the specific impact of the HFVC service during the calendar year 2020 to analyse in particular the value of the service in providing remote specialty care without the need for onward hospital referral.

Method Data including demographics, co-morbidity, medication, frailty, reason for referral, and the impact of the HFVC on what the GP would have done in the absence of this service, were prospectively collected on all cases discussed in HFVC during 2020. Descriptive and frequency analyses were performed using SPSS V.27 [figure 1].

Results The HFVC service discussed 317 cases during 2020. This was a decline from 452 in 2019, likely due to the reduced patient interaction with the GP. Of these cases (53% male, 76.8 ± 11.1 yrs.), 205 (65%) were new case discussions while the remainder represented review or follow-up discussions. Referrals were dominantly from Dublin (35%), Wicklow (29%) and Carlow/Kilkenny (27%). The population in general was vulnerable (Frailty scale 3.8 ± 1.5), multi-morbid (mean 7 ± 3.4 comorbidities) and on polypharmacy (10.4 ± 4.9 medications). The dominant reason for consultation was assistance with diagnosis (70%) and the remainder was related to management or investigation interpretation. The greatest impact of the HFVC was a dramatic reduction in the need for onward referral to the hospital outpatient department, either the general cardiology service or the heart failure service. Without the VC service 82% of the group would have been referred, in contrast to only 11% requiring hospital outpatient services after the VC consultation, with 72% now being managed in a shared GP-virtual specialty strategy. The intervention also prevented 3 patients being referred to the ED/AMAU services (figure 2).

Conclusion The HFVC, an already established platform to enable the transfer of aspects of HF care to the community, was particularly effective during the COVID-19 pandemic in 2020. In providing online, real time specialist advice to the GP, referral to the hospital outpatient service was reduced by 230 referrals, a more than 8-fold reduction in the year. This was observed in a frail, elderly, multimorbid population who would have been particularly at risk to virus exposure if travel to a hospital setting had been necessary. This experience further underlines the benefits of this platform for care delivery and should be encouraged and developed as a management tool to other cardiovascular problems and indeed other chronic illnesses.

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ANALYSIS OF TIMING OF PATIENTS REFERRED TO A NATIONAL TERTIARY ADVANCED HEART FAILURE CLINIC

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Background A hub and spoke healthcare model for national heart failure (HF) management is encouraged internationally. At the heart of this model is the necessity for recognition of patients developing advanced heart failure. Our aim was to understand referral patterns to a National Advanced HF clinic including triggers for referral and burden of disease at review.

Methods Patients reviewed at the National Advanced HF clinic between May 2019 and February 2021 were included in an advanced HF registry. Patient outcomes included immediate

hospital admission, mechanical support, heart transplant and death. Information such as New York Heart Association (NYHA) class, ESC 2018 'I need help' parameters and 'total HF hospital admissions in the previous year' were documented.

Results There were a total of 56 patients included in the registry of which 28.6% ($n=16$) of patients required immediate admission. Of the admitted group, mean NYHA class was 3 ± 1.1 compared to NYHA class 2 ± 0.8 in those not admitted ($p<0.001$). The mean number of 'I need help' markers in the admitted group were significantly higher (6.2 ± 2.4 Vs 2.8 ± 2 , $p \leq 0.001$) and frequency of hospital admissions in the previous year were double that of the not admitted group (2.3 ± 1.8 Vs 1.1 ± 1.2 , $p=0.03$). Of those admitted the 2 main reasons for referral were 1. intolerance of neurohormonal agents (40%) and 2. >1 HF hospitalisations (40%). Ultimately 75% of those admitted required inotropes and 43.8% ($n=7$) went on to have a ventricular assist device (VAD) (3 CentriMag devices and 4 durable LVADs). In total 56.3% ($n=9$) were listed for inpatient heart transplant. Of those 3 patients died on the active waiting list (2 CentriMag devices & 1 on inotropes). A total of 18.9% ($n=3$) proceeded to inpatient heart transplant. In the admitted group the mortality rate was 37.5% ($n=6$), 67% of which occurred during the index admission. This overall death rate was significantly higher than that of the not needing admission group (37.5% Vs 5%, $p=0.03$).

Conclusions This study signifies real world data surrounding advanced HF referrals to a national tertiary centre. It highlights the magnitude of patients referred at a significantly advanced stage reflected by almost a third requiring immediate inpatient admission. This translated to a significantly higher mortality rate within this cohort. Importantly, the mean NYHA class was 1 point higher in the admitted group. Although this alone cannot be used to trigger patient referral to an advanced HF clinic, as it is used universally, transition from class 2 to 3 should prompt a review of the patient using a model such as 'I need help' to question the need for referral. Notably of those admitted, 80% of referrals were triggered by only 2 markers within this model suggesting the usefulness of these 2 parameters for identifying a particularly advanced group of HF patients. Further work is needed however to evaluate which parameters will identify patients at an earlier stage of disease.

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IS AN NTproBNP SALIVA TEST PAVING A NEW AVENUE FOR DIAGNOSIS AND THERAPY MONITORING OF HEART FAILURE PATIENTS – INSIGHTS FROM THE KARDIATool STUDY

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Introduction There is ample room for improving the usability of risk prediction tools for the advancement of heart failure (HF) management. New biomarkers and testing technologies, which can diagnose HF, monitor therapy and provide information related to the subsequent risk for adverse events or mortality of the affected patients, may drive this change. Blood NTproBNP is a well-established biomarker for diagnosis and monitoring of HF. Saliva NTproBNP has

recently come under the radar as a potential new biomarker for HF – one that is more cost-effective, less invasive, more convenient and acceptable for both patients and healthcare professionals, and one which could potentially reflect the information received from a standard blood NTproBNP test. One hurdle in measuring NTproBNP in saliva samples using standard point-of-care (POC) devices is the level of this protein in saliva. Measuring about 2000-fold lower, saliva NTproBNP is hardly measurable with standard POC devices. Here we present the KardiaTool platform, an integrated POC solution for non-invasive diagnosis and therapy monitoring of HF patients. The platform consists of two components, KardiaPOC (a highly sensitive portable device for non-invasive and simultaneous quantitative assessment of multiple HF related biomarkers from saliva samples, incorporating a functionalized magnetic nanoparticle approach) and KardiaSoft (a decision support software based on predictive modelling techniques that analyses POC and other patient data, and delivers information on HF diagnosis and therapy monitoring). The KardiaTool platform was developed as part of an ongoing collaborative Horizon 2020 project, KARDIATool.

Methods and Results The aim of this sub-study was to test the hypothesis that saliva NTproBNP levels correlate to blood NTproBNP levels. To achieve this, we recruited chronic heart failure patients attending the HF unit in St. Michael's Hospital (SVUH, Dublin). Patients underwent routine physical examination, including venepuncture, echocardiography and electrocardiography. NTproBNP was quantified in peripheral blood samples. Saliva was collected with the SalivaBio Oral Swab device and extracted following centrifugation at 5000 g for 5 min. Saliva samples were assessed with a modified immunoassay prior to the official KardiaPOC testing. Results from the first 46 HF patients show a significant and positive correlation between blood and saliva NTproBNP ($p < 0.05$). In addition, saliva NTproBNP correlated significantly with echocardiography parameters, including LA diameter ($r = 0.36$, $p = 0.02$) and E/A ratio ($r = 0.43$, $p = 0.01$).

Conclusions We were successfully able to quantify saliva NTproBNP levels in HF patients using a modified immunoassay approach, and these levels correlated with blood levels. The KardiaTool project is still ongoing, with patient recruitment in Ireland, Greece, and Italy. The next stage is to test the KardiaPOC device, which we envisage will have superior sensitivity for saliva NTproBNP quantification, and to determine the diagnostic test accuracy for acute and chronic heart failure.

41 NOVEL HEART FAILURE BIOMARKER CLEC3B IS ASSOCIATED WITH CARDIAC FIBROSIS, AND IMPACTS CARDIAC FIBROBLAST CELL FUNCTION IN VITRO

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Background Through a proteomics approach we have recently identified a novel blood-based biomarker for heart failure

called CLEC3B, which exhibits improved diagnostic accuracy over BNP. We have previously investigated CLEC3B expression in human atrial tissue and shown that it correlates positively with the degree of cardiac tissue fibrosis. The purpose of this study was to expand our current knowledge of CLEC3B in the context of heart failure, with a specific emphasis on cardiac fibrosis.

Methods Left ventricular cardiac tissue samples from 30 patients with heart failure and 9 age/sex matched non-heart failure controls were studied to assess protein levels of CLEC3B and markers of cardiac fibrosis. As the primary cell type contributing to cardiac fibrosis is the fibroblast, parallel in vitro studies were carried out using primary human cardiac fibroblast cells (HCF). Both CLEC3B gene over-expression and gene knock-down studies were carried out in HCFs, in the presence or absence of stimulation with the pro-fibrotic growth factor TGF β . The impact of modulating endogenous CLEC3B levels on gene and protein expression was studied, including by RNA sequencing, to identify the potential role of CLEC3B in fibroblast cells. An in vivo model of Angiotensin II induced heart failure in CLEC3B knock out mice is currently ongoing to study the impact of CLEC3B on cardiac function and remodelling (echocardiography, histology, gene and protein analysis).

Results Protein levels of CLEC3B were significantly increased in cardiac tissue derived from patients with heart failure ($p < 0.01$), including in both HFrEF ($p < 0.001$) and HFpEF ($p < 0.01$) sub-sets, compared to non-failure controls. Levels of CLEC3B in cardiac tissue correlated significantly with markers of fibrosis, including collagen subtypes 1, 5, 6, 12, and 14, with the r-statistic ranging between 0.31 and 0.78, (all $p < 0.05$). RNAseq analysis of HCF cells showed significant changes in over 400 genes following both CLEC3B over-expression and knockdown, with different genes being modulated depending on TGF β stimulation of the HCF cells.

Conclusions/Implications These data show how CLEC3B has an important role in the fibrosis associated with cardiac remodelling in heart failure. Many candidate genes have been identified from RNAseq analysis which will help guide future investigations, alongside the in vivo CLEC3B knockout animal model of heart failure, to help elucidate the mechanisms involved in the role of CLEC3B in cardiac remodelling and disease progression.

42 RENAL SAFETY OF SGLT2 INHIBITORS IN THE REAL WORLD – AN OUTPATIENT HEART FAILURE CLINIC EXPERIENCE

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Background As recent evidence has emerged indicating the efficacy of sodium-glucose-co-transporter-2 inhibitors (SGLT2i) in reducing all-cause mortality as well as hospitalisations in patients with HFrEF, it has been widely and quickly adapted into Cardiology practice. However, given the comorbidities and polypharmacy associated with this patient cohort, the real-world initiation and monitoring can be challenging.

Aim To assess the renal biochemical effects of SGLT2i initiation, as well as effects on hospitalisation and side effects in a