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REPORT-HF: KCCQ after AHF

Quality of life assessed six months after hospitalisation for acute heart failure: An analysis from REPORT-HF (International Registry to assess mEdical Practice with lOngitudinal obseRvation for Treatment of Heart Failure).

Short title: KCCQ after AHF Hospitalisation

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Aims: Recovery of well-being after hospitalisation for acute heart failure (AHF) is a measure of the success of interventions and the quality of care but has rarely been quantified. Accordingly, we measured health status after discharge in an international registry (REPORT-HF) of AHF.

Methods and results: The analysis included 4,606 patients with AHF who survived to hospital discharge, had known vital status at six months, and were enrolled in the United States of America, Russian Federation, or Western Europe, where the Kansas City Cardiomyopathy Questionnaire (KCCQ) was administered. Median age was 69 years (quartiles 59-78), 40% were women, and 34% had a left ventricular ejection fraction (LVEF) <40%, and 12% patients died by six months. Of 2,475 patients with a follow-up KCCQ, 28% were "alive and well" (KCCQ>75), while 43% had poor health status (KCCQ ≤50). Being "alive and well" was associated with new-onset AHF, LVEF <40%, younger age, higher baseline KCCQ, country, and race. Associations were similar for increasing health status, with the exception of country and addition of comorbidities.

Conclusion: In this international global registry, health status recovery after AHF hospitalisation was highly variable. Those with the best health status at 6 months were younger, had new-onset HF, and higher baseline KCCQ; nearly one-third of survivors were "alive and well". Investigating reasons for changes in KCCQ after hospitalisation might identify new therapeutic targets to improve patient-centred outcomes.

Key words: acute heart failure, KCCQ, post-discharge health status

Introduction

Many patients with heart failure report that well-being is at least as important as prognosis (1), and there is a move by the ACC/AHA to include patient health status for the assessment of quality of heart failure care (2). Although rates of re-hospitalisation and death for patients with acute heart failure (AHF) are well documented, less is known regarding patient-reported outcomes and wellbeing in the months after discharge or features associated with persistence or recovery of impaired quality of life (3-6).

The International Registry to Assess Medical Practice With Longitudinal Observation for Treatment of Heart Failure (REPORT-HF) is a global registry of patients with AHF prospectively enrolled during hospitalisation for incident or decompensated AHF that, unlike clinical trials, had few exclusion criteria (7-9). In five countries (Germany, Great Britain, the Russian Federation, Spain and the United States of America), investigators were asked to invite participants to complete the Kansas City Cardiomyopathy Questionnaire (KCCQ) to assess their health status before discharge and at 6 and 12 months after hospital discharge. This provided an opportunity to investigate the natural history and features associated with favourable health status following hospitalisation for AHF in a diverse patient cohort enrolled in several world regions.

Methods

This study was performed in accordance with the principles outlined in the *Declaration of Helsinki*. Locally appointed ethics committees approved the research protocol, and informed consent was obtained from the participants or their guardians.

Methods for screening, enrolment, data collection, and follow-up of participants have been described previously (7). Any patient ≥18 years old hospitalised with a

primary diagnosis of AHF as determined by the treating clinician was eligible, except those involved in a therapeutic trial or unable or unwilling to provide informed consent. Patients were enrolled between July 2014 and March 2017. Data were recorded using the same case report form across all sites. Patients were managed according to local clinical practice. Vital status was assessed by enrolment sites and, where available, reporting databases.

Participants enrolled in Germany, Great Britain, Spain, the United States of America (USA), and the Russian Federation were invited to complete the KCCQ in their preferred language before hospital discharge (baseline) and at 6- and 12-month study follow-up. The primary analysis was based on participants who completed the KCCQ or had died within six months of hospital discharge; outcomes at 12 months were used if the 6-month follow-up was missing. Six rather than 12 months was chosen for the primary analysis because the data were more complete and there were fewer deaths at this time.

The KCCQ is a 23-item, patient-reported, disease-specific health status measure quantifying multiple health domains, including symptoms, physical and social functioning, and quality of life. The Overall Summary Score (KCCQ-OSS) averages these four domains to provide a more holistic description of health status (10). Scores range from 0-100, with higher scores indicating better function, fewer symptoms and better health status. The KCCQ has been shown to be a valid, reproducible and sensitive measure of patients' health status and is associated with mortality, hospitalisation rates and costs (9, 11, 12), and it has been approved by the US Food and Drug Administration as a Clinical Outcome Assessment (13). A mean difference of 5 points is considered clinically important (14). For this analysis, patients who were alive and reported a

KCCQ-OSS >75 at 6-months were considered to be "alive and well," that is, alive and with excellent health status (11, 15-17).

Statistical Analyses

Patient demographics, comorbidities, hospital discharge medications, and region are described as percentages; continuous variables are described by medians and first and third quartiles. The distribution of the KCCQ-OSS and sub-scales at enrolment and each follow-up are reported. Logistic regression models were used to examine associations between patient factors and country with the primary outcome of being "alive and well" (i.e., alive and excellent health status, with KCCQ-OSS>75) at six months. Univariate, baseline-adjusted (i.e., adjusted for enrolment KCCQ-OSS), and multivariable models were constructed. The following were included in multivariable models based on prior knowledge: enrolment KCCQ-OSS if available (per 10-points; also included in the baseline-adjusted model); age (per 10 years), sex (male, female), race (Black, Asian, or Other vs. White); smoking status (former, current vs. never); index hospitalisation for decompensation of chronic heart failure (yes, no); left ventricular ejection fraction (LVEF; <40% vs. 40-49%, ≥50%, and not recorded) history of hypertension, atrial fibrillation, diabetes, chronic kidney disease, coronary artery disease (defined as having a history of coronary artery bypass, percutaneous coronary intervention, acute coronary syndrome, or myocardial infarction); cause of HF (ischemic vs. hypertension, cardiomyopathy, valvular, other, and unknown).

Similarly, univariate, baseline-adjusted, and multivariable linear regression models were constructed to explore relationships with continuous post-discharge KCCQ-

OSS among the patients who had completed a 6-month or 12-month KCCQ-OSS. In sensitivity analyses, missing enrolment data were imputed using predictive mean matching within the "mice" package R (v3.12.10), and separate models were constructed and weighted by the inverse of the predicted probability of having KCCQ-OSS data available at follow-up, derived from a non-parsimonious model for being followed up. Post-hoc multivariable logistic and linear regression models were performed, stratified by EF. Findings were considered significant at $P<0.05$, with 2-tailed testing. Analyses were conducted in R (v3.6.0) using the "rms" package. Multivariable logistic regression model fit assessed by the le Cessie-va Houwelingen normal test statistic for the unweighted sum of squared errors revealed no evidence for lack of fit (18). Multivariable linear regression model fit assessed by quantile-quantile plot of residuals was also deemed sufficient.

Results

The main findings are summarized visually in the Graphical Abstract.

Baseline characteristics

Of 4,804 patients enrolled in the five participating countries (Figure 1), 4,685 survived to hospital discharge, and a further 4,606 also had known vital status at six months and are therefore the focus of these analyses. In total, 563 (12%) died within six months, with post-discharge mortality ranging from 9% in Russia and Spain to 15% in Britain. At follow-up, 2,475 individuals were alive and had KCCQ-OSS available, including 2,200 with 6-month KCCQ-OSS available and 275 with only a 12-month KCCQ-OSS available (these two groups were combined). A further 1,568 were alive but had not completed a KCCQ-OSS. Overall, 982 (21%) were enrolled in Germany, 564 (12%) in Great Britain, 1201 (26%) in the Russian Federation, 567 (12%) in Spain, and 1292 (28%) in the USA. Median (Q1, Q3) age was 69 (59, 78) years, 40% were women,

82% were Caucasian, 34% had a left ventricular ejection fraction <40% (HFrEF) and 33% had coronary artery disease. At discharge, patients with HFrEF were generally prescribed guideline recommended pharmacological therapy, including ACEi/ARB (76%), beta-blocker (87%) and mineralocorticoid antagonists (65%). Patients who died within 6 months were less likely to receive such treatments.

Table 1 shows baseline patient-characteristics for the 4,606 participants with post-discharge follow-up available, according to 6-month health status. Of these, 695 (28%) were "alive and well" (KCCQ-OSS >75). However, 1,057 (23% overall and 43% of the 2,475 with a post-discharge KCCQ) had poor health status (KCCQ-OSS ≤50), and 1,620 patients (35% overall and 65% of those with a post-discharge KCCQ) either died or were living with a KCCQ-OSS ≤50. In these unadjusted comparisons, participants who were "alive and well" at 6 months (KCCQ >75) had better baseline KCCQ-OSS (median 56), were younger (median age 66 years), more likely to be men (72%), had fewer co-morbid conditions including CAD, were more likely to have new-onset HF (49%), and more likely to have HFrEF (44%). In contrast, those who died within 6 months had a lower baseline KCCQ-OSS (median 33), were older (median age 74 years), were more likely to be Black, had more co-morbid conditions, and less often had new onset HF (19%). Patients who died also had lower blood pressure, eGFR, and fewer were prescribed an ACEi or ARB, beta-blocker, or an MRA. Patients who survived but with a KCCQ ≤50 generally had characteristics similar to those who died. Findings were similar when restricted to participants who also had a baseline KCCQ-OSS (Table S1 and S2).

We sought to understand the characteristics of the 1,568 discharged patients who were alive at 6 months but did not have a follow-up KCCQ. Of these, baseline KCCQ

was available for 420 patients (27%). Patients from the Russian Federation were most likely (93%) and those from the USA least likely (40%) to complete a follow-up KCCQ. Black patients, who were almost entirely enrolled in the USA, were least likely (27%) to complete a follow-up KCCQ. In other respects, patients who survived and did or did not complete a follow-up KCCQ had similar characteristics.

Trajectory of health status after hospital discharge

Most of the improvement in KCCQ-OSS occurred within 6 months with, on average, little further change by 12 months (Table 2, Figure 2, Figure S1). Symptom frequency, burden, physical limitations, total symptom score, and quality of life all improved from baseline to 6 months. Median values after improvement in each domain were consistent with persistent moderate or severe impairment (12).

Predictors of being "alive and well" after discharge

In a multivariable logistic model (Table 3), better baseline KCCQ, younger age, new-onset HF, and LVEF <40% vs. >50% was associated with greater odds of being "alive and well" at six months. The variables with largest magnitude associations were baseline KCCQ (OR 1.5 per 10 points baseline KCCQ-OSS, 95% CI 1.4, 1.6) and new-onset HF (OR 2.6, 95% CI 2.1, 3.4). Compared to White race, only Black race was associated with lower odds of being "alive and well", and patients enrolled in Germany and Spain had greater chance of being alive and well than those in the USA, while those enrolled in the Russian Federation had lower odds. Male sex was associated with better odds of being "alive and well" in the univariate and baseline-adjusted models (Table S3) but not in the full multivariable model. Imputation of missing baseline data yielded similar results (Table S4).

Predictors of better post-discharge health status

Results of multivariable linear regression models were similar, with the notable exceptions of country, which was not associated with better health status, and inclusions of atrial fibrillation, diabetes, and coronary artery disease (Table 3, Table S5). Better post-discharge health status was associated with higher baseline KCCQ, younger age, new-onset HF, and LVEF <40% vs. >50%. The largest magnitude associations with better post-discharge KCCQ-OSS were: new-onset HF (8.3 points, 95% CI 6.1 to 10.4), higher baseline KCCQ-OSS (4.4 points, per 10 points, 95% CI 4.0 to 4.9), and absence of diabetes (3.8 points, 95% CI 1.8 to 5.9). Compared to White race, only Black race was associated with worse post-discharge health status: -6.6 (95% CI -11.9 to -1.4) points. Male sex was associated with better health status in the univariate and baseline-adjusted models (Table S5), but not in the multivariable model. Multivariable associations were consistent in sensitivity analyses with imputation using predictive mean matching (Table S6) and weighting by the inverse of the predicted probability of having a post-discharge KCCQ-OSS (Table S7).

Sensitivity Analyses

Participants missing post-discharge KCCQ were slightly older, more often enrolled in the USA, Black, had chronic kidney disease, and unmeasured LVEF than participants who completed at least one follow-up KCCQ. To address potential differential follow-up, we conducted sensitivity analyses addressing missing data, including weighting to account for different probabilities of following up (Tables S4, S6, and S7). These results were essentially unchanged from the main models.

Stratification by LVEF

In contrast to the main analyses, among participants with baseline LVEF<40% (Table S

8.1) we did not detect associations between health status measured by KCCQ and age, country, race, or comorbid conditions, but there was evidence for associations with HF aetiology or smoking. Otherwise, associations were similar in direction and magnitude to those identified in the main analyses, i.e., baseline health status and new HF. Among patients with LVEF ≥40% or missing (Table S8.2), health status was associated with age, race, country, chronic kidney disease, atrial fibrillation, and diabetes, as well as baseline health status and new HF, but not with HF aetiology or smoking status.

Discussion

This analysis suggests nearly one-third of patients hospitalised with AHF were "alive and well" 6 months later, and this generally persisted until at least 12 months. However, about 40% of patients who survived to 6 months had a persistently poor quality of life. These findings are important, given that many HF patients value quality of life as much or more than prognosis (1) and the growing interest in health status as a measure of quality of HF care (2). A better understanding of patient characteristics associated with both poor and excellent post-discharge health status may identify patients who will benefit from further outpatient interventions aimed at controlling HF symptoms, managing comorbidities and improving health status. Our data also provides normative baseline data for future acute and chronic HFrEF and HFpEF studies designed to understand and improve the trajectory of KCCQ after AHF hospitalization.

After adjusting for known predictors of HF severity, new-onset HF had the strongest association with post-discharge health status, and this was consistent across our models. New-onset HF and HFrEF have historically been associated with high mortality, although findings have been mixed among observational studies. Patient age, underlying

aetiology, and comorbid conditions likely play important roles (9, 12, 19). Baseline KCCQ was also closely tied to excellent post-discharge health status. This suggests that patients who experienced rapid, complete response to in-hospital therapy predicts favourable outcomes after discharge, although it is also possible that these patients were less sick at the time of admission. Younger age and fewer comorbid conditions also appeared associated with a greater capacity to recover, particularly among those with HFpEF. The availability of multiple effective therapies may have contributed to better post-discharge health status for patients with HFrEF compared to those with HFpEF, for whom there were no effective therapies until recently and who were also older with more complex comorbidities (20, 21).

Exploration of associations with race and country were limited by differences in population demographics and healthcare systems across the enrolling countries, and it is notable that associations with race and country were not detected in post-hoc subgroup analysis of participants with HFrEF. In our study, 99% (685/695) of Black patients were enrolled in the USA, where health insurance is employment-based, and race is closely tied to social determinants of health. Health insurance was not included as a covariate in our multivariable models because the only included country without a universal healthcare system was the USA. Previous studies in the USA have found mixed results regarding the association of race with worse HF outcomes (22-25). An analysis conducted in the Veterans Health Administration, which resembles universal healthcare, suggests differences in health outcomes between races may not be evident when healthcare access is equal (26).

Women in this study were, on average, older and more often had HFpEF, making it difficult to disentangle age and underlying disease from potential associations with sex and health status. The odds of being alive and well were 1.22-times better for men compared to women, although confidence intervals did not reach the threshold for statistical significance.

Our data representing a broad international cohort provides new information regarding the natural history of health status more than six months after AHF hospitalization across multiple global regions and healthcare systems. Previous work generally focused on patients with stable HF, short-term trajectory of health status, or secondary analyses of clinical trials among carefully selected patients who may not represent the broader population of HF patients and HF care. Previous studies were secondary analyses of interventional or telemedicine trials and generally revealed modest but clinically important improvement in heart failure-specific quality of life, which was not always accompanied by reduction in AHF hospitalisation or mortality (25, 27-33).

Clinical Implications

There is on-going discussion regarding how best to use quality of life as an outcome measure in chronic and acute HF (34). Recent initiatives have proposed health status as a measure of the quality of care for outpatients with heart failure (5). The International Consortium for Health Outcomes Measurement has endorsed the KCCQ as part of its measurement set for outpatient quality assessment. In the United States, use of 30-day mortality and readmission as a surrogate measure of the quality of care for patients hospitalized with AHF (and for which poor performance leads to substantial financial penalties) has been under great scrutiny. Being 'alive and well' may be a more

meaningful outcome for patients and therefore a better measure of the effectiveness of care. As the first report of such an outcome, we believe that this lays the foundation for considering new opportunities to measure the outcomes of patients with AHF and can lay the foundation for both clinical practice (developing population health strategies to identify and treat patients not meeting this measure) and for assessment of effectiveness of care.

Pronounced improvements in KCCQ following hospitalisation for AHF may be expected in a substantial proportion of patients who receive guideline-directed medical therapies. Thus, trials using KCCQ improvement post-hospitalisation as an outcome should be adequately powered to demonstrate incremental benefit of new therapies in this setting. Understanding the trajectory of health status recovery may assist in its adoption for AHF and help target treatments and systems of care to those most in need (27, 35).

Limitations

Our findings should be interpreted in the context of several potential limitations. First, because follow-up was not complete, we cannot rule out the possibility that patients with lower post-discharge health status were less likely to complete a KCCQ, although sensitivity analyses suggest that this was not the case. Secondly, it was not feasible to enrol a random sample of patients hospitalized with AHF, thus our findings may not be generalizable to all AHF patients. Third, only patients who provided written informed consent were enrolled, except in rare cases where a guardian was available and willing to do so on their behalf. This effectively excluded patients who were critically ill and accounts for the low mortality during the index hospitalisation. Fourth, we were not able to examine potential effect modification by unmeasured factors such as medication non-

adherence, or recurrent hospitalisation. Participants were enrolled between 2014 and 2016, before ivabradine and ARNI were widely available. For patients lacking health insurance, these medications may have been unaffordable. This may account for the low use of these agents. While the use of ivabradine and ARNi may improve quality of life in chronic HFrEF (27, 36), analyses of randomized trials and current registries of patients taking these and other modern heart failure medications are ongoing to understand their potential impact on health status after hospitalization for AHF. Fifth, criteria for AHF diagnosis reflected local practice, and only the results of routine investigations were recorded in REPORT-HF, which may not have included tests of renal function in all countries (8). Also, in common with most registries and trials, the results of tests that were done were not always recorded. Finally, fewer than 25% of our patients were aged >80 years and so our findings may not generalize as well to such patients.

Conclusions

In this international global registry across several world regions, health status recovery after AHF hospitalisation was highly variable. Those with the best health status at 6 months were younger, had new-onset HFrEF and a higher baseline KCCQ. Nearly one-third of survivors were "alive and well" several months post-discharge. Investigating reasons for both failure and success might identify new therapeutic targets to improve outcomes. Efforts to improve survival for AHF should not neglect the importance of surviving 'well'.

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Dr. McNaughton received support from the Heart Failure Society of America, the Sunnybrook Research Institute, University of Toronto, and the Practice Plan of the Department of Emergency Services at Sunnybrook Health Sciences Centre.

Conflicts of interest:

Dr. Spertus discloses consulting fees from Novartis and intellectual property ownership of the KCCQ. Unrelated to this project, he discloses serving as a consultant on patient-reported outcome to Bayer, Amgen, Myokardia, Merck and Jannsen; owning the copyright to the SAQ and KCCQ, serving on a Scientific Advisory Board for United Healthcare and on the Board of Directors of Blue Cross Blue Shield of Kansas City. He has an equity ownership in Health Outcomes Sciences.

Dr. Filippatos reported receiving research grants from the European Union, committee fees from Novartis related to REPORT-HF, and serving as a committee member in trials and/or registries sponsored by Servier, Boehringer Ingelheim, Medtronic, and Vifor.

Dr. Angermann reported receiving grants and personal fees from Novartis related to REPORT-HF; serving on steering committees in trials and/or registries sponsored by Abbott, Boehringer Ingelheim, Novartis, and Vifor outside of REPORT-HF; receiving grants and personal fees from Abbott, Boehringer Ingelheim, Novartis, and Vifor; nonfinancial support from the University Hospital Würzburg and the Comprehensive Heart Failure Center Würzburg; and grant support from the German Ministry for Education and Research.

Dr. Cleland reports receiving personal fees from Johnson & Johnson during the conduct of the study; grants and personal fees from Amgen, Bayer, Bristol Myers Squibb, Philips, Stealth Biopharmaceuticals, and Torrent Pharmaceuticals; personal fees from AstraZeneca, GSK, Myokardia, Sanofi, and Servier; grants, personal fees, and nonfinancial support from Medtronic, Novartis, and Vifor; and grants and nonfinancial support from Pharmacosmos and PharmaNord.

Dr. Schweizer is employed by Novartis Pharma AG and owns Novartis shares.

Dr. Ghadanfar is a former employee of Novartis Pharma AG.

Dr. Collins reports receiving research support from the National Institutes of Health, Association for Healthcare Research and Quality, American Heart Association, and Patient-Centered Outcomes Research Institute, and serving as a paid consultant for Novartis, Ortho Clinical, Boehringer Ingelheim and Vixiar.

Dr. Dahlstrom reported serving in steering committees in trials/registries sponsored by Novartis and Amgen outside the REPORT-HF and receiving grants and personal fees from AstraZeneca, Pfizer, Novartis, Amgen, Vifor Pharma, Boehringer Ingelheim, Boston Scientific and Roche Diagnostics outside the REPORT-HF.

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Tables and supplemental tables

Table 1: Baseline characteristics by 6-month health status (KCCQ-OSS). KCCQ-OSS categorised into 25-point bands of Overall Summary Score distribution at 6m. Data shown as mean (standard deviation), median (Q1, Q3), or N (%) and rounded to whole numbers. Number of missing values shown in italics. p-values from ANOVA, Kruskal-Wallis Tests, or Fisher's Exact Test as appropriate.

Table 2: KCCQ domains at baseline, 6 months, and 12 months among those with baseline KCCQ-OSS (N=2715).

Table 3: Univariate, baseline-adjusted, and multivariable logistic regression models for being "alive and well" at 6 months, defined as alive with KCCQ-OSS >75.

Table 4: Univariate, baseline-adjusted, and multivariable linear regression models for KCCQ-OSS at 6 months (using 12m value if 6m value not available).

Supplemental Tables:

Table S1: Baseline characteristics in relation to status at 6 months. Subset used: those with KCCQ-OSS recorded at baseline. KCCQ categorised into 25-point bands of Overall Summary Score distribution at 6m. Data shown as Mean (SD), or N (%). Number of missing values shown in italics. p-values from ANOVA or Fisher's Exact Test.

Table S2: Study outcomes at 6 months in relation to baseline characteristics among those with baseline KCCQ-OSS.

Table S3: Univariate, baseline-adjusted, and multivariable logistic regression models for being "alive and well" (alive with KCCQ-OSS>75) at 6 months. Missing baseline data imputed using predictive mean matching within 'mice' package. Effect estimates reported as odds ratios for stated increase in covariate or difference between subgroups.

Table S4: Univariate, baseline-adjusted, and multivariable linear regression models for KCCQ-OSS at 6 months (using 12m value if 6m value not available). Missing baseline data imputed using predictive mean matching within 'mice' package. Effect estimates reported as mean difference for stated increase in covariate or difference between subgroups.

Table S5: Univariate, baseline-adjusted, and multivariable linear regression models for KCCQ OSS at 6 months (using 12m value if 6m value not available). Models weighted by the predicted probability of having KCCQ OSS data available at follow-up, derived from a non-parsimonious model for being followed up (C-statistic: 0.821). Effect estimates reported as mean difference for stated increase in covariate or difference between subgroups.

Figure legends

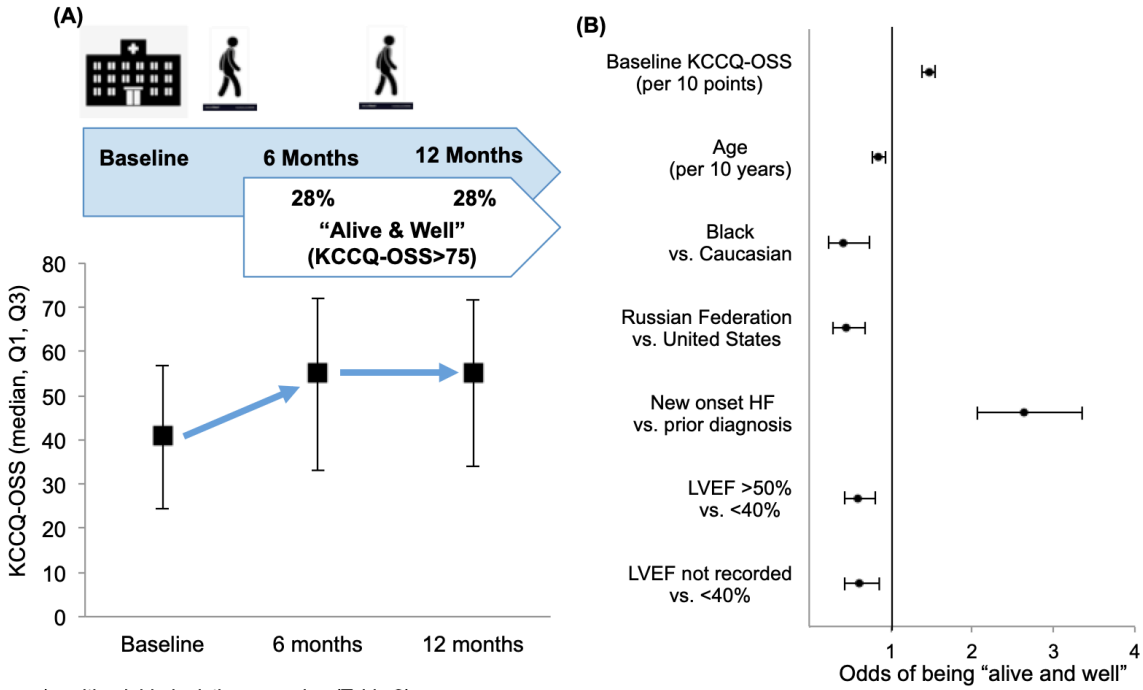
Graphical Abstract: (A) KCCQ-OSS at baseline, 6 months, and 12 months, and (B) forest plot of characteristics associated with being "alive and well" at follow-up

Figure 1: Study flow diagram

Figure 2: Health status at 6 and 12 months in relation to baseline KCCQ-OSS

Graphical Abstract:

Graphical Abstract: (A) KCCQ-OSS at baseline, 6 months, and 12 months, and (B) forest plot of characteristics associated with odds of being "alive and well" at follow-up*



* multivariable logistic regression (Table 3)
Abbreviations: KCCQ-OSS, Kansas City Cardiomyopathy Questionnaire Overall Summary Score; HF, heart failure; LVEF, left ventricular ejection fraction

Figure 1:

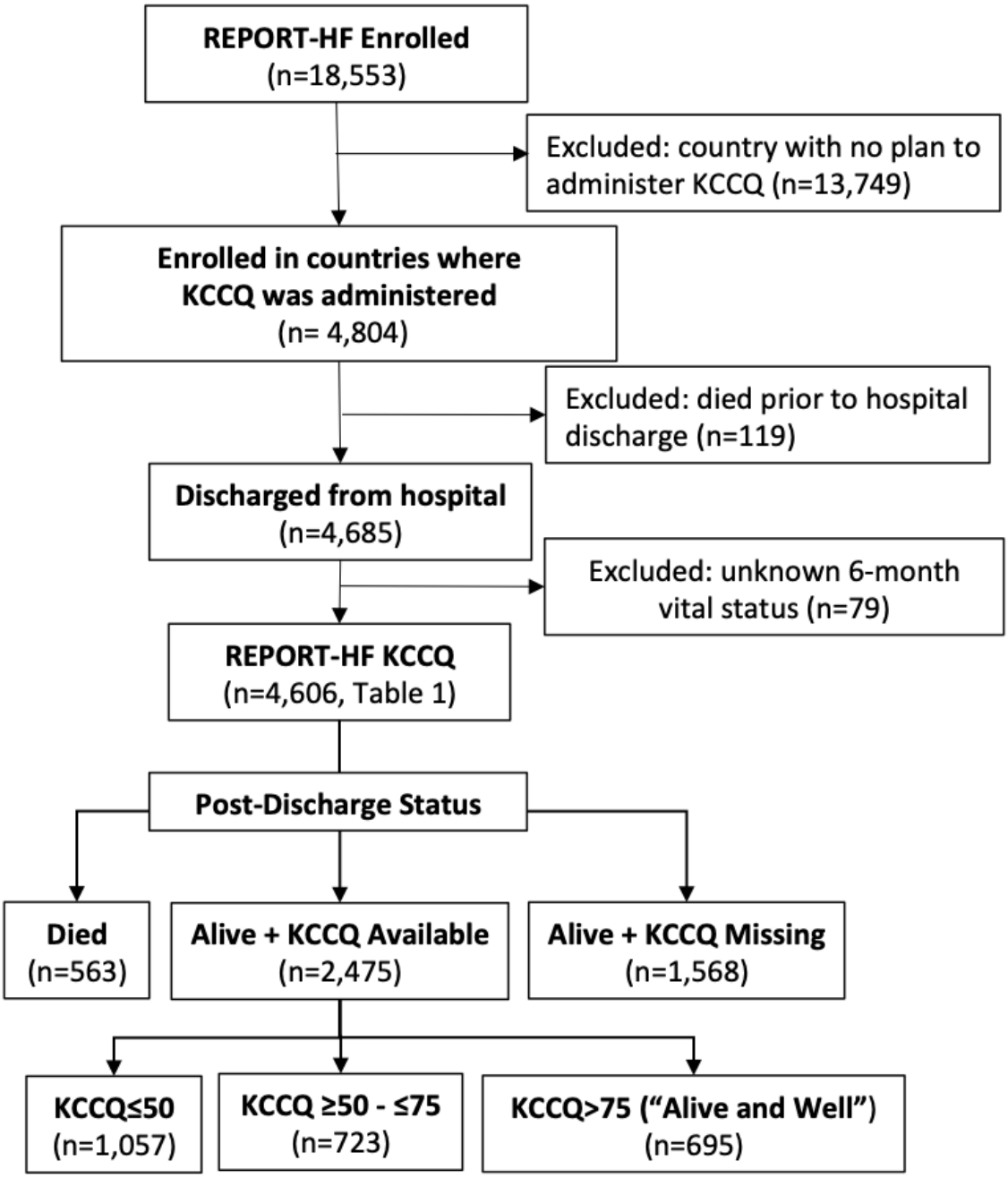


Figure 2: Health status at 6 and 12 months in relation to baseline KCCQ-OSS

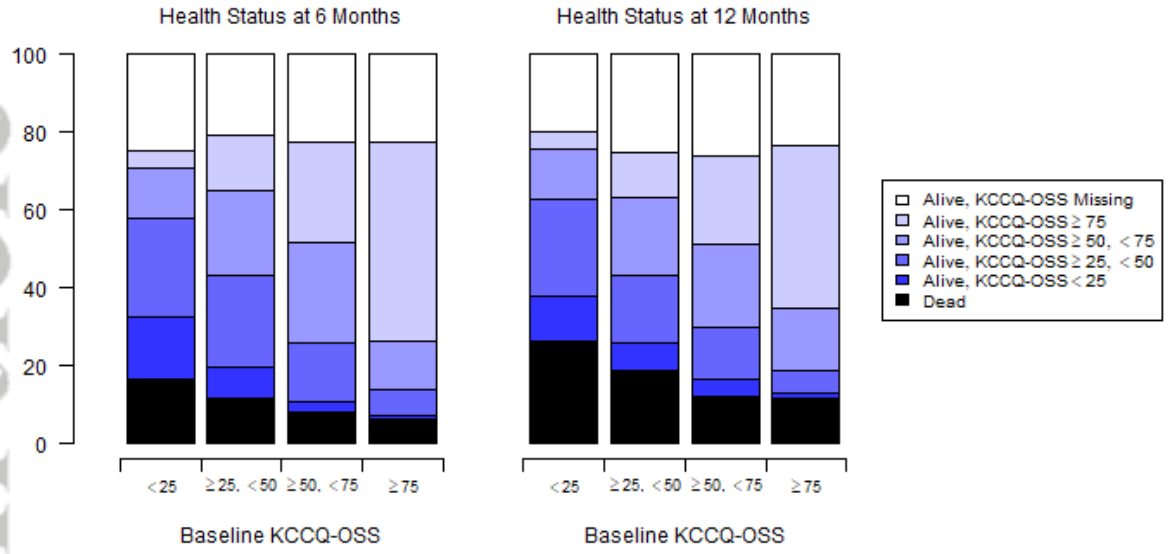


Table 1: Baseline characteristics by 6-month health status (KCCQ-OSS). KCCQ categorised into 25-point bands of Overall Summary Score distribution at 6m. Data shown as mean (standard deviation), median (Q1, Q3), or N (%) and rounded to whole numbers. Number of missing values shown in italics. p-values from ANOVA, Kruskal-Wallis Tests or Fisher's Exact Tests as appropriate.

		All	Dead	Alive, KCCQ ≤25	Alive, KCCQ >25, ≤50	Alive, KCCQ >50, ≤75	Alive, KCCQ >75	Alive, KCCQ Missing	p
N		4606	563	299	758	723	695	1568	
Baseline KCCQ OSS, mean (sd) *N Missing*		42 (22) *1891*	35 (21) *256*	28 (18) *58*	36 (19) *139*	45 (19) *128*	57 (21) *162*	43 (21) *1148*	p<0.0001
Baseline KCCQ OSS, median (Q1, Q3) *N Missing*		41 (25, 58) *1891*	33 (20, 48) *256*	25 (15, 39) *58*	36 (20, 48) *139*	47 (31, 59) *128*	56 (41, 73) *162*	42 (26, 59) *1148*	p<0.0001
Age (years)		68 (13)	72 (13)	70 (12)	69 (13)	67 (12)	66 (13)	67 (14)	p<0.0001
Female		1859 (40.4%)	225 (40.0%)	139 (46.5%)	333 (43.9%)	293 (40.5%)	197 (28.3%)	672 (42.9%)	p<0.0001
Race	Caucasian Black Asian Other	3770 (81.8%) 695 (15.1%) 40 (0.9%) 101 (2.2%)	452 (80.3%) 91 (16.2%) 5 (0.9%) 15 (2.7%)	261 (87.3%) 27 (9.0%) 4 (1.3%) 7 (2.3%)	676 (89.2%) 63 (8.3%) 7 (0.9%) 12 (1.6%)	664 (91.8%) 44 (6.1%) 3 (0.4%) 12 (1.7%)	617 (88.8%) 51 (7.3%) 9 (1.3%) 18 (2.6%)	1100 (70.2%) 419 (26.7%) 12 (0.8%) 37 (2.4%)	p<0.0001
Country	USA Russian Federation Germany Spain Great Britain	1292 (28.1%) 1201 (26.1%) 982 (21.3%) 567 (12.3%) 564 (12.2%)	188 (33.4%) 111 (19.7%) 120 (21.3%) 52 (9.2%) 92 (16.3%)	58 (19.4%) 102 (34.1%) 62 (20.7%) 31 (10.4%) 46 (15.4%)	126 (16.6%) 384 (50.7%) 113 (14.9%) 50 (6.6%) 85 (11.2%)	112 (15.5%) 341 (47.2%) 125 (17.3%) 59 (8.2%) 86 (11.9%)	141 (20.3%) 189 (27.2%) 183 (26.3%) 105 (15.1%) 77 (11.1%)	667 (42.5%) 74 (4.7%) 379 (24.2%) 270 (17.2%) 178 (11.4%)	p<0.0001
New Onset HF		1385 (30.1%)	106 (18.8%)	56 (18.7%)	158 (20.8%)	244 (33.7%)	342 (49.2%)	479 (30.5%)	p<0.0001
LVEF	<40% 40-50% >50% Not Recorded	1565 (34.0%) 711 (15.4%) 1219 (26.5%) 1111 (24.1%)	194 (34.5%) 80 (14.2%) 115 (20.4%) 174 (30.9%)	77 (25.8%) 50 (16.7%) 84 (28.1%) 88 (29.4%)	223 (29.4%) 129 (17.0%) 247 (32.6%) 159 (21.0%)	225 (31.1%) 112 (15.5%) 237 (32.8%) 149 (20.6%)	302 (43.5%) 114 (16.4%) 145 (20.9%) 134 (19.3%)	544 (34.7%) 226 (14.4%) 391 (24.9%) 407 (26.0%)	p<0.0001
Hypertension *N Missing*		3476 (75.6%) *6*	409 (72.8%) *1*	233 (78.2%) *1*	589 (77.9%) *2*	550 (76.2%) *1*	471 (67.8%) *0*	1224 (78.1%) *1*	p<0.0001
Atrial Fibrillation *N Missing*		2017 (43.8%) *6*	292 (52.0%) *1*	152 (51.0%) *1*	379 (50.1%) *2*	305 (42.2%) *1*	259 (37.3%) *0*	630 (40.2%) *1*	p<0.0001
Diabetes	Non-Diabetic Diabetic *N Missing*	2796 (60.7%) 1808 (39.3%) *2*	339 (60.2%) 224 (39.8%) *0*	158 (52.8%) 141 (47.2%) *0*	484 (63.9%) 274 (36.1%) *0*	462 (64.0%) 260 (36.0%) *1*	481 (69.3%) 213 (30.7%) *1*	872 (55.6%) 696 (44.4%) *0*	p<0.0001
CKD *N Missing*		1357 (29.5%) *2*	210 (37.3%) *0*	97 (32.4%) *0*	275 (36.3%) *0*	175 (24.2%) *1*	148 (21.3%) *1*	452 (28.8%) *0*	p<0.0001
CAD *N Missing*		1933 (42.0%) *6*	256 (45.6%) *1*	157 (52.7%) *1*	407 (53.8%) *2*	344 (47.6%) *1*	231 (33.2%) *0*	538 (34.3%) *1*	p<0.0001

Table 1: Baseline characteristics by 6-month health status (KCCQ-OSS). KCCQ categorised into 25-point bands of Overall Summary Score distribution at 6m. Data shown as mean (standard deviation), median (Q1, Q3), or N (%) and rounded to whole numbers. Number of missing values shown in italics. p-values from ANOVA, Kruskal-Wallis Tests or Fisher's Exact Tests as appropriate.

		All	Dead	Alive, KCCQ ≤25	Alive, KCCQ >25, ≤50	Alive, KCCQ >50, ≤75	Alive, KCCQ >75	Alive, KCCQ Missing	p
HF Aetiology	Ischaemic	1503 (32.6%)	198 (35.2%)	116 (38.8%)	310 (40.9%)	281 (38.9%)	201 (28.9%)	397 (25.3%)	p<0.0001
	Hypertensive	751 (16.3%)	73 (13.0%)	47 (15.7%)	132 (17.4%)	110 (15.2%)	90 (12.9%)	299 (19.1%)	
	Cardiomyopathy	720 (15.6%)	88 (15.6%)	33 (11.0%)	93 (12.3%)	90 (12.4%)	136 (19.6%)	280 (17.9%)	
	Valvular	458 (9.9%)	58 (10.3%)	29 (9.7%)	61 (8.0%)	71 (9.8%)	91 (13.1%)	148 (9.4%)	
	Other	376 (8.2%)	51 (9.1%)	23 (7.7%)	53 (7.0%)	42 (5.8%)	56 (8.1%)	151 (9.6%)	
	Unknown	798 (17.3%)	95 (16.9%)	51 (17.1%)	109 (14.4%)	129 (17.8%)	121 (17.4%)	293 (18.7%)	
Smoking History	Never	2057 (44.7%)	237 (42.1%)	155 (51.8%)	405 (53.4%)	361 (49.9%)	283 (40.7%)	616 (39.3%)	p<0.0001
	Former	713 (15.5%)	65 (11.5%)	28 (9.4%)	98 (12.9%)	122 (16.9%)	123 (17.7%)	277 (17.7%)	
	Current	1620 (35.2%)	232 (41.2%)	100 (33.4%)	230 (30.3%)	224 (31.0%)	257 (37.0%)	577 (36.8%)	
	Unknown	216 (4.7%)	29 (5.2%)	16 (5.4%)	25 (3.3%)	16 (2.2%)	32 (4.6%)	98 (6.2%)	
Medications in HFrEF (LVEF <40%*)									
ACEi or ARB		1182 (75.6%)	109 (56.5%)	61 (79.2%)	191 (85.7%)	180 (80.0%)	228 (75.5%)	413 (75.9%)	p<0.0001
N Missing		*1*	*1*	*0*	*0*	*0*	*0*	*0*	
β-Blockers		1357 (86.8%)	134 (69.4%)	70 (90.9%)	202 (90.6%)	206 (91.6%)	264 (87.4%)	481 (88.4%)	p<0.0001
N Missing		*1*	*1*	*0*	*0*	*0*	*0*	*0*	
MRAs		1023 (65.4%)	107 (55.4%)	52 (67.5%)	158 (70.9%)	174 (77.3%)	206 (68.2%)	326 (59.9%)	p<0.0001
N Missing		*1*	*1*	*0*	*0*	*0*	*0*	*0*	
Loop Diuretics		1406 (89.9%)	174 (90.2%)	72 (93.5%)	200 (89.7%)	209 (92.9%)	263 (87.1%)	488 (89.7%)	p=0.3307
N Missing		*1*	*1*	*0*	*0*	*0*	*0*	*0*	
Medications in non-HFrEF (LVEF ≥40% or Unknown)									
ACEi or ARB		2032 (66.9%)	174 (47.3%)	146 (65.8%)	389 (72.8%)	375 (75.6%)	297 (75.6%)	651 (63.6%)	p<0.0001
N Missing		*4*	*1*	*0*	*1*	*2*	*0*	*0*	
β-Blockers		2374 (78.2%)	271 (73.6%)	174 (78.4%)	433 (81.1%)	410 (82.7%)	315 (80.2%)	771 (75.3%)	p=0.0023
N Missing		*4*	*1*	*0*	*1*	*2*	*0*	*0*	
MRAs		1338 (44.1%)	141 (38.3%)	120 (54.1%)	304 (56.9%)	249 (50.2%)	197 (50.1%)	327 (31.9%)	p<0.0001
N Missing		*4*	*1*	*0*	*1*	*2*	*0*	*0*	
Loop Diuretics		2613 (86.0%)	337 (91.6%)	204 (91.9%)	454 (85.0%)	408 (82.3%)	329 (83.7%)	881 (86.0%)	p=0.0002
N Missing		*4*	*1*	*0*	*1*	*2*	*0*	*0*	
Clinical Characteristics, median (Q1, Q3)									
SBP (mmHg)		135 (117, 155)	125 (110, 141)	135 (120, 154)	135 (120, 152)	136 (119, 156)	134 (116, 154)	139 (120, 158)	p<0.0001
N Missing		*511*	*59*	*57*	*95*	*120*	*105*	*75*	
DBP (mmHg)		80 (69, 90)	73 (64, 82)	80 (65, 90)	80 (70, 90)	80 (70, 90)	80 (70, 90)	80 (70, 92)	p<0.0001
N Missing		*513*	*59*	*57*	*95*	*120*	*105*	*77*	

Table 1: Baseline characteristics by 6-month health status (KCCQ-OSS). KCCQ categorised into 25-point bands of Overall Summary Score distribution at 6m. Data shown as mean (standard deviation), median (Q1, Q3), or N (%) and rounded to whole numbers. Number of missing values shown in italics. p-values from ANOVA, Kruskal-Wallis Tests or Fisher's Exact Tests as appropriate.

	All	Dead	Alive, KCCQ ≤25	Alive, KCCQ >25, ≤50	Alive, KCCQ >50, ≤75	Alive, KCCQ >75	Alive, KCCQ Missing	p
Heart Rate (bpm) *N Missing*	85 (72, 101) *532*	85 (72, 100) *62*	80 (70, 95) *60*	85 (72, 100) *94*	84 (72, 100) *127*	85 (70, 106) *107*	87 (74, 103) *82*	p=0.0109
eGFR (ml/min/1.73m^2) *N Missing*	61 (42, 83) *1995*	47 (32, 67) *230*	57 (37, 77) *179*	57 (41, 80) *508*	69 (47, 92) *463*	66 (49, 86) *323*	63 (44, 85) *292*	p<0.0001

* 12-month KCCQ was used for 275 participants for whom 6-month KCCQ was not available
† Medications at hospital discharge. Angiotensin receptor-neprilysin inhibitor (n=90) included in angiotensin receptor II blocker category

Table 2: KCCQ Domains at baseline, 6 months, and 12 months. For those with KCCQ OSS recorded at baseline.

KCCQ domain, Median (Q1, Q3) *N missing*	Baseline (n=2715)	6 Months (N=1792)	12 Months (N=1567)
Physical Limitation	41.7 (20.8, 66.7) *115*	50.0 (33.3, 79.2) *988*	50.0 (29.2, 75.0) *1199*
Symptom Stability	100.0 (75.0, 100.0) *37*	50.0 (50.0, 75.0) *944*	50.0 (50.0, 75.0) *1160*
Symptom Frequency	41.7 (20.8, 62.5) *18*	62.5 (39.6, 83.3) *928*	62.5 (39.6, 83.3) *1149*
Symptom Burden	50.0 (25.0, 66.7) *10*	66.7 (50.0, 83.3) *926*	66.7 (50.0, 83.3) *1149*
Total Symptom Score	44.8 (25.0, 64.6) *10*	64.6 (43.8, 83.3) *926*	62.5 (43.8, 83.3) *1149*
Self Efficacy	75.0 (50.0, 87.5) *22*	75.0 (50.0, 87.5) *937*	75.0 (50.0, 87.5) *1158*
Quality of Life	41.7 (25.0, 58.3) *17*	58.3 (33.3, 75.0) *933*	58.3 (41.7, 75.0) *1155*
Social Limitation	33.3 (12.5, 58.3) *246*	50.0 (31.2, 81.2) *1054*	50.0 (33.3, 81.2) *1231*
Overall Summary Score	41.1 (25.3, 57.8) *0*	55.2 (38.5, 77.3) *923*	55.2 (38.7, 76.4) *1148*
Clinical Summary Score	43.2 (26.0, 61.4) *1*	57.8 (38.9, 79.2) *923*	57.3 (38.0, 78.1) *1148*

Table 3: Multivariable logistic regression model for being 'alive and well' at 6 months, defined as alive with KCCQ-OSS >75, and multivariable linear regression model for KCCQ-OSS at 6 months (using 12 month value if 6 month value not available).

Predictor		'Alive and well' (N=2290[(a)])		Post-discharge KCCQ-OSS (N=1984[(b)])	
		OR (95% CI)	p	β (95% CI)	p
Baseline KCCQ OSS	per 10 points	1.47 (1.39, 1.55)	p<0.0001	4.4 (4.0, 4.9)	p<0.0001
Age	per 10 years	0.85 (0.77, 0.94)	p=0.0017	-0.9 (-1.8, 0.0)	p=0.0473
Sex	Male vs. Female	1.22 (0.94, 1.60)	p=0.1394	1.2 (-1.1, 3.4)	p=0.3154
Race	Black vs. Caucasian Asian vs. Caucasian Other vs. Caucasian	0.41 (0.23, 0.74) 1.91 (0.66, 5.49) 0.58 (0.27, 1.25)	p=0.0065	-6.6 (-11.9, -1.4) 0.8 (-9.5, 11.2) -1.5 (-8.6, 5.6)	p=0.1005
Country	Russian Federation vs. USA Germany vs. USA Spain vs. USA Great Britain vs. USA	0.46 (0.30, 0.69) 0.95 (0.62, 1.44) 1.01 (0.63, 1.62) 0.64 (0.39, 1.06)	p<0.0001	-3.1 (-7.0, 0.7) -1.3 (-5.4, 2.8) -1.7 (-6.2, 2.8) -3.8 (-8.4, 0.9)	p=0.3439
HF Status	New Onset HF vs. Decompensated HF	2.63 (2.07, 3.35)	p<0.0001	8.3 (6.1, 10.4)	p<0.0001
LVEF	40-50% vs. <40% >50% vs. <40% Not Recorded vs. <40%	0.88 (0.63, 1.23) 0.60 (0.44, 0.82) 0.62 (0.44, 0.86)	p=0.0021	-2.2 (-5.1, 0.8) -2.8 (-5.5, -0.1) -4.9 (-7.9, -2.0)	p=0.0094
Hypertension	HTN vs. No HTN	1.03 (0.78, 1.35)	p=0.8475	0.1 (-2.4, 2.6)	p=0.9619
AF	AF vs. No AF	0.98 (0.77, 1.24)	p=0.8634	-2.3 (-4.3, -0.3)	p=0.0230
Diabetes	Diabetic vs. Non-Diabetic	0.83 (0.64, 1.06)	p=0.1293	-3.8 (-5.9, -1.8)	p=0.0003
CKD	CKD vs. No CKD	0.82 (0.62, 1.09)	p=0.1688	0.0 (-2.3, 2.2)	p=0.9746
CAD	CAD vs. No CAD	0.84 (0.64, 1.10)	p=0.2051	-2.6 (-4.9, -0.2)	p=0.0303
HF Aetiology	Hypertensive vs. Ischaemic Cardiomyopathy vs. Ischaemic Valvular vs. Ischaemic Other vs. Ischaemic Unknown vs. Ischaemic	1.18 (0.79, 1.75) 1.32 (0.90, 1.94) 1.49 (0.99, 2.25) 1.22 (0.77, 1.94) 1.46 (1.03, 2.07)	p=0.3054	1.4 (-1.7, 4.5) 3.3 (-0.2, 6.8) 4.2 (0.5, 7.9) 0.8 (-3.3, 4.9) 2.4 (-0.6, 5.5)	p=0.2107
Smoking	Former vs. Never Current vs. Never Unknown vs. Never	0.92 (0.66, 1.29) 1.03 (0.78, 1.35) 0.90 (0.45, 1.77)	p=0.9170	1.5 (-1.5, 4.4) 1.3 (-1.1, 3.8) -3.9 (-10.0, 2.3)	p=0.2854

[(a)]: Of 2295 subjects for whom 'alive and well' status could be determined, 5 subjects had missing data for one or more predictors.
[(b)]: Of 1988 subjects for whom post-discharge KCCQ-OSS was available, 4 subjects had missing data for one or more predictors.

Table S1: Baseline characteristics by 6-month health status (KCCQ-OSS). Subset used: those with KCCQ-OSS recorded at baseline. KCCQ categorised into 25-point bands of Overall Summary Score distribution at 6m. Data shown as mean (standard deviation), median (Q1, Q3), or N (%) and rounded to whole numbers. Number of missing values shown in italics. p-values from ANOVA, Kruskal-Wallis Tests or Fisher's Exact Tests as appropriate.

		All	Dead	Alive, KCCQ ≤25	Alive, KCCQ >25, ≤50	Alive, KCCQ >50, ≤75	Alive, KCCQ >75	Alive, KCCQ Missing	p
N		2715	307	241	619	595	533	420	
Baseline KCCQ OSS, mean (sd)		42 (22)	35 (21)	28 (18)	36 (19)	45 (19)	57 (21)	43 (21)	p<0.0001
Baseline KCCQ OSS, median (Q1, Q3)		41 (25, 58)	33 (20, 48)	25 (15, 39)	36 (20, 48)	47 (31, 59)	56 (41, 73)	42 (26, 59)	p<0.0001
Age (years)		68 (13)	72 (12)	70 (12)	69 (13)	67 (12)	65 (14)	64 (14)	p<0.0001
Female		1041 (38.3%)	114 (37.1%)	114 (47.3%)	268 (43.3%)	237 (39.8%)	148 (27.8%)	160 (38.1%)	p<0.0001
Race	Caucasian	2387 (87.9%)	261 (85.0%)	219 (90.9%)	564 (91.1%)	554 (93.1%)	491 (92.1%)	298 (71.0%)	p<0.0001
	Black	247 (9.1%)	32 (10.4%)	14 (5.8%)	40 (6.5%)	28 (4.7%)	24 (4.5%)	109 (26.0%)	
	Asian	25 (0.9%)	4 (1.3%)	2 (0.8%)	7 (1.1%)	2 (0.3%)	6 (1.1%)	4 (1.0%)	
	Other	56 (2.1%)	10 (3.3%)	6 (2.5%)	8 (1.3%)	11 (1.8%)	12 (2.3%)	9 (2.1%)	
Country	USA	554 (20.4%)	88 (28.7%)	36 (14.9%)	84 (13.6%)	71 (11.9%)	83 (15.6%)	192 (45.7%)	p<0.0001
	Russian Federation	1126 (41.5%)	104 (33.9%)	99 (41.1%)	354 (57.2%)	331 (55.6%)	185 (34.7%)	53 (12.6%)	
	Germany	463 (17.1%)	51 (16.6%)	43 (17.8%)	86 (13.9%)	86 (14.5%)	128 (24.0%)	69 (16.4%)	
	Spain	290 (10.7%)	25 (8.1%)	30 (12.4%)	44 (7.1%)	51 (8.6%)	84 (15.8%)	56 (13.3%)	
	Great Britain	282 (10.4%)	39 (12.7%)	33 (13.7%)	51 (8.2%)	56 (9.4%)	53 (9.9%)	50 (11.9%)	
New Onset HF		837 (30.8%)	56 (18.2%)	48 (19.9%)	135 (21.8%)	205 (34.5%)	274 (51.4%)	119 (28.3%)	p<0.0001
LVEF	<40%	868 (32.0%)	96 (31.3%)	59 (24.5%)	178 (28.8%)	181 (30.4%)	226 (42.4%)	128 (30.5%)	p<0.0001
	40-50%	448 (16.5%)	53 (17.3%)	45 (18.7%)	106 (17.1%)	98 (16.5%)	92 (17.3%)	54 (12.9%)	
	>50%	761 (28.0%)	64 (20.8%)	73 (30.3%)	215 (34.7%)	208 (35.0%)	118 (22.1%)	83 (19.8%)	
	Not Recorded	638 (23.5%)	94 (30.6%)	64 (26.6%)	120 (19.4%)	108 (18.2%)	97 (18.2%)	155 (36.9%)	
Hypertension		2042 (75.3%)	219 (71.6%)	186 (77.2%)	492 (79.7%)	457 (76.9%)	357 (67.0%)	331 (78.8%)	p<0.0001
N Missing		*4*	*1*	*0*	*2*	*1*	*0*	*0*	
Atrial Fibrillation		1204 (44.4%)	149 (48.7%)	127 (52.7%)	310 (50.2%)	254 (42.8%)	204 (38.3%)	160 (38.1%)	p<0.0001
Missing		*4*	*1*	*0*	*2*	*1*	*0*	*0*	
Diabetes	Non-Diabetic	1702 (62.7%)	184 (59.9%)	123 (51.0%)	394 (63.7%)	393 (66.2%)	380 (71.3%)	228 (54.3%)	p<0.0001
	Diabetic	1012 (37.3%)	123 (40.1%)	118 (49.0%)	225 (36.3%)	201 (33.8%)	153 (28.7%)	192 (45.7%)	
	N Missing	*1*	*0*	*0*	*0*	*1*	*0*	*0*	
CKD		746 (27.5%)	100 (32.6%)	74 (30.7%)	221 (35.7%)	140 (23.6%)	102 (19.1%)	109 (26.0%)	p<0.0001
Missing		*1*	*0*	*0*	*0*	*1*	*0*	*0*	
CAD		1247 (46.0%)	149 (48.7%)	132 (54.8%)	339 (54.9%)	294 (49.5%)	180 (33.8%)	153 (36.4%)	p<0.0001
N Missing		*4*	*1*	*0*	*2*	*1*	*0*	*0*	

Table S1: Baseline characteristics by 6-month health status (KCCQ-OSS). Subset used: those with KCCQ-OSS recorded at baseline. KCCQ categorised into 25-point bands of Overall Summary Score distribution at 6m. Data shown as mean (standard deviation), median (Q1, Q3), or N (%) and rounded to whole numbers. Number of missing values shown in italics. p-values from ANOVA, Kruskal-Wallis Tests or Fisher's Exact Tests as appropriate.

		All	Dead	Alive, KCCQ ≤25	Alive, KCCQ >25, ≤50	Alive, KCCQ >50, ≤75	Alive, KCCQ >75	Alive, KCCQ Missing	p
HF Aetiology	Ischaemic	969 (35.7%)	118 (38.4%)	100 (41.5%)	254 (41.0%)	235 (39.5%)	156 (29.3%)	106 (25.2%)	p<0.0001
	Hypertensive	407 (15.0%)	34 (11.1%)	36 (14.9%)	105 (17.0%)	97 (16.3%)	61 (11.4%)	74 (17.6%)	
	Cardiomyopathy	400 (14.7%)	43 (14.0%)	23 (9.5%)	75 (12.1%)	73 (12.3%)	104 (19.5%)	82 (19.5%)	
	Valvular	258 (9.5%)	33 (10.7%)	23 (9.5%)	52 (8.4%)	56 (9.4%)	66 (12.4%)	28 (6.7%)	
	Other	203 (7.5%)	23 (7.5%)	19 (7.9%)	42 (6.8%)	37 (6.2%)	45 (8.4%)	37 (8.8%)	
	Unknown	478 (17.6%)	56 (18.2%)	40 (16.6%)	91 (14.7%)	97 (16.3%)	101 (18.9%)	93 (22.1%)	
Smoking History	Never	1318 (48.5%)	134 (43.6%)	139 (57.7%)	346 (55.9%)	298 (50.1%)	226 (42.4%)	175 (41.7%)	p<0.0001
	Former	429 (15.8%)	43 (14.0%)	22 (9.1%)	81 (13.1%)	109 (18.3%)	97 (18.2%)	77 (18.3%)	
	Current	886 (32.6%)	119 (38.8%)	68 (28.2%)	178 (28.8%)	178 (29.9%)	193 (36.2%)	150 (35.7%)	
	Unknown	82 (3.0%)	11 (3.6%)	12 (5.0%)	14 (2.3%)	10 (1.7%)	17 (3.2%)	18 (4.3%)	
Medications in HFrEF (LVEF <40%)									
ACEi or ARB		688 (79.3%)	61 (63.5%)	47 (79.7%)	154 (86.5%)	149 (82.3%)	176 (77.9%)	101 (78.9%)	p=0.0010
β-Blockers		766 (88.2%)	70 (72.9%)	53 (89.8%)	161 (90.4%)	168 (92.8%)	196 (86.7%)	118 (92.2%)	p=0.0001
MRAs		643 (74.1%)	67 (69.8%)	45 (76.3%)	134 (75.3%)	146 (80.7%)	162 (71.7%)	89 (69.5%)	p=0.1854
Loop Diuretics		783 (90.2%)	90 (93.8%)	56 (94.9%)	155 (87.1%)	167 (92.3%)	199 (88.1%)	116 (90.6%)	p=0.2587
Medications in non-HFrEF (LVEF ≥40% or Unknown)									
ACEi or ARB		1319 (71.5%)	109 (51.7%)	121 (66.5%)	331 (75.2%)	321 (77.9%)	235 (76.5%)	202 (69.2%)	p<0.0001
N Missing		*3*	*0*	*0*	*1*	*2*	*0*	*0*	
β-Blockers		1481 (80.3%)	162 (76.8%)	137 (75.3%)	357 (81.1%)	340 (82.5%)	248 (80.8%)	237 (81.2%)	p=0.2927
N Missing		*3*	*0*	*0*	*1*	*2*	*0*	*0*	
MRAs		959 (52.0%)	92 (43.6%)	103 (56.6%)	264 (60.0%)	226 (54.9%)	168 (54.7%)	106 (36.3%)	p<0.0001
N Missing		*3*	*0*	*0*	*1*	*2*	*0*	*0*	
Loop Diuretics		1571 (85.2%)	194 (91.9%)	166 (91.2%)	370 (84.1%)	333 (80.8%)	255 (83.1%)	253 (86.6%)	p=0.0005
N Missing		*3*	*0*	*0*	*1*	*2*	*0*	*0*	
Clinical Characteristics, median (Q1, Q3)									
SBP (mmHg)		134 (118, 155)	128 (110, 142)	133 (119, 150)	135 (120, 152)	136 (119, 155)	133 (115, 154)	140 (120, 161)	p<0.0001
N Missing		*400*	*43*	*52*	*85*	*104*	*90*	*26*	
DBP (mmHg)		80 (70, 90)	74 (64, 81)	80 (65, 90)	80 (70, 90)	80 (70, 90)	80 (70, 90)	80 (70, 93)	p<0.0001
N Missing		*400*	*43*	*52*	*85*	*104*	*90*	*26*	
Heart Rate (bpm)		85 (72, 100)	85 (72, 100)	80 (70, 95)	87 (72, 100)	84 (72, 100)	86 (70, 109)	86 (75, 103)	p=0.0424
N Missing		*406*	*43*	*55*	*84*	*107*	*91*	*26*	

Table S1: Baseline characteristics by 6-month health status (KCCQ-OSS). Subset used: those with KCCQ-OSS recorded at baseline. KCCQ categorised into 25-point bands of Overall Summary Score distribution at 6m. Data shown as mean (standard deviation), median (Q1, Q3), or N (%) and rounded to whole numbers. Number of missing values shown in italics. p-values from ANOVA, Kruskal-Wallis Tests or Fisher's Exact Tests as appropriate.

	All	Dead	Alive, KCCQ ≤25	Alive, KCCQ >25, ≤50	Alive, KCCQ >50, ≤75	Alive, KCCQ >75	Alive, KCCQ Missing	p
eGFR (ml/min/1.73m^2)	61 (42, 84)	47 (32, 68)	60 (42, 77)	56 (40, 79)	67 (46, 90)	68 (52, 87)	62 (43, 85)	p<0.0001
N Missing	*1582*	*166*	*156*	*437*	*416*	*283*	*124*	

* 12-month KCCQ was used for 196 participants for whom 6-month KCCQ was not available

Medications at hospital discharge. Angiotensin receptor-neprilysin inhibitor (n<60) included in angiotensin receptor II blocker category

Table S2: Study outcomes at 6 months in relation to baseline characteristics, among those with baseline KCCQ OSS.

		Alive & Well (KCCQ-OSS >75)		Alive & Well (KCCQ-OSS Q4)		KCCQ-OSS Score	
		Total	N (%)	Total	N (%)	Total	Mean (SD)
	All	2295	533 (23%)	2295	474 (21%)	1988	56 (25)
Baseline KCCQ-OSS	≤25	571	37 (6%)	571	33 (6%)	460	41 (23)
	>25, ≤50	917	168 (18%)	917	146 (16%)	792	54 (23)
	>50, ≤75	623	209 (34%)	623	185 (30%)	565	65 (22)
	>75	184	119 (65%)	184	110 (60%)	171	79 (20)
Age (years)	<60	552	172 (31%)	552	162 (29%)	510	62 (25)
	60-69	637	165 (26%)	637	141 (22%)	562	57 (25)
	70-79	673	112 (17%)	673	94 (14%)	569	53 (24)
	≥80	433	84 (19%)	433	77 (18%)	347	52 (26)
Sex	Female	881	148 (17%)	881	128 (15%)	767	52 (24)
	Male	1414	385 (27%)	1414	346 (24%)	1221	59 (25)
Race	Caucasian	2089	491 (24%)	2089	435 (21%)	1828	56 (25)
	Black	138	24 (17%)	138	22 (16%)	106	52 (25)
	Asian	21	6 (29%)	21	6 (29%)	17	55 (30)
	Other	47	12 (26%)	47	11 (23%)	37	61 (26)
Country	USA	362	83 (23%)	362	69 (19%)	274	56 (26)
	Russian Federation	1073	185 (17%)	1073	160 (15%)	969	54 (22)
	Germany	394	128 (32%)	394	119 (30%)	343	61 (27)
	Spain	234	84 (36%)	234	75 (32%)	209	61 (28)
	Great Britain	232	53 (23%)	232	51 (22%)	193	55 (28)
New Onset HF	Decompensated HF	1577	259 (16%)	1577	219 (14%)	1326	52 (24)
	New Onset HF	718	274 (38%)	718	255 (36%)	662	65 (25)
LVEF	<40%	740	226 (31%)	740	207 (28%)	644	61 (25)
	40-50%	394	92 (23%)	394	79 (20%)	341	56 (25)
	>50%	678	118 (17%)	678	103 (15%)	614	54 (23)
	Not Recorded	483	97 (20%)	483	85 (18%)	389	53 (26)
Hypertension	No HTN	580	176 (30%)	580	166 (29%)	493	61 (26)
	HTN	1711	357 (21%)	1711	308 (18%)	1492	55 (24)
Atrial Fibrillation	No AF	1247	329 (26%)	1247	300 (24%)	1090	59 (25)
	AF	1044	204 (20%)	1044	174 (17%)	895	53 (25)
Diabetes	Non-Diabetic	1474	380 (26%)	1474	340 (23%)	1290	59 (24)
	Diabetic	820	153 (19%)	820	134 (16%)	697	52 (25)
CKD	No CKD	1657	431 (26%)	1657	385 (23%)	1450	58 (25)
	CKD	637	102 (16%)	637	89 (14%)	537	51 (23)
CAD	No CAD	1197	353 (29%)	1197	324 (27%)	1040	60 (26)
	CAD	1094	180 (16%)	1094	150 (14%)	945	52 (23)

Table S2: Study outcomes at 6 months in relation to baseline characteristics, among those with baseline KCCQ OSS.

		Alive & Well (KCCQ-OSS >75)		Alive & Well (KCCQ-OSS Q4)		KCCQ-OSS Score	
		Total	N (%)	Total	N (%)	Total	Mean (SD)
HF Aetiology	Ischaemic	863	156 (18%)	863	138 (16%)	745	53 (24)
	Hypertensive	333	61 (18%)	333	54 (16%)	299	53 (23)
	Cardiomyopathy	318	104 (33%)	318	96 (30%)	275	62 (26)
	Valvular	230	66 (29%)	230	58 (25%)	197	60 (25)
	Other	166	45 (27%)	166	41 (25%)	143	58 (27)
	Unknown	385	101 (26%)	385	87 (23%)	329	57 (26)
Smoking History	Never	1143	226 (20%)	1143	202 (18%)	1009	54 (25)
	Former	352	97 (28%)	352	90 (26%)	309	61 (23)
	Current	736	193 (26%)	736	166 (23%)	617	58 (25)
	Unknown	64	17 (27%)	64	16 (25%)	53	55 (29)
ACEi or ARB	No	588	122 (21%)	588	107 (18%)	451	55 (26)
	Yes	1704	411 (24%)	1704	367 (22%)	1534	57 (25)
β-Blockers	No	400	89 (22%)	400	81 (20%)	325	55 (27)
	Yes	1892	444 (23%)	1892	393 (21%)	1660	56 (25)
MRAs	No	885	203 (23%)	885	182 (21%)	737	57 (25)
	Yes	1407	330 (23%)	1407	292 (21%)	1248	56 (25)
Loop Diuretics	No	307	79 (26%)	307	73 (24%)	284	59 (24)
	Yes	1985	454 (23%)	1985	401 (20%)	1701	56 (25)
Medications in HFrEF (LVEF <40%)							
ACEi or ARB	No	153	50 (33%)	153	45 (29%)	118	64 (26)
	Yes	587	176 (30%)	587	162 (28%)	526	60 (25)
β-Blockers	No	92	30 (33%)	92	28 (30%)	66	63 (27)
	Yes	648	196 (30%)	648	179 (28%)	578	60 (25)
MRAs	No	186	64 (34%)	186	58 (31%)	157	63 (26)
	Yes	554	162 (29%)	554	149 (27%)	487	60 (25)
Loop Diuretics	No	73	27 (37%)	73	26 (36%)	67	63 (26)
	Yes	667	199 (30%)	667	181 (27%)	577	61 (25)
Medications in non-HFrEF (LVEF ≥40% or Unknown)							
ACEi or ARB	No	435	72 (17%)	435	62 (14%)	333	51 (26)
	Yes	1117	235 (21%)	1117	205 (18%)	1008	55 (24)
β-Blockers	No	308	59 (19%)	308	53 (17%)	259	53 (26)
	Yes	1244	248 (20%)	1244	214 (17%)	1082	54 (24)
MRAs	No	699	139 (20%)	699	124 (18%)	580	55 (25)
	Yes	853	168 (20%)	853	143 (17%)	761	53 (24)

Table S2: Study outcomes at 6 months in relation to baseline characteristics, among those with baseline KCCQ OSS.

		Alive & Well (KCCQ-OSS >75)		Alive & Well (KCCQ-OSS Q4)		KCCQ-OSS Score	
		Total	N (%)	Total	N (%)	Total	Mean (SD)
Loop Diuretics	No	234	52 (22%)	234	47 (20%)	217	58 (23)
	Yes	1318	255 (19%)	1318	220 (17%)	1124	53 (25)
Clinical Characteristics							
SBP (mmHg)	<120	525	130 (25%)	525	116 (22%)	430	58 (25)
	120-139	543	114 (21%)	543	101 (19%)	461	55 (25)
	140-159	449	101 (22%)	449	85 (19%)	399	56 (24)
	≥160	404	98 (24%)	404	89 (22%)	367	57 (24)
	Missing	374	90 (24%)	374	83 (22%)	331	55 (27)
DBP (mmHg)	<70	446	93 (21%)	446	78 (17%)	355	54 (26)
	70-84	783	181 (23%)	783	159 (20%)	665	57 (24)
	85-99	388	93 (24%)	388	86 (22%)	358	56 (25)
	≥100	304	76 (25%)	304	68 (22%)	279	58 (23)
	Missing	374	90 (24%)	374	83 (22%)	331	55 (27)
Heart Rate (bpm)	<70	373	98 (26%)	373	84 (23%)	324	57 (26)
	70-89	723	143 (20%)	723	120 (17%)	623	54 (24)
	90-109	473	96 (20%)	473	90 (19%)	394	57 (23)
	≥110	346	105 (30%)	346	96 (28%)	310	60 (25)
	Missing	380	91 (24%)	380	84 (22%)	337	55 (27)
eGFR (ml/min/1.73m^2)	<30	88	11 (12%)	88	8 (9%)	60	47 (24)
	30-59.9	322	83 (26%)	322	73 (23%)	252	57 (27)
	60-89.9	261	102 (39%)	261	92 (35%)	237	64 (27)
	≥90	166	54 (33%)	166	50 (30%)	147	62 (26)
	Missing	1458	283 (19%)	1458	251 (17%)	1292	54 (24)

Table S3: Univariate and baseline-adjusted logistic regression models for being 'alive and well' at 6 months, defined as alive with KCCQ-OSS >75.

Predictor		Univariate			Baseline-adjusted		
		N	OR (95% CI)	p	N	OR (95% CI)	p
Baseline KCCQ OSS	per 10 points	2295	1.53 (1.46, 1.61)	p<0.0001	2295	1.53 (1.46, 1.61)	p<0.0001
Age	per 10 years	2295	0.79 (0.73, 0.85)	p<0.0001	2295	0.84 (0.77, 0.91)	p<0.0001
Sex	Male vs. Female	2295	1.85 (1.50, 2.29)	p<0.0001	2295	1.41 (1.12, 1.76)	p=0.0031
Race	Black vs. Caucasian Asian vs. Caucasian Other vs. Caucasian	2295	0.69 (0.44, 1.08) 1.30 (0.50, 3.37) 1.12 (0.57, 2.17)	p=0.3391	2295	0.52 (0.32, 0.84) 1.35 (0.49, 3.72) 0.77 (0.37, 1.60)	p=0.0363
Country	Russian Federation vs. USA Germany vs. USA Spain vs. USA Great Britain vs. USA	2295	0.70 (0.52, 0.94) 1.62 (1.17, 2.23) 1.88 (1.31, 2.70) 1.00 (0.67, 1.47)	p<0.0001	2295	0.83 (0.61, 1.13) 1.64 (1.16, 2.33) 2.19 (1.48, 3.26) 1.22 (0.80, 1.86)	p<0.0001
HF Status	New Onset HF vs. Decompensated HF	2295	3.14 (2.57, 3.84)	p<0.0001	2295	2.59 (2.08, 3.21)	p<0.0001
LVEF	40-50% vs. <40% >50% vs. <40% Not Recorded vs. <40%	2295	0.69 (0.52, 0.92) 0.48 (0.37, 0.62) 0.57 (0.44, 0.75)	p<0.0001	2295	0.76 (0.56, 1.02) 0.56 (0.43, 0.73) 0.61 (0.45, 0.81)	p=0.0001
Hypertension	HTN vs. No HTN	2291	0.61 (0.49, 0.75)	p<0.0001	2291	0.64 (0.51, 0.80)	p=0.0001
AF	AF vs. No AF	2291	0.68 (0.56, 0.83)	p=0.0001	2291	0.74 (0.60, 0.92)	p=0.0054
Diabetes	Diabetic vs. Non-Diabetic	2294	0.66 (0.53, 0.82)	p=0.0001	2294	0.73 (0.58, 0.91)	p=0.0054
CKD	CKD vs. No CKD	2294	0.54 (0.43, 0.69)	p<0.0001	2294	0.65 (0.50, 0.84)	p=0.0007
CAD	CAD vs. No CAD	2291	0.47 (0.38, 0.58)	p<0.0001	2291	0.52 (0.42, 0.65)	p<0.0001
HF Aetiology	Hypertensive vs. Ischaemic Cardiomyopathy vs. Ischaemic Valvular vs. Ischaemic Other vs. Ischaemic Unknown vs. Ischaemic	2295	1.02 (0.73, 1.41) 2.20 (1.65, 2.95) 1.82 (1.31, 2.55) 1.69 (1.15, 2.47) 1.61 (1.21, 2.14)	p<0.0001	2295	1.11 (0.78, 1.58) 2.05 (1.49, 2.81) 1.78 (1.24, 2.55) 1.72 (1.13, 2.61) 1.71 (1.26, 2.33)	p<0.0001
Smoking	Former vs. Never Current vs. Never Unknown vs. Never	2295	1.54 (1.17, 2.03) 1.44 (1.16, 1.80) 1.47 (0.83, 2.60)	p=0.0014	2295	1.30 (0.96, 1.75) 1.24 (0.98, 1.57) 1.20 (0.64, 2.25)	p=0.2061

Table S4: Univariate, baseline-adjusted, and multivariable logistic regression models for being 'alive and well' (alive with KCCQ-OSS>75) at 6 months. Missing baseline data imputed using predictive mean matching within 'mice' package. Effect estimates reported as odds ratios for stated increase in covariate or difference between subgroups.

Predictor		Univariate	Baseline-adjusted	Multivariable
		OR (95% CI), p	OR (95% CI), p	OR (95% CI), p
Baseline KCCQ OSS	per 10 points	1.53 (1.46, 1.61), p<0.0001	1.53 (1.46, 1.61), p<0.0001	1.47 (1.39, 1.55), p<0.0001
Age	per 10 years	0.79 (0.73, 0.85), p<0.0001	0.84 (0.77, 0.91), p<0.0001	0.85 (0.77, 0.94), p=0.0017
Sex	Male vs. Female	1.85 (1.50, 2.29), p<0.0001	1.41 (1.12, 1.76), p=0.0034	1.23 (0.94, 1.61), p=0.1296
Race	Black vs. Caucasian	0.69 (0.44, 1.08), p=0.1010	0.52 (0.32, 0.84), p=0.0080	0.41 (0.23, 0.74), p=0.0033
	Asian vs. Caucasian	1.30 (0.50, 3.37), p=0.5872	1.35 (0.49, 3.72), p=0.5604	1.92 (0.67, 5.52), p=0.2269
	Other vs. Caucasian	1.12 (0.57, 2.17), p=0.7461	0.77 (0.37, 1.60), p=0.4861	0.58 (0.27, 1.25), p=0.1638
Country	Russian Federation vs. USA	0.70 (0.52, 0.94), p=0.0168	0.83 (0.61, 1.13), p=0.2380	0.46 (0.30, 0.69), p=0.0002
	Germany vs. USA	1.62 (1.17, 2.23), p=0.0036	1.64 (1.16, 2.33), p=0.0055	0.95 (0.62, 1.44), p=0.7933
	Spain vs. USA	1.88 (1.31, 2.70), p=0.0006	2.19 (1.48, 3.26), p=0.0001	1.01 (0.63, 1.62), p=0.9651
	Great Britain vs. USA	1.00 (0.67, 1.47), p=0.9812	1.22 (0.80, 1.86), p=0.3550	0.63 (0.38, 1.04), p=0.0725
HF Status	New Onset HF vs. Decompensated HF	3.14 (2.57, 3.84), p<0.0001	2.59 (2.08, 3.21), p<0.0001	2.64 (2.08, 3.36), p<0.0001
LVEF	40-50% vs. <40%	0.69 (0.52, 0.92), p=0.0105	0.76 (0.56, 1.02), p=0.0716	0.87 (0.63, 1.22), p=0.4274
	>50% vs. <40%	0.48 (0.37, 0.62), p<0.0001	0.56 (0.43, 0.73), p<0.0001	0.60 (0.43, 0.82), p=0.0013
	Not Recorded vs. <40%	0.57 (0.44, 0.75), p=0.0001	0.61 (0.45, 0.81), p=0.0008	0.62 (0.44, 0.86), p=0.0038
Hypertension	HTN vs. No HTN	0.61 (0.49, 0.75), p<0.0001	0.64 (0.51, 0.80), p=0.0001	1.03 (0.78, 1.35), p=0.8493
AF	AF vs. No AF	0.68 (0.56, 0.83), p=0.0001	0.74 (0.60, 0.92), p=0.0057	0.98 (0.77, 1.24), p=0.8598
Diabetes	Diabetic vs. Non-Diabetic	0.66 (0.53, 0.82), p=0.0001	0.73 (0.58, 0.91), p=0.0058	0.83 (0.65, 1.06), p=0.1376
CKD	CKD vs. No CKD	0.54 (0.43, 0.69), p<0.0001	0.65 (0.50, 0.84), p=0.0009	0.82 (0.62, 1.09), p=0.1775
CAD	CAD vs. No CAD	0.47 (0.39, 0.58), p<0.0001	0.52 (0.42, 0.65), p<0.0001	0.84 (0.64, 1.10), p=0.2043
HF Aetiology	Hypertensive vs. Ischaemic	1.02 (0.73, 1.41), p=0.9225	1.11 (0.78, 1.58), p=0.5473	1.18 (0.79, 1.76), p=0.4091
	Cardiomyopathy vs. Ischaemic	2.20 (1.65, 2.95), p<0.0001	2.05 (1.49, 2.81), p<0.0001	1.33 (0.90, 1.95), p=0.1524
	Valvular vs. Ischaemic	1.82 (1.31, 2.55), p=0.0004	1.78 (1.24, 2.55), p=0.0017	1.50 (0.99, 2.26), p=0.0540
	Other vs. Ischaemic	1.69 (1.15, 2.47), p=0.0077	1.72 (1.13, 2.61), p=0.0108	1.22 (0.77, 1.94), p=0.3921
	Unknown vs. Ischaemic	1.61 (1.21, 2.14), p=0.0011	1.71 (1.26, 2.33), p=0.0006	1.45 (1.02, 2.07), p=0.0368
Smoking	Former vs. Never	1.54 (1.17, 2.03), p=0.0020	1.30 (0.96, 1.75), p=0.0880	0.92 (0.66, 1.28), p=0.6168
	Current vs. Never	1.44 (1.16, 1.80), p=0.0011	1.24 (0.98, 1.57), p=0.0752	1.03 (0.78, 1.35), p=0.8598
	Unknown vs. Never	1.47 (0.83, 2.60), p=0.1899	1.20 (0.64, 2.25), p=0.5600	0.87 (0.44, 1.70), p=0.6770

Table S5: Univariate and baseline-adjusted linear regression models for KCCQ-OSS at 6 months (using 12m value if 6m value not available).

Predictor		Univariate			Baseline-adjusted		
		N	OR (95% CI)	p	N	OR (95% CI)	p
Baseline KCCQ OSS	per 10 points	1988	5.2 (4.8, 5.7)	p<0.0001	1988	5.2 (4.8, 5.7)	p<0.0001
Age	per 10 years	1988	-2.9 (-3.8, -2.1)	p<0.0001	1988	-1.8 (-2.6, -1.0)	p<0.0001
Sex	Male vs. Female	1988	7.1 (4.9, 9.4)	p<0.0001	1988	2.6 (0.6, 4.7)	p=0.0115
Race	Black vs. Caucasian Asian vs. Caucasian Other vs. Caucasian	1988	-4.0 (-8.9, 0.9) -1.1 (-13.0, 10.8) 4.9 (-3.2, 13.0)	p=0.2506	1988	-5.4 (-9.7, -1.0) -1.6 (-12.2, 9.0) -0.2 (-7.4, 7.1)	p=0.1177
Country	Russian Federation vs. USA Germany vs. USA Spain vs. USA Great Britain vs. USA	1988	-2.2 (-5.5, 1.2) 4.4 (0.4, 8.3) 4.7 (0.3, 9.2) -1.2 (-5.7, 3.4)	p<0.0001	1988	0.3 (-2.6, 3.3) 3.2 (-0.3, 6.7) 5.1 (1.1, 9.1) 0.8 (-3.2, 4.9)	p=0.0224
HF Status	New Onset HF vs. Decompensated HF	1988	13.4 (11.2, 15.7)	p<0.0001	1988	9.1 (7.0, 11.1)	p<0.0001
LVEF	40-50% vs. <40% >50% vs. <40% Not Recorded vs. <40%	1988	-5.0 (-8.3, -1.8) -7.2 (-10.0, -4.5) -7.4 (-10.5, -4.3)	p<0.0001	1988	-3.3 (-6.2, -0.4) -4.1 (-6.6, -1.6) -5.8 (-8.6, -3.0)	p=0.0002
Hypertension	HTN vs. No HTN	1985	-5.7 (-8.3, -3.2)	p<0.0001	1985	-4.3 (-6.5, -2.0)	p=0.0002
AF	AF vs. No AF	1985	-5.6 (-7.7, -3.4)	p<0.0001	1985	-3.9 (-5.8, -1.9)	p=0.0001
Diabetes	Diabetic vs. Non-Diabetic	1987	-6.9 (-9.2, -4.6)	p<0.0001	1987	-5.2 (-7.2, -3.2)	p<0.0001
CKD	CKD vs. No CKD	1987	-7.3 (-9.8, -4.9)	p<0.0001	1987	-3.1 (-5.4, -0.9)	p=0.0059
CAD	CAD vs. No CAD	1985	-8.4 (-10.6, -6.3)	p<0.0001	1985	-5.9 (-7.9, -4.0)	p<0.0001
HF Aetiology	Hypertensive vs. Ischaemic Cardiomyopathy vs. Ischaemic Valvular vs. Ischaemic Other vs. Ischaemic Unknown vs. Ischaemic	1988	-0.2 (-3.5, 3.2) 9.3 (5.9, 12.7) 7.2 (3.3, 11.1) 4.9 (0.5, 9.3) 4.2 (1.0, 7.5)	p<0.0001	1988	1.2 (-1.8, 4.1) 6.5 (3.5, 9.6) 5.7 (2.3, 9.2) 3.5 (-0.4, 7.5) 3.7 (0.9, 6.6)	p=0.0001
Smoking	Former vs. Never Current vs. Never Unknown vs. Never	1988	7.4 (4.2, 10.5) 4.4 (1.9, 6.8) 1.4 (-5.4, 8.3)	p<0.0001	1988	4.8 (2.0, 7.7) 1.8 (-0.5, 4.0) -1.9 (-8.1, 4.2)	p=0.0057

Table S6: Univariate, baseline-adjusted, and multivariable linear regression models for KCCQ-OSS at 6 months (using 12m value if 6m value not available). Missing baseline data imputed using predictive mean matching within 'mice' package. Effect estimates reported as mean difference for stated increase in covariate or difference between subgroups.

Predictor		Univariate	Baseline-adjusted	Multivariable
		Estimate (95% CI), p	Estimate (95% CI), p	Estimate (95% CI), p
Baseline KCCQ OSS	per 10 points	5.2 (4.8, 5.7), p<0.0001	5.2 (4.8, 5.7), p<0.0001	4.4 (4.0, 4.9), p<0.0001
Age	per 10 years	-2.9 (-3.8, -2.1), p<0.0001	-1.8 (-2.6, -1.0), p<0.0001	-0.9 (-1.8, 0.0), p=0.0470
Sex	Male vs. Female	7.1 (4.9, 9.4), p<0.0001	2.6 (0.6, 4.7), p=0.0115	1.2 (-1.0, 3.5), p=0.2867
Race	Black vs. Caucasian	-4.0 (-8.9, 0.9), p=0.1093	-5.4 (-9.7, -1.0), p=0.0159	-6.6 (-11.9, -1.4), p=0.0136
	Asian vs. Caucasian	-1.1 (-13.0, 10.8), p=0.8566	-1.6 (-12.2, 9.0), p=0.7657	0.8 (-9.5, 11.2), p=0.8727
	Other vs. Caucasian	4.9 (-3.2, 13.0), p=0.2395	-0.2 (-7.4, 7.1), p=0.9633	-1.5 (-8.6, 5.6), p=0.6803
Country	Russian Federation vs. USA	-2.2 (-5.5, 1.2), p=0.2033	0.3 (-2.6, 3.3), p=0.8206	-3.1 (-7.0, 0.7), p=0.1070
	Germany vs. USA	4.4 (0.4, 8.3), p=0.0297	3.2 (-0.3, 6.7), p=0.0750	-1.3 (-5.4, 2.8), p=0.5272
	Spain vs. USA	4.7 (0.3, 9.2), p=0.0376	5.1 (1.1, 9.1), p=0.0122	-1.7 (-6.2, 2.8), p=0.4620
	Great Britain vs. USA	-1.2 (-5.7, 3.4), p=0.6215	0.8 (-3.2, 4.9), p=0.6861	-3.9 (-8.5, 0.8), p=0.1026
HF Status	New Onset HF vs. Decompensated HF	13.4 (11.2, 15.7), p<0.0001	9.1 (7.0, 11.1), p<0.0001	8.2 (6.0, 10.4), p<0.0001
LVEF	40-50% vs. <40%	-5.0 (-8.3, -1.8), p=0.0024	-3.3 (-6.2, -0.4), p=0.0270	-2.1 (-5.0, 0.8), p=0.1580
	>50% vs. <40%	-7.2 (-10.0, -4.5), p<0.0001	-4.1 (-6.6, -1.6), p=0.0011	-2.8 (-5.5, -0.1), p=0.0403
	Not Recorded vs. <40%	-7.4 (-10.5, -4.3), p<0.0001	-5.8 (-8.6, -3.0), p<0.0001	-5.0 (-7.9, -2.0), p=0.0010
Hypertension	HTN vs. No HTN	-5.7 (-8.2, -3.2), p<0.0001	-4.2 (-6.5, -2.0), p=0.0002	0.1 (-2.4, 2.6), p=0.9526
AF	AF vs. No AF	-5.5 (-7.7, -3.3), p<0.0001	-3.9 (-5.8, -1.9), p=0.0001	-2.3 (-4.3, -0.3), p=0.0219
Diabetes	Diabetic vs. Non-Diabetic	-6.9 (-9.2, -4.6), p<0.0001	-5.2 (-7.2, -3.1), p<0.0001	-3.8 (-5.9, -1.7), p=0.0003
CKD	CKD vs. No CKD	-7.3 (-9.8, -4.9), p<0.0001	-3.1 (-5.3, -0.9), p=0.0060	0.0 (-2.3, 2.2), p=0.9811
CAD	CAD vs. No CAD	-8.4 (-10.6, -6.2), p<0.0001	-5.9 (-7.9, -4.0), p<0.0001	-2.6 (-4.9, -0.2), p=0.0303
HF Aetiology	Hypertensive vs. Ischaemic	-0.2 (-3.5, 3.2), p=0.9205	1.2 (-1.8, 4.1), p=0.4435	1.4 (-1.7, 4.5), p=0.3859
	Cardiomyopathy vs. Ischaemic	9.3 (5.9, 12.7), p<0.0001	6.5 (3.5, 9.6), p<0.0001	3.3 (-0.2, 6.8), p=0.0651
	Valvular vs. Ischaemic	7.2 (3.3, 11.1), p=0.0003	5.7 (2.3, 9.2), p=0.0012	4.2 (0.5, 7.9), p=0.0256
	Other vs. Ischaemic	4.9 (0.5, 9.3), p=0.0303	3.5 (-0.4, 7.5), p=0.0790	0.8 (-3.3, 4.9), p=0.6940
	Unknown vs. Ischaemic	4.2 (1.0, 7.5), p=0.0097	3.7 (0.9, 6.6), p=0.0110	2.4 (-0.7, 5.4), p=0.1277
Smoking	Former vs. Never	7.4 (4.2, 10.5), p<0.0001	4.8 (2.0, 7.7), p=0.0009	1.4 (-1.6, 4.4), p=0.3544
	Current vs. Never	4.4 (1.9, 6.8), p=0.0006	1.8 (-0.5, 4.0), p=0.1217	1.2 (-1.2, 3.7), p=0.3183
	Unknown vs. Never	1.4 (-5.4, 8.3), p=0.6864	-1.9 (-8.1, 4.2), p=0.5342	-3.9 (-10.0, 2.2), p=0.2053

Table S7: Univariate, baseline-adjusted, and multivariable linear regression models for KCCQ OSS at 6 months (using 12m value if 6m value not available). Models weighted by the inverse of the predicted probability of having KCCQ OSS data available at follow-up, derived from a non-parsimonious model for being followed up (C-statistic: 0.821). Effect estimates reported as mean difference for stated increase in covariate or difference between subgroups.

Predictor		Univariate		Baseline-adjusted		Multivariable	
		Estimate (95% CI)	p	Estimate (95% CI)	p	Estimate (95% CI)	p
Baseline KCCQ OSS	per 10 points	5.2 (4.8, 5.7)	p<0.0001	5.2 (4.8, 5.7)	p<0.0001	4.5 (4.0, 5.0)	p<0.0001
Age	per 10 years	-2.4 (-3.2, -1.6)	p<0.0001	-1.4 (-2.2, -0.7)	p=0.0003	-0.6 (-1.5, 0.3)	p=0.1889
Sex	Male vs. Female	6.8 (4.5, 9.1)	p<0.0001	2.4 (0.3, 4.4)	p=0.0258	1.0 (-1.3, 3.2)	p=0.4092
Race	Black vs. Caucasian Asian vs. Caucasian Other vs. Caucasian	-4.3 (-8.2, -0.4) -5.3 (-17.3, 6.7) 5.3 (-3.0, 13.6)	p=0.0661	-5.2 (-8.7, -1.8) -4.4 (-15.1, 6.3) -0.2 (-7.6, 7.2)	p=0.0261	-6.1 (-10.7, -1.6) -1.8 (-12.2, 8.7) -1.4 (-8.7, 5.8)	p=0.0663
Country	Russian Federation vs. USA Germany vs. USA Spain vs. USA Great Britain vs. USA	-1.2 (-4.2, 1.9) 5.4 (1.7, 9.0) 6.0 (1.8, 10.2) -0.8 (-5.1, 3.5)	p<0.0001	0.9 (-1.8, 3.7) 3.9 (0.7, 7.2) 6.6 (2.8, 10.3) 1.7 (-2.2, 5.5)	p=0.0025	-1.9 (-5.5, 1.7) -0.8 (-4.7, 3.1) 0.2 (-4.1, 4.6) -3.6 (-8.1, 0.9)	p=0.3573
HF Status	New Onset HF vs. Decompensated HF	13.2 (10.9, 15.5)	p<0.0001	9.2 (7.1, 11.3)	p<0.0001	8.1 (5.9, 10.4)	p<0.0001
LVEF	40-50% vs. <40% >50% vs. <40% Not Recorded vs. <40%	-5.1 (-8.4, -1.8) -7.9 (-10.7, -5.0) -7.7 (-10.7, -4.6)	p<0.0001	-3.1 (-6.1, -0.1) -4.6 (-7.2, -2.1) -6.0 (-8.7, -3.2)	p=0.0001	-2.0 (-5.0, 1.0) -3.6 (-6.4, -0.8) -4.7 (-7.6, -1.8)	p=0.0078
Hypertension	HTN vs. No HTN	-5.7 (-8.2, -3.1)	p<0.0001	-4.3 (-6.7, -2.0)	p=0.0002	0.0 (-2.5, 2.6)	p=0.9888
AF	AF vs. No AF	-5.1 (-7.3, -2.9)	p<0.0001	-3.4 (-5.4, -1.4)	p=0.0008	-2.4 (-4.4, -0.4)	p=0.0214
Diabetes	Diabetic vs. Non-Diabetic	-7.0 (-9.3, -4.7)	p<0.0001	-5.3 (-7.3, -3.2)	p<0.0001	-3.7 (-5.8, -1.5)	p=0.0007
CKD	CKD vs. No CKD	-7.0 (-9.5, -4.5)	p<0.0001	-3.3 (-5.6, -1.1)	p=0.0040	-0.1 (-2.4, 2.2)	p=0.9498
CAD	CAD vs. No CAD	-8.2 (-10.4, -6.0)	p<0.0001	-6.1 (-8.1, -4.1)	p<0.0001	-2.7 (-5.1, -0.3)	p=0.0260
HF Aetiology	Hypertensive vs. Ischaemic Cardiomyopathy vs. Ischaemic Valvular vs. Ischaemic Other vs. Ischaemic Unknown vs. Ischaemic	0.0 (-3.4, 3.3) 9.4 (5.9, 12.8) 7.4 (3.3, 11.4) 4.4 (0.0, 8.8) 4.0 (0.8, 7.3)	p<0.0001	1.2 (-1.8, 4.3) 6.7 (3.6, 9.7) 6.4 (2.8, 10.0) 4.2 (0.2, 8.2) 4.0 (1.1, 6.9)	p<0.0001	1.7 (-1.5, 4.9) 4.1 (0.6, 7.6) 4.8 (1.0, 8.7) 1.6 (-2.5, 5.8) 2.6 (-0.5, 5.7)	p=0.1113
Smoking	Former vs. Never Current vs. Never Unknown vs. Never	6.7 (3.6, 9.9) 4.1 (1.6, 6.6) 1.3 (-5.5, 8.1)	p=0.0001	4.7 (1.9, 7.5) 2.1 (-0.2, 4.3) -1.4 (-7.5, 4.6)	p=0.0072	1.4 (-1.6, 4.4) 2.0 (-0.5, 4.4) -3.6 (-9.6, 2.4)	p=0.1718

Table S8.1: In the subset of patients with LVEF<40% at baseline, multivariable logistic regression model for being 'alive and well' at 6 months, defined as alive with KCCQ-OSS >75, and multivariable linear regression model for KCCQ-OSS at 6 months (using 12 month value if 6 month value not available).

Predictor		'Alive and well' (N=740[a])		Post-discharge KCCQ-OSS (N=644[b])	
		OR (95% CI)	p	β (95% CI)	p
Baseline KCCQ OSS	per 10 points	1.44 (1.32, 1.57)	p<0.0001	4.5 (3.7, 5.2)	p<0.0001
Age	per 10 years	0.93 (0.78, 1.09)	p=0.3658	-0.2 (-1.8, 1.4)	p=0.7898
Sex	Male vs. Female	1.26 (0.78, 2.03)	p=0.3369	0.8 (-3.6, 5.1)	p=0.7305
Race	Black vs. Caucasian Asian vs. Caucasian Other vs. Caucasian	0.60 (0.23, 1.56) 1.15 (0.14, 9.24) 1.02 (0.34, 3.04)	p=0.7525	-12.6 (-22.1, -3.2) -3.3 (-20.9, 14.2) -0.5 (-11.2, 10.2)	p=0.0689
Country	Russian Federation vs. USA Germany vs. USA Spain vs. USA Great Britain vs. USA	0.58 (0.28, 1.19) 1.09 (0.54, 2.23) 1.24 (0.58, 2.67) 1.25 (0.51, 3.04)	p=0.0605	-4.6 (-11.6, 2.5) -2.6 (-9.8, 4.7) 0.5 (-7.3, 8.2) 2.2 (-6.7, 11.2)	p=0.2502
HF Status	New Onset HF vs. Decompensated HF	2.38 (1.58, 3.56)	p<0.0001	6.9 (2.9, 10.8)	p=0.0007
Hypertension	HTN vs. No HTN	0.88 (0.58, 1.35)	p=0.5631	-0.4 (-4.4, 3.5)	p=0.8252
AF	AF vs. No AF	1.15 (0.77, 1.73)	p=0.4847	-1.2 (-4.9, 2.5)	p=0.5138
Diabetes	Diabetic vs. Non-Diabetic	0.91 (0.59, 1.39)	p=0.6541	-4.2 (-8.0, -0.4)	p=0.0327
CKD	CKD vs. No CKD	1.08 (0.67, 1.72)	p=0.7619	3.8 (-0.5, 8.0)	p=0.0807
CAD	CAD vs. No CAD	0.80 (0.51, 1.28)	p=0.3564	-2.8 (-7.1, 1.6)	p=0.2136
HF Aetiology	Hypertensive vs. Ischaemic Cardiomyopathy vs. Ischaemic Valvular vs. Ischaemic Other vs. Ischaemic Unknown vs. Ischaemic	1.55 (0.70, 3.41) 1.93 (1.09, 3.42) 1.60 (0.71, 3.61) 2.10 (0.96, 4.62) 2.79 (1.55, 5.03)	p=0.0283	4.1 (-3.1, 11.2) 8.2 (2.8, 13.5) 5.4 (-2.6, 13.4) 3.2 (-4.5, 10.8) 10.7 (5.0, 16.4)	p=0.0064
Smoking	Former vs. Never Current vs. Never Unknown vs. Never	1.26 (0.75, 2.12) 1.08 (0.69, 1.67) 3.20 (1.01, 10.13)	p=0.2287	3.7 (-1.2, 8.5) 1.8 (-2.3, 5.9) 6.5 (-4.6, 17.7)	p=0.3792

[a]: Of 740 subjects with LVEF<40% for whom 'alive and well' status could be determined, 0 subjects had missing data for one or more predictors.
[b]: Of 644 subjects with LVEF<40% for whom post-discharge KCCQ-OSS was available, 0 subjects had missing data for one or more predictors.

Table S8.2: <u>In the subset of patients with LVEF≥40% or unknown at baseline</u>, multivariable logistic regression model for being 'alive and well' at 6 months, defined as alive with KCCQ-OSS >75, and multivariable linear regression model for KCCQ-OSS at 6 months (using 12 month value if 6 month value not available).

Predictor		'Alive and well' (N=1550[(a)])		Post-discharge KCCQ-OSS (N=1340[(b)])	
		OR (95% CI)	p	β (95% CI)	p
Baseline KCCQ OSS	per 10 points	1.50 (1.39, 1.62)	p<0.0001	4.3 (3.8, 4.9)	p<0.0001
Age	per 10 years	0.81 (0.71, 0.92)	p=0.0012	-1.1 (-2.2, 0.0)	p=0.0462
Sex	Male vs. Female	1.30 (0.94, 1.80)	p=0.1155	1.5 (-1.1, 4.2)	p=0.2535
Race	Black vs. Caucasian Asian vs. Caucasian Other vs. Caucasian	0.32 (0.14, 0.69) 2.19 (0.60, 7.98) 0.26 (0.07, 0.96)	p=0.0016	-4.4 (-10.8, 2.0) 4.0 (-8.9, 16.9) -4.6 (-14.4, 5.2)	p=0.3838
Country	Russian Federation vs. USA Germany vs. USA Spain vs. USA Great Britain vs. USA	0.43 (0.26, 0.71) 1.00 (0.59, 1.71) 1.06 (0.57, 1.97) 0.50 (0.27, 0.94)	p<0.0001	-1.8 (-6.2, 2.7) -0.2 (-5.1, 4.7) -2.3 (-7.9, 3.4) -6.0 (-11.4, -0.7)	p=0.1444
HF Status	New Onset HF vs. Decompensated HF	2.74 (2.02, 3.72)	p<0.0001	8.7 (6.1, 11.3)	p<0.0001
Hypertension	HTN vs. No HTN	1.12 (0.77, 1.63)	p=0.5475	0.3 (-3.0, 3.5)	p=0.8758
AF	AF vs. No AF	0.91 (0.67, 1.22)	p=0.5117	-2.4 (-4.8, -0.1)	p=0.0448
Diabetes	Diabetic vs. Non-Diabetic	0.79 (0.58, 1.07)	p=0.1280	-3.7 (-6.2, -1.2)	p=0.0037
CKD	CKD vs. No CKD	0.67 (0.46, 0.96)	p=0.0282	-1.6 (-4.3, 1.1)	p=0.2441
CAD	CAD vs. No CAD	0.84 (0.60, 1.19)	p=0.3241	-2.6 (-5.4, 0.2)	p=0.0690
HF Aetiology	Hypertensive vs. Ischaemic Cardiomyopathy vs. Ischaemic Valvular vs. Ischaemic Other vs. Ischaemic Unknown vs. Ischaemic	0.92 (0.58, 1.46) 0.93 (0.53, 1.62) 1.23 (0.76, 2.00) 0.79 (0.44, 1.41) 1.03 (0.66, 1.61)	p=0.7787	-0.4 (-3.9, 3.1) -1.5 (-6.4, 3.4) 3.2 (-0.9, 7.4) -0.4 (-5.3, 4.4) -0.7 (-4.4, 2.9)	p=0.4816
Smoking	Former vs. Never Current vs. Never Unknown vs. Never	0.72 (0.45, 1.13) 1.01 (0.71, 1.45) 0.49 (0.19, 1.22)	p=0.1794	0.6 (-3.2, 4.4) 1.0 (-2.1, 4.1) -7.6 (-15.0, -0.3)	p=0.1507

[(a)]: Of 740 subjects with LVEF≥40% or unknown for whom 'alive and well' status could be determined, 5 subjects had missing data for one or more predictors.
[(b)]: Of 644 subjects with LVEF≥40% or unknown for whom post-discharge KCCQ-OSS was available, 4 subjects had missing data for one or more predictors.

Figure S1.1: KCCQ Scores: Violin plot of Physical Limitation at baseline, 6 months, and 12 months.

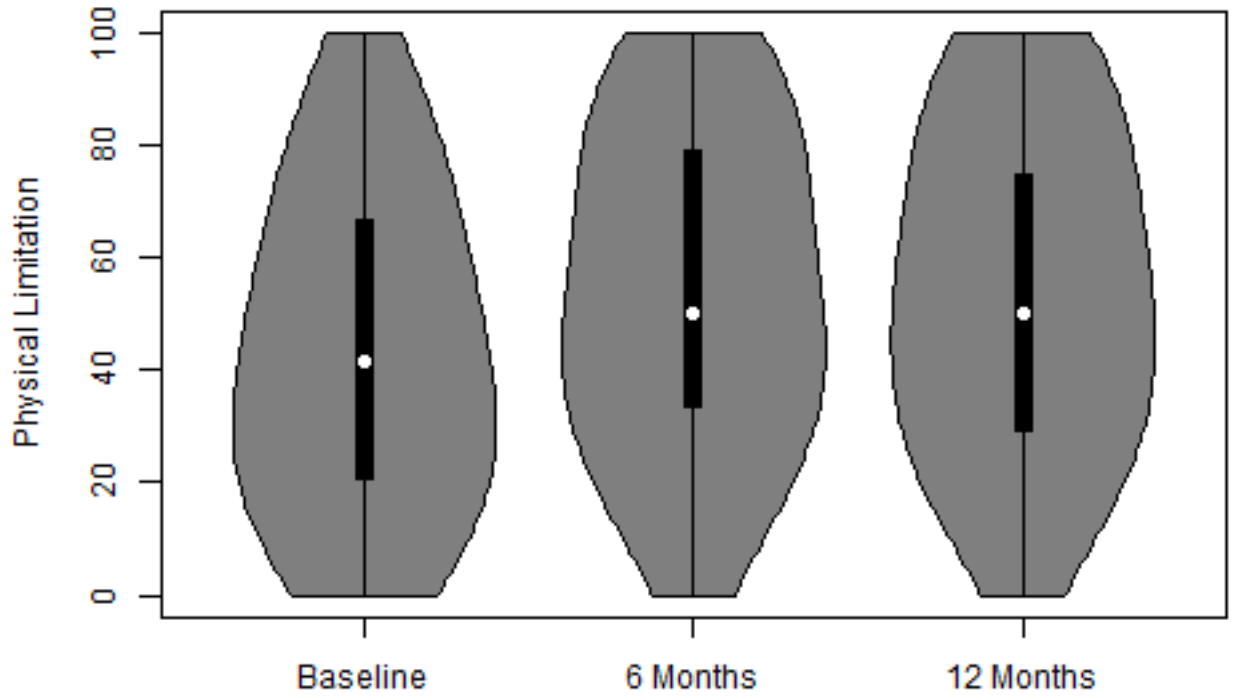


Figure S1.2: KCCQ Scores: Violin plot of Symptom Frequency at baseline, 6 months, and 12 months.

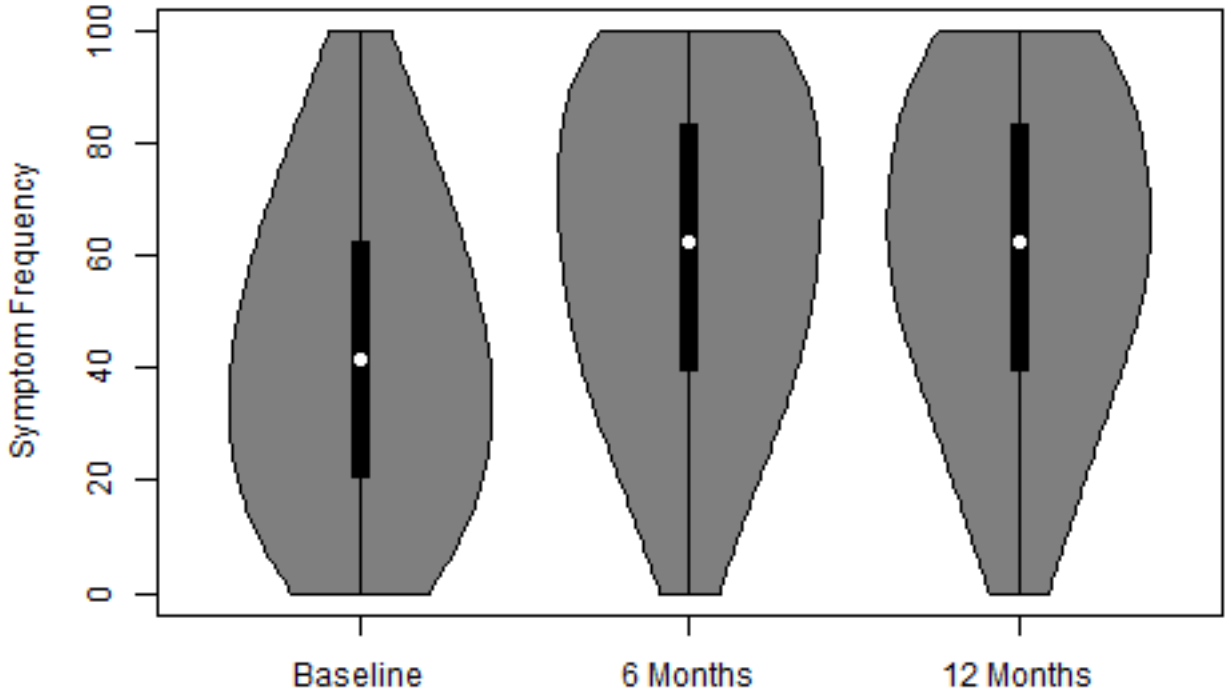


Figure S1.3: KCCQ Scores: Violin plot of Symptom Burden at baseline, 6 months, and 12 months.

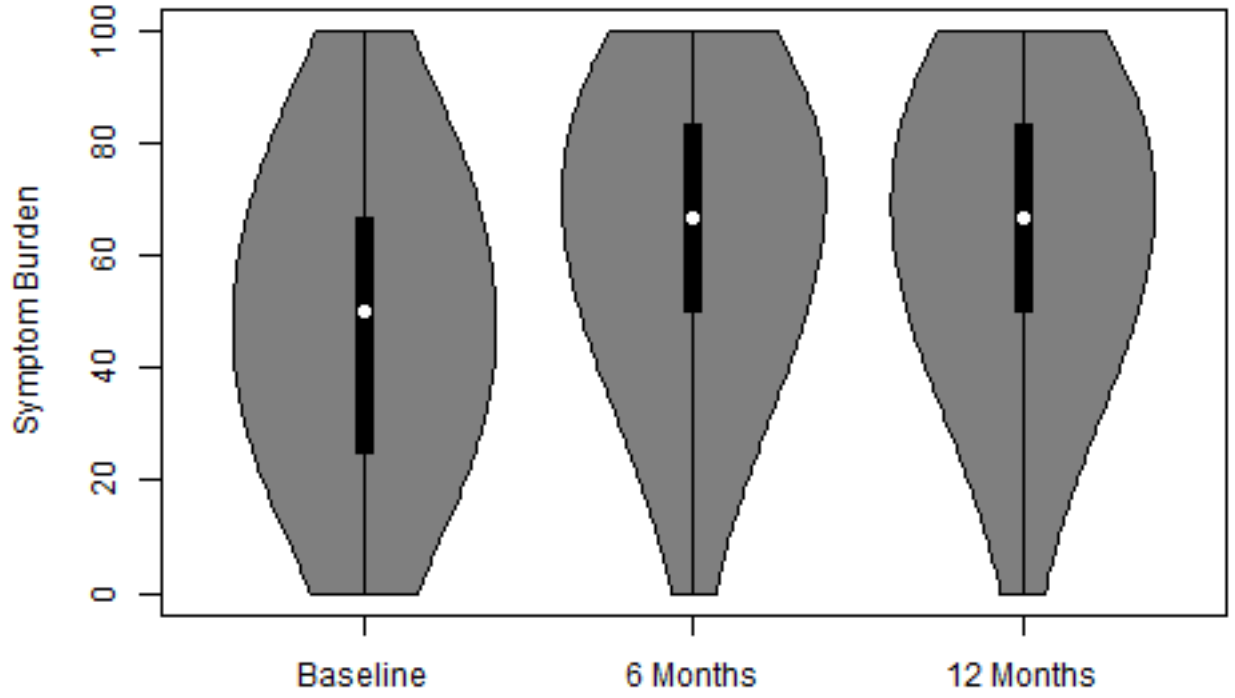


Figure S1.4: KCCQ Scores: Violin plot of Total Symptom Score at baseline, 6 months, and 12 months.

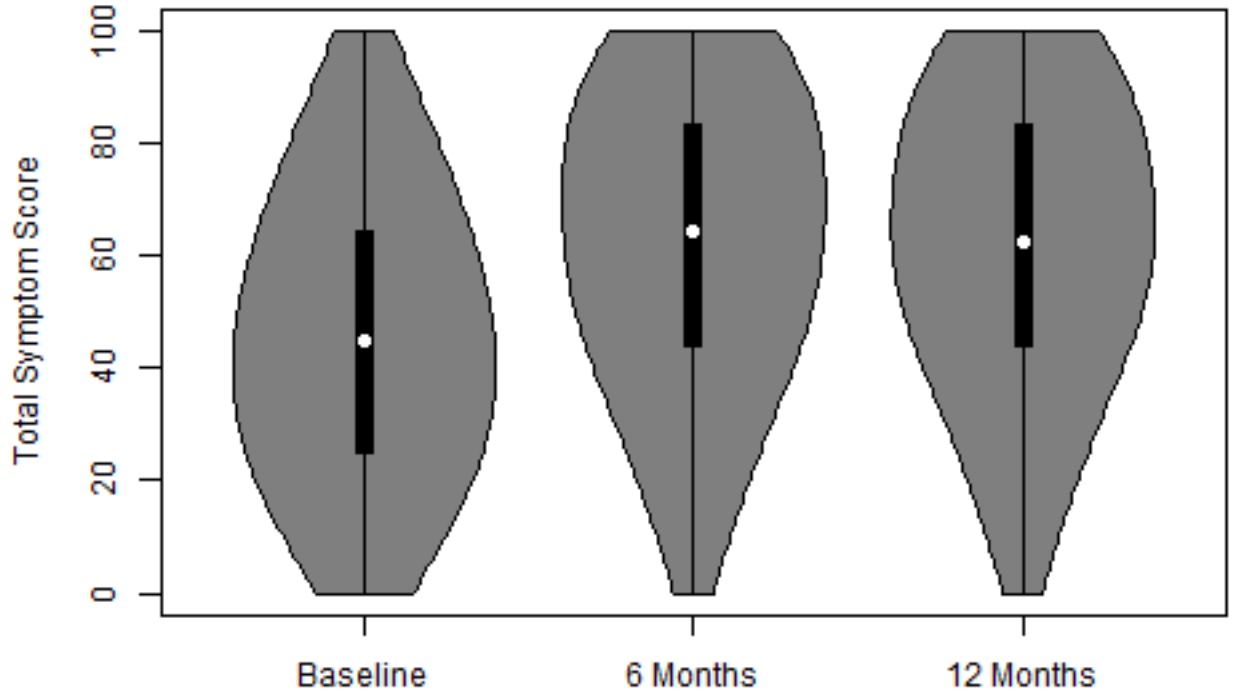


Figure S1.5: KCCQ Scores: Violin plot of Quality of Life at baseline, 6 months, and 12 months.

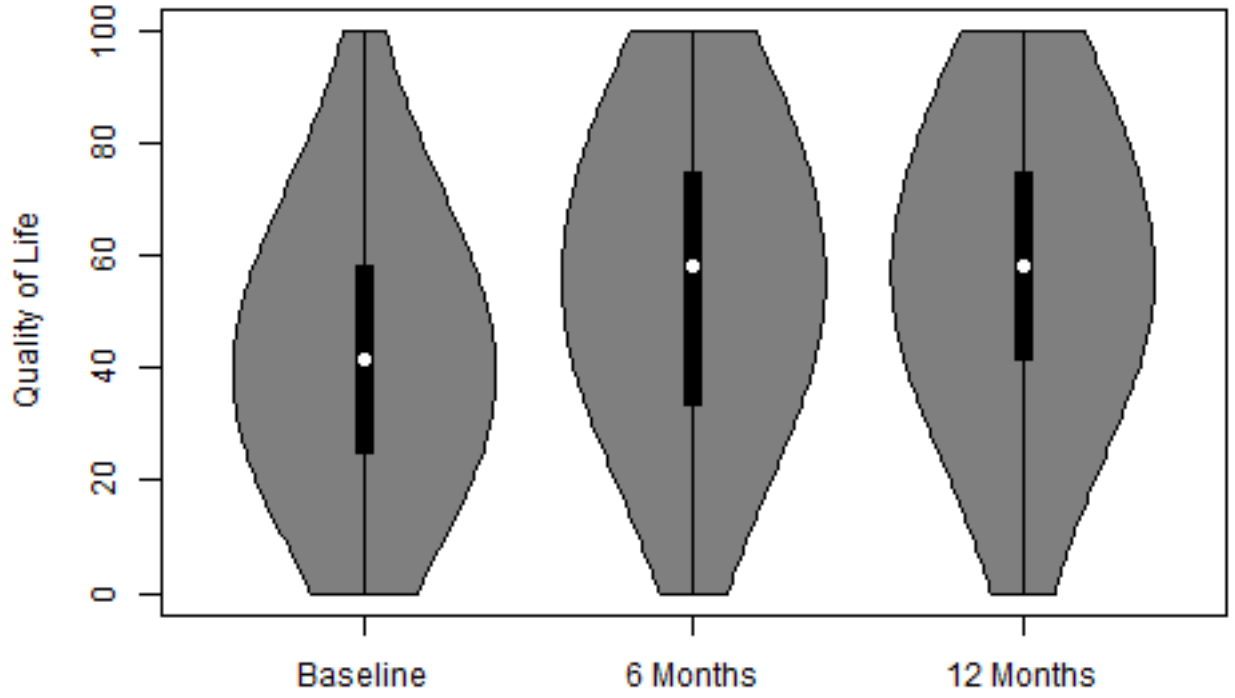


Figure S1.6: KCCQ Scores: Violin plot of Social Limitation at baseline, 6 months, and 12 months.

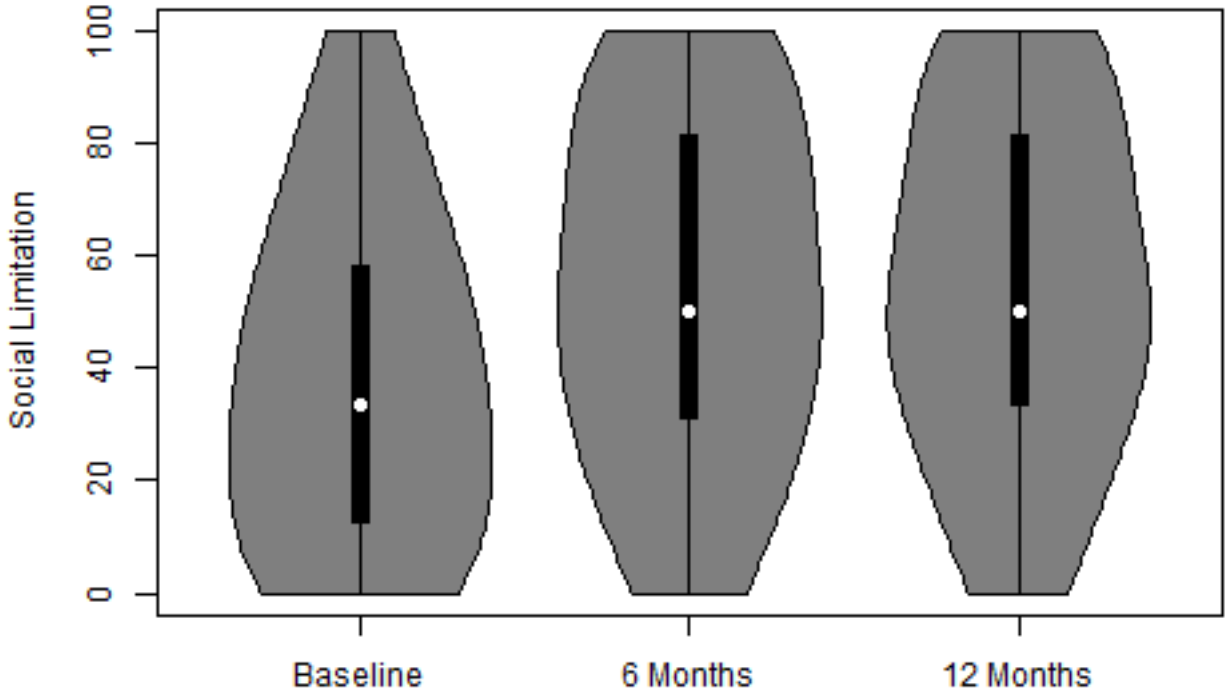


Figure S1.7: KCCQ Scores: Violin plot of Overall Summary Score at baseline, 6 months, and 12 months.

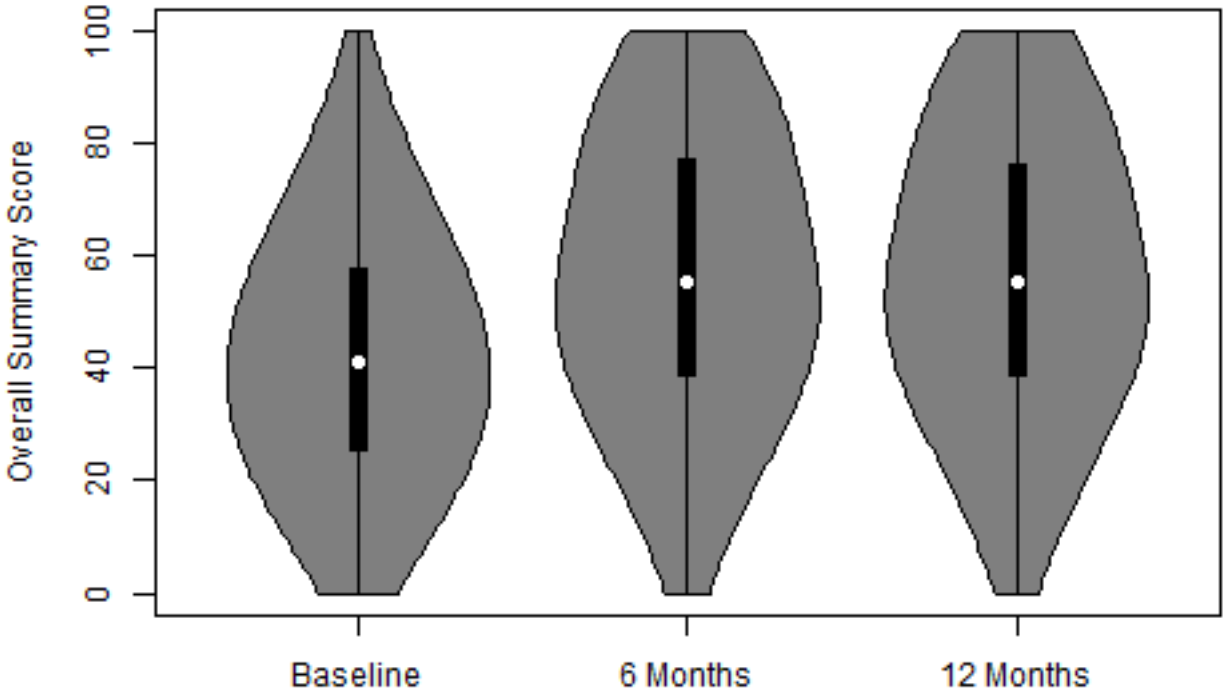


Figure S1.8: KCCQ Scores: Violin plot of Clinical Summary Score at baseline, 6 months, and 12 months.