Cardiology Research Review™

Making Education Easy

Issue 150 - 2023

In this issue:

Abbreviations used in this issue:

ACS = acute coronary syndrome; **AF** = atrial fibrillation; **CABG** = coronary artery bypass graft; **CSANZ** = Cardiac Society of Australia and New Zealand; **CTCA** = computed tomography coronary angiography; **HCM** = hypertrophic cardiomyopathy; **HF** = heart failure; **HFpEF** = HF with preserved ejection fraction; **HFrEF** = HF with reduced ejection fraction; **LAAT** = left atrial appendage thrombus; **LVEF** = left ventricular ejection fraction; **PCI** = percutaneous coronary intervention; **RHD** = rheumatic heart disease; **SCD** = sudden cardiac death; **STEMI** = ST-segment elevation myocardial infarction; **TAVI** = transcatheter aortic valve implantation.

Welcome to the latest issue of Cardiology Research Review.

This issue presents highlights from the 70th Annual CSANZ Meeting, held at the Gold Coast Convention and Exhibition Centre in August 2022. I found the following presentations to be particularly interesting, all of which have been published in a special supplement of *Heart, Lung and Circulation*.

We hope you find this issue interesting, and welcome your feedback.

Kind Regards,

Dr Adam Nelson
adam.nelson@researchreview.com.au

"Concealed cardiomyopathy" is an important cause of autopsy-inconclusive sudden cardiac death and diagnosis impacts care of surviving relatives

Authors: Isbister JC et al.

Summary: This study determined the spectrum of genes implicated in autopsy-inconclusive SCD, and the impact of identifying concealed cardiomyopathy (CCM) on the care of SCD families. Twenty disease-causing genetic variants were identified among 91 autopsy-inconclusive SCD cases (mean age 25.4 years). Cardiomyopathy-associated genes were overrepresented in cases with sub-diagnostic structural changes at autopsy, accounting for 11 out of 12 disease-causing variants in this group. Variants in arrhythmogenic cardiomyopathy genes were the most common cause of CCM. Nearly two-thirds of genotype-positive relatives had an observable phenotype either at initial assessment or during follow-up.

Comment: Elegant work from Isbister et al., winner of Ralph Reader and full manuscript now published in JACC. Many young SCDs go undiagnosed leaving uncertainty among family members. This study establishes that an SCD cannot be considered inconclusive unless a genetic panel has been performed, if not at least in the absence of an identifiable cause at autopsy. There is a clear impact on family members and an opportunity to intervene in the natural history. This will have a huge impact on the field.

Reference: Heart Lung Circ 2022;31(suppl. 3):S38-9
Abstract

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Independent commentary by Dr Adam Nelson, MBBS MBA MPH PhD

Adam Nelson is an early career cardiologist with academic interests in preventive cardiology, personalised medicine and implementation science. He has completed a PhD and a postdoctoral fellowship in clinical trials and health services research at the Duke Clinical Research Institute. Adam is currently a coronary interventional fellow at Monash Health and a postdoctoral research fellow at the Victorian Heart Institute.

Assessment of telehealth cardiology pharmacist clinic in improving therapy adherence following acute coronary syndrome and PCI

Authors: Livori A et al.

Summary: This Melbourne study investigated whether patient participation in a telehealth cardiology pharmacist clinic improves 12-month adherence to optimal medical therapy (ACE inhibitor, aspirin, P2Y12 inhibitor, statin, and beta-blocker) after PCI. 78 matched pairs of ACS patients who did or did not attend a post-PCI pharmacist telehealth clinic 1, 3 and 12 months after PCI were compared. Patients who attended the clinic had better adherence to optimal medical therapy at 12 months than those who did not (44% vs 31%; p=0.038), and had significantly fewer major adverse cardiac events over 12 months (8% vs 31%; p=0.004).

Comment: An important study from Livori et al., clinical pharmacist and current PhD candidate. Despite our best intentions, adherence to medications post ACS and PCI is often suboptimal, at least in part due to our fragmented and top-down models of chronic disease management. This matched cohort study demonstrated that not only could a pharmacist-led model of care meaningfully improve adherence but achieved it via a low-touch telehealth approach – a mode of delivering care that is likely to be cost-effective and to remain with us well after COVID has left us.

Reference: Heart Lung Circ 2022;31(suppl. 3):S40
Abstract

Sex disaggregated analysis of risk factors for adverse outcomes in hypertrophic cardiomyopathy

Authors: Butters A et al.

Summary: This retrospective analysis of the Sarcomeric Human Cardiomyopathy Registry investigated sex-disaggregated differences in risk factors for adverse outcomes in patients with HCM. 6647 probands with HCM were included. During a mean follow-up of 6.4 years from first encounter, women had a higher risk of the HF composite end-point and death than men, but no sex differences were seen for the ventricular arrhythmia composite end-point or AF. Sarcomere positive status (Sarc+) and causative variants in *MYBPC3* reduced the risk of the HF composite end-point for women but not for men. Baseline LVEF <35% and larger left atrial size increased the risk of the HF composite for both sexes but to a greater magnitude in men. Sarc+ status increased the risk of death in men but not women.

Comment: Risk stratifying for the adverse sequelae of HCM remains a daily challenge in clinical care. Here Butters et al. demonstrate not only differences in the risk of HF and death among key genotypic and imaging-based phenotypic subgroups, but that this variation is particularly notable for women who appear to have an excess in risk compared to men. Yet further evidence of the value of sex disaggregated analysis and support for our guidelines to become increasingly sex-specific.

Reference: Heart Lung Circ 2022;31(suppl. 3):S41-2
Abstract

Fully automated characterisation of vulnerable plaque features on cardiac CT using deep learning techniques

Authors: Sehly A et al.

Summary: This report described the development of a fully automated deep learning (DL) system capable of accurate characterisation of vulnerable plaques on CTCA. When the DL system was tested on 365 vessels and compared with expert readers, 72 (20%) vessels had vulnerable plaques (32 had low attenuation plaques, 14 had positive remodelling and 26 had spotty calcification). Average analysis time was 3.54 seconds.

Comment: Identifying the 'vulnerable plaque' remains the holy grail among many preventive cardiologists and if there is ever going to be a clinically available tool to do so, on scale, it will be with CT. Currently available techniques are laborious and hard to report consistently however this abstract by Sehly et al. on behalf of an international collaboration of coauthors appears to offer a promising machine-learning approach. How well it translates across vendors and with varying quality images, and its relationship to outcomes remains to be seen, but an exciting development nonetheless.

Reference: Heart Lung Circ 2022;31(suppl. 3):S43-4
Abstract

Catheter ablation in atrial fibrillation and heart failure with preserved ejection fraction improves peak pulmonary capillary wedge pressure, exercise capacity and quality of life. A prospective randomised controlled trial (RCT-STALL HFpEF)

Authors: Chieng D et al.

Summary: This study investigated the effects of catheter ablation on outcomes in patients with AF and HFpEF. 31 patients (mean age 64.1 years, 51.6% female) with symptomatic AF and HFpEF were randomised to AF ablation or medical therapy. All of them underwent exercise right heart catheterisation and cardiopulmonary exercise testing at baseline and again after 6 months; HFpEF diagnosis was based on peak exercise pulmonary capillary wedge pressure (PCWP) ≥25mm Hg. After 6 months, patients randomised to catheter ablation had significant improvements in peak PCWP, PCWP indexed for workload, brain natriuretic peptide, resting cardiac output, peak cardiac output, peak oxygen consumption, and peak workload. Quality of life scores also improved. 31.2% of patients had reversal of HFpEF after catheter ablation. In contrast, no significant improvements from baseline were seen in the medical therapy arm.

Comment: There is growing data for the role of catheter ablation in AF and HFrEF although less is known about its role in HFpEF. In this exciting study by Chieng et al., catheter ablation for AF compared with standard care in the context of HFpEF offered meaningful improvements in mechanistic end-points as well as quality of life scores and appeared to reverse remodel some of the HF perturbations. Bring on the large outcomes trial!

Reference: Heart Lung Circ 2022;31(suppl. 3):S48
Abstract

Risk prediction for left atrial appendage thrombus in patients with AF

Authors: Segan L et al.

Summary: This study described the development of a novel model for LAAT risk prediction in patients with AF or atrial flutter undergoing pre-procedural transoesophageal echocardiography (TOE). The weighted risk model comprised continuous (age, creatinine, LVEF, left atrial volume index, tricuspid annular plane systolic excursion and right ventricular systolic pressure) and categorical (anticoagulation duration) variables, and was found to have excellent predictive performance: area under the curve 0.872, positive predictive value 91%, negative predictive value 70%, and accuracy 80%.

Comment: In this work by Segan et al., a multivariable risk model involving clinical and simple echo parameters was able to identify patients most likely to have LAAT on TOE. While such a construct offers promise for guiding who is most likely to benefit from TOE, such an approach would need a higher negative predictive value than 70% to assuage the well-held fear of a periprocedural (and preventable) stroke.

Reference: Heart Lung Circ 2022;31(suppl. 3):S52-3
Abstract

Concordance with Australian rheumatic heart disease surveillance guidelines in all priority 1 patients in Central Australia

Authors: Rolfe Z et al.

Summary: A retrospective audit was conducted of all 150 priority 1 RHD patients (severe valvular disease or previous valvular intervention) living in Central Australia to determine surveillance guideline adherence. Patients were grouped into 'town or remote', or 'close (within 150km of Alice Springs) or far' proximity based on location. 38.7% of patients were up to date with echocardiography, more-so when in close rather than far proximity to Alice Springs (46.8% vs 29.6%; p=0.030). 12.7% of patients were lost to echo follow-up after July 2018.

Comment: In this sobering report from Rolfe et al. and their Northern Territory coauthors, only a third of priority 1 RHD patients were up to date with their echocardiography follow up and almost 1 in 8 overall had been lost to follow up for over 2 years. With almost 50% of this cohort living >150km from a town centre, this work highlights the difficulties in keeping track of such a high-risk population and the need to consider models of care that bring surveillance to remote and regional Australia.

Reference: Heart Lung Circ 2022;31(suppl. 3):S53
Abstract

Prevalence of coronary artery anomalies in young sudden cardiac death: Insights from a prospective state-wide registry

Authors: Paratz et al.

Summary: This analysis of a state-wide out-of-hospital cardiac arrest registry determined the prevalence of coronary artery anomalies (CAAs) in young SCD victims. 490 patients aged ≤50 years who died from SCD in 2019–2021 and underwent autopsy were evaluated. Five patients (1.0%) were found to have a CAA, but in no case was the CAA deemed responsible for the SCD.

Comment: This study from Paratz et al. highlights how much we don't know about sudden cardiac arrest ± death in the young. In the cath lab we focus so much on understanding CAAs and their intra-arterial courses as a potential malignant condition and yet this study found that such an abnormality was present in only 1% of their SCD patients and was not considered the underlying cause in any of those patients. The indications for exposing asymptomatic patients with CAA to a highly morbid procedure like CABG may need to be re-examined. A second study by the same investigators showed that, despite a reasonable proportion of out-of-hospital arrests in those under 50 years of age being caused by coronary disease, most had no reason to have seen a cardiologist beforehand or engaged in preventative care. Interrupting the natural history of young cardiac arrest is going to require novel methods to identify these individuals before their events.

Reference: Heart Lung Circ 2022;31(suppl. 3):S55-6
Abstract

Efficacy and safety of contemporary PCI in the elderly – a prospective two-year cohort study from the Concord Hospital PCI registry

Authors: Rubenis I et al.

Summary: 1038 patients (13.9% aged >80 years and 86.1% aged <80 years) on the Concord Hospital PCI registry were followed up after PCI to determine the efficacy and safety of the procedure in the elderly. PCI was found to be less successful in those aged >80 years (90.1% vs 95.2%; p=0.01) but in-lab PCI complications were similar in the two age-groups. At hospital discharge there were no age-related differences in rates of major adverse cardiac events (MACE) or bleeding, but the incidence of acute kidney injury was higher in those aged >80 years (9.8% vs 3.3%; p<0.001). Although 2-year rates of MACE were increased in the elderly, these were driven by all-cause mortality. Bleeding rates (11.1% vs 3.9%; p<0.001) were also higher in the elderly, but target-lesion revascularisations were comparable in the two age-groups.

Comment: Older patients tend to be subject to the risk-treatment/referral paradox for PCI – those with the most to gain are often those that are less likely to be referred for fear of complication/harm. Reassuring data here from Concord Hospital in NSW that rates of in-hospital complications among those >80 years of age undergoing PCI were no different to the overall cohort with similar MACE in follow up.

Reference: Heart Lung Circ 2022;31(suppl. 3):S333-4
Abstract

Next-day discharge following transcatheter aortic valve implantation: An Australian tertiary hospital experience

Authors: Soden L et al.

Summary: This retrospective study evaluated the safety of next-day discharge following TAVI. 33 patients (33% female, median age 82 years) who were discharged the day after TAVI were included in the analysis. None of the patients had significant procedural complications but 6 (18%) had new conduction abnormalities after TAVI (5 had transient left bundle branch block and 1 had AF which self-resolved). All patients were discharged home the day after TAVI. Two of them (6%) were re-hospitalised within 30 days (1 for presyncope of unclear cause and 1 who needed a pacemaker for tachy-brady syndrome). All patients were alive and well at 30 days.

Comment: This study from St Vincent's and one each from Royal Adelaide and the Royal Hobart reinforce that TAVI is taking the same path PCI took several decades earlier ... from inoperable to low risk indications … and now by achieving the procedure safely with less invasive monitoring there is the opportunity for next day (and potentially earlier!) discharge. Reassuring data here that in carefully selected patients, next-day discharge appears safe and may assist in reducing finite hospital resources.

Reference: Heart Lung Circ 2022;31(suppl. 3):S345
Abstract

Why don't patients with ST-segment elevation myocardial infarction call an ambulance?

Authors: Sillato S et al.

Summary: This study investigated the reasons why STEMI patients do not always call an ambulance. 100 patients with STEMI who presented to a level 5 NSW metropolitan hospital in 2019–2021 were surveyed using a structured interview. 56 of them presented to hospital via ambulance. Factors favouring self-presentation included not feeling sick enough (14%), proximity to hospital (12%), and expected ambulance response time (11%). Ambulance use was predominately associated with greater perceived symptom severity (29%). 40 patients (40%) were high risk for STEMI but more than 50% of them categorised themselves as low risk. Patients' expectations of STEMI came from a medical or reputable service in only 6% of cases.

Comment: Worrying data from Sillato et al. suggest that despite the Heart Foundation's best attempts to improve public education around chest pain and heart attacks, over half of STEMI patients in this sample from NSW did not call an ambulance. Given many STEMI patients don't make it to hospital, novel methods to improve health literacy in this space need to be considered if we are to bend the curve here.

Reference: Heart Lung Circ 2022;31(suppl. 3):S362-3
Abstract

Polygenic risk scores identify atrial electrophysiological substrate abnormalities and predict atrial fibrillation recurrence following catheter ablation

Authors: Al-Kaisey A et al.

Summary: This study investigated the utility of an AF-polygenic risk score (AF-PRS) for predicting AF recurrence after catheter ablation. 95 consecutive patients referred for AF ablation were enrolled. Left atrial (LA) high density mapping was performed to determine bipolar voltage, conduction velocity, and complex signals. All patients were followed up for arrhythmia recurrences. DNA samples were evaluated using the Axiom Precision Medicine Diversity Array, and AF-PRS was derived based on 6 million single nucleotide polymorphisms. AF-PRS was also derived from a healthy cohort of 12,815 patients without AF. Patients with AF had a significantly higher AF-PRS than healthy individuals without AF, and a high AF-PRS was associated with more advanced electrical LA substrate. Multivariate analysis showed that AF-PRS was an independent predictor of arrhythmia recurrence after ablation.

Comment: PRS remain an exciting research tool although their role in clinic care remains to be determined. In this study by Al-Kaisey et al., a high AF-PRS was associated with multiple electro-mechanical abnormalities consistent with an advanced AF substrate and remained an independent predictor of AF recurrence post ablation. Whether the score is able to identify a modifiable substrate upstream of these abnormalities is of particular interest.

Reference: Heart Lung Circ 2022;31(suppl. 3):S52
Abstract

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