Objective To examine the relationship between the mean of all HbA1c measures after CHF diagnosis and outcome in a large cohort of T2DM patients with incident CHF.
Design Retrospective, observational cohort study.
Setting Tayside, Scotland.
Patients T2DM patients with incident CHF between 1993 and 2010.
Measurement A weighted mean HbA1c was calculated using all available HbA1c measures following CHF diagnosis and patients were grouped into five categories of HbA1c (≤6%, >6–≤7%, >7–≤8%, >8–≤9% and >9%). We subsequently compared diet and drug treated populations. The relationship between mean HbA1c and all-cause deaths after CHF diagnosis was assessed.
Results 795 patients with T2DM met study criteria. Median follow-up of 3.8 years saw 491 (61.8%) deaths. Cox regression model, adjusted for all other significant predictors, with the middle HbA1c category (>7–≤8%) as the reference, showed a U shaped relationship between HbA1c and outcome. (<6% [HR 95% CI 1.78 (1.26 to 2.52)]; >6–≤7% [1.29 (1.01 to 1.66)] and >9% [1.38 (1.03 to 1.84)]. We found a similar relationship in the drug treated sub-group. However in the diet only group, low HbA1c was associated with the lowest risk of death (≤7% [0.17 (0.07 to 0.39)]).
Conclusions In patients with T2DM and CHF, our observational study shows that in drug treated patients there was a U shaped relationship between HbA1c and mortality with the lowest mortality risk in patients with modest glycaemic control (HbA1c, >7–≤9%). However in diet treated patients, lower HbA1c was associated with lower mortality risk.

012 AUTOMATED DATA CAPTURE FROM ECHOCARDIOGRAPHY REPORTS TO ENHANCE HEART FAILURE POPULATION RESEARCH

doi:10.1136/heartjnl-2012-301877b.12

[1]D H J Elder,* [2]F Shearer, [2]A Dawson, [1]M Pradeep, [1]H Parry, [2]P Currie, [2]S D Pringle, [1]J George, [1]A Choy, [1]C Lang. *[1]University of Dundee, Dundee, UK; [2]NHS Tayside, Dundee, UK*

Background As IT dominates cardiology, the ability of centres to link clinical databases to perform outcome based research has increased significantly. Good quality research relies on the ability to accurately identify and characterise the disease of interest in the population. Heart Failure is one such disease that is often challenging to define from datasets. Uniquely we have the ability to link the Tayside echocardiography dataset to other regional datasets including dispensed prescription and hospitalisation data. Echocardiography reports are commonly comprised of structured, usually numerical values, and a free text component to store overall conclusions or impressions. We therefore sought to develop a computer algorithm to determine LV function from the free text and subsequently to validate the ability to define systolic HF based upon LVSD and loop diuretic therapy.
Methods We iteratively the algorithm to process the free text component the reports and determine the degree of impairment. The algorithm was comprised of a lexicon of words and phrases and applied with negation detection. This was repetitively enhanced by recurrent processing of a subset of the data. The final algorithm was subsequently applied to the full dataset and was validated, first, against blinded manual review of a subset of reports and second by blinded review of the stored images. The data were then linked using a unique patient identifier to the dispensed prescribing data to determine loop diuretic use. The specificity of diagnosis of systolic heart failure was examined by blinded case note review.
Results The database contained 153 836 reports on 63 309 individuals. The lexicon comprised 488 keywords or phrases. When applied to the data 145 525 reports were classified (94.4%), while 8584 remained unclassified. (5969 (70%) contained no information in the free text fields, and the remainder provided either insufficient data on left ventricular function or severe spelling or typographical errors, preventing matching.) 19 758 were classified as having LVSD (5378 (27%) mild, 818 (4%) mild to moderate, 4646 (24%) moderate, 583 (3%) moderate to severe and 8333 (42%) severe). The validation of 1000 reports reviewed for the presence or absence of LVSD found concurrence with the algorithm in 980 (98%) cases. Blinded review of the stored movies and images revealed a 90% concordance for the presence or absence of LVSD. Record linkage with the dispensed prescription dataset identified 9875 individuals with LVSD who also received loop diuretic therapy. Validation, by case note review, demonstrated a 91% concordance with a clinical diagnosis of systolic HF.
Conclusion A computer algorithm can quickly and accurately identify the degree of LVSD from the free text component on an echocardiogram report and the presence of LVSD and combined with loop diuretic use is specific for a diagnosis of systolic heart failure.

013 AUDIT OF TERTIARY HEART FAILURE OUTPATIENT SERVICE TO ASSESS COMPLIANCE WITH UPDATED NICE GUIDELINES

doi:10.1136/heartjnl-2012-301877b.13

[1]H Pryse-Hawkins, [1]L Davidson,* [1]L Fallon, [1]K Guha, [2]A R Lyon, [1]R Sharma, [1]A Vazir, [1,2]M R Cowie. *[1]Royal Brompton and Harefield NHS Trust, London, UK; [2]National Heart and Lung Institute, Imperial College, London, UK*

Background Clinical audit provides a mechanism to review the quality of patient care, and highlight areas for further development. The National Institute of Clinical Excellence (NICE) updated the clinical guidelines for chronic heart failure (HF) in August 2010. Incorporated into this update were audit criteria, which were used to create an electronic tool to assess current outpatient management.
Methods The audit targeted patients with HF secondary to left ventricular disease attending a tertiary cardiac centre in London. After an initial pilot period using hard copy proformas, the audit was extended in electronic format to all HF clinics within the institution. This enabled the capture of demographical data, diagnosis, treatment, monitoring including heart rhythm and rate, measures of clinical follow-up, and the compliance with rehabilitation.
Results A total of 282 patients were included in the 8-month audit, of which 71% were male. The majority of patients were elderly, with a mean age of 68 years, and most lived outside of London (68%). The three commonest HF aetiologies were ischaemic heart disease (40%), idiopathic dilated cardiomyopathy (20%) and primary valvular disease (12%). Treatment demonstrated 89% correctly prescribed a β-blocker, 91% correctly prescribed an ACE-inhibitor or angiotensin receptor antagonist and 64% correctly prescribed an aldosterone antagonist. Rehabilitation questions changed after 3 months. Within the initial 155 patients, 15% were offered a rehabilitation programme. The subsequent 127 patients were audited using three questions, demonstrating that 6% were referred, and 1% were enrolled into a rehabilitation programme, and 36% were educated regarding the benefits of exercise for HF.
Discussion The experience throughout this audit was positive as it was flexible and well supported by the audit department. The electronic proforma is easily adaptable to incorporate subsequent clinical or research questions as desired. Treatment and monitoring reflect national recommendations, but rehabilitation referrals are below desired levels. A minority of patients have been referred to or

enrolled in HF rehabilitation programmes reflecting poor national provision. Two-thirds of patients lived outside of London, making it impractical for them to frequently visit our hospital. Hence a hospital-based rehabilitation programme would not improve this care priority. Added questions demonstrated less than optimal numbers receive exercise education within clinic.

Conclusion This audit demonstrated that a tertiary HF service has high rates of documentation, follow-up and compliance with established medical therapies. Notably many patients did not receive cardiac rehabilitation. This may be influenced by geographical limitations and the configuration of local services. To improve patient management further, alternative strategies including telehealth and enhanced multi-disciplinary team education are currently being explored.

014 SPECIALIST INTERVENTION LEADS TO IMPROVED IN-PATIENT OUTCOMES IN PATIENTS WITH DECOMPENSATED HEART FAILURE: IMPACT OF INTRODUCING A HEART FAILURE TEAM

doi:10.1136/heartjnl-2012-301877b.14

J Masters,* I Anton, J Szymanski, E Greenwood, J Grogono, D Kelly, P J Cowburn. *University Hospital Southampton, Hampshire, UK*

In the Health Care Commission Audit in 2005, our hospital had an in-patient (IP) mortality of 30%. A Heart Failure Team (HFT) was introduced to provide specialist in-patient care wherever the patients presented. The HFT was composed of two specialist nurses, a part time pharmacist and a clinical fellow and was led by a Consultant Cardiologist with a special interest in HF. The service commenced in April 2008. In the first year of the service 211 IPs were seen by the HFT. The mean age was 72.0 years (SD ±13.0), 40% were female, 53% had ischaemic heart disease and 28% were diabetic. Examination findings on admission revealed a mean heart rate of 89 (±26) bpm and a mean systolic BP of 126 (±25) mm Hg; mean QRS duration was 116 (±44) ms. 79% had an IP echo: of these 70% were classified as having moderate/severe left ventricular systolic dysfunction with 15% having preserved LV systolic function. Admission bloods revealed a mean Na of 135 (±6) mmol/l, urea 12 (±12) mmol/l, eGFR 51 (±22) and Hb 124 (±23) g/l. Mean length of stay (LOS) was 19 (±18) days. In the preceding 6 months 215 patients were coded with a primary diagnosis for HF. Subsequent case note review confirmed that 196 patients had been correctly coded. The baseline characteristics and outcome of these 196 patients are described. The mean age was 73.5 years (±14.7), 36% were female, 51% had ischaemic heart disease and 26% were diabetic. Examination findings on admission revealed a mean heart rate of 87 (±21) bpm and a mean systolic BP of 126 (±28) mm Hg; mean QRS duration was 117 (±37) ms. 82% had an IP echo: of these 63% were classified as moderate/severe left ventricular systolic dysfunction with 17% having preserved LV systolic function. Admission bloods revealed a mean Na of 135 (±6) mmol/l, urea 11 (±12) mmol/l, eGFR 48 (±23) and Hb 122 (±22) g/l. Mean LOS was 17(±19) days. All ns vs HFT baseline demographics. Despite very similar baseline characteristics and LOS, outcomes were very different. The IP mortality in the pre-HFT cohort was 23% whereas the patients managed by the HFT had an IP mortality of 6% ($p<0.001$). Analysis of discharge medications shows patients managed by the HFT received higher doses of loop diuretics (mean bumetanide/equivalent dose 2.4 (±1.5) mg HFT vs 1.6 (±1.2) mg pre HFT, $p<0.001$) with more receiving intravenous diuretics during hospitalisation (88% of HFT patients vs 76% pre-HFT, $p=0.002$). Discharge prescription of thiazide diuretics was also commoner in the HFT patients (17% vs 5%, $p=0.001$). ACE-inhibitors and/or ARBs (91% vs 83%, $p<0.05$) and aldosterone receptor antagonists (68% vs 44%, $p<0.001$) were prescribed more frequently by the HFT on discharge. β-blocker use was similar (HFT 63% vs pre-HFT 59%, ns). The introduction of a specialist HFT dramatically reduced in-patient mortality. Improved use of evidence based therapies, together with more aggressive diuretic use, may contribute to the difference in patient outcomes.

015 CAN WE PREDICT LIVER FIBROSIS PREOPERATIVE IN PATIENTS WHO UNDERGO HEART FAILURE SURGERY AND DOES IT INFLUENCE POSTOPERATIVE LIVER FUNCTION?

doi:10.1136/heartjnl-2012-301877b.15

N Farre,* L Tilling, A Rice, A Simon, N R Banner. *Harefield Hospital, Harefield, Middlesex, UK*

Background Liver dysfunction is common in patients with heart failure and may progress to irreversible fibrosis, which is predictive of poor prognosis. Our objective was to determine the frequency of liver fibrosis in patients who died after heart failure surgery (Insertion of ventricular assist device (VAD) or heart transplantation) and to identify predictors of liver fibrosis.

Methods We identified 19 patients who died after a median of 24 days after heart failure surgery. Liver sections were analysed post-mortem for the presence of fibrosis which was staged according to the scheme: 0=none, 1=portal or limited perivenular/perisinusoidal, 2=portal, perivenular and sinusoidal, 3=bridging fibrosis and 4=cirrhosis. Clinically relevant fibrosis was defined as stage 3 or 4. Pre- and post-operative data were analysed to identify predictors of fibrosis.

Results Mean age was 45±11 years. 14/19 patients were male. 84% had non-ischaemic cardiomyopathy, 8 patients received a heart transplantation and 11 patients a VAD, 21% of patients had previous heart failure surgery (VAD or transplantation). Eight patients had stage 3 or 4 fibrosis (42%, 2 patients had cirrhosis and 6 bridging fibrosis, group F+), 11 had 0–2 stage (group F–). F+ patients had higher pre-operative right atrial pressure (16±9 vs 11±4 mm Hg, $p=0.18$) and a higher incidence of moderate to severe tricuspid regurgitation (75% vs 25%, $p=0.07$), but cardiac index was similar (median 1.7 (IQR 1.4–2.15) in F+ vs 1.8 (1.4–2.8) in F–, $p=0.60$). There were no differences in biochemical measurements of renal or liver function: creatinine 97 µmol/l (88–226) in group F+ vs 104 (81–113) in F–, bilirubin in F+ 30 (22–43) µmol/l vs 22 (12–53) in F–, alanine transaminase 27 µmol/l (16–231) vs 33 (18–107); and alkaline phosphatase 78 µmol/l (69–101) vs 90 (70–144). A higher international normalised ratio (INR) was seen in F+ (2.4±0.6 vs 1.6±0.5, $p=0.013$), but F+ had a greater warfarin exposure than F– (62% vs 9%, $p=0.067$). To correct for the higher incidence of warfarin therapy in F+ we analysed the Model for End Stage Liver Disease-IX (MELD-IX) score. This was higher in group F+ (19.4 (14.4–25.6) vs 15.2 (9.4–21.6), $p=0.13$). Patients in F+ had a higher post-surgery need of blood products than F–: red blood cell units 38 (15–42) vs 17 (2–35), $p=0.18$; plasma units 11 (6–27) vs 7 (1–20), $p=0.43$; and platelets units 9 (5–13) vs 2 (1–15), $p=0.71$. F+ patients had a higher bilirubin than F– at day 8 post-surgery (127 µmol/l (48–218) vs 20 (17–56), $p=0.032$).

Conclusion Liver fibrosis was common in patients who did not survive heart failure surgery, but could not be predicted from preoperative clinical and biochemical markers, although there was a trend to be associated with more severe tricuspid regurgitation. Fibrosis was associated with more postoperative liver dysfunction.

*FN and TL authors contributed equally to the work.