lower in HIV aortopathy patients ($5.39 \pm 2.82\%$ vs. $12.6 \pm 3.92\%$, $p=0.0001$). The β_2 index was higher in aortopathy patients than in controls ($0.51 \pm .39$ vs. 0.13 ± 0.039 , $p=0.0006$). There was a negative correlation between CS and β_2 index in the study patients ($r=-0.76$, $p=0.0001$).

Conclusion: CS using STE can be easily measured and used as a surrogate for aortic stiffness in patients with HIV aortopathy. In this study, patients with HIV aortopathy had increased arterial stiffness.

A “screwed-up” heart-case report

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Introduction: Aorta-pulmonary (A-P) fistula following a stab wound to the chest with superimposed infective endocarditis (IE) is a rare, often unrecognised presentation. Herein, we report a case of A-P fistula due to a stab to the chest, assessed by 3 dimensional (3D) imaging.

Methods: We describe a rare case of an A-P fistula after a stab wound to the chest, complicated by IE, using 2D and 3D echocardiographic imaging.

Results: A 30-year-old male presented with a history of a stab wound to the chest with a screwdriver. The chest wall laceration was sutured and an intercostal drain inserted for haemopneumothorax and the patient was subsequently discharged. He presented 3 weeks later with exertional dyspnoea, fever, rigors, and loss of weight. On examination, the patient had a wide pulse pressure and a harsh continuous murmur in the 2nd left intercostal space, associated with a palpable thrill. A 12-lead electrocardiogram was normal. Blood tests revealed raised infective markers and anaemia. All blood cultures were sterile. The echocardiogram showed good left ventricular function. The aortic valve and pulmonary valve were severely damaged with suspicion of superimposed vegetations secondary to IE. There was severe aortic regurgitation primarily due to destruction of the right coronary cusp and moderate pulmonary regurgitation. There was a fistula between the aorta and the main pulmonary artery, just below the commissure between the right and left coronary sinus. On 3D imaging, the defect measured $1.4 \times 0.6\text{cm}$ in diameter, with an area of 0.9cm^2 . The patient was subsequently referred for aortic and pulmonary valve replacement and closure of the A-P fistula. The presence of multiple vegetations was confirmed intra-operatively.

Conclusion: We have described a rare case of an A-P fistula due to a stab to the chest complicated by IE. Furthermore, 3D imaging was useful in providing a comprehensive assessment of the morphology of the lesion prior to surgery.

Utility of three dimensional echocardiography in a case of tricuspid valve stenosis

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Introduction: Three dimensional (3D) echocardiography is not widely utilised for assessment of the tricuspid valve (TV).

Methods: Herein, we describe a case report highlighting the role of 3D echocardiography as a useful adjunctive tool for comprehensive assessment of TV stenosis.

Results: A 57-year-old female with background history of HIV, chronic kidney disease, hypertension, atrial fibrillation and previous mitral valve (MV) replacement 25 years ago for possible rheumatic heart disease, presented with signs and symptoms of right heart failure. On echocardiography, she had severe stenosis of the TV with a mean gradient of 10mmHg . Due to heavy calcification of the TV and reverberation artifacts from the prosthetic MV, it was difficult to assess the anatomy of the TV and hence to ascertain the mechanism of tricuspid stenosis on 2D echocardiography. Thus, the

patient underwent 3D transesophageal echocardiography, whereby significant degenerative disease of a TV homograft was noted. The TV area was 0.6cm². on planimetry, using 3D multiplane reconstruction.

Conclusion: This case highlights the utility of 3D echocardiography in comprehensive evaluation of TV stenosis prior to therapy. Due to heavy calcification and presence of concomitant moderate tricuspid regurgitation, the valve was deemed to be unsuitable for percutaneous valvuloplasty, and thus the patient was referred for surgery.

Genetic susceptibility to rheumatic heart disease in 2 African populations: Egypt and Ethiopia

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Introduction: Rheumatic heart disease (RHD) is a leading cause of incapacity and premature death in Africa among the young population. The disease is mainly acquired as a long-term outcome of acute rheumatic fever (ARF) following Group A β -haemolytic streptococcal (GAS) infections with a faster and more malignant course, and is rarely diagnosed with acute stage in the developing world as compared to developed nations.

Methods: This study is an experimental study which includes 1000 patients with RHD and 800 controls. Single nucleotide polymorphisms (SNP) were typed from DNA samples of the patients, and a discovery analysis was conducted using a genome-wide association study (GWAS) approach focusing on the 3 populations.

Results: A positive association HLA-DRB1*07 allele was found for RHD when compared with healthy controls (49.4% vs. 23.1%; $p < 0.01$, P-corrected: $p < 0.01$ odds ratio [OR] 2.78, 95% confidence interval [CI] 1.43 - 5.26) and also for recurrent streptococcal pharyngitis (34.48% vs. 23.1%; $p < 0.05$, P-corrected: $p < 0.05$, OR 2.44, 95% CI 1.17 - 3.56). The frequency of the HLA-DRB1*11 allele was decreased in patients with RHD (23.5% vs. 42.3%; $p < 0.01$, P-corrected: $p < 0.01$, OR 0.42, 95% CI 0.24 - 0.75).

Conclusion: The study suggests that the HLA-DRB1*07 allele may contribute to the pathogenesis of RHD and the development of recurrent streptococcal pharyngitis in the susceptible host. A successful vaccine could address a huge unmet public health demand, and could prevent ARF as well as invasive GAS disease, with the potential to save over 500 000 premature deaths per year, and would also have an enormous impact on health expenditure.

Increased systolic blood pressure with administration of hormone-based contraceptives in a rat model of hypertriglyceridemia

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Introduction: The use of hormone-based contraceptives is associated with metabolic disturbances and cardiovascular diseases. However, the effect of contraceptives on cardiovascular parameters during a lipogenic diet is uncertain. The aim of the present study was to determine whether the administration of hormone-based contraceptives alters cardiovascular parameters in a rat model of hyperlipidaemia.

Methods: Forty eight female Sprague-Dawley rats were randomly assigned into 4 groups (n=12 per group). Rats received a standard (STD) or a high-fat-high-sucrose diet (HFHS) with or without a transdermal contraceptive patch (2 μ g/kg/day norelgestromin and 0.38 μ g/kg/day ethinyl estradiol). Blood glucose concentration (BG), blood triglycerides concentration (BTG) and triglycerides clearance, as well as systolic and diastolic blood pressures (BP), were measured at baseline and at the end of the intervention. At termination, systolic and diastolic functions as well as the reactivity of mesenteric arteries were assessed.

Results: Body mass was not different between the 4 different experimental groups. However, rats receiving the STD gained significantly more weight than those receiving the HFHS. Food intake was significantly lower in the HFHS compared to the STD groups. BTG was significantly increased and triglycerides clearance was significantly impaired only in rats receiving the HFHS. The early-to-late diastolic filling velocity ratio (E/A) was lower in rats receiving the HFHS compared to the STD groups. Phenylephrine-induced vasoconstrictions were shifted to the left in the HFHS compared to the STD groups. Endocardial fractional shortening (FSend) was significantly greater in the rats receiving hormone-based contraceptives. Systolic BP was significantly higher in the rats receiving HFHS plus contraceptives compared to the other groups.

Conclusion: These results suggest that impaired diastolic function and increased sensitivity to an alpha-agonist of resistance arteries with a lipogenic diet, as well as increased systolic function with contraceptives, may be responsible for the increased SBP observed in rats receiving a combination of the lipogenic diet and contraceptives.

Improving the diagnosis of infective endocarditis: The development of, and safety testing for, a novel blood culture device

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Introduction: Rapid identification and treatment of the causative organism is key in the successful treatment of bacterial infection. This can be difficult in conditions such as infective endocarditis, when the organisms are circulating in low concentrations. In conditions such as IE, a delay in identifying the organism and initiating appropriate antimicrobial treatment is associated with a worse outcome. Blood culture yields may be improved by the development of a device specifically for this purpose.

Methods: A blood culture device (BCD) was designed to allow an increased volume of blood (100ml) to circulate under turbulent conditions over a large surface area to optimise bacterial exposure. To prevent clotting during sampling, the BCD was preloaded with heparin saline. The efficacy and safety of the developed BCD was tested on an animal model of 5 sheep.

Results: All 5 developed BCDs functioned well when tested on the sheep model. 100ml of blood was circulated through each device without clotting. The sheep did not display any clinical or biochemical evidence of bleeding or bleeding risk during or after sampling.

Conclusion: This study confirms that a BCD can be developed through which an increased volume of blood can be circulated under turbulent conditions over a large surface area, without clotting during sampling, and without exposing the subject to a haemorrhagic risk.

Autoimmune diseases PSMG1 gene implicated in rheumatic heart disease

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Introduction: Rheumatic heart disease (RHD) is an autoimmune inflammatory condition following a Group A β -hemolytic Streptococcus (GAS) infection. Existing genetic studies suggest that loci responsible for susceptibility to 1 autoimmune disease may influence similar or opposite risk effects on another. Given that the pathogenic processes in RHD are vaguely known, we sought to evaluate the overlap between RHD and other autoimmune diseases, to identify possible disease-risk genes and pathways.

Methods: We recently conducted genome-wide association studies (GWAS) of 1 843 cases with clinically-diagnosed RHD and 1 510 ethnically-matched controls from 8 African countries. We evaluated the association within our dataset, of 1 926 single nucleotide polymorphisms (SNPs) significantly implicated ($p < 5 \times 10^{-8}$) in 28 autoimmune diseases, as listed in the GWAS catalog and Pubmed. Genotyping was conducted using the Illumina omni2.5 array, and standard QC and association analysis were conducted in PLINK.

Results: Sixty SNPs associated with 28 autoimmune diseases showed an association with RHD GWAS ($p < 0.05$). The rs2836882 SNP associated with Crohn's disease and ulcerative colitis had the lowest p-value ($p = 7.2e-06$). rs2836882 is located near the proteasome assembly chaperone 1 (PSMG1) gene on position 21q22.2. Mutations in the PSMG1 gene, which is involved in ubiquitin-proteasome system function, result in an impaired immunoproteasome formation responsible for degradation of the intracellular protein. Thus, where mutations exist, the inflammatory responses to bacterial infection are impaired – resulting in an accumulation of specific microbes such as GAS.

Conclusion: RHD appears to have similarities to the disease pathways of autoimmune disease. This work provides an impetus for further investigation into the ubiquitin-proteasome system's role in RHD.

Incidence of atrial fibrillation and atrioventricular block among patients with sinus node dysfunction who underwent cardiac pacing at Groote Schuur Hospital between 2007 and 2017

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Introduction: The incidence of atrial fibrillation (AF) is higher among patients with atrial (AAIR) compared to dual chamber (DDDR) pacing for sinus node dysfunction (SND). Development of atrioventricular block (AVB) in patients with AAIR requires DDDR. We sought to determine the incidence of AF and AVB among patients with SND, with no AVB, who underwent AAIR or DDDR at Groote Schuur Hospital between 2007 and 2017.

Methods: We conducted a retrospective, descriptive cross-sectional study of 211 patients identified from medical records. Patient demographics and clinical variables, including development of AF or AVB, were recorded. Continuous and discrete data were presented as mean \pm SD and as counts (percentage), respectively. A chi-square test was used to test for group differences at $p < 0.05$ significant level.

Results: SND was found in 55% ($n = 116$) of the patients, out of which 48% ($n = 56$) and 52% ($n = 60$) underwent AAIR and DDDR respectively. Mean \pm SD age was 65 ± 15 years and two thirds were females. A third were diabetics and 71% were hypertensives. The commonest symptoms were syncope and dizziness, while the commonest diagnoses were sinus pauses and bradycardia. Three patients developed AF who received AAIR (5.4%),

compared to 1 patient (1.7%) with DDDR pacing. Two patients developed a combination of AF and AVB (incidence 1.8% and 1.7% in AAIR and DDDR respectively), and no patient developed isolated AVB. The difference for the occurrence of these events in the 2 modes was not statistically significant (Fisher's Exact $p=0.06$).

Conclusion: We found a very low incidence of AF and/or AVB in patients with SND without AVB. This study suggests that AAIR pacing is reasonable for SND patients, provided there are no signs of AVB or bundle branch block at presentation, and if the AVN is able to conduct 1:1 with atrial pacing at 120bpm at implant.

Awareness of rheumatic fever/rheumatic heart disease among health workers in Tororo District, Rural Uganda

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Introduction: Given a high burden of rheumatic heart disease (RHD) in Uganda, primary prevention is a cost-effective measure for curbing the disease. However, this has been minimally utilised as most programmes focus on secondary and tertiary prevention. We therefore set out to assess knowledge, practices and raise awareness of rheumatic fever (RF)/RHD in Tororo district, Eastern Uganda.

Methods: The project was carried out from 13 - 18 May 2018 in Tororo District, located 210km from Uganda's capital, Kampala. Health workers from the district general hospital and the 3 health sub-districts were trained at their respective facilities. A pre- and post-test was administered to all participants based on the RHD action evaluation tool. We focused on assessing knowledge about clinical features of rheumatic fever, and the role of benzathine penicillin in the treatment and prevention of recurrence of RF. Stakeholders (district director of health services and deputy chief administrative officer) were also involved.

Results: Overall, 131 health workers participated, with a 80% response for the pre-test evaluation. The majority were nurses (44%), 4% were doctors, and 15% were clinical officers. Laboratory staff comprised 10%, and 27% were other support staff. Of these, 25% (34/131) were familiar with the clinical features of rheumatic fever and 19% had knowledge of the role of benzathine penicillin in the treatment and prevention of RF/RHD. Prior to the training, the level of awareness gradually declined with remote health centres. Over 80% of health workers understood the role of benzathine penicillin and 65% could identify the clinical features after the training.

Conclusion: Before training, knowledge of rheumatic fever/RHD was low among health workers in Tororo District. These findings support the need to improve health worker education for better prevention of RF/RHD.

Transcatheter occlusion of giant congenital coronary cameral fistulae using Amplatzer vascular plug II: Case report series

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Introduction: Coronary cameral fistulae are abnormal communications between the coronary arteries and cardiac chambers, bypassing the cardiac capillary bed system. We describe 3 patients with coronary cameral fistulae successfully treated in our institution using the novel trans-catheter closure with vascular plugs.

Methods: **Case 1:** A 7-year-old boy presented with decreased effort tolerance. He had a grade 3/6 machinery murmur. A chest roentgenogram showed cardiomegaly and an echocardiogram demonstrated a large left coronary cameral fistula draining into the left ventricle. This was confirmed on angiography. We describe successful closure of the fistula using an Amplatzer vascular plug II. **Case 2:** A 9-year-old boy presented with a long-standing history of fatigue. A grade 3/6 continuous murmur in the LLSB and bounding pulses were noted, with a BP of 100/20mmHg. Echocardiography demonstrated a large coronary cameral fistula involving the left coronary artery and the left ventricle. This was confirmed at cardiac catheterisation and angiography. Surgical ligation of the fistula was performed. Unfortunately there was a small residual fistula, though his symptoms improved. The residual fistula was successfully occluded using an Amplatzer vascular plug II device a few years later. **Case 3:** A 28-year-old woman presented with decreased effort tolerance and chest pain on exertion. A grade 2/6 continuous murmur was audible over the left lower sternal border. Echocardiography demonstrated a dilated right coronary artery with a fistulous connection to the right ventricle. An ascending aortogram confirmed a large tortuous coronary cameral fistula arising from the right coronary artery to the right ventricle. The fistula was successfully occluded using an Amplatzer vascular plug II.

Results: Coronary cameral fistulae can now be successfully occluded by a trans-catheter technique, with minimal complications. Studies have shown that it is cheaper, has high closure rates and less complications, compared to the surgical technique.

Conclusion: Trans-catheter occlusion is now the treatment of choice for coronary cameral fistulae.

Prevalence of dyslipidaemia among adults in Africa: A systematic review and meta-analysis

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Introduction: The burden of dyslipidaemia in Africa remains inadequately characterised. We conducted a systematic review and meta-analysis to estimate the prevalence of dyslipidaemia in adult Africans from hospital and community-based studies.

Methods: We searched multiple databases for studies published from January 1980 - July 2017, without language restriction. Methodological quality of eligible studies was assessed, and a random-effect models meta-analysis was used to derive the pooled prevalence of elevated total cholesterol (TC), low HDL-cholesterol (HDL-C), elevated LDL-cholesterol (LDL-C), and elevated triglycerides (TG). Review registration: PROSPERO CRD42014015376.

Results: In all, 181 studies (309 297 participants) were included in the meta-analysis. The pooled prevalence of dyslipidaemia in the general population from population-based studies was 23.6% (95% CI 18.4 - 29.2) for elevated TC using a cut-off of >5.2mmol/L, 41.1% (33.0 - 49.4) for low HDL-C using the cut-off of <1.0 mmol/L, 25.7% (16.2 - 36.6) for elevated LDL-C using a cut-off of >3.3mmol/L and 16.4% (11.8 - 21.6) for elevated TG using a cut-off of >1.7mmol/L. Using a cut-off of >5.2 mmol/L, the prevalence of elevated TC was 34.4% (23.3 - 46.4) in diabetes mellitus, 38.0% (23.8 - 53.4) in hypertension, 23.1% (18.9 - 27.6) in HIV-infected individuals, and 26.2% (19.9 - 33.1) in those on antiretroviral treatment (ART). The prevalence of low HDL-C was 42.1% (32.3 - 52.2) in diabetes mellitus, 39.4% (29.4 - 49.9) in hypertension, 53.7% (48.6 - 58.8) in HIV-infected individuals, and 45.6% (33.4 - 58.1) in those on ART using a cut-off of 1.0 mmol/L. The prevalence of elevated TG was 35.5% (28.9 - 42.5) in diabetes mellitus, 22.2% (11.7 - 34.8) in hypertension, 22.7% (20.2 - 25.4) in HIV-infected individuals, and 24.2% (95% CI 18.7 - 30.2) in HIV patients on ART using a cut-off of 1.7 mmol/L.

Conclusion: This study suggests high prevalence of dyslipidaemia in the general adult population in Africa, with a much higher prevalence in those with hypertension, diabetes mellitus or HIV infection. Ongoing efforts to fight cardiovascular diseases in Africa, should integrate effective detection and treatment of dyslipidaemia.

The prevalence of elevated blood pressure in children and adolescents in Africa: A systematic review and meta-analysis

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Introduction: We did the first systematic review and meta-analysis to provide estimates of the prevalence of elevated blood pressure and to assess associated factors among children and adolescents in Africa.

Methods: We did a comprehensive literature search to identify articles published from 1 January 1996 - 2 February 2017, and searched the reference list of retrieved articles. We used a random-effects model to estimate the prevalence of elevated blood pressure across studies and heterogeneity (I^2) was assessed via the χ^2 test on Cochran's Q statistic.

Results: We included 51 studies in qualitative synthesis and 25 in the meta-analysis reporting data of a pooled sample of 54 196 participants aged 2 - 19 years. Prevalence of elevated blood pressure varied widely across studies (range 0.2% - 24.8%). The pooled prevalence of elevated blood pressure (systolic or diastolic blood pressure \geq 95th percentile) was 5.5% (95% CI 4.2 - 6.9), whereas that of slightly elevated blood pressure (systolic or diastolic blood pressure \geq 90th percentile and $<$ 95th percentile) was 12.7% (2.1 - 30.4). The prevalence of elevated blood pressure was largely associated with body-mass index (BMI), and prevalence of elevated blood pressure was 6 times higher in obese (30.8%, 95% CI 20.1 - 42.6) versus normal-weight children (5.5%, 3.1 - 8.4; $p < 0.0001$).

Conclusion: This study suggests a high prevalence of elevated blood pressure among children and adolescents in Africa, with being overweight and obesity being important risk factors. Efforts to address this burden of elevated blood pressure in children and adolescents should mainly focus on primary prevention at the community level, by promoting healthy lifestyles and avoiding other cardiovascular risk factors – especially being overweight and obesity.

The prevalence of resistant hypertension: A global systematic review and meta-analysis of data from 3.2 million treated hypertensive patients

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Introduction: Uncontrolled hypertension is a major contributor to the global burden of disease. We conducted the first systematic review and meta-analysis to estimate the specific prevalence of apparent treatment resistant, pseudo-resistant and true resistant hypertension among treated hypertensive patients globally.

Methods: We conducted a comprehensive literature search to identify articles published from inception to 30 September 2017, and searched the reference list of retrieved articles. We used a random-effects model to estimate the prevalence of elevated blood pressure across studies, and heterogeneity (I^2) was assessed via the χ^2 test on Cochran's Q statistic.

Results: We included 92 studies published between 1991 and 2017 reporting data of a pooled sample of 3 207 911 hypertensive patients on anti-hypertensive drugs globally. In the general population of treated hypertensive patients, the prevalence of apparent treatment resistant hypertension was 14.7% (95% CI: 13.1 - 16.3, 63 studies; 3 099 100 participants), and that of true resistant hypertension was 10.3% (95% CI: 7.6 - 13.2, 12 studies; 76 130 participants). Pseudo-resistant hypertension was present in up to 10.3% (95% CI: 6.0 - 15.5; 9 studies; 73 730 participants). The prevalence of true resistant hypertension was 22.9% (95% CI: 19.1 - 27.0), 56.0% (95% CI: 52.7 - 59.3) and 12.3% (95% CI: 1.7 - 30.5) in patients with chronic kidney disease, renal transplant, and the elderly respectively.

Conclusion: This study shows a high prevalence of true resistant hypertension. This prevalence is lower than that of apparent treatment-resistant hypertension, demonstrating the importance of excluding causes of pseudo-resistant hypertension, including white-coat hypertension, with the use of ambulatory blood pressure measurement. The burden of resistant hypertension is highest in patients with chronic kidney disease. New treatments for resistant hypertension are highly needed considering the disastrous complications of the disease.

Sickle cell disease, sickle trait and the risk for venous thromboembolism: A systematic review and meta-analysis

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Introduction: Sickle cell trait (SCT) and sickle cell disease (SCD) are present in approximately 300 million and 25 million people worldwide, respectively. This review summarises the available evidence on the association between SCD, SCT and venous thromboembolism (VTE) – including deep vein thrombosis (DVT) and pulmonary embolism (PE).

Methods: We conducted a comprehensive literature search to identify articles published, from inception to 27 April 2017. The random-effects method of Der Simonian and Laird was performed to pool weighted odds ratios (OR) of risk estimates.

Results: Ten studies were in the meta-analysis. SCD patients had significantly higher risk for VTE (pooled OR 4.43, 95% CI 2.62 - 7.48, $p < 0.001$), DVT (OR 1.12, 95% CI 1.09 - 1.15, $p < 0.001$) and PE (pooled OR 3.66, 95% CI 3.57 - 3.75, $p < 0.001$), as compared to non SCD-adults. A very high risk of VTE (OR 33.16, 95% CI 9.70 - 113.37, $p < 0.001$) and DVT (OR 30.66, 95% CI 1.63 - 578.15, $p = 0.02$) was found in pregnant or postpartum women with SCD, as compared to their counterparts without SCD. Compared to adults with SCT, the risk of VTE was higher in adults with SCD (pooled OR 3.09, 95% CI 1.79 - 5.33, $p < 0.001$), and specifically in pregnant or postpartum women with SCD (OR 20.34, 95% CI 4.05 - 102.05, $p = 0.0003$). The risk of PE was also higher in adults with SCD (OR 3.14, 95% CI 1.67 - 5.92, $p = 0.0004$) as compared to those with SCT. The risk of VTE (pooled OR 1.71, 95% CI 1.34 - 2.18, $p < 0.0001$) and PE (pooled OR 2.12, 95% CI 1.18 - 3.80, $p = 0.012$) was higher in individuals with SCT compared to controls.

Conclusion: Individuals with SCD, especially pregnant or postpartum women, have a significantly higher risk of VTE compared to the general population. SCT also increases the risk of VTE.

A systematic review and meta-analysis of prevalence studies of white coat and masked hypertension in Africa

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Introduction: Data on masked hypertension and white-coat hypertension in African populations are needed to estimate the true prevalence of hypertension in these populations that have the highest burden of the disease worldwide. We conducted the first systematic review and meta-analysis which summarised available data on the prevalence of white-coat hypertension and masked hypertension in Africa.

Methods: We searched Embase, PubMed, African Journals Online, and African Index Medicus to identify articles published on masked hypertension and white-coat hypertension in populations living in Africa from inception to 30 November 2017. A random-effects model was used to estimate the prevalence of white-coat hypertension and masked hypertension across studies.

Results: Eleven studies were included, all having a low risk of bias. The prevalence of masked hypertension was 11.0% (95% CI 4.7 - 19.3; 10 studies) in a pooled sample of 7 789 individuals. The prevalence of white-coat hypertension was 14.8% (95% CI 9.4 - 21.1; 8 studies) in a pooled sample of 4 451 individuals. There was no difference in the prevalence of white-coat hypertension and masked hypertension between studies in which participants were recruited from the community and the hospital. The prevalence of masked hypertension was higher in urban areas compared to rural ones; there was no difference for white-coat hypertension.

Conclusion: White-coat hypertension and masked hypertension seem to be frequent in African populations, suggesting the importance of out-of-clinic BP measurement in the diagnosis and management of patients with hypertension in African settings, and especially in urban areas for masked hypertension.

Hypertensive disorders of pregnancy in Africa: A systematic review and meta-analysis

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Introduction: Africa has the highest burden of hypertension in the general population. We conducted the first systematic review and meta-analysis to summarise data on the prevalence of hypertensive disorders of pregnancy in Africa.

Methods: We did a comprehensive literature search to identify articles published from 1 January 1996 - 30 September 2017, and searched the reference list of retrieved articles. We used a random-effects model to estimate the prevalence of gestational hypertension, preeclampsia, severe preeclampsia, superimposed preeclampsia, eclampsia, HELLP syndrome and chronic hypertension across studies, and heterogeneity (I^2) was assessed via the χ^2 test on Cochran's Q statistic.

Results: We included 82 studies published between 1997 and 2017 reporting data on a pooled sample of 854 304 women who were either pregnant or had delivered. All studies were hospital-based studies carried out in 24 countries. In this population of women, the prevalence of hypertensive disorders of pregnancy was 49.8% (95% CI: 32.3 - 70.7) for gestational hypertension, 14.7% (95% CI: 11.6 - 18.2) for chronic hypertension, 9.2% (95% CI: 4.2 - 16.0) for superimposed preeclampsia, 44.0% (95% CI: 36.7 - 52.0) for preeclampsia, 22.1% (95% CI: 14.8 - 30.8) for severe preeclampsia, 14.7% (95% CI: 8.1 - 23.2) for eclampsia, and 2.2% (95% CI: 1.2 - 3.4) for HELLP syndrome.

Conclusion: This study shows a high prevalence of hypertensive disorders of pregnancy in African women. These data stress the need for effective strategies for the prevention, screening and management of hypertensive disorders of pregnancy in the resource-limited African settings, in order to curb the alarming maternal and perinatal mortality associated with these disorders in Africa.

Heart failure in sub-Saharan Africa: A contemporaneous and comprehensive overview

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Introduction: Heart failure (HF) is an important contributor to the global burden of disease. This systematic review and meta-analysis aimed to summarise available data on the prevalence, aetiology, treatment, prognosis and cost of treatment of heart failure (HF) in sub-Saharan Africa (SSA).

Methods: We did a comprehensive literature search to identify articles published from 1 January 1996 - 23 June 2017, on heart failure in individuals aged 12 years and older and residing in sub-Saharan Africa. We used a random-effects model to estimate the prevalence of etiologies of heart failure.

Results: HF represented about 9.4% - 42.5% of all medical admissions and acute HF appears to be the leading cause of admissions into cardiology units, and is responsible for about 25.6% - 30.0% of all cases. Hypertensive heart disease (HHD) (39.2% [95% CI 32.6 - 45.9]) was the commonest cause of HF in SSA, followed by cardiomyopathies (CMO) (21.4% [95% CI 16.0 - 27.2]) and rheumatic heart disease (RHD) (14.1% [95% CI 10.0 - 18.8]). Ischaemic heart disease (7.2% [95% CI 4.1 - 11.0]) was less common. The all-cause mortality rates were 3.9% - 25.2%, 14.7% - 35.0%, 15.0% - 57.8% and 21.9% - 57.9% in hospitalised patients and at 30, 60, 180 and 360 days following discharge, respectively. Predictors of mortality included poor socio-economic status, higher NYHA class, atrial fibrillation, pulmonary hypertension, renal dysfunction, and anaemia. Loop diuretics were the most frequently used medications, while β -blockers were the least used. The total cost of in-patient care for heart failure was estimated at about USD 1 260/patient/year in a study.

Conclusion: HF is common in SSA. It is associated with high mortality and healthcare expenditure. Most health facilities in SSA are poorly equipped for the diagnosis and management of heart failure. HHD, CMO and RHD are the most common causes of HF, with HHD and CMO responsible for over 50% of the cases.

Prevalence and progression of rheumatic heart disease: A global systematic review and meta-analysis of population-based echocardiographic studies

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Introduction: Rheumatic heart disease (RHD) is a global public health concern, disproportionately affecting the world's poorest people. Reliable estimates of the burden of RHD are needed to underpin strategies to curb the burden of the disease and for active surveillance. This systematic review and meta-analysis aimed to provide a contemporaneous estimate of the global burden of RHD from echocardiographic population-based studies.

Methods: We searched multiple databases to identify relevant studies in which echocardiography and reporting on the prevalence and evolution of RHD published between 1 January 1996 and 17 October 2017. The methodological quality of eligible studies was assessed, a random-effect model was used to estimate the prevalence of RHD across studies, and heterogeneity was evaluated using the χ^2 test on Cochran's Q statistic.

Results: Overall, 82 studies reporting data on the prevalence of RHD from a pooled sample of 1 090 792 participants and 9 studies on the evolution of RHD lesions were included in the quantitative synthesis. The pooled prevalence of RHD was 26.1% (95% CI 19.2 - 33.1) and 11.3% (9% CI 7.2 - 16.2) for studies which used the World Heart Federation (WHF) and WHO criteria, respectively. The prevalence of RHD varied inversely with the level of a country's income, was lower in studies which used the WHO criteria compared with those that used the WHF criteria, and was lowest in South East Asia. Definite RHD progressed in 7.5% (95% CI 1.5 - 17.6) of the cases, while 60.7% (95% CI 42.4 - 77.5) of cases remained stable over the course of follow-up. The proportion of cases of borderline RHD that progressed to definite RHD was 11.3% (95% CI 6.9 - 16.5).

Conclusion: The prevalence of RHD across WHO regions remains high. The highest prevalence of RHD was noted among studies which used the WHF diagnostic criteria. Definite RHD tends to progress or remain stable over time.

Heart-to-heart: Advocacy for rheumatic heart disease prevention and management in Kenya

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Introduction: Rheumatic Heart Disease (RHD) is a significant cause of cardiovascular disease. It develops as a result of poorly managed streptococcal infections and affects mainly 5 - 25-year-olds, mostly residing in poverty-stricken areas. Each year Kenya has approximately 200 000 new cases, making it among the world's hardest-hit. Our project aimed to create awareness on the preventive measures and provided guidance on access to quality healthcare for those affected.

Methods: Students undertaking various courses were trained on the disease by a cardiologist. The first phase involved school visits in low socio-economic areas, followed by social media advocacy. For phase 2, the team received a grant from RHD Action, which, in addition to the above, facilitated setting up a support group, and animation and translation of CLAN's (Caring and Living as Neighbors) RHD child's rights flyer to Kiswahili. The third phase is on and involves training primary caregivers on RHD prevention and early diagnosis.

Results: Phase 1 educated 10 630 students and 70 teachers. The second phase launched a support group that focused on female patients and their reproductive health issues. It now has 39 members who meet quarterly to discuss challenges arising, and also to plan for local advocacy. In addition, flyers with RHD information were distributed to schools, and a detailed report with recommendations was submitted to the Ministry of Health and RHD Action.

Conclusion: RHD, though preventable, is still a major cause of morbidity and mortality in developing countries such as Kenya. There is a need to ensure that communities and people living with RHD are empowered to enable advocacy for better healthcare.

Pericardiectomy for constrictive pericarditis in paediatric patients in Durban

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Introduction: Constrictive pericarditis (CP) is a disabling disease with chronic fibrous thickening of the pericardium. Tuberculous (TB) pericarditis accounts for 50% - 70% of pericardial disease in Africa. There are no defined risk factors of outcome after surgery. Without treatment, the disease is associated with high morbidity and mortality.

Methods: A retrospective chart analysis of paediatric patients undergoing pericardiectomy between January 2005 and December 2017 was performed.

Results: Fifteen paediatric patients underwent pericardiectomy for constrictive pericarditis. The patients were aged 3 - 16 years (mean 9.5 years; 4 were females and 11 were males). The causes of constrictive pericarditis were TB in 12 (80%), staphylococcal pericarditis in 2 (13%), and HIV with concurrent CMV infection in 1 (6.6%). Five patients (33%) had HIV infection and were on antiretrovirals. The commonest presentation was right-sided cardiac failure. All patients with TB had treatment for at least 6 months and received 4 weeks of steroids. Patients with purulent pericarditis were treated with appropriate antibiotics for 6 weeks. CMV was treated with ganciclovir. The diagnosis of CP was based on clinical and echocardiographic findings as well as a cardiac CT scan. One patient required 4 pericardiocenteses and 1 had open drainage for purulent pericarditis prior to pericardiectomy. Two patients died postoperatively from low cardiac output syndrome (13.3%). Both patients had tuberculosis with bilateral pleural effusions. All patients were on inotropes for low cardiac output post-operatively and required intensive care for 2 - 5 days. Low-dose diuretics were discontinued at 6-week follow up. Two patients were lost to follow-up. One patient initially required ACE inhibitors for poor LV function.

Conclusion: TB remains the predominant cause of constrictive pericarditis. Pericardiectomy is a useful, effective procedure for constrictive pericarditis, which leads to improvement in functional capacity. Intensive peri-operative monitoring is imperative for good outcomes.

Transapical aortic valve deployment in a sheep model; aortic root dimension determinants of success

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Introduction: Rheumatic heart disease is a major cause of cardiovascular mortality in developing countries, and if untreated early mortality is a consequence. During the development of transcatheter pericardial and polymer aortic valves, echocardiography and fluoroscopy are important ancillary modalities for the insertion and monitoring of valve performance in a sheep model. The study objective was to ascertain the aortic dimensions that determine successful transapical aortic valve deployment in a sheep model.

Methods: Definitions: Successful deployment (SD): valve deployed in the appropriate anatomical site. Operative success (OS): valve deployed in the appropriate site and animal transferred to the animal pen. Post-implant success (PIS): animal survival to 10 days. Embolisation (EMB): proximal or distal migration of the valve. Pre-operative transthoracic echocardiography (TTE) for assessment of the aortic annulus dimension. Transapical aortic valve insertion (TAVI) under general anaesthesia. Intra-operative trans-oesophageal echocardiography (TOE) and fluoroscopy for assessment of aortic root dimensions, valve insertion and monitoring. Dimensions (mm) obtained included: the aortic annulus (AA), left ventricular outflow tract (LVOT), sinus of Valsalva (SOV), sino-tubular junction (STJ), annulus-coronary (ANC), and STJ-Annulus (STJ-Ann).

Results: Twenty sheep implants were done - 23mm pericardial (16) and polymer (4) valves were implanted. The SD, OS, PIS and EMB were seen in 14 (70%), 8 (40%), 6 (30%) and 4 (20%) respectively.

Univariate analysis revealed these significant dimensions: SOV [SD (p=0.05), OS (p=0.0066), EMB (p=0.0011), PIS (p=0.0038)], ANC [SD (p=0.0012), PIS (p=0.0015)], pre-operative weight [OS (p=0.0207, median - 39.8kg), EMB (p=0.0167)], pre-operative AA [OS (p=0.0354), EMB (p=0.0094)] and STJ [OS (p=0.0044), PIS (p=0.0027)]. Multivariate analysis revealed these significant dimensions: pre-operative weight [OS (p=0.038), EMB (p=0.05)] and STJ [OS (p=0.05), PIS (0.05)]. None of the dimensions were significant for SD, although intra-operative fluoroscopy SOV had the highest relative influence (41.5).

Conclusion: The pre-operative weight is significant in OS and EMB, while the STJ is the most significant dimension in OS and PIS. The SOV, while not significant, has the largest influence on SD.

Developing a cardiothoracic anaesthesia fellowship programme in South Africa

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Introduction: Fellowship training provides a standardised route toward specialty expertise. Cardiothoracic surgery at the Groote Schuur and Red Cross War Memorial Children's Hospital is assured a 24-hour dedicated anaesthesia service from UCT's Department of Anaesthesia and Peri-operative Medicine and support from the cardiothoracic critical care and high care units for 450 adult and 350 paediatric cases annually, covering the entire spectrum of cardiothoracic surgery, including most recently lung transplantations and extracorporeal life-support programmes. The department includes a robust team of anaesthetists who are skilled in cardiac anaesthesia, as well as peri-operative transoesophageal echocardiography (TOE). A 1-week hands-on peri-operative TOE course is offered 4 times per year. This presents a solid foundation and dynamic backdrop for subspecialty training.

Methods: The first "Global Surgery" Cardiothoracic Anaesthesia Fellow gained extensive exposure to all the cardiothoracic activities. The department facilitated participation in various training and teaching opportunities and access to conferences. This provided an excellent learning environment, which led to the Fellow successfully completing the British Society of Echocardiography's TOE accreditation examination, and publishing a case report in an international journal. Subsequently, a more formal curriculum was established, with active attempts to provide protected time for academic pursuits and research as well as partnering with other societies. Industries are constantly approached to help fund this unsponsored fellowship position.

Results: The department currently hosts the second fellow who benefits from the groundwork laid, while a third fellow is in place to follow on. Future recommendations include assorted didactic experiences, e.g. multidisciplinary morbidity/mortality engagements, tailoring the curriculum toward areas of particular interest/need while meeting core objectives, participation in examination setting and delivery, inclusion of a scholarly/academic project, active marketing of the programme, and exploring its accreditation with a relevant body.

Conclusion: This training presents a rich source of subspecialty expertise to the continent and beyond.

Case report: Two consecutive episodes of acute myocardial infarction occurring in different coronary arteries of the same patient in less than 48 hours

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Introduction: Recurrent ST-elevation MI in less than 48 hours in the same patient are very rare, and occurring after receiving a full loading dose of antiplatelet and statin and fibrinolysis is unreported. Herein we report an elderly male initially suffering from anterior STEMI, treated according to the guidelines by receiving streptokinase in less than 2 hour, and then loaded by antiplatelet and statin. Good reperfusion state and pre-renal impairment delayed PCI for a while; 32 hours later, another attack of inferior STEMI was complicated with complete heart block and severe cardiogenic shock.

Methods: It was a case report.

Results: It was a case report.

Conclusion: It is important to evaluate the clinical and metabolic status of patients with renal impairment and to consider early management and intubation to prevent a catastrophic clinical outcome.

Current application of patient specific 3D printing in complex congenital heart disease

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Introduction: 3D printing technology can be utilised to create 3D printed replicas of patient's hearts. These 3D printed hearts enable precise understanding of the complex anatomy, hands-on surgical simulation, morphology teaching, and also aid with parent and patient communication. We aim to share our experience of 3D printed patient-specific cardiac models.

Methods: Nineteen patient-specific 3D printed heart models were used in the clinical setting between July 2015 and October 2017. The patients were specifically selected and CT and/or MRI was obtained pre-operatively. Specific specialised software was used to create and print 3D models of either intravascular blood volume or tissue (myocardium and vasculature) or air and airways. We evaluated the indication for production and the clinical application of each 3D printed model.

Results: All 19 cases were produced with high fidelity to the native organ. Eleven cases were produced to aid the multidisciplinary meeting decision-making and pre-operative surgical planning. These cases included Double Outlet Right Ventricle, Truncus Arteriosus with Interrupted Aortic arch, Multiple VSDs, complex Tetralogy of Fallot, and patients requiring redo surgery for complex congenital heart disease. Six models were produced post-operatively for education purposes and morphology training of health professionals. Two soft silicone models of Tetralogy of Fallot were used in hands-on surgical simulation for surgical trainees.

Conclusion: 3D printed models are a valuable additional method for visualising the heart in complex congenital heart disease, supporting decision-making and surgical planning. Utilising 3D printed models in morphology training and hands-on surgical simulation provides enhanced learning opportunities and aids patient and parent communication of the morphology and surgical correction.

Risk perception of mothers and fathers of children undergoing heart surgery: A quantitative longitudinal analysis

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Introduction: The way in which risk is interpreted by parents of children undergoing congenital cardiac surgery is poorly documented. The literature suggests clinicians have concerns that parents may not understand the complexity of procedures, and conversely some parents perceive an unnecessarily over-emphasis of risks. We aim to explore how risk is encountered by parents in order to deliver effective and compassionate care.

Methods: A mixed methods approach was adopted. Ninety parents of children undergoing cardiac surgery were recruited. A Likert scale from 1 (perceived lowest risk) to 6 (perceived highest risk), was completed at 5 points: arrival at pre-admission; post discussion with anaesthetist or surgeon; day of surgery; discharge from intensive care; following hospital discharge. The surgical sample was stratified according to RACHS-score.

Results: The median score of each parent was calculated. This was then combined to produce a median score for mother/father combined (3.8), maternal score (4.75), and paternal score (3). These were then compared to the median RACHS-score (2) using the Kruskal Wallis (KW) test. All comparisons were statistically significant with a p-value of 0.001 for each comparison. The Bonferroni correction for multiple testing was also significant, with a p-value of 0.001. In addition, individual parental risk scores varied at the different time points, with no consistent risk scores observed. Post-operative complications resulted in a rise in risk perception following surgery and persisted even after discharge.

Conclusion: When ranking perception of risk, parents reflect higher scores than those reported by the clinical team. Mothers report statistically significant higher scores than their partners, highlighting potential tensions. In addition, the changing perception of risk over different time points emphasises the need for flexible levels of support and information as parents navigate uncertainty.

Is deep hypothermic circulatory arrest necessary for total anomalous pulmonary venous connection repair?

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Introduction: Surgical repair of the total anomalous pulmonary venous drainage (TAPVD) has traditionally been performed under deep hypothermia circulatory arrest (DHCA). This study analyses a single institution's experience in the evolution of the surgical management of TAPVD without the use of deep hypothermia over 10 years.

Methods: This is a retrospective review of 73 patients who underwent TAPVD repair, from January 2007 - October 2017, at Alder Hey Children's Hospital, Liverpool, United Kingdom. Patients with single ventricle physiology were excluded.

Results: There were 34 supracardiac, 22 infracardiac, 9 cardiac, and 8 mixed types. The median age at repair was 22 days (range 0 - 459) and the median weight 3.35 kg (2 - 7.8kg). Forty two patients presented with obstructive pulmonary venous drainage. Normothermia at 36°C was employed in 26 cases, mild hypothermia (28 - 34°C) in 25 cases, moderate hypothermia (21 - 28°C) in 7 cases, and deep hypothermia ($\leq 20^\circ\text{C}$) in 15 cases. The CPB time was shorter in the normothermic group: 99 minute (39 - 236) vs. circulatory arrest 134 minute (89 - 207) ($p=0.036$). Lactate levels were lower in the normothermic group. Days of intubation, PICU and hospital stay were shorter in the normothermia group: 2 (0 - 14), 3 (1 - 14), 6.5 (3 - 35) days respectively. The hospital mortality was 2.75% ($n=2$). There was no mortality in the normothermic group. There were 3 late deaths at 2, 3 and 5 months, due to pulmonary hypertension and hypoplasia of the native pulmonary veins. Reoperation for restenosis was required in 4 cases without mortality. In the last 5 years, we have gradually moved toward normothermia for managing CPB for TAPVD correction for all types, with no mortality.

Conclusion: The surgical repair of TAPVD without the use of hypothermia is a safe and reproducible technique with comparable morbidity, early, and late mortality.

Pilot testing the RHD action needs an assessment tool in a live environment

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Introduction: In 2016, RhEACH – with support from RHD Action – developed a needs assessment tool (NAT) to target interventions to prevent and control acute rheumatic fever and rheumatic heart disease in resource-limited settings. The tools were developed by public health practitioners and healthcare professionals with clinical and field experience, but had not been tested in a real-time, live environment. Our objective was to test the NAT tools in a live, resource-limited environment.

Methods: A protocol was developed by a multi-university team incorporating selected qualitative and quantitative tools, and conducted at 2 peri-urban clinical sites in Uganda in May 2017. RhEACH conducted a site visit to observe and assist with the application of the tools at 1 site. Information regarding the other site experience was obtained via a skype interview. The pilot framework was based on assessing relevance, effectiveness and efficiency in the application of NAT tools and the User Guide.

Results: Initial observations and feedback from the sites suggest that: • Pre-implementation site strategy meetings are critical to discuss interviewing techniques, logistics, and adaptation of questions and topics to the local context. • Questions and prompts in the interview guides should be reviewed for formatting, flow and redundancy. • A cover sheet to record demographic and employment information on each respondent should be developed. • Incorporating user guide materials into individual tools and using YouTube links or similar media, should be considered to make them more accessible. • The role of technical support in pilot projects should be formalised so that expectations are clear.

Conclusion: Pilot testing data collection tools and methods in a live environment are a critical component of the needs assessment process. Lessons learned provide the basis for improving and refining tools to be relevant, effective and efficient for end-users.

Introducing a radial lounge-based outpatient coronary service: The Tygerberg Hospital experience

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Introduction: We have established an outreach cardiology service in the Western Cape to ensure delivery of specialised cardiology services to the previously underserved population. This required capacity to provide coronary angiography to more people within the constraints of our staff and bed shortage. A radial lounge providing outpatient angiography and percutaneous coronary intervention (PCI) to ambulant patients was the potential solution to our bed and nursing staff limitation. We have analysed our experience with patients serviced in the initial 3-year period to identify the advantages and challenges of establishing a radial lounge-based outpatient coronary angiography service.

Methods: An audit was performed of patients admitted to our radial lounge for a 3-year period since its inception in December 2014. Data were retrospectively collected from the cardiac catheterisation laboratory (cathlab) bookings, admission records of the coronary intensive and high care units (CCU), and cardiologist angiography reports.

Results: Seven hundred and twenty eight patients were admitted to the 6-chair radial lounge from December 2014 - December 2017. The service, integrated into the service provided by 2 cathlabs, was run with 2 registered professional nurses and 2 registered enrolled nurses, and adhered to a strict patient care and monitoring protocol: 184 patients received PCI; 144 patients were referred for CABG; 94 patients underwent pre-valve replacement angiography; 88 patients were diverted to the inpatient service (29 admitted to the CCU due to complicated PCI procedures, 24 for completion of the haemostasis protocol, 35 required femoral access); 1 patient required resuscitation in the radial lounge with a successful outcome. Nursing staff report improved administrative logistics and patient flow, with less hands-on nursing required.

Conclusion: Establishing a radial lounge-based outpatient coronary angiography service played an important role in enabling a cardiology outreach service with improved access to specialised cardiology services in the Western Cape.

Racial variation of QRS duration for CRT qualification among systolic heart failure patients: Why is the door still closed for black patients?

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Introduction: In sub-Saharan Africa decompensated heart failure is the commonest primary diagnosis for patients admitted to hospital with heart disease. Recent ESC guidelines propose that patients on optimal medical therapy, in sinus rhythm with a left bundle branch block (LBBB) and QRS duration ≥ 150 ms are ideal candidates for cardiac resynchronisation therapy (CRT). It is unknown whether race is associated with QRS duration and LBBB prevalence.

Methods: Consecutive patients with a new diagnosis of Heart Failure with a reduced Ejection Fraction (HFrEF) and dilated cardiomyopathy (DCMO) were enrolled. Race was self-reported. The cohort was sub-stratified into black and non-black racial groups and the predictors of response to biventricular therapy – namely QRS duration, left ventricular end-diastolic diameter (LVEDD), and left ventricular ejection fraction (LVEF). Means (SD) were compared with Student's t-test and relative proportions with Fisher's exact test. A p-value < 0.05 was considered significant.

Results: Among 44 patients with a DCMO and HFrEF, medical treatment did not differ significantly, but ischaemic heart disease was more prevalent among white (n=15) than black (n=14) patients (77% vs. 57%; $p=0.035$). QRS duration was significantly shorter in blacks compared to whites (100.71ms vs. 127.15ms; $p=0.0001$). LBBB was less prevalent among black than in white patients (7% vs. 53%; $p=0.01$).

Conclusion: Based on the QRS duration and LBBB prevalence, black South African DCMO and HFrEF patients will seldom qualify for potentially life-saving CRT. Larger studies are urgently needed to investigate this relevant treatment issue.

Tetralogy of Fallot with an anomalous left pulmonary artery arising from the ascending aorta: Case reports

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Introduction: An anomalous pulmonary artery (PA) arising from the aorta, with the contralateral PA arising from the right ventricular outflow tract is a rare congenital cardiac anomaly. Its association with Tetralogy of Fallot is extremely rare. There will be differential pulmonary perfusion, with oligoemia of 1 lung and pulmonary hypertension with pulmonary vascular occlusive disease in the other. Early surgical correction that results in restoration of normal physiology, before development of severe irreversible pulmonary hypertension of the over-perfused lung, is recommended.

Methods: Case reports.

Results: **Case 1:** A 3-month-old female infant presented with bronchopneumonia and an incidental murmur. She had no cyanosis, but had cardiomegaly and signs of CCF. A 3/6 ejection systolic murmur was audible at the left upper sternal border. A chest X-ray showed a plethoric left lung with oligoemia on the right. Echocardiography revealed Tetralogy of Fallot, with infundibular stenosis and the RPA arising from the RVOT. The LPA arose anomalously from the ascending aorta. This was confirmed on CT angiography and at cardiac catheterisation. She underwent surgical repair of the TOF as well as re-implantation of the anomalous LPA to the MPA. **Case 2:** A 6-month-old infant presented with bronchiolitis, cardiac murmur and CCF. She had no cyanosis. A 3/6 ESM + 2/4 EDM was audible at the LUSB. A diagnosis of Tetralogy of Fallot with absent pulmonary valve syndrome was made on echocardiography. She was initially managed conservatively and had cardiac catheterisation at 2 years old. The surprise finding of TOF with absent pulmonary valve syndrome and an LPA arising from the ascending aorta was made. She is awaiting corrective surgery.

Conclusion: TOF is often associated with an anomalous LPA rather than RPA. Early surgical intervention before development of severe PHT is recommended.

Increased waist circumference drives development of the metabolic syndrome in Asian Indian community participants

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Introduction: There is no current evidence available on the prevalence of metabolic syndrome (MetS) in South African Asian Indians, who are at high risk for cardiovascular disease. The aim of our study was to determine the prevalence of the MetS in this group, between males and females, as well as in the different age groups, using the harmonised criteria and to determine the main components driving the development of MetS.

Methods: This cross-sectional study recruited randomly selected community participants aged 15 - 65 years, in the community of Phoenix, KwaZulu-Natal. All subjects had anthropometric variables and blood pressure measured, as well as blood drawn for blood glucose and lipids after overnight fasting. The MetS was determined using the harmonised criteria.

Results: There were 1 378 subjects sampled, mean age 45.5 ± 13 years and 1 001 (72.6%) women. The age standardised prevalence for MetS was 39.9% and was significantly higher ($p < 0.001$) in women (49.9% vs. 35.0% in men). The MetS was identified in 6.9% of young adults (15 - 24 years), with a 4-fold increase in the 25 - 34 year-olds, and was 60.1% in the 55 - 64 year-old group. Clustering of MetS components was present in all age groups, but increased with advancing age. After adjusting for all factors using stepwise, backward logistic regression, subjects with increased waist circumference were mostly likely to have the MetS ($p < 0.001$; OR=19.0 95% CI 9.8; 36.9), followed by those with raised triglycerides ($p < 0.001$; OR=15.1 95% CI 10.4; 21.9) and obesity ($p < 0.001$; OR=8.5 95% CI 5.1; 14.3).

Conclusion: This study highlights the high prevalence of MetS in this ethnic group and the emergence of MetS in our younger subjects. Urgent population-based awareness campaigns focusing on correcting unhealthy lifestyle behaviours should begin in childhood.

Coarctation of the aorta, management challenges and complications: A case report

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Introduction: Coarctation of the aorta (COA) is narrowing of the aortic segment commonly at the juxtaductal area just distal to the left subclavian artery. Although there are controversies regarding management, surgical correction is still the gold standard of treatment for native COA, with balloon angioplasty and stenting recommended for older children and for re-COA.

Methods: We report on a 12-year-old girl who had VSD repair at 1 year. She presented 10 years later with systemic hypertension (HT) and weak femoral pulses.

Results: Echocardiography confirmed COA. She underwent successful COA stenting with a covered CP stent. Subsequently she developed a femoral artery aneurysm which was successfully repaired surgically, and a year later she also required re-stenting for the COA and aortic aneurysm.

Conclusion: COA is the 6th common congenital heart defect (CHD) with an incidence of 1 in 2 500 live births and occurring in 5% - 8% of (CHD). It is commonly discrete or could be a long segment. It is usually associated with cardiac abnormalities like bicuspid aortic valve, VSD, PDA or other complex CHD, and occurs commonly in patients with Turners syndrome. Cerebral aneurysms are the common extra cardiac anomaly. Neonates with critical COA present with shock and CHF and require ductal reopening with prostaglandin E1, and ventilatory and inotropic support for stabilisation before surgical correction. Older children present with CHF, hypertension or weak femoral pulses. Indications for intervention are a significant echocardiographic gradient, CCF and HT. Treatment options are controversial, but surgical repair is still the gold standard for native COA, and balloon angioplasty and stent placement are recommended for re-COA and older children. Re-COA and aneurysm formation occurs commonly post-surgical and endovascular repair of COA, and thus patients require long-term follow up.

The association of depressive symptoms in patients with acute myocardial infarction in a regional hospital in Durban, South Africa

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Objective: To examine the association of depressive symptoms and contributing psychosocial factors during hospitalisation and at 1-month post-discharge, in patients with acute myocardial infarction (MI).

Methods and Results: The study population comprised 117 patients that were admitted during June - November 2015 to the Coronary Care Unit at R.K. Khan Hospital, Durban – with a diagnosis of MI. Demographic and clinical data stored in an electronic cardiac database were extracted for all patients. The Cardiac Depression Scale (CDS) was used to screen for depressive symptoms. Levels of perceived stress were evaluated using the 4-item Perceived Stress Scale (4-PSS). The mean age of patients was 58.16 ± 11.12 years, with the majority being males (70%). Forty-nine percent of participants were diagnosed with depressive symptoms, with a significantly greater number of females experiencing depressive symptoms compared to males ($p=0.01$). Patients with depressive symptoms were more likely to have had a previous history of depression ($p=0.02$), a positive family history of depression ($p=0.04$), greater non-adherence to their medication ($p=0.01$), and lower levels of physical activity ($p=0.01$). Depressed patients reported higher levels of stress on voluntary ($p=0.01$) and subjective rating ($p=0.01$), experienced greater financial stress ($p=0.01$), major life events ($p=0.01$), and had higher 4 – PSS scores ($p=0.01$). Thirteen percent of patients experienced major adverse cardiac events (MACE) particularly, in those with depressive symptoms ($p=0.01$).

Conclusion: Depressive symptoms are a common finding in a South African population presenting with MI, and are linked to higher rates of MACE, previous history and family history of depression, greater stress levels, and major life events. Females are significantly more likely to present with depressive symptoms. Patients with MI should be screened for depressive symptoms and psychosocial factors – because it may serve as an important arena for research and therapeutic intervention.

Pulmonary artery banding: A retrospective review and 10 years' experience at a large Southern African tertiary care centre

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Introduction: Pulmonary artery banding (PAB) is mainly used as a temporary palliative surgical procedure in neonates and infants to limit excessive pulmonary blood flow, until they are able to withstand open heart surgery. It is also used in patients with transposition of the great arteries requiring training of the left ventricle as a staged approach to the arterial switch procedure.

Methods: A retrospective descriptive study was conducted at Chris Hani Baragwanath Academic Hospital (CHBAH) to review patients who underwent PAB for the period January 2007 - December 2017. Data were extracted from the paediatric cardiology electronic database at CHBAH and additional information was obtained from hospital records.

Results: Thirty seven patients underwent PAB during the study period. The most common indication for PAB was ventricular septal defect (VSD) (54%), followed by double outlet right ventricle (DORV) (19%) and transposition of the great arteries (TGA) (8%). The age of the majority of patients (70%) was 1 - 12 months. The overall case fatality rate was 16%, which was related to the underlying cardiac lesion and/or sepsis. Following PAB, 19/37 patients (51%) went on to have definitive surgery, 6/37 (16.2%) died before definitive surgery, and 12/37 (32.4%) are currently still awaiting surgery. Of the 19 patients who had definitive surgery, 13 (68%) had VSD repair and 6 (32%) had single ventricle staged repair (Glenn and Fontan). The time-frame between PAB and definitive surgery for most patients was 2 - 18 months.

Conclusion: PAB remains a safe and effective surgical palliative procedure in neonates and infants with excessive pulmonary blood flow, who are unable to withstand open heart surgery.

Systematic review of the worldwide prevalence of group A *Streptococcus* emm-clusters: Vaccine development to reduce rheumatic heart disease in Africa

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Introduction: Group A *Streptococcus* (GAS), also known as *Streptococcus pyogenes*, is a gram-positive bacterial pathogen that causes a range of infections – including pharyngitis and post-infectious auto-immune diseases including rheumatic heart disease (RHD). A GAS vaccine, incorporating 30 of the most prevalent emm-types in North America and Europe, is currently in preclinical studies. Recently, Sanderson-Smith introduced a classification of GAS based on organising emm-types into 48 clusters that have similar binding properties to the host, thus serving as a cross-protection framework, and potentially extending vaccine coverage to all or most GAS serotypes. Here, we summarise from published literature, using the systematic review method, the global distribution of GAS clusters, and consider these results in terms of current vaccine efforts.

Methods: We conducted a comprehensive search across a number of databases. Applying a priori criteria, we selected articles reporting on prevalence of GAS clusters based on CDC classification – regardless of region. Emm-types were classified into corresponding clusters where necessary. Data were extracted onto data extraction forms, captured electronically, and analysed using Stata software.

Results: Ninety seven articles met the inclusion criteria, the majority coming from Europe (n=35) and the Asia-Pacific (n=27). The Arab states and Africa had the least number of publications, at (n=2) and (n=4) respectively. The final dataset included 51 791 isolates representing 159 different emm-types recovered from 39 countries. Meta-analysis of the clusters revealed that most represented was E4 (18% of all isolates; n=11 095 isolates), which is included in the putative vaccine. Regionally, E4 was more prevalent among isolates from North America (21%), Europe (24%) and Latin America (25%), while it was less abundant in Africa (16%), the Arab states (15%), Asia-Pacific (12%) and Oceania (14%).

Conclusion: Most vaccine clusters in Africa were well represented in the vaccine, thus providing evidence for potential broad coverage through the use of a cluster-based vaccine for GAS.

The role of SHARE-TAVI and local registry data in a resource-constrained economy: Patient selection and outcome comparison

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Introduction: SHARE-TAVI, a prospective multi-centre observational registry, captures data for all South African TAVI patients, defining local variations in clinical presentation and comparing outcomes to international data – in order to support locally relevant assessments, guidelines and improved treatment access.

Methods: Eight private/3 state TAVI centres enter potential TAVI patients into a web-based registry as part of funding approval processes. Procedural data and complications were entered according to VARC-2 criteria, postoperative follow-up at 30 days, and annually.

Results: From September 2014 - May 2018, 695 patients were entered during evaluation. Seven exited (unsuitable anatomy), 108 patients await funding decisions (outstanding 1 - 946d), and mortality occurred in 26 waiting for TAVI funding approval. Mortality occurred within 1 year in 38% of patients declined funding (n=18/46). Differences in presentation of risk factors (dialysis, prior CVA/TIA, frailty) at evaluation occur between state (0%, 1.96%, 22%), and private patients (3.5%, 7.1%, 31%). The 478 (16% in state) who received implants are comparable to similar registry and trial populations in mean age 80.3 ± 7.2 years, being 53.5% male, with mean risk predictions $6.4 \pm 5.7\%$ (STS PROM), 22.0 ± 14.4 (logEuroSCORE) and $6.4 \pm 4.8\%$ (EuroSCORE 2). Procedural success was similar in state (92%) and private (93%) at 30 days (n=469), and 1-year mortality among state patients indicated as frail at evaluation is higher than frail private (18.8% vs. 6.9%). All-cause mortality of 11.5% (n=36/313) at 1 year compares favourably to other published TAVI populations (14.2% US Corevalve, 12.6% SOURCE 3, 20% GARY). Mean ICU and total length of stay were similar in state (ICU 1.73 ± 1.82 d, LOS 4.56 ± 3.16 d) and private (ICU 2.45 ± 1.80 d, LOS 5.27 ± 4.01 d).

Conclusion: Referral and evaluation protocols are more restrictive in state, but frail patients have worse outcomes. A novel frailty score needs to allow for local socio-economic differences. TAVI at both state and private centres compares favourably to international best practice standards. Local data from independent registries like SHARE-TAVI may support access to TAVI in resource-constrained economies, and guide appropriate patient selection.

Assessment of the relationship between the severity of chronic heart failure and serum uric acid levels

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Introduction: Heart failure often characterises the outcome of several heart diseases. Its rising prevalence is of public health importance and outcomes are dependent on the severity of the disease. Several serum bio-markers have been used to assess progression and severity – aimed at better evaluation and overall management

Methods: The study was a cross-sectional descriptive study. Consecutive chronic heart failure patients (NYHA II-IV) presenting at the ABUTH cardiac unit and age and sex-matched apparently healthy individuals, were recruited as controls. Resting ECG, echocardiography and other clinical details were obtained using a structured questionnaire. Serum UA level was determined. Data were analysed using SPSS version 16. Statistical tests for significance was at a p value of <0.05

Results: A total of 180 subjects, with an equal number of patients and controls, were studied. The mean age of patients was 40.69 ± 15.46 years, while for controls it was 37.11 ± 52 years. There were 30 (33.3%) male and 60 (66.7%) female patients, while controls consisted of 43 (47.8%) males and 47 (52.2%) females. The prevalence of hyperuricaemia among patients and controls was 67.8% and 18.9% respectively. Severity of heart failure was associated with rising mean serum UA level ($p=0.001$). Left ventricular ejection fraction was significantly correlated with rising serum UA level ($p=0.002$), but E/A ratio did not show significant statistical correlation with serum UA level ($p=0.236$).

Conclusion: Chronic heart failure is associated with hyperuricaemia in patients attending ABUTH and increases with severity of heart failure.

Task sharing in the diagnosis, prevention and management of rheumatic heart disease: A systematic review

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Background: Globally, rheumatic heart disease (RHD) is an important cause of cardiovascular disease. Major gaps in RHD prevention and treatment have been documented at all levels of health systems in low- and middle-income countries (LMICs). Task sharing is an approach that could prove effective in remediating bottlenecks in RHD-related care. We conducted a systematic review to assess the state of the evidence for the use of task sharing in the diagnosis, prevention and management of RHD.

Method: Guided by a previously-published protocol, we searched various databases using a systematic search strategy including MeSH and free-text terms for: (i) Group A Streptococcus (GAS), acute rheumatic fever (ARF) and RHD, and (ii) strategies of task sharing in limited-resource settings. Two authors independently screened the search outputs, selected the studies, extracted the data, and assessed the risk of bias – resolving discrepancies by discussion and consensus.

Results: The literature search yielded 212 records, of which 20 articles were deemed as potentially eligible for inclusion. None of the studies, however, met the inclusion criteria.

Conclusions: There is a lack of evidence for the use of task-sharing approaches in scaling up RHD prevention and treatment services in limited-resource settings. Considering the persistent burden of GAS, ARF, and RHD in LMICs, this work highlights the urgent need to develop and test models of RHD-related care utilising an evidence-based approach to task sharing.

Cardioprotective properties of Afriplex green rooibos extract in diet-induced obese wistar rats

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Introduction: Cardiovascular diseases remains the leading cause of death globally, with a rising prevalence of individual risk factors such as obesity and insulin resistance. *Aspalathus linearis* (commonly known as rooibos) is an indigenous South African plant grown exclusively in the Western Cape fynbos region. Rooibos is rich in bioactive phenolic compounds, including aspalathin, a C-linked dihydrochalcone glucoside unique to rooibos. Aspalathin is known for its hypoglycemic and strong antioxidant potential.

Methods: Afriplex green rooibos extract (GRT), rich in aspalathin, was dissolved in jelly cubes, at a dose equivalent to 100 cups of fermented rooibos tea, and fed for 6 weeks daily to rats receiving a 16-week high-fat, high-caloric diet (HCD). The aim was to investigate its therapeutic potential in treating ischaemia/reperfusion injury in 150 rats with increased susceptibility for cardiovascular disease.

Results: HCD over 16 weeks led to an increase in body weight ($370.0 \pm 6.0g$ vs. $400.0 \pm 6.1g = \uparrow 8.1\%$) and intraperitoneal adiposity ($13.5g$ vs. $22.7g = \uparrow 68.1\%$) compared to age-matched control animals. Fasting blood glucose was also significantly elevated in HCD compared to controls (5.75 vs. 5.208 mmol/L). Pre-ischaemia, GRT treatment enhanced the heart's total pressure and kinetic power compared to both untreated controls

(13.4 ± 0.3 vs. 11.5 ± 0.2) and untreated HCD (11.50 ± 0.5 vs. 10.2 ± 0.3). Post-ischæmia, HCD hearts had a weakened coronary output recovery (58.7 ± 2.7% vs. 69.5 ± 3.0%), and GRT treatment re-established coronary capacity (70.4 ± 3.2%). Furthermore, post-ischæmia, viable tissue was found to be consistently 45% - 60% in all treatment groups, except the HCD rats which had the worse viability profile closer to 40%. Infarct size was also highest in the HCD group (45.9 ± 2.2%) vs. 35.9 ± 1.4% in controls, and GRT treatment protected against the damage incurred (HCD: 24.3 ± 1.8%; controls: 26.6 ± 1.0%).

Conclusion: These preliminary results shows that GRT supplementation has the potential to be cardioprotective in rats with early-onset risk factors for cardiovascular disease.

Abdominal obesity and antiretroviral therapy are associated with improved endothelium-dependent vascular function in HIV-infected individuals: Results from the EndoAfrica study

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Introduction: Obesity rates in HIV-infected populations are rising, mainly due to more effective antiretroviral therapy (ART). HIV infection, ART and obesity are regarded as independent CVD risk factors, often resulting in early vascular dysfunction. However, the potential cardiovascular effects of HIV/ART in the context of obesity are not well described. This study aimed to evaluate the CVD risk profile and vascular endothelial function in obese HIV-infected individuals in the Western Cape.

Methods: HIV-infected and HIV-free study participants were recruited at health clinics and subjected to health screening, anthropometric measurements, biochemical analyses and vascular function assessment.

Results: The study cohort (n=427, mean age: 39.78 ± 9.97 years, 68.85% female and 80.85% mixed ancestry) consisted of 279 (65.34%) HIV-infected participants, of whom 210 (75.26%) received ART. Abdominal obesity (AO; defined as increased waist circumference) was present in 54.3% of the participants, of whom 60.96% were HIV-infected. Cardiovascular risk factor prevalence was high in the total cohort (smokers: 68.38%, diastolic hypertension: 32.55%, increased LDL-cholesterol: 28.13%, decreased HDL-cholesterol: 32.86%). The AO group had significantly higher rates of hypercholesterolaemia, hypertriglyceridaemia and hyperglycaemia. Although these trends were also evident in obese HIV-infected participants, they showed improved vascular function [%flow-mediated dilatation (FMD): 7.16 (4.47 - 10.85) vs. 5.41 (3.11 - 10.25); p=0.01] compared to their non-obese HIV-infected counterparts. Conversely, improved %FMD was not observed in obese HIV-free participants. Multiple regression analysis (adjusted for age, sex and smoking) confirmed that waist circumference (β: 0.17; CI: 0.04 - 0.31; p=0.01) and ART (β: 0.15; CI: 0.03 - 0.28; p=0.01) were positively associated with %FMD in HIV-infected participants. Finally, logistic regression indicated that the odds ratio for impaired %FMD (<median) was 0.42 for both AO and ART in HIV-infected participants. These observations were not present in non-obese HIV-infected participants.

Conclusion: Our results show that AO and ART are independent predictors of improved endothelium-dependent vascular function (%FMD) in HIV-infected participants.

Lupus in a low-resource setting: Pulmonary hypertension may better predict prognosis

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Introduction: Systemic lupus erythematosus (SLE), is a complex life-threatening multisystem disease. However, in many African countries, this disease remains grossly under-diagnosed, and is often mis-diagnosed due to the difficulties in diagnosing this illness. We hereby present a case study of SLE that presented with lupus pericarditis, but also with concurrent multi-system disease.

Methods: In this case study, we present a 30-year-old female, who, after several months of symptoms, presented with generalised body malaise, fluctuating arthralgias, and easy fatigability; the patient was also found to have renal impairment, with serological evidence of inflammation. An auto-immune screen suggested lupus, and therapy was commenced. However, over the next few months, the patient's condition deteriorated progressively, until she presented with lupus pericarditis. Since then, a complex multitude of concomitant comorbidities were diagnosed, including lupus arthritis, vasculitis, serositis, cystitis, and haematological abnormalities that, together with diagnostic serology, led to the final diagnosis of SLE.

Results: Throughout her 2 years of treatment with us, the patient fluctuated in and out of pulmonary hypertension (PHT). While only some of these correlated with presence of heart failure, or with evidence of flares, the others did not. However, the presence of PHT in the absence of overt heart failure appeared to better correlate with concomitant disease activity, including sub-clinical activity – more than we realised at the time. Such volatile PHT may have been due to fluctuating pulmonary vasculitis, as opposed to the more common causes known.

Conclusion: SLE remains grossly under-diagnosed in the African setting. This case highlights the importance of a high index of suspicion for SLE by practitioners, as well as the benefits of inter-disciplinary collaborations across the field of medicine. In SLE, PHT from pulmonary vasculitis may be of greater importance than we know, and this may also better predict current disease activity, as well as immediate prognosis.

Endothelial dysfunction in HIV-positive patients with acute coronary syndromes

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Introduction: There are approximately 37 million HIV-positive patients worldwide, of whom 70% live in sub-Saharan Africa. In developing countries there are limited data on HIV and endothelial dysfunction.

Methods: A prospective study of 60 patients, included 20 HIV-positive patients with ACS, 20 HIV-negative patients with ACS and 20 HIV-positive patients with no ACS. Carotid intima-media thickness (CIMT), brachial flow mediated dilatation (FMD), pulse wave velocity (PWV) and endothelial biomarkers (VCAM-1, IL1 β , IL1ra, MCP-1, TNF α , P-selectin and PAI-1) were measured.

Results: There was no difference in the mean CIMT of the 2 groups of patients with ACS. The CIMT in the group without ACS (0.50; sd=0.08 mm) was marginally but significantly lower than the CIMT of both the HIV+/ACS group (0.66; sd=0.16 mm) and the HIV-/ACS group (0.70; sd=0.06 mm), (p=0.0005 and p<0.0001, respectively). There was no evidence of arterial stiffness as measured by pulse wave velocity in all 3 groups; 4.1 (sd=1.1) m/s, 4.6 (sd=1.1) m/s and 3.9 (sd=1.1) m/s, respectively (p=0.12). Endothelial dysfunction as assessed by FMD was similar in the HIV+/ACS and the HIV-/ACS patients. The HIV+/ACS patients did, however, have fewer coronary risk factors (hypertension, diabetes, dyslipidaemia) compared to the HIV-/ACS patients. Vascular cell adhesion molecule-1 (VCAM-1) levels in the 2 HIV-positive cohorts were significantly higher than in the HIV-negative cohort. There were no significant differences in the levels of IL1 β , IL1ra, MCP-1, TNF α , P-selectin, and PAI-1.

Conclusion: HIV-positive patients had low carotid intima-media thickness and there was no significant arterial stiffness as measured by PWV. Non-invasive investigations like FMD, CIMT and PWV did not identify patients with HIV who are at high risk of ACS. The endothelial biomarker, VCAM-1, may be a useful biomarker to identify HIV patients who have endothelial dysfunction and have increased risk of ACS.

Three-year South-African data for renal denervation

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Introduction: Resistant hypertension affects 13% of the entire hypertensive population, and is defined as a blood pressure that remains elevated despite being on treatment with a full dose of more than 3 anti-hypertensive agents of different classes, including a diuretic. Catheter-based renal denervation with radiofrequency energy ablation is a promising treatment option for patients suffering from resistant hypertension. This therapy reduces sympathetic renal tonus and arterial blood pressure. The aim of this study was to report the 3-year outcome of patients treated with renal denervation.

Methods: A total of 11 patients were treated with renal denervation after having coronary and renal angiography. Pre and post blood pressure measurements were recorded up to 3 years post procedure. The femoral artery was accessed with the standard percutaneous technique. A renal angiogram was performed. The simplicity catheter was advanced into the renal artery and connected to the radio frequency generator. Four to 6 ablations were performed in each renal artery. Femoral closure devices were used where appropriate. The patients were monitored overnight and their renal functions were measured the next day.

Results: A significant decrease in systolic blood pressure from baseline to 180 days was seen with a mean decrease of 18mmHg (p=0.016). There were 6 patients who experienced more than a 10mmHg decrease in systolic blood pressure from baseline up to 180 days. Also, 33% of patients reduced medication in at least 1 agent. There were 3 patients who experienced more than a 20mmHg decrease in systolic blood pressure from baseline up to 3 years post procedure, and an additional 2 patients had a 10mmHg decrease after the 3rd year.

Conclusion: Catheter-based renal denervation is a successful procedure for lowering blood pressure, which may decrease major hypertension complications in patients with resistant hypertension.

Models of care for pregnant women with RHD: A content analysis

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Background: The recently adopted World Health Assembly rheumatic heart disease (RHD) resolution highlights the disproportionate impact of this preventable condition in women. RHD in pregnancy (RHD-P) requires an integrative approach to care to ensure early diagnosis and to optimise outcomes. We undertook a content analysis to improve understanding of gaps, facilitators and constraints to RHD-P care pathways.

Methods: There was a structured search in 13 databases of primary research 1995 - 2018. Studies that met the inclusion criteria of reference to RHD-P were appraised using standard tools. A content analysis of extracted data was informed by standards of quality care identified in existing guidelines.

Results: Preliminary results show 35 studies from 16 countries were all conducted in tertiary care centres and 1 community setting. Few studies referred to all key attributes of care, with limited/no reference to guidelines/standards in 12 papers. Most (33/35) referred to the provision of multi-disciplinary cardiac/obstetric care; 5 papers also discussed other disciplines/sectors. Access to required services/surgery was discussed in 12 studies.

Up to 67% of women were diagnosed with RHD during pregnancy; however, 19 studies did not specify timing of diagnosis – despite it being a determining factor in complications. Secondary prophylaxis was discussed in 7 studies. Fifteen studies did not refer to conception counselling, and fewer again referred to discussion with women regarding anticoagulation risks.

Conclusions: Despite complex care requirements in often resource-challenged environments, pregnancy for women with RHD also provides the opportunity to strengthen health system responses, address whole-of-life health, and ultimately reduce the burden of disease. Where reported, high numbers of women diagnosed during pregnancy suggests improved education of the health workforce outside tertiary centres is needed. A framework of reporting metrics specific to studies that include women with RHD-P is proposed to more accurately assess care pathways, outcomes, and the burden of RHD in pregnancy.

Evaluating the prognostic significance of the 12-lead ECG in peripartum cardiomyopathy

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Introduction: Peripartum cardiomyopathy (PPCM) is an important cause of pregnancy-associated heart failure, affecting previously healthy women toward the end of pregnancy or within 5 months following delivery. Although the electrocardiogram (ECG) is widely available in most clinical settings, its prognostic value in PPCM remains elusive.

Methods: We analysed 12-lead ECGs of women with PPCM at index presentation and at 6 month follow-up. Poor outcome was defined as the composite endpoint of death, readmission to hospital, persistent NYHA class III/IV or left ventricular ejection fraction (LVEF) \leq 35% at follow-up.

Results: This cohort of 66 patients presented with a median age of 28.59 (IQR 25.43 - 32.19). The median LVEF at presentation was 33% (IQR 25 - 40), which improved significantly 6 months later (LVEF 49%, IQR 25 - 40, $p < 0.001$). Overall, 27.91% had a poor outcome. The median heart rate was 87bpm (IQR 71 - 102) at index presentation. Sinus tachycardia (>100 beats/minute) at baseline was a predictor of poor outcome (OR 4.89, 95% CI 1.17 - 20.41, $p = 0.030$). Patients with sinus arrhythmia had better event free survival (death, readmission to hospital) as compared with those without heart rate variability (log rank $p < 0.001$). While 29% met Sokolow-Lyon criteria for left ventricular hypertrophy (LVH) on the ECG, echocardiography did not show LVH in any of these patients. Although T wave inversion in any lead was associated with an LVEF \leq 35% at presentation ($p = 0.038$), it did not predict poor outcome ($p = 0.946$). On multivariable logistic regression analysis, an initial prolonged QTc interval was an independent predictor of poor outcome (OR 6.34, 95% CI 1.06 - 37.80, $p = 0.043$).

Conclusion: Sinus tachycardia and prolonged QTc interval at baseline were predictors of poor outcome in PPCM. In contrast, sinus arrhythmia was associated with a favourable outcome. T wave inversion was commonly encountered in patients with an initial LVEF \leq 35%, but did not predict outcome.

Prospective cohort study comparing blended learning with lecture-based training in electrocardiography

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Introduction: Better methods of instruction are being sought to address the lack of ECG competence among graduating medical students. E-learning has not conclusively been shown to be superior to lecture-based ECG training. We therefore aimed to assess whether blended learning (lectures reinforced by e-learning) resulted in better ECG competence in medical students than with lectures alone.

Methods: Two cohorts of fourth year medical students were studied prospectively. The control group (67 students from 2016) received 4 hours of interactive lectures, covering the basic principles of electrocardiography, waveform abnormalities and arrhythmias. In addition to the same lectures, the intervention group (66 students from 2017) had access to a web application that enables ECG analysis and interpretation with structured feedback. Participants completed 3 tests (examining the same topics) assessing baseline knowledge at enrolment, acquisition of knowledge 6 weeks later (after ECG teaching, with or without e-learning), and retention of knowledge 6 months later (with no further ECG training).

Results: There was no difference in baseline knowledge in the control and intervention cohorts (mean test scores 31.18 ± 1.60 and 31.82 ± 1.39 respectively, $p = 0.765$). Although both groups showed a meaningful improvement after ECG training, blended learning resulted in significantly better acquisition of knowledge (76.14 ± 1.99 vs. 50.75 ± 1.94 ; $p < 0.001$) and retention of knowledge (59.15 ± 2.21 vs. 38.06 ± 1.94 ; $p < 0.001$). While lecture-based training showed a large effect size in the acquisition of knowledge test, there was only a moderate effect size in the retention of knowledge test (Cohen's d of 1.34 and 0.47 respectively). Blended learning showed very large effect sizes for both the acquisition and retention of knowledge tests (Cohen's d of 3.18 and 1.82 respectively).

Conclusion: Our study found that a blended learning strategy resulted in better acquisition and retention of knowledge in electrocardiography, than lectures alone. A blended learning approach may therefore be considered for the ECG training of medical students.

Retinal vasculature reactivity during flicker-light-provocation, cardiac stress and stroke risk in Africans: The SABPA study

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Introduction: Anatomical similarities exist between the retinal, coronary and cerebral vasculature. Retinal microvascular structure and functionality (in response to flicker-light-induced-provocation (FLIP)) relate to coronary artery disease risk and possible stroke risk. We investigated the associations between retinal vessel structure-functionality and cardiac stress markers [cardiac troponin T (cTnT), amino-terminal B-type natriuretic peptide (NT-proBNP)] to translate these retina-heart relationships to the stroke risk.

Methods: A target population study included 317 African and Caucasian teachers (aged 23 - 68 years), who participated in the Sympathetic Activity and Ambulatory Blood Pressure in Africans (SABPA) study. Fasting plasma and serum samples for cTnT and NT-proBNP were obtained. Blood-and-diastolic ocular perfusion pressures were determined. Retinal vascular calibres were quantified from fundus images and dynamic retinal vessel calibre responses during FLIP were determined. The University of California stroke risk score was applied to assess 10-year stroke risk.

Results: cTnT levels were similar in this bi-ethnic cohort, whereas NT-proBNP were lower in Africans. A smaller arterio-venular ratio and retinal wider venular calibres were observed in Africans. In Africans, a reduced artery calibre and attenuated artery dilation were associated with cTnT ($p<0.01$), whereas a larger vein calibre ($p<0.02$) and reduced artery dilation ($p<0.05$) were associated with NT-proBNP. In Africans, cTnT and NT-proBNP predicted an increased 10-year stroke risk with odds ratios of 1.2 and 1.4 ($p<0.05$) respectively. None of these associations were evident in the Caucasian group.

Conclusion: The findings support the notion that investigating the retinal vasculature may serve as a surrogate for coronary and cerebral microvasculature. These cardiac-retinal associations additionally predicted a greater stroke risk in the SABPA-Africans. Observable changes in the retinal vasculature may thus serve as markers for the identification, discovery and prediction of retinal, cardio-systemic and cerebral vascular morbidities and risks – thereby establishing a heart-brain link.

Sympathetic tone and modulation, cardiac stress and the dynamic nature of the retinal microvasculature: The SABPA study

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Introduction: Controversy exists regarding the autonomic nervous system's (ANS) importance in retinal microvasculature autoregulatory capacities. Nocturnal BP non-dipping is a key feature associated with SNS hyperactivity, hypertension and increased cardiac stress [cardiac troponin T (cTnT) and amino-terminal-pro-B-type natriuretic peptide (NT-proBNP)]. Whether dipping status, reflective of SNS hyperactivity, might influence the autoregulatory capacity of the retinal vasculature during stressor application, however remains unknown. Furthermore, whether cardiac stress associated with SNS dysfunction, reflects attenuated retinal responses, is to be determined. We therefore aimed to establish the relationship between dipping status, sympathetic tone and modulation, retinal vasculature dynamics, and cardiac stress markers in a South African bi-ethnic cohort.

Methods: Cross-sectional observations were obtained from the Sympathetic Activity and Ambulatory Blood Pressure in Africans (SABPA) cohort (N=271), aged 23 - 68 years. Fasting serum samples for cardiac injury and stress (cTnT and NT-proBNP) were obtained. Retinal vascular calibres were quantified from fundus images and dynamic retinal vessel calibre responses during flicker light (flicker light induced provocation, (FLIP)) were determined. HRV frequency and time domain parameters were calculated during FLIP for each participant. Dipping status was determined via ambulatory blood pressure monitoring.

Results: cTnT and NT-proBNP levels were higher in non-dippers of both ethnicities ($p=0.005$). cTnT levels were positively associated with FLIP HRV frequency parameters normalised-high-frequency (HFnu) and normalised-low-frequency (LFnu) ($p<0.001$), in non-dippers exclusively. FLIP HRV time-and-frequency parameters SDNN ($p<0.001$), rMSSD ($p<0.001$), HFnu ($p<0.04$) and LFnu ($p<0.001$) associated with attenuated artery constriction, and dilatory and venular dilatory responses, in non-dippers exclusively. None of these associations were evident in dippers – regardless of ethnicity.

Conclusion: In non-dippers, increased sympathetic modulation and tone and cardiac stress may significantly contribute to impaired autoregulation of retinal blood flow. Denervation of the SNS may cause loss of tone and altered autoregulatory haemodynamics regardless of the microvascular bed, occurring as an integral feature of general ANS dysfunction.

Surgical experience with chronic invasive constrictive pericarditis in an African setting: A 16-year retrospective review

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Introduction: Chronic invasive constrictive pericarditis is an uncommon disease with multiple causes and unclear clinical outcomes. The aim of this study was to assess early outcomes, morbidity and NYHA functional class status following treatment of chronic invasive constrictive pericarditis by pericardiectomy.

Methods: A retrospective analysis was carried out in 88 consecutive patients who underwent surgery between 2000 and 2015.

Results: There were 55 males (62.5%) and 33 females (37.5%). Age varied from 7 years to 40 years. Early mortality was 13.6% (12/88 patients). The cause of death was low cardiac output syndrome in 4 (4.5%) patients, severe sepsis in 7 (7.9%) and haemorrhage in the remaining patient. One patient required ECMO insertion due to associated severe lung adhesions requiring a decortication and resultant air leaks. Three patients required dialysis. In the majority of patients 71.6% (n=63) were in NYHA FC III-IV. The most common cause was tuberculosis in 65.95% (n=58) patients and associated HIV in 13.6% (n=12) patients. One patient required a mitral valve repair and 1 a coronary bypass graft. The remainder were idiopathic. Pericardiectomy, including an epicardiectomy with a systematic release of the ventricles, was carried out in every case via sternotomy. The pericardiectomy of most patients was performed off cardiopulmonary bypass 71.6% (n=63) and the more invasive subgroup required a combination of cardiopulmonary bypass and aortic cross clamp 5.8% (n=5).

Conclusion: Pericardiectomy improved symptomatology in most patients. A subgroup of patients did not experience an amelioration in clinical symptoms, probably because myocardial function did not completely recover. Aggressive invasion of the myocardium was associated with a worse pre-operative and postoperative outcome, and performing the pericardiectomy on aortic cross clamp increased risk of mortality.

Multiple saccular aortic aneurysms in a 6-year-old: A case report

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Introduction: Isolated reports, mainly from Southern Africa, suggest that among black Africans, aneurysms are uncommon, occur in persons without sex bias, and are non-atherosclerotic. Some studies report no involvement of the thoracic aorta and others report involvement of the abdominal aorta more than the thoracic aorta.

Methods: Mycobacterium tuberculosis is believed to be the most common etiopathogenic factor, followed by HIV and other infections. Clinical features are highly variable. The key to the diagnosis is a high index of suspicion.

Results: Multiple aortic aneurysms are uncommon in children. A 6-year-old boy with unexplained chest pain, coughing for less than a month and shortness of breath was referred to our centre for cardiovascular examination. He had normochromic normocytic anaemia (Hb 4g/dl) and cardiac failure attributed to anaemia.

Conclusion: A chest x-ray showed a prominent left mediastinal silhouette; the electrocardiogram was normal. Transthoracic echocardiography demonstrated an aneurysm of the aorta extending from the transverse arch to distal abdominal aorta, measuring 40mm proximally and 27mm distally, with thrombus at the distal end. Left ventricle systolic function was poor (FS = 17%). A computed tomography angiogram of the aorta confirmed the echocardiographic findings. The coronary arteries were normal. Further investigations including HIV serology, extensive TB workup (GeneXpert, sputum AFB, sputum culture, stool AFB) and connective tissue screening tests were all negative. The patient was discussed with the cardiothoracic surgical team, with further consultation undertaken with other units. Both surgical and percutaneous catheterisation procedures were considered unlikely to succeed. Empirical treatment with anti-tuberculosis drugs for a period of 6 months, together with antiplatelet therapy and diuretics was commenced. Follow-up radiological investigations revealed no reduction in size of the aortic aneurysms. The patient has remained stable and is seen at regular intervals at our outpatient department. The long-term management remains a challenge.