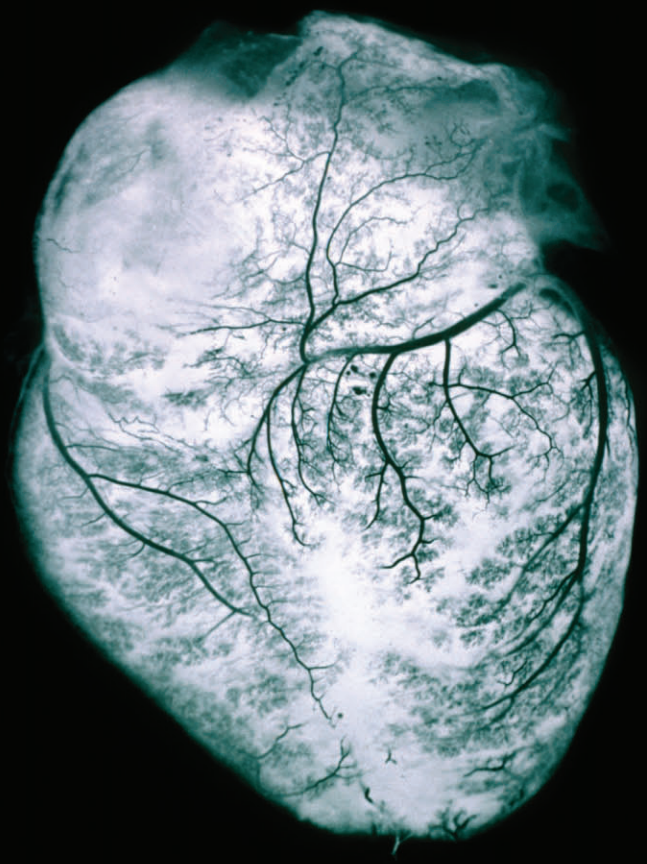
NICOR

BRITISH SOCIETY FOR HEART FAILURE



NATIONAL HEART FAILURE AUDIT

APRIL 2012 - MARCH 2013

NICOR (National Institute for Cardiovascular Outcomes Research) is a partnership of clinicians, IT experts, statisticians, academics and managers which manages six cardiovascular clinical audits and a growing portfolio of new health technology registries, including the UK TAVI registry. NICOR analyses and disseminates information about clinical practice in order to drive up the quality of care and outcomes for patients.

The British Society for Heart Failure (BSH) is a national organisation of healthcare professionals which aims to improve care and outcomes for patients with heart failure by increasing knowledge and promoting research about its diagnosis, causes and management.

The Healthcare Quality Improvement Partnership (HQIP) is led by a consortium of the Academy of Medical Royal Colleges, the Royal College of Nursing and National Voices. Its aim is to promote quality improvement, and in particular to increase the impact of clinical audit in England and Wales. HQIP hosts the contract to manage and develop the National Clinical Audit and Patient Outcomes Programme (NCAPOP). The programme comprises 40 clinical audits that cover care provided to people with a wide range of medical, surgical and mental health conditions.

Founded in 1826, **UCL (University College London)** was the first English university established after Oxford and Cambridge, the first to admit students regardless of race, class, religion or gender, and the first to provide systematic teaching of law, architecture and medicine. It is among the world's top universities, as reflected by performance in a range of international rankings and tables. UCL currently has 24,000 students from almost 140 countries, and more than 9,500 employees. Its annual income is over £800 million.

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The report was produced on behalf of and with input from the National Heart Failure Audit Project Board. It was completed in close collaboration with the NICOR analysis team, and the NICOR technical team. Marion Standing, Andrew Donald and and Andrew Harrison have been especially involved.

Acknowledgments

The National Heart Failure Audit is managed by the National Institute for Cardiovascular Outcomes Research (NICOR), which is part of the National Centre for Cardiovascular Prevention and Outcomes, based at University College London. The National Heart Failure Audit is commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP).

Specialist clinical knowledge and leadership is provided by the British Society for Heart Failure (BSH) and the audit's clinical lead, Professor Theresa McDonagh. The strategic direction and development of the audit is determined by the audit Project Board. This includes major stakeholders in the audit, including cardiologists, the BSH, heart failure specialist nurses, clinical audit and effectiveness managers, cardiac networks, patients, NICOR managers and developers, and HQIP. See Appendix A for current Project Board membership.

We would especially like to thank the contribution of all NHS Trusts, Welsh Heath Boards and the individual nurses, clinicians and audit teams who collect data and participate in the audit. Without their input the audit could not continue to produce credible analysis, or to effectively monitor and assess the standard of heart failure care in England and Wales.

This report is available online at www.ucl.ac.uk/nicor/audits/heartfailure/additionalfiles

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National Heart Failure Audit

April 2012 - March 2013

The sixth annual report for the National Heart Failure Audit presents findings and recommendations based on patients discharged with a diagnosis of heart failure between 1 April 2012 and 31 March 2013. The report covers all NHS Trusts in England and Health Boards in Wales which admit patients with acute heart failure.

The report is aimed at those involved in collecting data for the National Heart Failure Audit, as well as clinicians, hospital chief executives and managers, clinical governance leads, and all those interested in improving the outcomes and well-being of patients with heart failure. The report includes clinical findings at national and local levels and patient outcomes.

Contents

Foreword

The outcomes for people diagnosed with heart failure have often been compared with those of the worst cancers. However, whilst it is true that those with sub-optimally or untreated heart failure do indeed fare poorly, those receiving specialist input can do much better. Good management of heart failure improves survival and reduces hospital admissions and its importance has been emphasised in the 2010 Chronic Heart Failure Guidance and related Quality Standards (2011) from NICE, and most recently the Department of Health's Cardiovascular Disease Outcomes Strategy (2013). For many people with heart failure there is strong clinical trial evidence for the benefit of a number of disease modifying drugs, but previous audit reports have sadly highlighted that many people do not receive specialist input to their care or optimal drug management.

This 2012/2013 audit reports on nearly 44,000 hospital admissions for acute heart failure. Considerable variations in outcomes across hospitals and within hospitals are evident, a variation which we have a collective responsibility to reduce, through prevention, earlier diagnosis, better management and integration of services. For the first time a modest but significant reduction in all-cause mortality, both during the index admission and over the subsequent period of follow up, is reported. More patients are being cared for within specialist cardiac care or cardiology wards, more patients are receiving specialist input overall, and improved prescribing rates of disease modifying drugs are seen.

This is encouraging but there remains much that can be done to ensure all patients receive an early diagnosis and care from a specialist cardiology team. When patients leave hospital they can be especially vulnerable and early careful review from within the multidisciplinary team will help drive better outcomes.

All those contributing to this welcome audit, the quality of which has improved considerably over recent years, deserve congratulations for their commitment to improved data collection. Only through knowing more about current practice, and particularly variations in such practice, can we understand better where improvements can be made and how these translate into better outcomes in the future.

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1 Summary

The National Heart Failure Audit has shown a reduction in both in-hospital and one-year mortality for people admitted to hospital with acute heart failure during the 2012/13 audit cycle, when compared with the same outcomes for the 2011/12 cohort. This improvement reflects better treatment and management of heart failure, including improved prescribing rates of disease modifying therapies, and higher levels of specialist input. These findings cannot be attributed to any noteworthy difference in the age, co-morbidities or disease severity of patients across the two years but reflect better adherence to NICE and other guidelines.

Mortality rates do, however, remain quite variable, reflecting a diversity of clinical care alongside patient characteristics. Good clinical management by heart failure and cardiology specialists continues to result in significantly better outcomes for patients: not only is mortality reduced in hospital and in the month following discharge for these patients, but the cumulative analysis demonstrates that the quality of care during an index admission continues to confer noticeable mortality benefit for some years following discharge.

1.1 National Heart Failure Audit

The National Heart Failure Audit was established in 2007 to monitor and improve the care and treatment of patients with an unscheduled admission to hospital in England and Wales with acute heart failure. The audit collects data based on recommended clinical indicators with a view to driving up standards by encouraging the implementation of evidence based and guideline recommendations and by reporting on clinical practice and outcomes.

Increasing the standard of care depends on healthcare professionals, improvement groups and commissioners using audit data to monitor performance, encourage progress, and ensure adequate provision of acute hospital heart failure care. Hospitals will also find reviewing their own audit data is a powerful tool to change and to improve practice.

The audit is supported by the British Society for Heart Failure and is one of six cardiovascular audits managed by the National Institute for Cardiovascular Outcomes Research (NICOR), part of the National Centre for Cardiovascular Prevention and Outcomes at UCL. This project is commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP), along with five other audits managed by NICOR.

1.2 Findings

1.2.1 Participation and case ascertainment

Between April 2012 and March 2013 145 out of 150 NHS Trusts in England and Health Boards in Wales (97%) submitted data to the audit.

After data cleaning, the total number of records in the 2012/13 audit was 43,894. The audit represents 60% of all heart failure coded discharges or deaths in England and Wales. This comprises 41,932 heart failure admissions in England, 61% of the 68,654 patients coded as heart failure in Hospital Episode Statistics (HES), and 1,962 admissions in Wales, representing 47% of the 4,165 total recorded by the Patient Episode Database for Wales (PEDW).

1.2.2 Demographics

The patients' median age was 80 years; 66% were aged >75 years and 30% >85 years. The majority of patients up to 85 years were men, but in those aged >85 years, most were women. The median age at admission was almost 5 years greater in women compared to men, and about 5 years lower in the most socio-economically deprived quintile compared to those in the least deprived group.

Many patients had multiple co-morbidities – almost half had ischaemic heart disease, over half had hypertension, and a quarter had both. Myocardial infarction, arrhythmia and diabetes were also very common. Almost 80% of patients were breathless on minimal exertion or at rest at first admission, and 50% exhibited moderate or severe peripheral oedema.

The demographics of the patients in the 2012/13 audit cycle are very similar to those recorded last year, suggesting that the audit is being implemented in a consistent fashion. Given the advanced age, disease burden and complex health issues of these patients the reported reduction in mortality this year is particularly remarkable.

1.2.3 Hospitalisation

Half of the patients in the audit were treated on cardiology wards, 40% on general medical wards, and 10% on other wards, which includes care of the elderly (COTE). Men and younger patients were more likely to be treated on a cardiology ward.

57% of patients were seen by a consultant cardiologist, 22% by a heart failure nurse specialist, 6% by any other consultant with specialist skills for heart failure management, and, overall, 78% of patients were seen by one of more of the above heart failure specialists. Of those patients not treated on a cardiology ward, only a quarter were seen by a consultant cardiologist, though about 60% of these patients saw one or more clinicians from the specialist heart failure team.

The mean length of stay was 12.2 days, and the median stay was 8 days. Patients who received specialist input, irrespective of their whereabouts, had longer lengths of stay than those receiving no specialist input into their management. It is widely suggested that heart failure specialists appear more rigorous in ensuring that patients receive optimal care and are stable prior to discharge, which is expected to translate into better outcomes including fewer early readmissions to hospital and a lower mortality.

1.2.4 Diagnosis

99% of patients received an electrocardiogram (ECG), and 91% had an imaging test of heart function, usually an echocardiogram (echo). Most patients (72%) had left ventricular systolic dysfunction (LVSD); 25% of patients were diagnosed with valve disease, 8% with diastolic dysfunction and 6% with left ventricular hypertrophy. These diagnoses are not mutually exclusive. Women and older patients were less likely to have LVSD to explain their heart failure.

1.2.5 Treatment

Prescription rates for disease modifying treatments have increased slightly since last year, although rates of exception reporting have also increased.

Most (85%) patients with LVSD, and without a stated contraindication, were prescribed an ACE inhibitor or an ARB and 82% were prescribed a beta blocker at discharge – both of these are recommended by NICE as first-line treatments for LVSD. 49% were prescribed an MRA, which is recommended as a second-line treatment. Only 39% of patients with LVSD were prescribed all three of the above treatments. Prescription rates for ACE inhibitors, beta blockers and MRAs were all higher when patients were admitted to cardiology wards or seen by members of the heart failure team.

The patients with HF due to LVSD who leave hospital with a prescription of these drugs have significantly better outcomes than those who do not. Although prescription rates are fairly high, they do not include patients for whom the therapies are contraindicated; thus prescription rates for ACE inhibitor and beta blocker should be at or near 100%.

1.2.6 Monitoring and follow-up

Over half of the patients in the audit were referred for cardiology follow-up, and almost 60% were referred for follow-up with a heart failure nurse specialist, although only 11% of patients were referred to cardiac rehabilitation services. These data suggest improving service provision compared to previous audit years. Whilst only 4% were formally referred to specialist palliative care services, many aspects of palliative care are routinely delivered by members of the heart failure team, so this figure needs to be interpreted with care.

Patients treated on cardiology wards and those seen by heart failure specialists were more likely to receive referrals to heart failure follow-up services, which are shown to have a beneficial impact on outcomes.

1.2.7 Hospital level analysis

For hospitals that submitted at least 50 patient records to the audit, hospital-level analysis is published for ten clinical indicators. These analyses are published to allow hospitals to benchmark their practice against each other, and against the national average.

The audit encourages hospitals to regularly review their audit data, both in order to monitor and drive changes in clinical practice, and to ensure high data quality. As of April 2013, hospitals will be expected to enter data on at least 70% of heart failure discharges, which will ensure a more accurate picture of the variation in the treatment and management of heart failure at a hospital level.

In 2013/14 50% of all records submitted to the audit by each hospital should have all of the mandatory fields completed, that is, with no 'unknown' values. In 2014/15, 70% of all records submitted by each hospital must meet this level of completeness.

1.2.8 Mortality

In-hospital mortality has dropped from 11.1% in 2011/12 to 9.4% in 2012/13. This is a relative reduction of 15.3%, and an absolute reduction of 1.7%. Mortality rates for those patients who survived to discharge in 2012/13 are also lower than recorded in 2011/12, with 24.6% dying within the follow-up period, compared to 26.2% last year representing a 6.1% relative reduction and a 1.6% absolute reduction. This is consistent with improved implementation of recommended practice for the treatment of heart failure. The decrease in mortality rates goes hand-in-hand with increased prescribing rates, treatment in specialist wards and referral to heart failure follow-up services. We hope this improvement will be sustained or increase in future years.

Despite this, there is still significant variation in mortality rates dependent on the quality of treatment received by patients. For mortality, there is marked improvement associated with treatment in a cardiology ward and prescription of evidence-based therapies, seen not only in single-variable analysis, but also in multivariate analysis, when other confounding factors are taken into account.

Notably, in-hospital mortality stood at 7.0% for patients treated on cardiology wards, compared to 11.3% for those treated on general medical wards and 14.4% for patients treated on other wards. Of those receiving no specialist input, 14.4% died in hospital, compared with 7.5% of patients receiving input into their care from a consultant cardiologist or other consultant with interest in heart failure, or a heart failure specialist nurse. In multivariate analysis, when age, severity of disease and biomarkers are accounted for, the benefit of being treated on a cardiology ward remains. Patients not treated on a cardiology ward are 54% more likely to die in hospital and 14% more likely to die following discharge.

For the first time this year, the National Heart Failure Audit has published 30-day mortality. 6.1% of patients who survived to discharge died in the 30 days following discharge. Overall, therefore, 14.9% of patients died either in hospital or in the month following discharge – almost one in seven patients.

2 Recommendations

1. Data quality

The National Heart Failure Audit has developed a minimum data standard, in an attempt to ensure that the records submitted to the audit are fit for purpose. As we are working towards the development of a risk model over the next two years, the minimum data standard focuses on the core dataset, and reducing the number of fields marked 'unknown'. This maximises the records that can be used in the risk model.

In 2013/14 50% of all records submitted to the audit by each hospital should have all of the mandatory fields completed, that is, with no 'unknown' values. In 2014/15, 70% of all records submitted by each hospital must meet this level of completeness, and a higher percentage will apply to subsequent years.

We will create an online tool to monitor compliance with the minimum data standard, to allow hospitals to keep track of their progress.

2. Clinical coding

The coding of heart failure continues to be problematic, and this year 9% of records were excluded on the basis that the patient did not have a confirmed diagnosis of heart failure, and did not have any clinical indication of heart failure.

All acute patients who are given a discharge code indicating a diagnosis of heart failure should be included in the audit. This allows us to comprehend and report on the extent of the problems with clinical coding.

We are aware that some of you rigorously review the notes and would suggest that if you come across patients who really do not have heart failure, but who have been coded as such, efforts should be made to change their coding diagnosis by working with your coding department. If this is undertaken as soon as possible following an admission it will help all concerned. The percentage of discharge coded patients submitted by your Trust to the audit with a confirmed diagnosis of heart failure can be monitored using the existing online tools.

3. Treatment and stability on discharge

All patients with LVSD should be treated in line with the NICE clinical guideline. ACE inhibitors and beta blockers licensed for heart failure should be offered as a first-line treatment. All patients with LVSD should be offered a beta blocker, including older patients and those with peripheral vascular disease, erectile dysfunction, diabetes, interstitial pulmonary disease and COPD. An MRA should then be offered.

The audit allows you to record when a therapy is contraindicated, or not indicated, for a particular patient. Therefore ACE inhibitor/ARB and beta blocker prescription rates should be at or near 100%, with contraindications accurately recorded and we would similarly expect higher rates of MRA prescription than those currently seen. Most patients with LVSD should leave hospital on all three disease modifying drugs, unless a true contraindication has been identified.

Patients should be stable on oral therapy before being discharged from hospital. This means that prescription levels should not be changed, and the patient's well-being, weight and renal function should be stable, for 48 hours prior to discharge.

The same principles apply to patients with heart failure from other causes, though drug choices will be driven by the underlying aetiology, which may require specific treatment or intervention.

All those admitted to hospital with acute heart failure, irrespective of type or aetiology, should be seen by a member of the multi-disciplinary heart failure team, within two weeks of leaving hospital. The most effective way of ensuring this happens is for the patient to be given that appointment before they leave hospital so they understand who they are to see, where and when. These details should also be included in the discharge summary given to the patient as they leave hospital, and sent in parallel to the GP. Earlier inpatient referral to the specialist hospital HF team will facilitate this process.

4. Specialist input

Patients should be treated on a cardiology ward where possible. When this is not possible, or where other co-morbidities suggest a different specialist ward may confer particular overriding benefit for that individual patient, they should nonetheless have input from a heart failure specialist, and preferably the consultant cardiologist or another consultant, with specific remit for heart failure patients.

3 Introduction

3.1 Heart Failure

Heart Failure is a complex clinical syndrome characterised by the reduced ability of the heart to pump blood around the body. It is caused by abnormalities in the structure and function of the heart, for example damaged heart tissue following a heart attack, cardiomyopathy (deterioration of the heart muscle), valve disease and high blood pressure. It is thought that around 70% of all heart failure cases are caused by coronary heart disease.

Cardiac dysrhythmia (irregular heartbeat) and kidney dysfunction often contribute to and complicate heart failure, and the condition is characterised by shortness of breath, fatigue and fluid retention.

It is estimated that around 800,000 people in the UK suffer from heart failure, a number which will continue to rise due to an ageing population, improved survival rates following a heart attack, and more effective treatments.[1] British Heart Foundation (BHF) statistics estimating the incidence and prevalence of heart failure in the UK, using Clinical Practice Research Datalink (CPRD) data, show that both rise steeply with age. BHF analysis shows that 0.9% of men and 0.7% of women in the UK suffer from heart failure, rising to 13.1% of men and 11.9% of women aged over 75 years old.[2]

Heart failure constitutes a large burden on the NHS, accounting for one million inpatient bed-days – 2% of the NHS total – and 5% of all emergency hospital admissions.[3] Survival rates for heart failure patients are variable, dependent on the age and severity of disease of the patient, and the quality of care they receive. Outcomes are consistently poor for patients who receive suboptimal care, but input from heart failure specialists and prescription of evidence-based heart failure therapies have a significant impact on prognosis and life expectancy. The National Heart Failure Audit has reported around one in ten patients dying in hospital, and of those who survive between one-quarter and one-third dying within the year of their admission. However these mortality rates are beginning to reduce, reflecting more consistent implementation of guidelines for recommended practice.

Heart failure patients can also experience poor quality of life, experiencing pain, shortness of breath and fatigue. Heart failure patients also often suffer from mental health problems, with studies showing that over half report low mood, and more than a third suffer from major depression.[4 5]

3.2 The role of the audit

Clinical audit is a quality improvement process for healthcare, which aims to enhance the care of patients by systematically reviewing medical practice against explicit criteria, modifying it where necessary.

The National Heart Failure Audit was established in 2007 with the aim of helping clinicians improve the quality of heart failure services and to achieve better outcomes for patients. The audit aims to capture data on clinical indicators which have a proven link to improved outcomes, and to encourage the increased use of clinically recommended diagnostic tools, disease modifying treatments and referral pathways. Over the past six years, the audit has consistently shown that following existing clinical guidelines for best practice results in significantly better outcomes for patients.

The clinical standards used by the National Heart Failure Audit include NICE Clinical Guidance for Chronic Heart Failure (2010),[6] NICE chronic heart failure quality standards (2011),[7] and European Society of Cardiology guidelines for the diagnosis and treatment of acute and chronic heart failure (2012).[8] The audit dataset corresponds to these standards, and thus is able to evaluate the implementation of these existing evidence-based recommendations by hospitals in England and Wales.

The audit dataset is regularly reviewed and updated to ensure that it remains in line with contemporary guidance. In April 2012 the audit dataset was revised to bring it in line with the guidelines by including fields concerning specialist and multi-disciplinary team input, cardiac rehabilitation, oral stability on discharge, and discharge planning. The Project Board took the opportunity to also include a number of fields which will allow the development of a risk model, enabling the publication of far more accurate risk-adjusted outcomes data.

3.3 The scope of the audit

The National Heart Failure Audit collects data on patients discharged from hospitals in England and Wales with a primary diagnosis of heart failure.[i] The audit covers patients with an unscheduled admission to hospital for heart failure only, so those patients admitted for elective procedures, for example elective pacemaker implantation or angiography, are not included.

Participation in the audit is mandated by the Department of Health's NHS Standard Contracts for 2012/13,[9] and by the NHS Wales National Clinical Audit and Outcome Review Plan 2012/13.[10]

In 2012/13 participation was defined as an NHS Trust or Welsh Health Board submitting a minimum of 20 cases to the audit database each calendar month, or the full number of cases if fewer than 20 patients with heart failure are discharged from the Trust in a month. From April 2013 onwards, Trusts have been expected to include all patients discharged with a primary diagnosis of heart failure in the audit.

i. This is designated by any of the following ICD-10 codes: I11.0 Hypertensive heart disease with (congestive) heart failure; I25.5 Ischaemic cardiomyopathy; I42.0 Dilated cardiomyopathy; I42.9 Cardiomyopathy, unspecified; I50.0 Congestive heart failure; I50.1 Left ventricular failure; I50.9 Heart failure, unspecified.

Although a large proportion of the treatment of heart failure occurs in the community, the National Heart Failure Audit currently only covers unscheduled admissions to hospital. Extension of the audit to primary care is currently under consideration, with a pilot project in the pipeline.

3.4 Use of audit data

Participation in the audit is to be included in Trusts' Quality Accounts,[11] and the NHS Information Centre's Indicators for Quality Improvement (IQI), a set of indicators developed to describe the quality of NHS service, include participation in the National Heart Failure Audit.[12]

In addition to this publicly available annual report, the analyses produced by the National Heart Failure Audit are used by national groups with a legitimate interest in the analysis. The publication of clinical audit data is part of the Government's Transparency Agenda, and as part of this National Heart Failure Audit analysis by hospital is published on data.gov.uk in an accessible format. Hospital level analysis can be accessed by each hospital throughout the year via the Lotus Notes-based audit platform. These online reports give hospitals information on their clinical practice on a month-by-month basis. Using these reports to scrutinise audit data is essential to ensuring high data quality, and a useful way of monitoring the treatment of heart failure patients against NICE and ESC guidelines.

There are future plans to provide anonymised National Heart Failure Audit data, at a hospital level, to Strategic Clinical Networks and Clinical Commissioning Groups. An archive of annual audit reports, containing national aggregate data and hospital-level analysis, is also available for download on NICOR's publicly accessible website.[13]

Earlier this year, for the first time, a version of the annual report was developed specifically for patients and the public. The report was written in conjunction with patient representatives, and has been widely distributed by patient groups and charities. Following the success and positive feedback of the report, the audit is hoping to produce a printed version of the 2012/13 patient report. The report can be found on the NICOR website, along with the National Heart Failure Audit Annual Reports.[14]

3.5 Audit governance

The National Heart Failure Audit is part of the National Institute for Cardiovascular Outcomes Research (NICOR), which manages six cardiovascular clinical audits and a growing portfolio of new health technology registries, including the UK TAVI registry. NICOR is part of the National Centre for Cardiovascular Prevention and Outcomes, which sits within the Institute of Cardiovascular Science at University College London.

The National Heart Failure Audit is commissioned by the Healthcare Quality Improvement Partnership as part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP), which comprises of 40 national clinical audits.

The development and strategy of the audit is overseen by a project board, the membership of which is made up of stakeholders in the audit, including Consultant Cardiologists, Heart Failure Specialist Nurses, Clinical Audit Managers, primary care clinicians, and NICOR staff. The project board is chaired by the audit's clinical lead, Theresa McDonagh, Professor of Heart Failure and Consultant Cardiologist at King's College Hospital. Current membership of the project board can be found in appendix 1.

The audit is supported by, and receives clinical direction from, the British Society of Heart Failure.

3.6 Data collection and IT

Data collection and data entry for the audit should be treated as a collaborative process between various hospital departments.

As the patients included in the audit are selected based on their discharge diagnosis, there should be a dialogue between cardiology clinicians and the clinical coding department in each hospital to ensure that heart failure patients are being coded accurately. Effective systems of data collection and data entry tend to use Heart Failure Nurse Specialists, or other clinical staff, to interpret medical notes and collect data, and clerical staff or clinical audit facilitators to enter it onto the database. This ensures that the data are clinically accurate whilst making optimal use of clinicians' time. The whole process should be overseen by a clinical lead, usually a Consultant Cardiologist with a specific remit for heart failure patients, who takes overall responsibility for the audit at each hospital site.

Hospitals are ultimately responsible for ensuring that data are accurate, but the database contains a series of validation checks to ensure that contradictory and clinically improbable data are not entered into the audit. A pro forma, designed to aid data collection, can be downloaded from the NICOR website, along with a set of application notes which define and explain core data items.[15] The application notes will be regularly reviewed to ensure they are clinically accurate and will be amended in response to comments and questions from users to cover frequently asked questions and points of contention.

All data are submitted electronically by hospitals into a secure central database. Data are currently submitted via Lotus Notes software, but a web-based audit application is currently in development, to be rolled out in November 2013. The web-based audit will enable more people in each hospital to have access to the audit, and for data to be submitted from any computer with an internet connection, provided a valid ID and password is used. To ensure patient confidentiality the database uses advanced data encryption technology and access control through a secure key system. Data can be inputted manually or imported from locally developed systems or third party commercial databases.

3.7 Analysis

NICOR's Analysis Team developed programs run on a set of meta-data tables that define many aspects of analytic work. The amount of meta-data required to define one National Heart Failure Audit analysis is quite large. For example, the meta-data required for recoding categorical variables in the Heart Failure data currently consists of 980 values. These meta-data are regularly curated by the Analysis Team and will be reviewed by the audit clinical leads to ensure that the analyses are properly specified, transparent and reproducible.

All analysis except for multiple imputation of missing data was conducted using R statistical language. In the next year this will also be operated in R, thus standardising the process across NICOR audits.

Duplicates were identified via the combination of patients' pseudonymised NHS number, date of admission and discharge, which is more robust than previously adopted methods. Subsequently, index patient record in the analytic period was identified through their pseudonymised NHS number, which is an improvement from previous analyses that focused a generated patient identifier that uses a combination of hospital and hospital number.

For almost all of the descriptive statistics presented, percentages were rounded to 0 decimal places. Thus, there are some analyses where percentage breakdowns add up to slightly more or less than 100%. This is not in error, and is simply a consequence of rounding.

4 Findings

4.1 Data cleaning and data quality

The National Heart Failure Audit has collected 177,018 records of admissions to hospitals for heart failure between October 2006 and March 2013. 44,689 of these admissions had a discharge date between 1 April 2012 and 31 March 2013.

Table 1: Number of records excluded from analysis in this report

Records excluded 2012/13 (n)	Records excluded 2006-13 (n)	Dataset	Reason
5	33	Admission	Missing or invalid hospital identifier
1	15	Admission	Identical duplicate row
4	71	Readmission	Identical duplicate row
783	3277	Admission/ readmission	Non-identical rows with identical NHS number and identical admission/ discharge dates
2	4155	Admission/ Readmission	Time to discharge <0

After data cleaning and exclusion of invalid records, the total number of records was 43,894.

Mortality data for patients in the National Heart Failure Audit is provided by the Data Linkage and Extract Service of the Health and Social Care Information Centre. This service links audit data with death registration data from the Office of National Statistics (ONS).[16]

Table 2: Number of records excluded from mortality analysis in this report

Records excluded 1-year mortality analysis (n)	Records excluded 4-year mortality analysis (n)	Reason
233	865	No life status
292	861	Time from discharge to follow-up either <0 or >longest possible interval

4.2 Participation

4.2.1 Number of Trusts

In 2012/13, 144 NHS Acute Trusts in England and six Local Health Boards in Wales discharged patients with a coded diagnosis of heart failure, according to data from HES and PEDW. Out of these, 139 Trusts (97%) and six Health Boards (100%) submitted data to the audit – a total of 97% of all eligible institutions. The audit has thus achieved its target participation rate of 95% of all Trusts and Health Boards.

In England 95 of the eligible institutions (66%) met the National Heart Failure Audit participation requirements of 20 cases per calendar month, or submitted more than 70% of their HES-recorded heart failure discharges. 70% was chosen as the cut-off point because this was the overall case ascertainment rate aimed for in the 2012/13 audit. A further 38 Trusts (26%) submitted less than 70% of their HES figures, but still between 10 and 20 cases per month.

In Wales five Health Boards (83%) met the participation requirements of at least 20 cases per calendar month.

In 2013/14, Trusts will be expected to include 70% of patients discharged with a primary diagnosis of heart failure in the audit.

No data were submitted by five Trusts in England. This is a great improvement from 12 non-submitting Trusts and one Local Health Board in 2011/12. By the end of the 2013/14 audit year, we hope to be collecting data from all Trusts in England.

4.2.2 Number of records

In 2012/13 the National Heart Failure Audit recorded 43,894 admissions to hospital with heart failure, following data cleaning. This is an increase of 18% from the 37,076 admissions recorded in 2011/12. This was made up of 41,932 records from English hospitals and 1,962 records from Welsh hospitals. It consisted of 36,788 index admissions and 7,106 readmissions within the year.

4.2.3 Case ascertainment

The total number of cases where a patient was discharged with a primary diagnosis of heart failure recorded by HES and PEDW in 2012/13 was 72,819. The National Heart Failure Audit therefore currently represents 60% of all emergency heart failure admissions in England and Wales.

The number of emergency admissions to hospital with a primary discharge diagnosis of heart failure recorded by HES and PEDW has risen significantly since last year. In 2011/12 the audit recorded 59% case ascertainment out of 63,341 recorded discharges. PEDW numbers remain broadly similar (4,348 in 2011/12 v. 4,165 in 2012/13), but HES figures increased 16% from 59,083 to 68,654. Thus, although case ascertainment has remained similar to last year, this represents a significant increase in the size of the audit dataset for 2012/13. The reasons for this increase remain obscure: the prevalence of heart failure is increasing, though not at this rate, and there have been no officially sanctioned changes to coding practice. Budget cuts and changes in social care could have impacted on hospital admissions, but it is unlikely to account for such a steep increase.

While the 2012/13 PEDW data used to measure case ascertainment is final, 2012/13 HES data is provisional, as final HES data is not released until November. In 2011/12 the difference between the provisional data and the final Annual Refresh for HES Emergency Admission data was a 0.02% increase in the number of admissions.[17] It was therefore deemed appropriate to use the provisional data, as it offers a better comparator for case ascertainment than final 2011/12 HES data.

Participation and case ascertainment by hospital can be found in section 4.9 of this report.

4.2.4 Diagnosis of heart failure

Of the 43,894 patients in the 2012/13 audit, 3,844 (9%) were excluded from analysis in this report because they did not in fact have heart failure, despite having a heart failure clinical code given as their primary diagnosis on discharge.

The audit records whether a patient has been given a clinical diagnosis of heart failure, as a way of determining the accuracy of the clinical coding of heart failure. A diagnosis of heart failure is defined by the audit as a diagnosis that has been confirmed by imaging or brain natriuretic peptide (BNP) measurement either during the current admission or at a previous time. It is acknowledged that in some cases a clinician may justifiably diagnose heart failure in the absence of tests.

Out of the patients with no clinical diagnosis of heart failure, those exhibiting either breathlessness or oedema on admission, who also had a recorded echo abnormality, were determined to in fact have heart failure and were included in the audit. The remaining 3,844 patients were excluded from the analysis in this report on the basis that they did not have heart failure. These records remain included in hospital participation and case ascertainment figures, on the assumption that they were coded as having heart failure on discharge from hospital.

4.3 Demographics

4.3.1 Age

The mean age of patients on their first admission to hospital in 2012/13 was 77.5 years, with standard deviation of 12.4 years. The median age at first admission was 80.0 years. On first admission, 66% of patients were over 75 and 30% over 85.

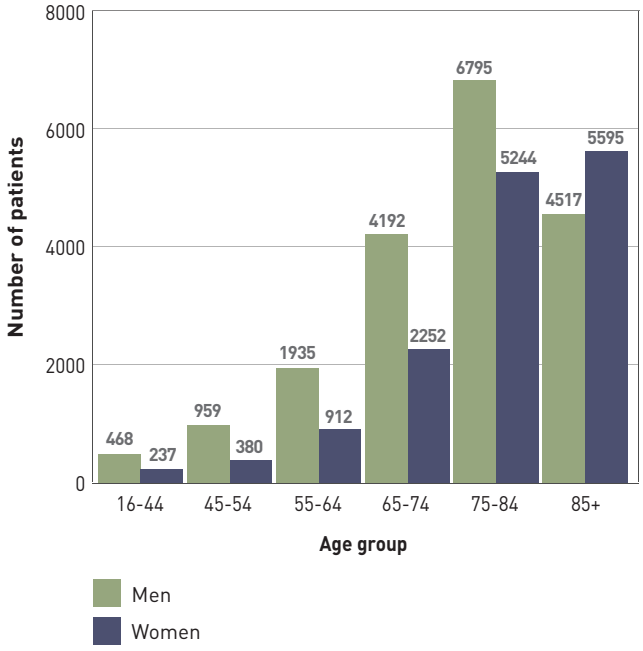
On readmission the mean age was slightly younger, at 76.6 years, with standard deviation of 12.6 years. The median age at readmission was 79.1 years. On readmission, 63% of patients were over 75 and 28% over 85.

4.3.2 Age and sex

The mean age at first admission was 75.7 years for men, and 80.0 years for women. As in previous reports, the majority of patients up to the age of 85 were men (61%); in those over the age of 85 there were more women (55%) (figure 1).

Overall there were more men recorded in the audit than women, with men comprising 56% of the patient group at index admission and 58% at readmission. This is a very similar split to previous years.

Fig 1: Age at first admission by sex

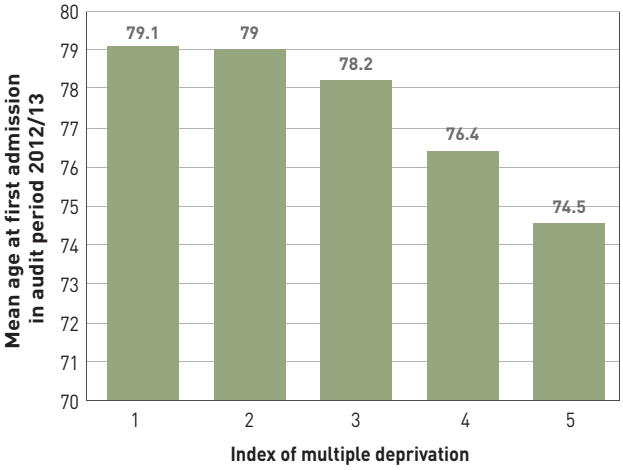


4.3.3 Age and Index of Multiple Deprivation

An Index of Multiple Deprivation was assigned to each patient based on their postcode of residence. Indices of Multiple Deprivation are allocated to 34,378 areas in England and Wales, each with an average of 1,500 and a minimum of 1,000 residents. Seven factors are combined to produce a single deprivation score for each area: income deprivation; employment deprivation; health deprivation and disability; education, skills and training deprivation; barriers to housing and services; crime; and living environment deprivation.

Mean age of admission for patients in the most deprived quintile, with a deprivation score of 5, was 74.5 years (standard deviation 13.6), compared with a mean age at admission of 79.1 years (standard deviation 11.6) for patients in the least deprived quintile, with a deprivation score of 1 (figure 2). This is a difference of 4.6 years, similar to the mean age difference recorded last year (5.0 years). The median age of patients with a deprivation score of 5 was 77.0 years, compared to a median age of patients with a deprivation score of 1 of 81.3 years.

Fig 2: The effect of deprivation on age of first admission



1= least deprived 5= most deprived

4.4 Hospital care

4.4.1 Main place of care

As in previous years, around half of all patients were treated in a cardiology ward for the majority of their time in hospital (table 3). In addition to the 40% treated on general medical wards, 10% of patients were treated in other wards – this includes care of the elderly wards and any other specialist wards.

Table 3: Main place of care

Place of care	Index admission (%)	Readmission (%)
Cardiology ward	50	52
General medical ward	40	37
Other ward	10	11

Patients were more likely to be treated on a cardiology ward if male (table 4) and younger (table 5), and less likely to be treated on a general medical ward or other ward. As seen above, men are likely to be admitted to hospital with heart failure at a younger age than women, which may indicate that age, rather than gender per se is the reason for this. Older heart failure patients with multiple co-morbidities may be treated on care of the elderly or generalist wards rather than specialist cardiology wards.

Table 4: Main place of care by sex

Place of care	Men (%)	Women (%)
Cardiology ward	55	44
General medical ward	36	46
Other ward	9	11

Table 5: Main place of care by age

Place of care	16-74 years (%)	≥75 years (%)
Cardiology ward	65	43
General medical ward	29	46
Other ward	6	11

4.4.2 Specialist input

In April 2012, the audit added a number of new fields to its database. These included a more detailed assessment of the specialist input received by the patient. Over half of all patients were seen by a cardiologist on their index admission in 2012/13, over 20% were seen by a heart failure nurse specialist, and 6% were seen by another consultant with a specific remit for heart failure patients (table 6). Overall around 80% of patients were seen by a heart failure specialist in some capacity, both on first admission and on readmission. Note that patients could be seen by more than one of the above heart failure specialists.

This year, the audit also began recording whether a patient was seen by a member of the heart failure multidisciplinary team (MDT). An MDT is a group of specialists, which, in the case of heart failure will be led by a consultant with an interest in heart failure, often a consultant cardiologist, and may include heart failure nurse specialists, pharmacists, dieticians, physiotherapists, psychologists and primary care physicians. The majority of patients in the audit were seen by a member of an MDT (table 6).

Table 6: Specialist input

Specialist	First admission (%)	Readmission (%)
Consultant cardiologist	57	61
Heart failure nurse specialist	22	20
Other consultant with interest in heart failure	6	6
Any HF specialist	78	80
Other clinician	22	20
Input from HF MDT	66	70

Men were more likely to have input from a heart failure specialist, and by a cardiologist, than women (table 7). They were also more likely to have input into their management by a member of the MDT. Women were more likely than men to be seen only by clinicians who do not have a heart failure specialism. Again, this is likely to be linked to the tendency for women to be treated on non-cardiology wards.

Older patients were also less likely to receive specialist input or to be seen by a cardiologist than younger patients, corroborating with the tendency seen above in section 4.4.1, although they were more likely to see a heart failure nurse specialist or

non-cardiology consultant with an interest in heart failure (table 8). In the case of older patients, the latter may often be a care of the elderly consultant with a remit for heart failure patients.

Table 7: Specialist input by sex

Specialist	Men (%)	Women (%)
Consultant cardiologist	62	51
Heart failure nurse specialist	21	22
Other consultant with interest in heart failure	6	7
Any of the above	82	74
Other clinician	18	26
Input from HF MDT	68	62

Table 8: Specialist input by age

Specialist	<75 years (%)	≥75 years (%)
Consultant cardiologist	70	50
Heart failure nurse specialist	19	23
Other consultant with interest in heart failure	4	7
Any of the above	87	74
Other clinician	13	26
Input from HF MDT	72	63

Unsurprisingly, the vast majority of patients treated on a cardiology ward were seen by a cardiologist, or another heart failure specialist (table 9). However, interestingly the majority of patients who were treated on general and other wards also received specialist input into their management. A quarter of patients on general medical and other wards were seen by a consultant cardiologist, and around 60% of patients were seen by a specialist in both cases.

Patients treated on cardiology wards were substantially less likely to be seen by a heart failure nurse specialist.

Table 9: Specialist input by place of care

Specialist	Cardiology ward (%)	General medical ward (%)	Other ward (%)
Consultant cardiologist	89	24	25
Heart failure nurse specialist	13	30	33
Other consultant with interest in heart failure	3	10	9
Any of the above	98	58	61
Other clinician	2	42	39
Input from HF MDT	78	52	57

4.4.3 Length of stay

Both mean and median lengths of stay remain long, with considerable spread (table 10). Both median and mean length of stay are one day shorter than recorded in 2011/12. This is likely to be primarily due to the re-inclusion of 0 and 1 day admissions in audit analysis this year, rather than any significant change in practice.

Table 10: Length of stay

	Index admission	Readmission
Mean LOS (days)	12.2 ±13.7	12.3 ±13.3
Median LOS (days)	8 (IQR 4-16)	8 (IQR 4-16)

Patients treated on general medical wards had shorter lengths of stay than those treated on cardiology wards and other wards; this may indicate sub-optimal treatment and premature discharge, rather than good practice (table 11), especially when viewed in light of the independent benefit of being treated on a cardiology ward, shown in the regression analyses in section 5. The long mean length of stay recorded in other wards could be due to the inclusion of care of the elderly wards in this group, which will include some of the sickest patients.

Patients who had specialist input had noticeably longer mean and median lengths of stay compared to those without specialist input into their care (table 12). This provides support to the claim that specialist cardiology clinicians spend more time up-titrating therapies and ensuring stability prior to discharge, resulting in longer hospital admissions.

Table 11: Length of stay by place of care

	Cardiology ward	General medical ward (%)	Other ward (%)
Mean LOS (days)	12.5 ±12.6	11.4 ±14.1	13.8 ±16.7
Median LOS (days)	9 (IQR 5-16)	7 (IQR 3-15)	9 (IQR 3-18)

Table 12: Length of stay by specialist input

	Seen by any HF specialist (%)	No specialist input (%)
Mean LOS (days)	12.8 ±13.3	9.8 ±14
Median LOS (days)	9 (IQR 5-16)	6 (IQR 2-12)

There was wide variation in both the mean and median length of stay between hospitals. The longest mean length of stay for a hospital was 24.0 days, and the shortest was 2.6 days (figure 3). The longest median length of stay was 15 days and the shortest was 1 day (figure 4).

Fig 3: Mean length of stay by hospital

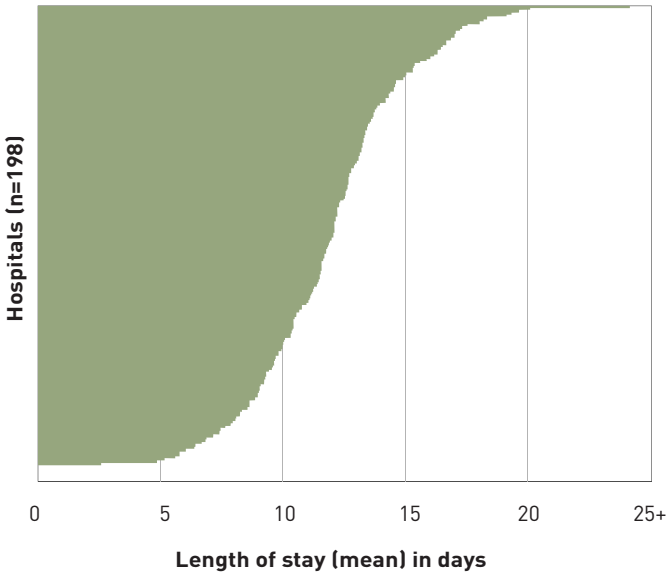
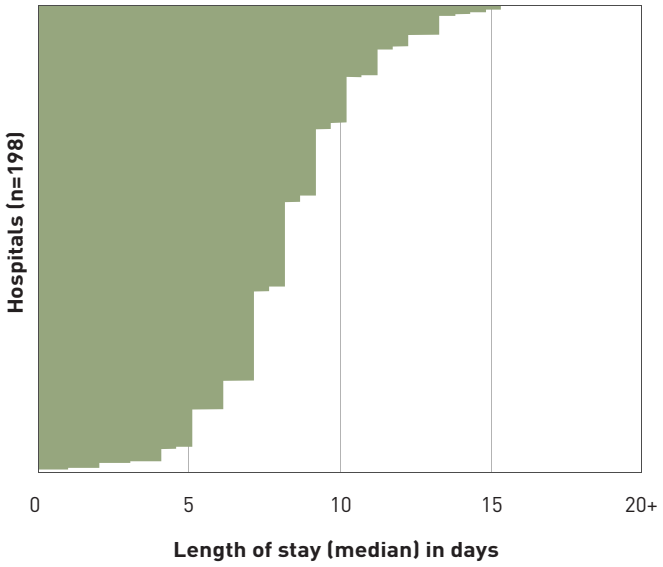


Fig 4: Median length of stay by hospital



4.5 Aetiology and comorbidity

4.5.1 Medical history of patients included in the audit

The medical history of patients admitted to hospital with heart failure is very similar to that recorded in previous years (table 13). Just under half of all patients had a history of ischaemic heart disease (IHD) and just over half had hypertension, with over a quarter of all patients in the audit suffering from both.

Arrhythmia, myocardial infarction, diabetes and valve disease were also very common, and a number of patients also suffered from asthma or COPD.

Table 13: Medical history of heart failure patients in 2012/13

Medical History	Total (%)
Ischaemic heart disease (IHD)	47
Acute myocardial infarction (AMI)	31
Valve disease	23
Arrhythmia	42
Hypertension	55
Chronic renal impairment	24
Diabetes	31
Asthma	9
Coronary Obstructive Pulmonary Disease (COPD)	17
IHD and hypertension	27

4.5.2 Medical history by diagnosis of LVSD

Patients with a history of IHD, arrhythmia, myocardial infarction and renal impairment were more likely to be given a diagnosis of left ventricular systolic dysfunction (LVSD) (table 14). Patients with valve disease or hypertension were more likely to have non-systolic heart failure.

Table 14: Medical history by diagnosis of LVSD

Medical History	LVSD (%)	Non-LVSD (%)	p-value
Ischaemic heart disease (IHD)	51	40	< 0.001
Atrial fibrillation	43	40	0.177
Acute myocardial infarction (AMI)	36	22	< 0.001
Valve disease	20	29	< 0.001
Hypertension	53	60	< 0.001
Chronic renal impairment	27	20	< 0.001
Diabetes	31	30	0.084
Asthma	9	9	0.115
Coronary Obstructive Pulmonary Disease (COPD)	17	18	0.001

4.5.3 Symptoms and signs

New York Heart Association (NHYA) classifications are assigned to patients with heart failure to record the severity of their symptoms, in particular the extent of their breathlessness. NYHA class I and II denote no or mild symptoms, class III denotes moderate symptoms, and class IV denotes severe symptoms. As recorded in previous years, the audit showed the majority of patients to be in NYHA class III or IV on admission; overall 79% of patients were in NYHA II/IV on first admission, and 84% on readmission (table 15).

Half of all patients exhibited moderate or severe peripheral oedema (accumulation of fluid in the lower limbs) at first admission, and slightly more than half at readmission.

Table 15: Symptoms and signs of heart failure in 2012/13

Symptom/sign of heart failure	Total on admission (%)	Total on readmission (%)
NYHA class I/II	21	16
NYHA class III	44	44
NYHA class IV	35	40
No/mild peripheral oedema	50	45
Moderate peripheral oedema	32	33
Severe peripheral oedema	18	22

4.6 Diagnosis

4.6.1 Diagnostic tests

The percentage of patients receiving an echo rose from 86% in 2011/12 to 91% in 2012/13, indicating that NICE guidelines, which recommend echocardiography for all patients with suspected heart failure, are being implemented widely. Almost all patients receive an ECG (table 16).

Table 16: Diagnostic tests received

Diagnostic tests	Total received (%)
ECG	99
Echo	91

4.6.2 Echo

Men were slightly more likely than women to have received an echo, as were younger patients compared to older patients (tables 17 and 18). This echoes the findings in previous years.

Table 17: Receipt of echo by sex

	Men (%)	Women (%)
Received echo	93	90
Echo not done (planned)	3	5
Echo not done (not planned)	4	6

Table 18: Receipt of echo by age

	16-74 years (%)	≥75 years (%)
Received echo	94	90
Echo not done (planned)	3	4
Echo not done (not planned)	3	6

Similarly, in line with previous findings, patients treated on cardiology wards were more likely to receive an echo (table 19). Most striking is the difference between the percentage receiving an echo when they were treated by a specialist (95%) to the percentage receiving an echo who also received no specialist input into their care (79%) (table 20).

Table 19: Receipt of echo by place of care

	Cardiology ward	General medical ward	Other ward
Received echo	96	86	88
Echo not done (planned)	2	7	4
Echo not done (not planned)	2	7	7

Table 20: Receipt of echo by specialist input

	Seen by any HF specialist (%)	No specialist input (%)
Received echo	95	79
Echo not done (planned)	3	9
Echo not done (not planned)	3	12

4.6.3 Echo diagnosis

Of those people who had an echo, the following diagnoses were given (table 21). Note that patients could be given a diagnosis of more than one of the options below, but could not be given a 'normal' echo diagnosis in combination with any other diagnoses.

Table 21: Overall echo diagnosis

Echo diagnosis	Total (%)
Normal echo	4
Left ventricular systolic dysfunction (LVSD)	72
Left ventricular hypertrophy (LVH)	6
Valve disease	25
Diastolic dysfunction	8
Other diagnosis	9

Of all patients who received an echo, men were more likely to be diagnosed with LVSD and women were more likely to be given a diagnosis of other types of heart failure (table 22). Younger patients were also more likely to be given a diagnosis of LVSD, with more patients over 75 diagnosed with other types of heart failure (table 23).

Table 22: Echo diagnosis by sex

Echo diagnosis	Men (%)	Women (%)
Normal echo	3	5
Left ventricular systolic dysfunction (LVSD)	78	63
Left ventricular hypertrophy (LVH)	6	7
Valve disease	21	31
Diastolic dysfunction	7	10
Other diagnosis	8	10

Table 23: Echo diagnosis by age

Echo diagnosis	<75 years (%)	≥75 years (%)
Normal echo	4	4
Left ventricular systolic dysfunction (LVSD)	80	67
Left ventricular hypertrophy (LVH)	5	7
Valve disease	17	30
Diastolic dysfunction	7	9
Other diagnosis	8	9

4.7 Treatment on discharge for LVSD

All analyses concerning therapies prescribed on discharge only apply to those patients who were given a diagnosis of LVSD and who survived to discharge.

Prescription rates of ACE inhibitors and ARBs remain broadly similar to those recorded in 2011/12 (table 24). Prescription of diuretics and digoxin also remain similar to last year. Beta blocker use appears to have risen a little (from 78% in 2011/12 to 82%), as has use of MRA (from 45% in 2011/12 to 49%).

However, it should be noted that there has been an increase in patients reported as being contraindicated for all of ACE inhibitors, ARBs, beta blockers and MRAs. This may account for some of the apparent increase in prescribing rates.

39% of patients were discharged on all three of the recommended therapies for heart failure – ACE inhibitor/ ARB, beta blocker and MRA. Outcomes analysis from the audit (see section 5) shows that patients discharged on all three drugs have better outcomes following discharge than those discharged on other combinations of this triumvirate.

Table 24: Treatment on discharge for LVSD

Medication	Total prescribed (%)
ACE inhibitor	73
ARB	18
ACEI and/or ARB	85
Beta blocker	82
MRA	49
ACEI and/or ARB, beta blocker and MRA	39
Loop diuretic	91
Thiazide diuretic	5
Digoxin	22

As recorded in previous years, men are marginally more likely to be prescribed ACE inhibitors or ARBs and beta blockers and somewhat more likely to be prescribed MRAs (table 25). Men are, however, substantially more likely to receive all three. This effect is exacerbated when comparing younger and older age groups, younger patients being more likely to be prescribed any of ACE inhibitors/ARBs, beta blockers or MRAs, and substantially more likely to be prescribed all three on discharge (table 26).

Older patients are more likely to be prescribed loop diuretics than their younger counterparts. Figure 5 shows how the use of ACE inhibitors, beta blockers and MRAs declines with age, while the use of loop diuretics increases. Use of ARBs remains fairly stable across age groups.

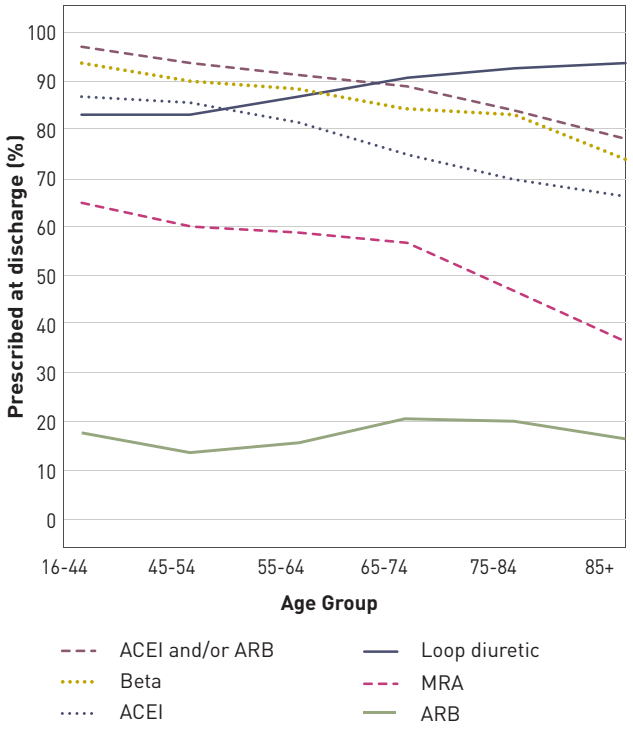
Table 25: Treatment on discharge for LVSD by sex

Medication	Men (%)	Women (%)
ACE inhibitor	74	70
ARB	18	19
ACEI and/or ARB	86	84
Beta blocker	83	80
MRA	52	45
ACEI and/or ARB, beta blocker and MRA	42	34
Loop diuretic	91	92
Thiazide diuretic	6	4
Digoxin	21	23

Table 26: Treatment on discharge for LVSD by age

Medication	<75 years (%)	≥75 years (%)
ACE inhibitor	79	68
ARB	18	18
ACEI and/or ARB	91	82
Beta blocker	87	79
MRA	58	43
ACEI and/or ARB, beta blocker and MRA	49	31
Loop diuretic	88	93
Thiazide diuretic	6	5
Digoxin	78	78

Fig 5: Prescription of secondary prevention medication by age



Patients who were treated in a cardiology ward for the majority of their admission were more likely to receive ACE inhibitors/ARBs, beta blockers and MRAs (table 27). Levels of prescription in general medical wards and other wards were similar for each of these therapies.

Cardiology patients were also far more likely to receive all three of these treatments that patients treated on general and other wards.

Loop diuretic prescription was high across all wards, although slightly higher in general wards.

Table 27: Treatment on discharge for LVSD by main place of care

Medication	Cardiology ward (%)	General medical ward (%)	Other ward (%)
ACE inhibitor	76	68	69
ARB	18	19	16
ACEI and/or ARB	89	81	82
Beta blocker	87	76	76
MRA	56	40	37
ACEI and/or ARB, beta blocker and MRA	46	28	27
Loop diuretic	90	93	90
Thiazide diuretic	7	3	3
Digoxin	23	21	21

Table 28: Treatment on discharge for LVSD by specialist input

Medication	Seen by any HF specialist (%)	No specialist input (%)
ACE inhibitor	75	62
ARB	18	19
ACEI and/or ARB	87	76
Beta blocker	85	69
MRA	53	32
ACEI and/or ARB, beta blocker and MRA	42	19
Loop diuretic	91	93
Thiazide diuretic	6	3
Digoxin	22	21

4.8 Monitoring and follow-up

4.8.1 Referral to follow-up services

Of those patients who survived to discharge, over half were referred to cardiology and heart failure nurse follow-up services (table 29). Some heart failure nurse clinics are only intended for LVSD patients, and almost 70% of all patients with a diagnosis of LVSD were referred for follow-up with a specialist nurse. Referral to specialist follow-up is associated with better outcomes, with the benefits showing even several years after discharge.

For the first time, the audit has started recording whether patients were referred to a cardiac rehabilitation programme on discharge; 11% of patients were referred to these services. This number is set to rise, as the Cardiovascular Disease Outcomes Strategy, published in March 2013, sets an aim for hospitals to refer a third of heart failure patients to cardiac rehabilitation programmes.

Palliative care referrals remain low, which is surprising, given the high age of the heart failure patient population, and the high mortality rates within a year of discharge. However it should be noted that palliative care training is part of the role of a heart failure nurse specialist, and thus most patients treated by the heart failure MDT, or by a specialist nurse, will receive palliative care input if necessary.

Table 29: Overall referral to follow-up services

Service	Total referred (%)
Cardiology follow-up	54
Heart failure nurse follow-up	59
Heart failure nurse follow-up (LVSD patients only)	69
Cardiac rehab	11
Care of the elderly follow-up	15
GP follow-up	80
Palliative care	4

Men and older patients were more likely than women to receive referrals to specialist follow-up services and cardiac rehabilitation programmes (tables 30 and 31). The figures for cardiac rehabilitation referrals exclude those patients for whom referral was not applicable and those who declined treatment.

Table 30: Referral to follow-up services by sex

Service	Men (%)	Women (%)
Cardiology follow-up	60	47
Heart failure nurse follow-up	63	53
Cardiac rehabilitation	13	9

Table 31: Referral to follow-up services by age

Service	<75 years (%)	> 75 years (%)
Cardiology follow-up	71	45
Heart failure nurse follow-up	66	55
Cardiac rehabilitation	15	9

Unsurprisingly, and as recorded in previous years, patients were also far more likely to receive specialist follow-up when treated on cardiology wards (table 32). Cardiology patients were more than twice as likely to be referred to a cardiac rehabilitation programme.

Patients who received specialist heart failure care were around three times more likely to be referred to follow-up with a cardiologist or heart failure nurse, and twice as likely to be referred to a cardiac rehabilitation programme on discharge (table 33).

Table 32: Referral to follow-up services on discharge by main place of care

Service	Cardiology ward (%)	General medical ward (%)	Other ward (%)
Cardiology follow-up	71	36	36
Heart failure nurse follow-up	68	48	54
Cardiac rehabilitation	16	6	6

Table 33: Referral to follow-up services on discharge by specialist input

Service	Seen by any HF specialist (%)	No specialist input (%)
Cardiology follow-up	63	22
Heart failure nurse follow-up	69	23
Cardiac rehabilitation	13	3

4.8.2 Follow-up appointment with heart failure multi-disciplinary team

Over half of patients were referred for a follow-up appointment with the heart failure MDT on discharge, and a third of these had their appointment planned for within two weeks of leaving hospital (table 33). The NICE clinical guideline and quality standard for heart failure recommend that people admitted to hospital because of heart failure receive a clinical assessment from a member of the heart failure MDT within two weeks of discharge.

Table 34: Follow-up appointment with MDT

Follow-up appointment	Total (%)
Follow-up appointment with MDT scheduled	56
Appointment scheduled within two weeks of discharge	34

4.9 Analysis by hospital

4.9.1 Participation and case ascertainment

Case ascertainment is measured against the number of emergency heart failure admissions with a primary discharge diagnosis of heart failure, as recorded by Hospital Episode Statistics (HES) in England and the Patient Episode Database of Wales (PEDW).

Case ascertainment is reported by Trust and Health Board, although the number of records submitted by each hospital is also included in this table. Trusts are counted as fully participating if they submitted 20 records per month (240 over the year) or more than 70% of their HES figures if the HES recorded heart failure admissions for the Trust was fewer than 240.

*NB. In some instances the percentage of HES submitted is greater than 100%. This indicates that the hospital has included patients which do not meet the audit criteria. In some cases this is because a hospital also included elective admissions. This error has since been communicated to relevant sites.

Table 35: Participation and case ascertainment in England

Trust name	Trust records submitted	% HES submitted	Participation status	Primary HES heart failure discharges	NICOR hospital code	Hospital name	Hospital records submitted
England and Wales	**43894**	**60**		**72819**			**43894**
England	**41932**	**61**		**68654**			**41932**
Aintree University Hospital NHS Foundation Trust	326	92.6	Yes	352	FAZ	University Hospital Aintree	326
Airedale NHS Foundation Trust	188	70.1	Yes	268	AIR	Airedale General Hospital	188
Ashford and St Peter's Hospitals NHS Trust	415	103.5*	Yes	401	SPH	St Peter's Hospital	415
Barking, Havering and Redbridge University Hospitals NHS Trust	669	75.1	Yes	891	KGG	King George Hospital	308
					OLD	Queen's Hospital Romford	361
Barnet and Chase Farm Hospitals NHS Trust	541	78.3	Yes	691	BNT	Barnet General Hospital	295
					CHS	Chase Farm Hospital	246
Barnsley Hospital NHS Foundation Trust	234	60.8	Partial	385	BAR	Barnsley Hospital	234
Barts Health NHS Trust	746	68.6	Yes	1087	BAL	Barts and the London	240
					NWG	Newham University Hospital	126
					WHC	Whipps Cross University Hospital	380
Basildon and Thurrock University Hospitals NHS Foundation Trust	0	0.0	No	404	BAS	Basildon University Hospital	0
Bedford Hospital NHS Trust	238	69.0	Partial	345	BED	Bedford Hospital	238
Blackpool Teaching Hospitals NHS Foundation Trust	735	133.6	Yes	550	VIC	Blackpool Victoria Hospital	735
Bolton NHS Foundation Trust	114	22.8	Partial	501	BOL	Royal Bolton Hospital	114

Bradford Teaching Hospitals NHS Foundation Trust	247	49.2	Yes	502	BRD	Bradford Royal Infirmary	247
Brighton and Sussex University Hospitals NHS Trust	568	97.6	Yes	582	PRH	Princess Royal Hospital (Haywards Heath)	159
					RSC	Royal Sussex County Hospital	409
Buckinghamshire Healthcare NHS Trust	260	63.4	Yes	410	SMV	Stoke Mandeville Hospital	62
					AMG	Wycombe Hospital	198
Burton Hospitals NHS Foundation Trust	240	72.3	Yes	332	BRT	Queen's Hospital (Burton)	240
Calderdale and Huddersfield NHS Foundation Trust	483	77.2	Yes	626	RHI	Calderdale Royal Hospital	244
					HUD	Huddersfield Royal Infirmary	239
Cambridge University Hospitals NHS Foundation Trust	42	8.2	Partial	513	ADD	Addenbrooke's Hospital	42
Central Manchester University Hospitals NHS Foundation Trust	238	45.2	Partial	527	MRI	Manchester Royal Infirmary	238
					TRA	Trafford General Hospital	0
Chelsea and Westminster Hospital NHS Foundation Trust	127	67.9	Partial	187	WES	Chelsea and Westminster Hospital	127
Chesterfield Royal Hospital NHS Foundation Trust	154	40.6	Partial	379	CHE	Chesterfield Royal Hospital	154
City Hospitals Sunderland NHS Foundation Trust	285	59.5	Yes	479	SUN	Sunderland Royal Hospital	285
Colchester Hospital University NHS Foundation Trust	438	80.7	Yes	543	COL	Colchester General Hospital	438
Countess of Chester Hospital NHS Foundation Trust	333	82.6	Yes	403	COC	Countess of Chester Hospital	333
County Durham and Darlington NHS Foundation Trust	344	47.6	Yes	722	DAR	Darlington Memorial Hospital	152
					DRY	University Hospital of North Durham	192
Croydon Health Services NHS Trust	276	73.2	Yes	377	MAY	Croydon University Hospital	276
Dartford and Gravesham NHS Trust	244	98.4	Yes	248	DVH	Darent Valley Hospital	244
Derby Hospitals NHS Foundation Trust	259	37.7	Yes	687	DER	Royal Derby Hospital	259
Doncaster and Bassetlaw Hospitals NHS Foundation Trust	208	32.0	Partial	651	BSL	Bassetlaw Hospital	69
					DID	Doncaster Royal Infirmary	139
Dorset County Hospital NHS Foundation Trust	107	47.6	Partial	225	WDH	Dorset County Hospital	107
Ealing Hospital NHS Trust	275	97.5	Yes	282	EAL	Ealing Hospital	275
East and North Hertfordshire NHS Trust	298	65.6	Yes	454	LIS	Lister Hospital	198
					QEW	Queen Elizabeth II Hospital	100
East Cheshire NHS Trust	189	73.0	Yes	259	MAC	Macclesfield District General Hospital	189

Trust name	Trust records submitted	% HES submitted	Participation status	Primary HES heart failure discharges	NICOR hospital code	Hospital name	Hospital records submitted
East Kent Hospitals University NHS Foundation Trust	454	55.8	Yes	814	KCC	Kent and Canterbury Hospital	119
					QEQ	Queen Elizabeth The Queen Mother Hospital	159
East Kent Hospitals University NHS Foundation Trust	454	55.8	Yes	814	WHH	William Harvey Hospital	176
East Lancashire Hospitals NHS Trust	355	54.4	Yes	652	BLA	Royal Blackburn Hospital	355
East Sussex Healthcare NHS Trust	490	88.4	Yes	554	CGH	Conquest Hospital	246
					DGE	Eastbourne District General Hospital	244
Epsom and St Helier University Hospitals NHS Trust	163	39.0	Partial	418	EPS	Epsom Hospital	79
					SHC	St Helier Hospital	84
Frimley Park Hospital NHS Foundation Trust	313	73.6	Yes	425	FRM	Frimley Park Hospital	313
Gateshead Health NHS Foundation Trust	227	87.6	Yes	259	QEG	Queen Elizabeth Hospital (Gateshead)	227
George Eliot Hospital NHS Trust	279	91.2	Yes	306	NUN	George Eliot Hospital	279
Gloucestershire Hospitals NHS Foundation Trust	117	18.2	Partial	643	CHG	Cheltenham General Hospital	58
					GLO	Gloucestershire Royal Hospital	59
Great Western Hospitals NHS Foundation Trust	298	79.9	Yes	373	PMS	Great Western Hospital	298
Guy's and St Thomas' NHS Foundation Trust	322	101.3	Yes	318	STH	St Thomas' Hospital	322
Hampshire Hospitals NHS Foundation Trust	167	34.7	Partial	481	NHH	Basingstoke and North Hampshire Hospital	167
					RHC	Royal Hampshire County Hospital	0
Harrogate and District NHS Foundation Trust	67	36.8	Partial	182	HAR	Harrogate District Hospital	67
Heart of England NHS Foundation Trust	373	31.7	Yes	1175	EBH	Birmingham Heartlands Hospital	169
					GHS	Good Hope Hospital	34
					SOL	Solihull Hospital	170
Heatherwood and Wexham Park Hospitals NHS Foundation Trust	203	48.8	Partial	416	WEX	Wexham Park Hospital	203
Hinchingbrooke Health Care NHS Trust	0	0.0	No	165	HIN	Hinchingbrooke Hospital	0
Homerton University Hospital NHS Foundation Trust	250	93.6	Yes	267	HOM	Homerton University Hospital	250
Hull and East Yorkshire Hospitals NHS Trust	692	86.1	Yes	804	CHH	Castle Hill Hospital	563
					HRI	Hull Royal Infirmary	129

Imperial College Healthcare NHS Trust	421	65.4	Yes	644	CCH	Charing Cross Hospital	104
					HAM	Hammersmith Hospital	210
					STM	St Mary's Hospital Paddington	107
Isle of Wight NHS PCT	164	82.0	Yes	200	IOW	St Mary's Hospital, Newport	164
James Paget University Hospitals NHS Foundation Trust	145	38.8	Partial	374	JPH	James Paget University Hospital	145
Kettering General Hospital NHS Foundation Trust	333	79.9	Yes	417	KGH	Kettering General Hospital	333
King's College Hospital NHS Foundation Trust	157	31.2	Partial	503	KCH	King's College Hospital	157
Kingston Hospital NHS Trust	153	46.1	Partial	332	KTH	Kingston Hospital	153
Lancashire Teaching Hospitals NHS Foundation Trust	677	134.1	Yes	505	CHO	Chorley and South Ribble Hospital	246
					RPH	Royal Preston Hospital	431
Leeds Teaching Hospitals NHS Trust	278	26.0	Yes	1069	LGI	Leeds General Infirmary	278
Lewisham Healthcare NHS Trust	207	78.7	Yes	263	LEW	University Hospital Lewisham	207
Liverpool Heart and Chest Hospital NHS Foundation Trust	154	261.0	Yes	59	BHL	Liverpool Heart and Chest Hospital	154
Luton and Dunstable Hospital NHS Foundation Trust	332	81.0	Yes	410	LDH	Luton and Dunstable Hospital	332
Maidstone and Tunbridge Wells NHS Trust	388	82.0	Yes	473	MAI	Maidstone Hospital	215
					KSX	Tunbridge Wells Hospital	173
Medway NHS Foundation Trust	0	0.0	No	364	MDW	Medway Maritime Hospital	0
Mid Cheshire Hospitals NHS Foundation Trust	188	46.2	Partial	407	LGH	Leighton Hospital	188
Mid Essex Hospital Services NHS Trust	222	55.9	Partial	397	BFH	Broomfield Hospital	222
Mid Staffordshire NHS Foundation Trust	170	82.9	Partial	205	SDG	Stafford Hospital	170
Mid Yorkshire Hospitals NHS Trust	765	95.5	Yes	801	DEW	Dewsbury and District Hospital	295
					PIN	Pinderfields Hospital	470
Milton Keynes Hospital NHS Foundation Trust	146	46.5	Partial	314	MKH	Milton Keynes General Hospital	146
Norfolk and Norwich University Hospitals NHS Foundation Trust	430	55.1	Yes	781	NOR	Norfolk and Norwich University Hospital	430
North Bristol NHS Trust	478	84.6	Yes	565	FRY	Frenchay Hospital	254
					BSM	Southmead Hospital	224
North Cumbria University Hospitals NHS Trust	154	36.2	Partial	426	CMI	Cumberland Infirmary	102
					WCI	West Cumberland Hospital	52
North Middlesex University Hospital NHS Trust	204	60.0	Partial	340	NMH	North Middlesex University Hospital	204

Trust name	Trust records submitted	% HES submitted	Participation status	Primary HES heart failure discharges	NICOR hospital code	Hospital name	Hospital records submitted
North Tees and Hartlepool NHS Foundation Trust	339	88.1	Yes	385	HGH	University Hospital of Hartlepool	185
					NTG	University Hospital of North Tees	154
Northampton General Hospital NHS Trust	261	68.9	Yes	379	NTH	Northampton General Hospital	261
Northern Devon Healthcare NHS Trust	290	92.7	Yes	313	NDD	North Devon District Hospital	290
Northern Lincolnshire and Goole Hospitals NHS Foundation Trust	212	41.7	Partial	508	GGH	Diana Princess of Wales Hospital	179
					SCU	Scunthorpe General Hospital	33
Northumbria Healthcare NHS Foundation Trust	492	72.6	Yes	678	HEX	Hexham General Hospital	43
					NTY	North Tyneside Hospital	250
					ASH	Wansbeck General Hospital	199
Nottingham University Hospitals NHS Trust	238	22.3	Partial	1066	CHN	Nottingham City Hospital	92
					UHN	Queen's Medical Centre	146
Oxford Radcliffe Hospitals NHS Trust	732	126.0	Yes	581	HOR	Horton General Hospital	188
					RAD	John Radcliffe Hospital	544
Pennine Acute Hospitals NHS Trust	879	98.3	Yes	894	BRY	Fairfield General Hospital	327
					NMG	North Manchester General Hospital	232
					BHH	Rochdale Infirmary	49
					OHM	Royal Oldham Hospital	271
Peterborough and Stamford Hospitals NHS Foundation Trust	282	62.7	Yes	450	PET	Peterborough City Hospital	282
					SMF	Stamford and Rutland Hospital	0
Plymouth Hospitals NHS Trust	0	0.0	No	652	PLY	Derriford Hospital	0
Poole Hospital NHS Foundation Trust	271	88.0	Yes	308	PGH	Poole General Hospital	271
Portsmouth Hospitals NHS Trust	300	51.8	Yes	579	QAP	Queen Alexandra Hospital	300
Rotherham NHS Foundation Trust	245	84.5	Yes	290	ROT	Rotherham Hospital	245
Royal Berkshire NHS Foundation Trust	413	87.9	Yes	470	BHR	Royal Berkshire Hospital	413
Royal Brompton and Harefield NHS Foundation Trust	301	178.1	Yes	169	HH	Harefield Hospital	80
					NHB	Royal Brompton Hospital	221
Royal Cornwall Hospitals NHS Trust	235	44.9	Partial	523	RCH	Royal Cornwall Hospital	235

Royal Devon and Exeter NHS Foundation Trust	243	56.3	Yes	432	RDE	Royal Devon and Exeter Hospital	243
Royal Free London NHS Trust	209	64.3	Partial	325	RFH	Royal Free Hospital	209
Royal Liverpool and Broadgreen University Hospitals NHS Trust	286	86.7	Yes	330	RLU	Royal Liverpool University Hospital	286
Royal Surrey County Hospital NHS Foundation Trust	151	79.5	Yes	190	RSU	Royal Surrey County Hospital	151
Royal United Hospital Bath NHS Trust	238	45.0	Partial	529	BAT	Royal United Hospital Bath	238
Salford Royal NHS Foundation Trust	276	91.7	Yes	301	SLF	Salford Royal	276
Salisbury NHS Foundation Trust	276	121.1	Yes	228	SAL	Salisbury District Hospital	276
Sandwell and West Birmingham Hospitals NHS Trust	336	43.6	Yes	770	DUD	Birmingham City Hospital	160
					SAN	Sandwell General Hospital	176
Sheffield Teaching Hospitals NHS Foundation Trust	499	58.3	Yes	856	NGS	Northern General Hospital	499
Sherwood Forest Hospitals NHS Foundation Trust	394	82.9	Yes	475	KMH	King's Mill Hospital	388
					NHN	Newark Hospital	6
Shrewsbury and Telford Hospital NHS Trust	53	8.2	Partial	643	TLF	Princess Royal Hospital (Telford)	30
					RSS	Royal Shrewsbury Hospital	23
South Devon Healthcare NHS Foundation Trust	408	84.6	Yes	482	TOR	Torbay Hospital	408
South London Healthcare NHS Trust	517	63.1	Yes	819	BRO	Princess Royal University Hospital (Bromley)	256
					GWH	Queen Elizabeth Hospital (Woolwich)	261
South Tees Hospitals NHS Foundation Trust	372	65.6	Yes	567	FRH	Friarage Hospital	0
					SCM	James Cook University Hospital	372
South Tyneside NHS Foundation Trust	280	156.4	Yes	179	STD	South Tyneside District Hospital	280
South Warwickshire NHS Foundation Trust	128	48.3	Partial	265	WAR	Warwick Hospital	128
Southend University Hospital NHS Foundation Trust	598	113.0	Yes	529	SEH	Southend Hospital	598
Southport and Ormskirk Hospital NHS Trust	247	83.2	Yes	297	SOU	Southport and Formby District General Hospital	247
St George's Healthcare NHS Trust	231	55.1	Partial	419	GEO	St George's Hospital	231
St Helens and Knowsley Teaching Hospitals NHS Trust	246	71.3	Yes	345	WHI	Whiston Hospital	246
Stockport NHS Foundation Trust	344	77.7	Yes	443	SHH	Stepping Hill Hospital	344
Surrey and Sussex Healthcare NHS Trust	177	43.4	Partial	408	ESU	East Surrey Hospital	177
Tameside Hospital NHS Foundation Trust	241	69.7	Yes	346	TGA	Tameside General Hospital	241

Trust name	Trust records submitted	% HES submitted	Participation status	Primary HES heart failure discharges	NICOR hospital code	Hospital name	Hospital records submitted
Taunton and Somerset NHS Foundation Trust	362	77.7	Yes	466	MPH	Musgrove Park Hospital	362
The Dudley Group NHS Foundation Trust	243	47.4	Yes	513	RUS	Russells Hall Hospital	243
The Hillingdon Hospitals NHS Foundation Trust	134	46.0	Partial	291	HIL	Hillingdon Hospital	134
The Ipswich Hospital NHS Trust	120	27.7	Partial	433	IPS	Ipswich Hospital	120
The Newcastle Upon Tyne Hospitals NHS Foundation Trust	254	51.9	Yes	489	FRE	Freeman Hospital /Royal Victoria Infirmary	254
The North West London Hospitals NHS Trust	292	48.7	Yes	599	CMH	Central Middlesex Hospital	104
					NPH	Northwick Park Hospital	188
The Princess Alexandra Hospital NHS Trust	0	0.0	No	293	PAH	Princess Alexandra Hospital	0
The Queen Elizabeth Hospital King's Lynn NHS Foundation Trust	231	63.3	Partial	365	QKL	Queen Elizabeth Hospital (King's Lynn)	231
The Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust	269	47.9	Yes	562	BOU	Royal Bournemouth General Hospital	269
The Royal Wolverhampton Hospitals NHS Trust	224	33.2	Partial	674	NCR	New Cross Hospital	224
The Whittington Hospital NHS Trust	131	53.5	Partial	245	WHT	Whittington Hospital	131
United Lincolnshire Hospitals NHS Trust	305	34.3	Yes	888	GRA	Grantham and District Hospital	90
					LIN	Lincoln County Hospital	91
					PIL	Pilgrim Hospital	124
University College London Hospitals NHS Foundation Trust	308	149.5	Yes	206	UCL	University College Hospital	308
University Hospital of North Staffordshire NHS Trust	239	27.7	Partial	862	STO	University Hospital of North Staffordshire	239
University Hospital of South Manchester NHS Foundation Trust	301	104.5	Yes	288	WYT	Wythenshawe Hospital	301
University Hospital Southampton NHS Foundation Trust	256	50.0	Yes	512	SGH	Southampton General Hospital	256
University Hospitals Birmingham NHS Foundation Trust	298	49.8	Yes	598	QEB	Queen Elizabeth Hospital (Edgbaston)	298
University Hospitals Bristol NHS Foundation Trust	403	111.0	Yes	363	BRI	Bristol Royal Infirmary	403
University Hospitals Coventry and Warwickshire NHS Trust	427	63.9	Yes	668	RUG	Hospital of St Cross	8
					WAL	University Hospital Coventry	419
University Hospitals of Leicester NHS Trust	516	35.6	Yes	1449	GRL	Glenfield Hospital	516
					LER	Leicester Royal Infirmary	0

University Hospitals of Morecambe Bay NHS Foundation Trust	40	8.7	Partial	459	FGH	Furness General Hospital	0
					RLI	Royal Lancaster Infirmary	40
Walsall Healthcare NHS Trust	258	65.2	Partial	396	WMH	Manor Hospital	258
Warrington and Halton Hospitals NHS Foundation Trust	200	61.3	Yes	326	WDG	Warrington Hospital	200
West Hertfordshire Hospitals NHS Trust	274	58.9	Yes	465	WAT	Watford General Hospital	274
West Middlesex University Hospital NHS Trust	243	93.8	Partial	259	WMU	West Middlesex University Hospital	243
West Suffolk NHS Foundation Trust	235	55.0	Yes	427	WSH	West Suffolk Hospital	235
Western Sussex Hospitals NHS Trust	687	84.3	Yes	815	STR	St Richard's Hospital	327
					WRG	Worthing Hospital	360
Weston Area Health NHS Trust	85	31.8	Yes	267	WGH	Weston General Hospital	85
Wirral University Teaching Hospital NHS Foundation Trust	250	45.3	Yes	552	WIR	Arrowe Park Hospital	250
Worcestershire Acute Hospitals NHS Trust	343	56.2	Yes	610	RED	Alexandra Hospital	249
					WRC	Worcestershire Royal Hospital	94
Wrightington, Wigan and Leigh NHS Foundation Trust	499	114.2	Partial	437	AEI	Royal Albert Edward Infirmary	499
Wye Valley NHS Trust	129	66.2	Yes	195	HCH	County Hospital Hereford	129
Yeovil District Hospital NHS Foundation Trust	237	99.2	Partial	239	YEO	Yeovil District Hospital	237
York Teaching Hospital NHS Foundation Trust	142	21.6	Partial	656	SCA	Scarborough General Hospital	0
					YDH	The York Hospital	142

Table 36: Participation and case ascertainment in Wales

Trust name	Trust records submitted	% HES submitted	Participation status	Primary HES heart failure discharges	NICOR hospital code	Hospital name	Hospital records submitted
England and Wales	**43894**						**43894**
Wales	**1962**	**47.11**		**4165**			**1962**
Abertawe Bro Morgannwg University Health Board	91	12.05	Partial	755	MOR	Morriston Hospital	0
					NGH	Neath Port Talbot Hospital[ii]	4
					POW	Princess Of Wales Hospital	87
					SIN	Singleton Hospital	0
Aneurin Bevan Health Board	315	35.92	Yes	877	NEV	Nevill Hall Hospital	222
					GWE	Royal Gwent Hospital	93
					YYF	Ysbyty Ystrad Fawr	0
Betsi Cadwaladr University Health Board	373	43.47	Yes	858	CLW	Glan Clwyd Hospital	92
					LLA	Llandudno General Hospital	0
					WRX	Wrexham Maelor Hospital	281
					GWY	Ysbyty Gwynedd	0
Cardiff and Vale University Health Board	406	80.40	Yes	505	LLD	University Hospital Llandough	180
					UHW	University Hospital of Wales	226
Cwm Taf Health Board	375	72.39	Yes	518	PCH	Prince Charles Hospital	223
					RGH	Royal Glamorgan Hospital	152
Hywel Dda Health Board	402	61.66	Yes	652	BRG	Bronglais General Hospital	101
					PPH	Prince Philip Hospital	111
					WWG	West Wales General Hospital	87
					WYB	Withybush General Hospital	103

ii. Unscheduled heart failure admissions to Neath Port Talbot Hospital stopped in December 2012.

4.9.2 Clinical practice analysis

Ten hospital-level analyses are reported in tables 38-41. The analysis criteria for each column are as follows:

Table 37: Analysis criteria for hospital level analysis for heart failure admissions

Analysis	Numerator	Denominator
Heart failure admissions (n)	**Number of admissions where the patient had a confirmed diagnosis of heart failure OR had an echo diagnosis of heart failure and signs and symptoms of heart failure**	
Received echo (%)	Any echo diagnosis	All heart failure admissions
Cardiology inpatient (%)	Main place of care=cardiology	All heart failure admissions
Input from consultant cardiologist (%)	Input from consultant cardiologist	All heart failure admissions
Input from specialist (%)	Input from consultant cardiologist, other consultant with interest in heart failure or heart failure nurse specialist	All heart failure admissions
ACEI on discharge (%)	Any ACEI on discharge	Diagnosis of LVSD and survived to discharge
ACEI/ARB on discharge (%)	Any ACEI or ARB on discharge	Diagnosis of LVSD and survived to discharge
Beta blocker on discharge (%)	Any beta blocker on discharge	Diagnosis of LVSD and survived to discharge
Received discharge planning (%)	Discharge management plan in place	Survived to discharge
Referral to HF nurse follow-up (%)	Referred to HF nurse follow-up	Survived to discharge
LVSD referral to HF nurse follow-up (%)	Referred to HF nurse follow-up	Diagnosis of LVSD and survived to discharge
Referral to cardiology follow-up (%)	Referred to cardiology follow-up	Survived to discharge

Note that these analyses have not been risk adjusted, although the analysis criteria have been chosen to ensure that the figures are as representative as possible. Analyses are published for all hospitals that submitted more than 50 records to the audit. An asterisk (*) in a cell indicates that too few records were submitted for a percentage to be published. The clinical practice analysis excludes patients without a confirmed diagnosis of heart failure (as described in section 4.2.4).

Table 38: Clinical practice in England (in-hospital care)

Trust name	NICOR Hospital code	Hospital name	Heart failure admissions (n)	Received echo (%)	Cardiology inpatient (%)	Input from consultant cardiologist (%)	Input from specialist (%)
England and Wales			**40050**	**91**	**50**	**57**	**78**
Aintree University Hospital NHS Foundation Trust	FAZ	University Hospital Aintree	325	99.4	72.3	76.9	98.1
Airedale NHS Foundation Trust	AIR	Airedale General Hospital	170	89.8	25.9	27.1	28.2
Ashford and St Peter's Hospitals NHS Trust	SPH	St Peter's Hospital	402	79.1	50.7	50.2	94.5
Barking, Havering and Redbridge University Hospitals NHS Trust	KGG	King George Hospital	256	99.6	28.1	58.6	91.4
Barking, Havering and Redbridge University Hospitals NHS Trust	OLD	Queen's Hospital Romford	303	100	19.1	25.8	70.2
Barnet and Chase Farm Hospitals NHS Trust	BNT	Barnet General Hospital	294	98.3	71.4	75	87
Barnet and Chase Farm Hospitals NHS Trust	CHS	Chase Farm Hospital	244	94.7	44.7	56.1	86.1
Barnsley Hospital NHS Foundation Trust	BAR	Barnsley Hospital	194	84.4	34	48.4	77.6
Barts Health NHS Trust	NWG	Newham University Hospital	213	95.2	99.2	99.2	100
Barts Health NHS Trust	BAL	The Royal London Hospital/The London Chest Hospital	125	99	66.7	69.6	87.9
Barts Health NHS Trust	WHC	Whipps Cross University Hospital	289	94.5	28.7	30.8	78.5
Basildon and Thurrock University Hospitals NHS Foundation Trust	BAS	Basildon University Hospital	0	NA	NA	NA	NA
Bedford Hospital NHS Trust	BED	Bedford Hospital	233	97.9	58.8	61.4	76.4
Blackpool Teaching Hospitals NHS Foundation Trust	VIC	Blackpool Victoria Hospital	688	99.7	59.6	35	99.4
Bolton NHS Foundation Trust	BOL	Royal Bolton Hospital	114	93.9	64.9	80.7	84.2
Bradford Teaching Hospitals NHS Foundation Trust	BRD	Bradford Royal Infirmary	246	90.1	45.5	47.6	51.2
Brighton and Sussex University Hospitals NHS Trust	PRH	Princess Royal Hospital (Haywards Heath)	159	73	5.7	28.9	51.6
Brighton and Sussex University Hospitals NHS Trust	RSC	Royal Sussex County Hospital	408	83.7	49.3	56.4	59.3
Buckinghamshire Healthcare NHS Trust	SMV	Stoke Mandeville Hospital	34	*	*	*	*
Buckinghamshire Healthcare NHS Trust	AMG	Wycombe Hospital	181	97.2	72.4	78.9	97.8
Burton Hospitals NHS Foundation Trust	BRT	Queen's Hospital (Burton)	233	65.5	40.3	45.3	49.6
Calderdale and Huddersfield NHS Foundation Trust	RHI	Calderdale Royal Hospital	219	96.3	62.1	61.6	67.6

Calderdale and Huddersfield NHS Foundation Trust	HUD	Huddersfield Royal Infirmary	200	96	41.5	52	59
Cambridge University Hospitals NHS Foundation Trust	ADD	Addenbrooke's Hospital	42	*	*	*	*
Central Manchester University Hospitals NHS Foundation Trust	MRI	Manchester Royal Infirmary	200	100	51	52.3	80.4
Central Manchester University Hospitals NHS Foundation Trust	TRA	Trafford General Hospital	0	NA	NA	NA	NA
Chelsea and Westminster Hospital NHS Foundation Trust	WES	Chelsea and Westminster Hospital	122	95	19.7	57.9	89.3
Chesterfield Royal Hospital NHS Foundation Trust	CHE	Chesterfield Royal Hospital	153	82.9	35.9	48.4	48.4
City Hospitals Sunderland NHS Foundation Trust	SUN	Sunderland Royal Hospital	285	95.8	38.2	52.6	99.6
Colchester Hospital University NHS Foundation Trust	COL	Colchester General Hospital	432	100	63	70.5	95.4
Countess of Chester Hospital NHS Foundation Trust	COC	Countess of Chester Hospital	324	99.7	76.2	100	100
County Durham and Darlington NHS Foundation Trust	DAR	Darlington Memorial Hospital	136	98.5	39.7	65.4	69.9
County Durham and Darlington NHS Foundation Trust	DRY	University Hospital of North Durham	188	97.3	71.8	75.3	75.8
Croydon Health Services NHS Trust	MAY	Croydon University Hospital	181	99.4	51.9	39.1	75.4
Dartford and Gravesham NHS Trust	DVH	Darent Valley Hospital	229	91.7	49.3	73.6	82.4
Derby Hospitals NHS Foundation Trust	DER	Royal Derby Hospital	259	92.3	63.3	71	97.7
Doncaster and Bassetlaw Hospitals NHS Foundation Trust	BSL	Bassetlaw Hospital	61	95	21.3	36.7	91.7
Doncaster and Bassetlaw Hospitals NHS Foundation Trust	DID	Doncaster Royal Infirmary	110	98.2	20.9	32.7	38.2
Dorset County Hospital NHS Foundation Trust	WDH	Dorset County Hospital	102	81.7	22.5	41.2	47.1
Ealing Hospital NHS Trust	EAL	Ealing Hospital	269	97.6	34.6	63.2	73.2
East and North Hertfordshire NHS Trust	LIS	Lister Hospital	179	100	77.1	89.3	98.8
East and North Hertfordshire NHS Trust	QEW	Queen Elizabeth II Hospital	91	87.5	2.2	7.7	26.4
East Cheshire NHS Trust	MAC	Macclesfield District General Hospital	171	92	50.3	53.3	75.4
East Kent Hospitals University NHS Foundation Trust	KCC	Kent and Canterbury Hospital	108	51	13.9	17.9	41.5
East Kent Hospitals University NHS Foundation Trust	QEQ	Queen Elizabeth The Queen Mother Hospital	133	71.2	27.8	30	54.6
East Kent Hospitals University NHS Foundation Trust	WHH	William Harvey Hospital	135	75.2	44.4	35.1	71.6
East Lancashire Hospitals NHS Trust	BLA	Royal Blackburn Hospital	349	68.9	45	48.8	92.9
East Sussex Healthcare NHS Trust	CGH	Conquest Hospital	222	99.5	34.7	31.5	76.6
East Sussex Healthcare NHS Trust	DGE	Eastbourne District General Hospital	224	99.1	70.1	67.9	80.8
Epsom and St Helier University Hospitals NHS Trust	EPS	Epsom Hospital	79	80.3	41.8	40.8	51.3

Trust name	NICOR Hospital code	Hospital name	Heart failure admissions (n)	Received echo (%)	Cardiology inpatient (%)	Input from consultant cardiologist (%)	Input from specialist (%)
Epsom and St Helier University Hospitals NHS Trust	SHC	St Helier Hospital	84	82.7	38.1	35.4	58.5
Frimley Park Hospital NHS Foundation Trust	FRM	Frimley Park Hospital	230	97.8	76.1	86.4	95.5
Gateshead Health NHS Foundation Trust	QEG	Queen Elizabeth Hospital (Gateshead)	190	98.9	58.9	79.9	91.4
George Eliot Hospital NHS Trust	NUN	George Eliot Hospital	197	98.5	37.1	55.1	56.6
Gloucestershire Hospitals NHS Foundation Trust	CHG	Cheltenham General Hospital	55	54.5	20	23.6	25.5
Gloucestershire Hospitals NHS Foundation Trust	GLO	Gloucestershire Royal Hospital	56	55.4	37.5	41.1	41.1
Great Western Hospitals NHS Foundation Trust	PMS	Great Western Hospital	298	96.8	40.9	48.5	72.1
Guy's and St Thomas' NHS Foundation Trust	STH	St Thomas' Hospital	310	100	65.2	93.2	98.1
Hampshire Hospitals NHS Foundation Trust	NHH	Basingstoke and North Hampshire Hospital	134	99.3	72.4	66.7	79.4
Hampshire Hospitals NHS Foundation Trust	RHC	Royal Hampshire County Hospital	0	NA	NA	NA	NA
Harrogate and District NHS Foundation Trust	HAR	Harrogate District Hospital	66	80	40.9	44.6	46.2
Heart of England NHS Foundation Trust	EBH	Birmingham Heartlands Hospital	168	98.2	50	51.8	88.7
Heart of England NHS Foundation Trust	GHS	Good Hope Hospital	34	*	*	*	*
Heart of England NHS Foundation Trust	SOL	Solihull Hospital	170	100	85.3	86.5	97.6
Heatherwood and Wexham Park Hospitals NHS Foundation Trust	WEX	Wexham Park Hospital	203	80.6	32	68.8	73.3
Hinchingbrooke Health Care NHS Trust	HIN	Hinchingbrooke Hospital	0	NA	NA	NA	NA
Homerton University Hospital NHS Foundation Trust	HOM	Homerton University Hospital	248	88.5	47.2	74	75.7
Hull and East Yorkshire Hospitals NHS Trust	CHH	Castle Hill Hospital	455	99.3	80.9	84.6	95.5
Hull and East Yorkshire Hospitals NHS Trust	HRI	Hull Royal Infirmary	67	93.8	7.5	6.6	72.1
Imperial College Healthcare NHS Trust	CCH	Charing Cross Hospital	104	96.9	24	94.7	100
Imperial College Healthcare NHS Trust	HAM	Hammersmith Hospital	207	84.7	39.6	69.7	89.4
Imperial College Healthcare NHS Trust	STM	St Mary's Hospital Paddington	104	100	16.3	35	99
Isle of Wight NHS PCT	IOW	St Mary's Hospital, Newport	131	86.5	29.8	35.8	38.2
James Paget University Hospitals NHS Foundation Trust	JPH	James Paget University Hospital	140	97.5	78.6	82.9	93.2
Kettering General Hospital NHS Foundation Trust	KGH	Kettering General Hospital	321	95.3	66.4	85.6	100
King's College Hospital NHS Foundation Trust	KCH	King's College Hospital	155	100	33.5	94.8	99.4

Kingston Hospital NHS Trust	KTH	Kingston Hospital	152	71.9	38.8	49.3	49.3
Lancashire Teaching Hospitals NHS Foundation Trust	CHO	Chorley and South Ribble Hospital	246	98.8	44.7	63.4	100
Lancashire Teaching Hospitals NHS Foundation Trust	RPH	Royal Preston Hospital	427	99	48.2	53.9	99.3
Leeds Teaching Hospitals NHS Trust	LGI	Leeds General Infirmary	277	100	90.3	0	100
Lewisham Healthcare NHS Trust	LEW	University Hospital Lewisham	171	99.4	34.5	45.3	59.3
Liverpool Heart and Chest Hospital NHS Foundation Trust	BHL	Liverpool Heart and Chest Hospital	153	99.3	99.3	100	100
Luton and Dunstable Hospital NHS Foundation Trust	LDH	Luton and Dunstable Hospital	249	97.6	29.3	54.7	76.3
Maidstone and Tunbridge Wells NHS Trust	MAI	Maidstone Hospital	212	97.2	39.6	75.9	96.7
Maidstone and Tunbridge Wells NHS Trust	KSX	Tunbridge Wells Hospital	150	96.6	59.3	68	91.3
Medway NHS Foundation Trust	MDW	Medway Maritime Hospital	0	NA	NA	NA	NA
Mid Cheshire Hospitals NHS Foundation Trust	LGH	Leighton Hospital	187	98.9	89.3	92.5	97.3
Mid Essex Hospital Services NHS Trust	BFH	Broomfield Hospital	214	100	38.3	71.8	72.8
Mid Staffordshire NHS Foundation Trust	SDG	Stafford Hospital	167	93.4	56.3	58.8	67.9
Mid Yorkshire Hospitals NHS Trust	DEW	Dewsbury and District Hospital	277	77.4	13	45.1	58.8
Mid Yorkshire Hospitals NHS Trust	PIN	Pinderfields Hospital	395	98.2	42	49.4	66.3
Milton Keynes Hospital NHS Foundation Trust	MKH	Milton Keynes General Hospital	140	97.8	69.3	80.2	96
Norfolk and Norwich University Hospitals NHS Foundation Trust	NOR	Norfolk and Norwich University Hospital	430	83.8	100	100	100
North Bristol NHS Trust	FRY	Frenchay Hospital	253	90	28.5	41.3	53.3
North Bristol NHS Trust	BSM	Southmead Hospital	220	96.3	62.3	70.8	80.2
North Cumbria University Hospitals NHS Trust	CMI	Cumberland Infirmary	100	99	11	20.4	98
North Cumbria University Hospitals NHS Trust	WCI	West Cumberland Hospital	48	*	*	*	*
North Middlesex University Hospital NHS Trust	NMH	North Middlesex University Hospital	179	83.8	11.7	30.7	62.6
North Tees and Hartlepool NHS Foundation Trust	HGH	University Hospital of Hartlepool	166	98.8	53.6	43.4	44.6
North Tees and Hartlepool NHS Foundation Trust	NTG	University Hospital of North Tees	108	99.1	62	60.2	70.4
Northampton General Hospital NHS Trust	NTH	Northampton General Hospital	261	92.3	46.4	61	96.5
Northern Devon Healthcare NHS Trust	NDD	North Devon District Hospital	290	93.4	51.6	61.4	66
Northern Lincolnshire and Goole Hospitals NHS Foundation Trust	GGH	Diana Princess of Wales Hospital	176	83.6	48.9	51.4	52
Northern Lincolnshire and Goole Hospitals NHS Foundation Trust	SCU	Scunthorpe General Hospital	33	*	*	*	*

Trust name	NICOR Hospital code	Hospital name	Heart failure admissions (n)	Received echo (%)	Cardiology inpatient (%)	Input from consultant cardiologist (%)	Input from specialist (%)
Northumbria Healthcare NHS Foundation Trust	HEX	Hexham General Hospital	30	*	*	*	*
Northumbria Healthcare NHS Foundation Trust	NTY	North Tyneside Hospital	189	99.5	54	58.9	66.5
Northumbria Healthcare NHS Foundation Trust	ASH	Wansbeck General Hospital	162	100	57.4	60	65.2
Nottingham University Hospitals NHS Trust	CHN	Nottingham City Hospital	70	98.5	67.1	78.6	82.9
Nottingham University Hospitals NHS Trust	UHN	Queen's Medical Centre	115	98.2	13	36.8	39.6
Oxford Radcliffe Hospitals NHS Trust	HOR	Horton General Hospital	173	97.6	31.2	49.1	91.9
Oxford Radcliffe Hospitals NHS Trust	RAD	John Radcliffe Hospital	497	96.8	25.8	64	91.8
Pennine Acute Hospitals NHS Trust	BRY	Fairfield General Hospital	315	81.8	45.1	20.4	49.7
Pennine Acute Hospitals NHS Trust	NMG	North Manchester General Hospital	225	89.3	40.9	28.3	64.6
Pennine Acute Hospitals NHS Trust	BHH	Rochdale Infirmary	29	*	*	*	*
Pennine Acute Hospitals NHS Trust	OHM	Royal Oldham Hospital	226	96.9	29.2	23.7	64.3
Peterborough and Stamford Hospitals NHS Foundation Trust	PET	Peterborough City Hospital	280	93.6	71.8	75	87.9
Peterborough and Stamford Hospitals NHS Foundation Trust	SMF	Stamford and Rutland Hospital	0	NA	NA	NA	NA
Plymouth Hospitals NHS Trust	PLY	Derriford Hospital	0	NA	NA	NA	NA
Poole Hospital NHS Foundation Trust	PGH	Poole General Hospital	271	66.9	29.9	37	50.4
Portsmouth Hospitals NHS Trust	QAP	Queen Alexandra Hospital	296	99.3	80.4	93.6	98.6
Rotherham NHS Foundation Trust	ROT	Rotherham Hospital	200	92.9	44.5	41.9	67.2
Royal Berkshire NHS Foundation Trust	BHR	Royal Berkshire Hospital	365	100	55.6	75.9	86.5
Royal Brompton and Harefield NHS Foundation Trust	HH	Harefield Hospital	80	100	61.2	91.2	100
Royal Brompton and Harefield NHS Foundation Trust	NHB	Royal Brompton Hospital	221	100	92.3	95.3	100
Royal Cornwall Hospitals NHS Trust	RCH	Royal Cornwall Hospital	177	100	49.7	59.7	67
Royal Devon and Exeter NHS Foundation Trust	RDE	Royal Devon and Exeter Hospital	194	82.5	43.8	57.5	57.5
Royal Free London NHS Trust	RFH	Royal Free Hospital	199	99.5	48.2	48.2	54.8
Royal Liverpool and Broadgreen University Hospitals NHS Trust	RLU	Royal Liverpool University Hospital	261	97.9	62.5	71.5	86.8
Royal Surrey County Hospital NHS Foundation Trust	RSU	Royal Surrey County Hospital	142	85.3	41.5	53.3	62.2
Royal United Hospital Bath NHS Trust	BAT	Royal United Hospital Bath	234	97.3	57.9	59	100

Salford Royal NHS Foundation Trust	SLF	Salford Royal	253	81.4	36	44.3	99.2
Salisbury NHS Foundation Trust	SAL	Salisbury District Hospital	276	90.9	62.7	70.3	79.3
Sandwell and West Birmingham Hospitals NHS Trust	DUD	Birmingham City Hospital	138	97.8	50.7	86.7	89.8
Sandwell and West Birmingham Hospitals NHS Trust	SAN	Sandwell General Hospital	173	98.8	57.8	86	96.5
Sheffield Teaching Hospitals NHS Foundation Trust	NGS	Northern General Hospital	326	100	25.5	49.4	96.3
Sherwood Forest Hospitals NHS Foundation Trust	KMH	King's Mill Hospital	373	55.5	48.8	63.6	68.5
Sherwood Forest Hospitals NHS Foundation Trust	NHN	Newark Hospital	6	*	*	*	*
Shrewsbury and Telford Hospital NHS Trust	TLF	Princess Royal Hospital (Telford)	30	100	63.3	75.9	96.6
Shrewsbury and Telford Hospital NHS Trust	RSS	Royal Shrewsbury Hospital	23	100	65.2	69.6	100
South Devon Healthcare NHS Foundation Trust	TOR	Torbay Hospital	408	71.6	32.4	36.4	81.3
South London Healthcare NHS Trust	BRO	Princess Royal University Hospital (Bromley)	246	80.8	39.8	41.5	42.7
South London Healthcare NHS Trust	GWH	Queen Elizabeth Hospital (Woolwich)	256	99.6	72.7	78.4	84.8
South Tees Hospitals NHS Foundation Trust	FRH	Friarage Hospital	0	NA	NA	NA	NA
South Tees Hospitals NHS Foundation Trust	SCM	James Cook University Hospital	356	100	78.6	86.6	99.4
South Tyneside NHS Foundation Trust	STD	South Tyneside District Hospital	250	94.8	61.2	68.8	87.6
South Warwickshire NHS Foundation Trust	WAR	Warwick Hospital	97	86.3	71.1	84	91.5
Southend University Hospital NHS Foundation Trust	SEH	Southend Hospital	455	99.8	52.5	56.5	70.1
Southport and Ormskirk Hospital NHS Trust	SOU	Southport and Formby District General Hospital	246	98.8	43.9	52.7	93.5
St George's Healthcare NHS Trust	GEO	St George's Hospital	231	99.6	22.1	58	99.6
St Helens and Knowsley Teaching Hospitals NHS Trust	WHI	Whiston Hospital	245	96.7	74.7	94.6	97.8
Stockport NHS Foundation Trust	SHH	Stepping Hill Hospital	344	86.9	17.4	31.3	57
Surrey and Sussex Healthcare NHS Trust	ESU	East Surrey Hospital	177	86.5	54.3	61	62.2
Tameside Hospital NHS Foundation Trust	TGA	Tameside General Hospital	239	72.6	40.2	41.8	66.1
Taunton and Somerset NHS Foundation Trust	MPH	Musgrove Park Hospital	362	86.2	43.9	50.6	51.1
The Dudley Group NHS Foundation Trust	RUS	Russells Hall Hospital	231	99.1	69.7	67.5	81
The Ipswich Hospital NHS Trust	IPS	Ipswich Hospital	74	90.4	41.9	48.6	54.2
The Newcastle Upon Tyne Hospitals NHS Foundation Trust	FRE	Freeman Hospital /Royal Victoria Infirmary	253	37.8	87.1	91.7	97.6

Trust name	NICOR Hospital code	Hospital name	Heart failure admissions (n)	Received echo (%)	Cardiology inpatient (%)	Input from consultant cardiologist (%)	Input from specialist (%)
The North West London Hospitals NHS Trust	CMH	Central Middlesex Hospital	94	96.8	20.2	49.5	68.1
The North West London Hospitals NHS Trust	NPH	Northwick Park Hospital	187	92	54.3	54.8	68.8
The Princess Alexandra Hospital NHS Trust	PAH	Princess Alexandra Hospital	0	NA	NA	NA	NA
The Queen Elizabeth Hospital King's Lynn NHS Foundation Trust	QKL	Queen Elizabeth Hospital (King's Lynn)	170	92.4	36.5	38.8	94.1
The Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust	BOU	Royal Bournemouth General Hospital	267	43.2	55.1	41.6	50.2
The Royal Wolverhampton Hospitals NHS Trust	NCR	New Cross Hospital	97	95.8	29.9	35.9	55.4
The Whittington Hospital NHS Trust	WHT	Whittington Hospital	129	100	61.2	84.6	84.6
United Lincolnshire Hospitals NHS Trust	GRA	Grantham and District Hospital	90	90.9	43.3	74.4	74.4
United Lincolnshire Hospitals NHS Trust	LIN	Lincoln County Hospital	90	75.4	38.9	42.7	44.9
United Lincolnshire Hospitals NHS Trust	PIL	Pilgrim Hospital	122	87.8	40.2	53.3	58.2
University College London Hospitals NHS Foundation Trust	UCL	University College Hospital	304	99.7	50.3	70.9	94.4
University Hospital of North Staffordshire NHS Trust	STO	University Hospital of North Staffordshire	222	94.6	48.5	15.6	95.2
University Hospital of South Manchester NHS Foundation Trust	WYT	Wythenshawe Hospital	299	78.1	38.8	42.1	62.5
University Hospital Southampton NHS Foundation Trust	SGH	Southampton General Hospital	254	100	44.1	24	98.8
University Hospitals Birmingham NHS Foundation Trust	QEB	Queen Elizabeth Hospital (Edgbaston)	241	77.2	31.1	52.3	57.8
University Hospitals Bristol NHS Foundation Trust	BRI	Bristol Royal Infirmary	362	100	91.7	95.6	100
University Hospitals Coventry and Warwickshire NHS Trust	RUG	Hospital of St Cross	8	*	*	*	*
University Hospitals Coventry and Warwickshire NHS Trust	WAL	University Hospital Coventry	389	95.9	69.2	60.3	82
University Hospitals of Leicester NHS Trust	GRL	Glenfield Hospital	411	94.7	64.2	55.7	68.6
University Hospitals of Leicester NHS Trust	LER	Leicester Royal Infirmary	0	NA	NA	NA	NA
University Hospitals of Morecambe Bay NHS Foundation Trust	FGH	Furness General Hospital	0	NA	NA	NA	NA
University Hospitals of Morecambe Bay NHS Foundation Trust	RLI	Royal Lancaster Infirmary	37	*	*	*	*
Walsall Healthcare NHS Trust	WMH	Manor Hospital	258	100	47.7	86.4	100
Warrington and Halton Hospitals NHS Foundation Trust	WDG	Warrington Hospital	195	99	63.6	62.4	95.2
West Hertfordshire Hospitals NHS Trust	WAT	Watford General Hospital	266	81.2	43.2	47.7	99.6

West Middlesex University Hospital NHS Trust	WMU	West Middlesex University Hospital	241	88.8	22	25.2	89
West Suffolk NHS Foundation Trust	WSH	West Suffolk Hospital	219	97	54.3	35.4	55.9
Western Sussex Hospitals NHS Trust	STR	St Richard's Hospital	313	90.5	56.9	71.7	89.9
Western Sussex Hospitals NHS Trust	WRG	Worthing Hospital	300	95.1	52	58.7	91.8
Weston Area Health NHS Trust	WGH	Weston General Hospital	56	100	17.9	21.8	21.8
Wirral University Teaching Hospital NHS Foundation Trust	WIR	Arrowe Park Hospital	250	98.4	53.6	57.6	85.6
Worcestershire Acute Hospitals NHS Trust	RED	Alexandra Hospital	243	88.6	14.4	65.8	67.1
Worcestershire Acute Hospitals NHS Trust	WRC	Worcestershire Royal Hospital	92	77.3	65.2	82.1	85.7
Wrightington, Wigan and Leigh NHS Foundation Trust	AEI	Royal Albert Edward Infirmary	443	97.7	73.8	2	93.7
Wye Valley NHS Trust	HCH	County Hospital Hereford	100	98	44	50	50
Yeovil District Hospital NHS Foundation Trust	YEO	Yeovil District Hospital	232	96.1	78.4	84.6	96.4
York Teaching Hospital NHS Foundation Trust	SCA	Scarborough General Hospital	0	NA	NA	NA	NA
York Teaching Hospital NHS Foundation Trust	YDH	The York Hospital	141	63.3	15.6	29.1	55.3

Table 39: Clinical practice in Wales (in-hospital care)

Trust name	NICOR Hospital code	Hospital name	Heart failure admissions (n)	Received echo (%)	Cardiology inpatient (%)	Input from consultant cardiologist (%)	Input from specialist (%)
England and Wales			**40050**	**91**	**50**	**57**	**78**
Abertawe Bro Morgannwg University Health Board	MOR	Morriston Hospital	0	NA	NA	NA	NA
Abertawe Bro Morgannwg University Health Board	NGH	Neath Port Talbot Hospital	4	*	*	*	*
Abertawe Bro Morgannwg University Health Board	POW	Princess Of Wales Hospital	75	92	54.7	67.6	70.3
Abertawe Bro Morgannwg University Health Board	SIN	Singleton Hospital	0	NA	NA	NA	NA
Aneurin Bevan Health Board	NEV	Nevill Hall Hospital	191	98.9	45.5	46.3	50.5
Aneurin Bevan Health Board	GWE	Royal Gwent Hospital	67	100	53.7	58.7	60.3
Aneurin Bevan Health Board	YYF	Ysbyty Ystrad Fawr	0	NA	NA	NA	NA
Betsi Cadwaladr University Health Board	CLW	Glan Clwyd Hospital	81	96.3	50.6	53.1	55.6
Betsi Cadwaladr University Health Board	LLA	Llandudno General Hospital	0	NA	NA	NA	NA
Betsi Cadwaladr University Health Board	WRX	Wrexham Maelor Hospital	222	98.2	57.2	63.6	78.2
Betsi Cadwaladr University Health Board	GWY	Ysbyty Gwynedd	0	NA	NA	NA	NA
Cardiff and Vale University Health Board	LLD	University Hospital Llandough	176	91.8	0	14.9	39.4
Cardiff and Vale University Health Board	UHW	University Hospital of Wales	222	86.1	57.2	60.5	64.1
Cwm Taf Health Board	PCH	Prince Charles Hospital	148	98.6	64.9	82.3	82.3
Cwm Taf Health Board	RGH	Royal Glamorgan Hospital	127	98.4	46.5	59.1	68.5
Hywel Dda Health Board	BRG	Bronglais General Hospital	101	100	87.1	88.1	89.1
Hywel Dda Health Board	PPH	Prince Philip Hospital	91	92.1	26.4	39.1	47.1
Hywel Dda Health Board	WWG	West Wales General Hospital	61	95	54.1	66.7	66.7
Hywel Dda Health Board	WYB	Withybush General Hospital	102	63.4	20.6	15.7	15.7

Table 40: Clinical practice in England (discharge)

Trust name	NICOR Hospital code	Hospital name	Heart failure admissions (n)	ACEI on discharge (%)	ACEI/ ARB on discharge (%)	Beta blocker on discharge (%)	Received discharge planning (%)	Referral to HF liaison service (%)	Referral to HF liaison service (LVSD only) (%)	Referral to cardiology follow-up (%)
England and Wales			**40050**	**73**	**85**	**82**	**83**	**59**	**69**	**52.7**
Aintree University Hospital NHS Foundation Trust	FAZ	University Hospital Aintree	325	61.5	71.1	83.5	92.6	94.7	97.6	84.1
Airedale NHS Foundation Trust	AIR	Airedale General Hospital	170	62	70.8	74	93.3	10.7	16.7	19.3
Ashford and St Peter's Hospitals NHS Trust	SPH	St Peter's Hospital	402	84.1	88.9	89	87.6	48.3	68	49.2
Barking, Havering and Redbridge University Hospitals NHS Trust	KGG	King George Hospital	256	55.4	81.6	83.4	68.2	72.9	85.9	63.1
Barking, Havering and Redbridge University Hospitals NHS Trust	OLD	Queen's Hospital Romford	303	67.3	78.9	83.7	70.9	64.4	71	59.8
Barnet and Chase Farm Hospitals NHS Trust	BNT	Barnet General Hospital	294	69.3	93.8	82.8	89.4	56.9	65	64.8
Barnet and Chase Farm Hospitals NHS Trust	CHS	Chase Farm Hospital	244	90.8	100	89.4	99.2	79.5	88.2	68.2
Barnsley Hospital NHS Foundation Trust	BAR	Barnsley Hospital	194	72	86.4	80.2	85.7	31.3	45.5	57
Barts Health NHS Trust	BAL	Barts and the London	213	71.9	79.1	82	92.2	72.2	85.8	93.2
Barts Health NHS Trust	NWG	Newham University Hospital	125	94.2	96.9	98.7	95.9	87	87.5	73
Barts Health NHS Trust	WHC	Whipps Cross University Hospital	289	57.1	78.1	68.8	84.8	81.8	90.6	42.8
Basildon and Thurrock University Hospitals NHS Foundation Trust	BAS	Basildon University Hospital	0	NA	NA	NA	NA	NA	NA	NA
Bedford Hospital NHS Trust	BED	Bedford Hospital	233	72.1	85.9	86.2	89.1	48.3	53.7	70
Blackpool Teaching Hospitals NHS Foundation Trust	VIC	Blackpool Victoria Hospital	688	79	87.2	87.8	99.7	87.8	90.7	33.3
Bolton NHS Foundation Trust	BOL	Royal Bolton Hospital	114	96.3	97.9	100	90	45.5	62.7	76.5
Bradford Teaching Hospitals NHS Foundation Trust	BRD	Bradford Royal Infirmary	246	56.7	74.3	76.1	86.5	41.9	48.3	34.1

Trust name	NICOR Hospital code	Hospital name	Heart failure admissions (n)	ACEI on discharge (%)	ACEI/ ARB on discharge (%)	Beta blocker on discharge (%)	Received discharge planning (%)	Referral to HF liaison service (%)	Referral to HF liaison service (LVSD only) (%)	Referral to cardiology follow-up (%)
Brighton and Sussex University Hospitals NHS Trust	PRH	Princess Royal Hospital (Haywards Heath)	159	73.9	91.1	80.9	98.1	36.5	72.1	23.4
Brighton and Sussex University Hospitals NHS Trust	RSC	Royal Sussex County Hospital	408	69.5	82.3	80.6	99.3	49.6	65.5	54.9
Buckinghamshire Healthcare NHS Trust	SMV	Stoke Mandeville Hospital	34	*	*	*	*	*	*	*
Buckinghamshire Healthcare NHS Trust	AMG	Wycombe Hospital	181	72.7	85.7	77.7	90.3	57	63	68
Burton Hospitals NHS Foundation Trust	BRT	Queen's Hospital (Burton)	233	95.3	98	84.6	80.3	27.5	38.6	40.7
Calderdale and Huddersfield NHS Foundation Trust	RHI	Calderdale Royal Hospital	219	69.9	83.2	77.7	99.5	39.6	47.2	54.9
Calderdale and Huddersfield NHS Foundation Trust	HUD	Huddersfield Royal Infirmary	200	71.3	91	77.3	97.2	51.4	58.4	45.3
Cambridge University Hospitals NHS Foundation Trust	ADD	Addenbrooke's Hospital	42	*	*	*	*	*	*	*
Central Manchester University Hospitals NHS Foundation Trust	MRI	Manchester Royal Infirmary	200	76.3	93.4	88.1	98.1	73.7	83	77
Central Manchester University Hospitals NHS Foundation Trust	TRA	Trafford General Hospital	0	NA	NA	NA	NA	NA	NA	NA
Chelsea and Westminster Hospital NHS Foundation Trust	WES	Chelsea and Westminster Hospital	122	68.2	90.2	87.8	99.2	38.9	43.8	56.6
Chesterfield Royal Hospital NHS Foundation Trust	CHE	Chesterfield Royal Hospital	153	63.8	79.7	83.3	93.4	36.8	48.6	27.8
City Hospitals Sunderland NHS Foundation Trust	SUN	Sunderland Royal Hospital	285	62.8	80.5	85.5	80.1	72.8	78.5	73.8
Colchester Hospital University NHS Foundation Trust	COL	Colchester General Hospital	432	69.4	77.8	81.7	98.3	98.9	99.2	32.9
Countess of Chester Hospital NHS Foundation Trust	COC	Countess of Chester Hospital	320	94.2	97.1	95.1	96	77.5	92.2	49
County Durham and Darlington NHS Foundation Trust	DAR	Darlington Memorial Hospital	136	83.3	88.3	93.3	57.5	65.5	74.1	54.8
County Durham and Darlington NHS Foundation Trust	DRY	University Hospital of North Durham	188	54.5	73.5	74.8	36.8	31.3	32.6	37.2

Croydon Health Services NHS Trust	MAY	Croydon University Hospital	181	74.2	89.8	77.9	100	65.4	74.5	77.4
Dartford and Gravesham NHS Trust	DVH	Darent Valley Hospital	229	72.4	93.9	91.2	96.9	23.8	33.6	63.7
Derby Hospitals NHS Foundation Trust	DER	Royal Derby Hospital	259	49.6	68.6	66.4	100	92.2	93	80.6
Doncaster and Bassetlaw Hospitals NHS Foundation Trust	BSL	Bassetlaw Hospital	61	70	86.2	70	98.1	35.2	41.9	47.3
Doncaster and Bassetlaw Hospitals NHS Foundation Trust	DID	Doncaster Royal Infirmary	110	76.5	90.7	77.2	97	47	50.8	53
Dorset County Hospital NHS Foundation Trust	WDH	Dorset County Hospital	102	66.7	75	84.8	82.8	17.9	36.4	34.6
Ealing Hospital NHS Trust	EAL	Ealing Hospital	269	53.5	67.6	72.4	100	19.9	22	83.5
East and North Hertfordshire NHS Trust	LIS	Lister Hospital	179	64.6	80.1	90.1	100	66.9	71.4	81.1
East and North Hertfordshire NHS Trust	QEW	Queen Elizabeth II Hospital	91	54.8	74.2	70	98.6	36.4	38.7	13
East Cheshire NHS Trust	MAC	Macclesfield District General Hospital	171	56.9	68.8	73.1	81.9	61.2	70.8	60.2
East Kent Hospitals University NHS Foundation Trust	KCC	Kent and Canterbury Hospital	108	75	76.9	70	34.6	35.3	47.6	25
East Kent Hospitals University NHS Foundation Trust	QEQ	Queen Elizabeth The Queen Mother Hospital	133	77.1	82.1	78.7	56.2	38.5	66.7	18.2
East Kent Hospitals University NHS Foundation Trust	WHH	William Harvey Hospital	135	88.6	92.5	79.2	63.4	57.9	75	32.1
East Lancashire Hospitals NHS Trust	BLA	Royal Blackburn Hospital	349	80.7	93.1	87.5	94	94.4	96.2	57.6
East Sussex Healthcare NHS Trust	CGH	Conquest Hospital	222	58	73.7	72.5	100	73.4	79.7	45.8
East Sussex Healthcare NHS Trust	DGE	Eastbourne District General Hospital	224	66.7	78.8	62	100	73.4	76.2	78.9
Epsom and St Helier University Hospitals NHS Trust	EPS	Epsom Hospital	79	72.7	84	84.6	94.2	48.5	96.4	52.3
Epsom and St Helier University Hospitals NHS Trust	SHC	St Helier Hospital	84	66.7	90.6	75.8	98.7	81.7	97.2	61.4
Frimley Park Hospital NHS Foundation Trust	FRM	Frimley Park Hospital	230	63.6	76.8	66.7	100	81.7	84.8	55.4
Gateshead Health NHS Foundation Trust	QEG	Queen Elizabeth Hospital (Gateshead)	190	79.1	94.2	84.7	92.3	82.4	87.3	32.6
George Eliot Hospital NHS Trust	NUN	George Eliot Hospital	197	75.3	86	95.8	1.3	0	0	71.9

Trust name	NICOR Hospital code	Hospital name	Heart failure admissions (n)	ACEI on discharge (%)	ACEI/ ARB on discharge (%)	Beta blocker on discharge (%)	Received discharge planning (%)	Referral to HF liaison service (%)	Referral to HF liaison service (LVSD only) (%)	Referral to cardiology follow-up (%)
Gloucestershire Hospitals NHS Foundation Trust	CHG	Cheltenham General Hospital	55	64.3	78.6	84.6	92.2	19.1	60	19.1
Gloucestershire Hospitals NHS Foundation Trust	GLO	Gloucestershire Royal Hospital	56	72.7	84.6	81.2	85.5	28.3	40	32.6
Great Western Hospitals NHS Foundation Trust	PMS	Great Western Hospital	298	84.4	97.3	88.6	99.7	56.6	73.2	49.6
Guy's and St Thomas' NHS Foundation Trust	STH	St Thomas' Hospital	310	63.5	80.1	86.9	95	86.6	92.7	83.8
Hampshire Hospitals NHS Foundation Trust	NHH	Basingstoke and North Hampshire Hospital	134	67.4	84.1	75.5	98.5	70.3	77.4	16.2
Hampshire Hospitals NHS F oundation Trust	RHC	Royal Hampshire County Hospital	0	NA	NA	NA	NA	NA	NA	NA
Harrogate and District NHS Foundation Trust	HAR	Harrogate District Hospital	66	94.4	95.2	84.2	87.3	24.6	40.9	29.8
Heart of England NHS Foundation Trust	EBH	Birmingham Heartlands Hospital	168	74.8	85.7	68	97.9	87.4	88.9	44.7
Heart of England NHS Foundation Trust	GHS	Good Hope Hospital	34	*	*	*	*	*	*	*
Heart of England NHS Foundation Trust	SOL	Solihull Hospital	170	70.1	85.7	81.9	98.7	89.4	90.3	43.4
Heatherwood and Wexham Park Hospitals NHS Foundation Trust	WEX	Wexham Park Hospital	203	83.3	89.5	85	99.5	25.5	31.5	87.5
Hinchingbrooke Health Care NHS Trust	HIN	Hinchingbrooke Hospital	0	NA	NA	NA	NA	NA	NA	NA
Homerton University Hospital NHS Foundation Trust	HOM	Homerton University Hospital	248	70	85.1	84.1	91.1	57.4	67.9	54
Hull and East Yorkshire Hospitals NHS Trust	CHH	Castle Hill Hospital	455	75.6	82.4	84.7	78.6	64.4	73.5	90
Hull and East Yorkshire Hospitals NHS Trust	HRI	Hull Royal Infirmary	67	54.5	60.6	74.3	67.2	63.2	82.9	73.7
Imperial College Healthcare NHS Trust	CCH	Charing Cross Hospital	104	79.5	95.5	67.4	100	41	49	60
Imperial College Healthcare NHS Trust	HAM	Hammersmith Hospital	207	83.3	94	86.4	99.2	37.2	51	69.3
Imperial College Healthcare NHS Trust	STM	St Mary's Hospital Paddington	104	61.8	83	81.8	93.9	85.9	89.7	43.5

Isle of Wight NHS PCT	IOW	St Mary's Hospital, Newport	131	53.4	70.7	42.4	81.6	21.3	28.6	16
James Paget University Hospitals NHS Foundation Trust	JPH	James Paget University Hospital	140	73	79.4	88.9	91.7	79.2	79.7	56.4
Kettering General Hospital NHS Foundation Trust	KGH	Kettering General Hospital	321	70.9	77.7	88.8	99	60.7	76.5	65.1
King's College Hospital NHS Foundation Trust	KCH	King's College Hospital	155	76.6	87.8	87.1	92.3	75.7	81.7	88.3
Kingston Hospital NHS Trust	KTH	Kingston Hospital	152	52.1	66	62.5	90.5	1.6	2	49.2
Lancashire Teaching Hospitals NHS Foundation Trust	CHO	Chorley and South Ribble Hospital	246	80.7	100	97.5	99.1	100	100	85.3
Lancashire Teaching Hospitals NHS Foundation Trust	RPH	Royal Preston Hospital	427	70.8	83.8	90.1	98.6	98.6	98.6	77.1
Leeds Teaching Hospitals NHS Trust	LGI	Leeds General Infirmary	277	59.8	76.7	81.2	98.2	95.9	96.2	88.1
Lewisham Healthcare NHS Trust	LEW	University Hospital Lewisham	171	57.5	83.9	85.7	64.6	44.6	62.2	68.5
Liverpool Heart and Chest Hospital NHS Foundation Trust	BHL	Liverpool Heart and Chest Hospital	153	81.5	88	91.2	99.3	74.5	75.9	96.5
Luton and Dunstable Hospital NHS Foundation Trust	LDH	Luton and Dunstable Hospital	249	72.9	84.5	76.2	93.1	57.9	64.6	64.7
Maidstone and Tunbridge Wells NHS Trust	MAI	Maidstone Hospital	212	76.7	88.4	80.6	81.4	77.8	88.3	72.3
Maidstone and Tunbridge Wells NHS Trust	KSX	Tunbridge Wells Hospital	150	84.2	96.5	60.3	87.2	83.8	94	69.1
Medway NHS Foundation Trust	MDW	Medway Maritime Hospital	0	NA	NA	NA	NA	NA	NA	NA
Mid Cheshire Hospitals NHS Foundation Trust	LGH	Leighton Hospital	187	82.8	91.5	93.8	98.9	57.4	60.7	35.4
Mid Essex Hospital Services NHS Trust	BFH	Broomfield Hospital	214	79.3	99.4	97.3	99.1	89	88.8	62.6
Mid Staffordshire NHS Foundation Trust	SDG	Stafford Hospital	167	71	88.5	81.2	71.7	47	62.4	48.9
Mid Yorkshire Hospitals NHS Trust	DEW	Dewsbury and District Hospital	277	88.7	96.8	83.1	97.8	62.4	77.5	45.7
Mid Yorkshire Hospitals NHS Trust	PIN	Pinderfields Hospital	395	74.6	88.8	83.5	90.3	64	65.3	59.5
Milton Keynes Hospital NHS Foundation Trust	MKH	Milton Keynes General Hospital	140	77.1	88.7	85.1	99.1	41.8	52.5	77.2
Milton Keynes Hospital NHS Foundation Trust	MKH	Milton Keynes General Hospital	140	77.1	88.7	85.1	99.1	41.8	52.5	77.2

Trust name	NICOR Hospital code	Hospital name	Heart failure admissions (n)	ACEI on discharge (%)	ACEI/ ARB on discharge (%)	Beta blocker on discharge (%)	Received discharge planning (%)	Referral to HF liaison service (%)	Referral to HF liaison service (LVSD only) (%)	Referral to cardiology follow-up (%)
Norfolk and Norwich University Hospitals NHS Foundation Trust	NOR	Norfolk and Norwich University Hospital	430	84.8	97.8	97.9	100	48.9	54.1	86.5
North Bristol NHS Trust	FRY	Frenchay Hospital	253	65.5	80	77.8	98.1	2.4	3.2	17.6
North Bristol NHS Trust	BSM	Southmead Hospital	220	53.8	66.7	72.4	98.4	6.6	7.9	42.4
North Cumbria University Hospitals NHS Trust	CMI	Cumberland Infirmary	100	69.7	80.6	70.8	83.5	87.1	89	56
North Cumbria University Hospitals NHS Trust	WCI	West Cumberland Hospital	48	*	*	*	*	*	*	*
North Middlesex University Hospital NHS Trust	NMH	North Middlesex University Hospital	179	55.3	77.6	77.6	98.3	72.5	85.2	38.4
North Tees and Hartlepool NHS Foundation Trust	HGH	University Hospital of Hartlepool	166	100	100	100	60.6	79.6	79.3	35.4
North Tees and Hartlepool NHS Foundation Trust	NTG	University Hospital of North Tees	108	97.8	98.3	100	78.7	71.3	76.8	30.5
Northampton General Hospital NHS Trust	NTH	Northampton General Hospital	261	100	100	100	99	95.2	97.1	34
Northern Devon Healthcare NHS Trust	NDD	North Devon District Hospital	290	68	79.6	58.5	80.1	43.4	64.2	44.2
Northern Lincolnshire and Goole Hospitals NHS Foundation Trust	GGH	Diana Princess of Wales Hospital	176	85.3	93.3	91.9	90.8	14.9	21.8	50.4
Northern Lincolnshire and Goole Hospitals NHS Foundation Trust	SCU	Scunthorpe General Hospital	33	*	*	*	*	*	*	*
Northumbria Healthcare NHS Foundation Trust	HEX	Hexham General Hospital	30	*	*	*	*	*	*	*
Northumbria Healthcare NHS Foundation Trust	NTY	North Tyneside Hospital	189	58.4	74.7	73.3	66.3	46.7	59.8	36.4
Northumbria Healthcare NHS Foundation Trust	ASH	Wansbeck General Hospital	162	60.4	77.2	79.4	56.5	55.6	62.6	44.4
Nottingham University Hospitals NHS Trust	CHN	Nottingham City Hospital	70	84.1	90.2	81.2	73.3	48.5	46.6	61.8

Nottingham University Hospitals NHS Trust	UHN	Queen's Medical Centre	115	76.6	85.7	68.9	66.3	49.1	51	28.9
Oxford Radcliffe Hospitals NHS Trust	HOR	Horton General Hospital	173	92.8	98.6	87.8	99.4	89	94.9	32
Oxford Radcliffe Hospitals NHS Trust	RAD	John Radcliffe Hospital	497	96.4	100	96	96.7	90.4	95.3	55.5
Pennine Acute Hospitals NHS Trust	BRY	Fairfield General Hospital	315	84.4	88.9	81	53	85	90.8	59
Pennine Acute Hospitals NHS Trust	NMG	North Manchester General Hospital	225	91.1	92.3	85.2	60.5	93.2	95.8	81.7
Pennine Acute Hospitals NHS Trust	BHH	Rochdale Infirmary	29	*	*	*	*	*	*	*
Pennine Acute Hospitals NHS Trust	OHM	Royal Oldham Hospital	226	84.2	86	78.9	57.1	96.9	97.4	95.5
Peterborough and Stamford Hospitals NHS Foundation Trust	PET	Peterborough City Hospital	280	69	82.7	79.4	87.3	59.6	69.4	68.3
Peterborough and Stamford Hospitals NHS Foundation Trust	SMF	Stamford and Rutland Hospital	0	NA	NA	NA	NA	NA	NA	NA
Plymouth Hospitals NHS Trust	PLY	Derriford Hospital	0	NA	NA	NA	NA	NA	NA	NA
Poole Hospital NHS Foundation Trust	PGH	Poole General Hospital	271	64.6	76.5	73.8	57.9	34.4	42.9	35.1
Portsmouth Hospitals NHS Trust	QAP	Queen Alexandra Hospital	296	70.7	82.2	82.9	94.4	84.6	87.7	44
Rotherham NHS Foundation Trust	ROT	Rotherham Hospital	200	66.1	74.1	71.6	41.9	52.8	60.8	33.5
Royal Berkshire NHS Foundation Trust	BHR	Royal Berkshire Hospital	365	71.3	89.8	87.4	90	68.8	72.8	36.4
Royal Brompton and Harefield NHS Foundation Trust	HH	Harefield Hospital	80	77.6	88.2	87.7	93.8	77.8	79.4	93
Royal Brompton and Harefield NHS Foundation Trust	NHB	Royal Brompton Hospital	221	83.8	95	89.2	95.3	59.9	72.7	96.1
Royal Cornwall Hospitals NHS Trust	RCH	Royal Cornwall Hospital	177	50.9	64.6	68.1	58.5	44.4	44.6	40.8
Royal Devon and Exeter NHS Foundation Trust	RDE	Royal Devon and Exeter Hospital	194	100	100	100	50	87.1	88.5	30.1
Royal Free London NHS Trust	RFH	Royal Free Hospital	199	81.6	93.6	97.1	97.1	48.9	64.3	69.1
Royal Liverpool and Broadgreen University Hospitals NHS Trust	RLU	Royal Liverpool University Hospital	261	82.4	91.9	97.3	77.9	77.4	85.3	59.4
Royal Surrey County Hospital NHS Foundation Trust	RSU	Royal Surrey County Hospital	142	73.1	81.1	69.2	94.9	17.7	25	41.8
Royal United Hospital Bath NHS Trust	BAT	Royal United Hospital Bath	234	82.5	90.2	85.8	91.3	33.5	29	30.6
Salford Royal NHS Foundation Trust	SLF	Salford Royal	253	68.1	79.6	80.8	94	85.3	91.6	62.9

Trust name	NICOR Hospital code	Hospital name	Heart failure admissions (n)	ACEI on discharge (%)	ACEI/ ARB on discharge (%)	Beta blocker on discharge (%)	Received discharge planning (%)	Referral to HF liaison service (%)	Referral to HF liaison service (LVSD only) (%)	Referral to cardiology follow-up (%)
Salisbury NHS Foundation Trust	SAL	Salisbury District Hospital	276	65.9	89.9	81.7	99.1	44.7	45.9	24.9
Sandwell and West Birmingham Hospitals NHS Trust	DUD	Birmingham City Hospital	138	85.7	93.8	90.7	92.7	83.2	85.9	95
Sandwell and West Birmingham Hospitals NHS Trust	SAN	Sandwell General Hospital	173	70.3	93.9	79.1	89.9	98.7	98.5	78.5
Sheffield Teaching Hospitals NHS Foundation Trust	NGS	Northern General Hospital	326	68.3	71.7	74.5	97.1	64.5	73.1	24.4
Sherwood Forest Hospitals NHS Foundation Trust	KMH	King's Mill Hospital	373	79.8	91.1	86.5	88.4	47.3	70.3	40.3
Sherwood Forest Hospitals NHS Foundation Trust	NHN	Newark Hospital	6	*	*	*	*	*	*	*
Shrewsbury and Telford Hospital NHS Trust	TLF	Princess Royal Hospital (Telford)	30	*	*	*	*	*	*	*
Shrewsbury and Telford Hospital NHS Trust	RSS	Royal Shrewsbury Hospital	23	*	*	*	*	*	*	*
South Devon Healthcare NHS Foundation Trust	TOR	Torbay Hospital	408	48.3	61.9	50	100	23.1	27.5	32.7
South London Healthcare NHS Trust	BRO	Princess Royal University Hospital (Bromley)	246	78.4	82.8	82.6	97.9	15.5	14.4	43.1
South London Healthcare NHS Trust	GWH	Queen Elizabeth Hospital (Woolwich)	256	70	81.5	87.6	93.5	64.4	71.9	51.9
South Tees Hospitals NHS Foundation Trust	FRH	Friarage Hospital	0	NA	NA	NA	NA	NA	NA	NA
South Tees Hospitals NHS Foundation Trust	SCM	James Cook University Hospital	356	81.3	92.8	87.6	90.4	90.8	93.1	70.3
South Tyneside NHS Foundation Trust	STD	South Tyneside District Hospital	250	73.3	91.9	90.5	86	81.9	87.7	67.8
South Warwickshire NHS Foundation Trust	WAR	Warwick Hospital	97	51.1	85.4	73.5	73.6	19.5	18	69.2
Southend University Hospital NHS Foundation Trust	SEH	Southend Hospital	455	70.6	77.7	81.7	84.2	62.6	89.5	43.4

Southport and Ormskirk Hospital NHS Trust	SOU	Southport and Formby District General Hospital	246	85.6	88.8	74	99.1	85.1	91.3	53.1
St George's Healthcare NHS Trust	GEO	St George's Hospital	231	71.4	90.8	94.8	99	90.2	93.2	60.8
St Helens and Knowsley Teaching Hospitals NHS Trust	WHI	Whiston Hospital	245	92.7	98	93.3	94.7	86.4	90.1	54.5
Stockport NHS Foundation Trust	SHH	Stepping Hill Hospital	344	62.3	76.3	86.4	38.7	11.9	14.6	41.2
Surrey and Sussex Healthcare NHS Trust	ESU	East Surrey Hospital	177	90	97.6	91.1	44.4	51.5	56.1	51
Tameside Hospital NHS Foundation Trust	TGA	Tameside General Hospital	239	74.3	82.9	85.1	42	51.7	77.8	39.7
Taunton and Somerset NHS Foundation Trust	MPH	Musgrove Park Hospital	362	60.3	83	85.6	16	0	0	36.3
The Dudley Group NHS Foundation Trust	RUS	Russells Hall Hospital	231	64.5	76.8	76.8	82.7	83.4	85.3	71.6
The Hillingdon Hospitals NHS Foundation Trust	HIL	Hillingdon Hospital	119	42.2	60.3	61.3	100	49.5	57.8	27.2
The Ipswich Hospital NHS Trust	IPS	Ipswich Hospital	74	78.4	84.6	79.2	81.9	43.8	54.2	32.3
The Newcastle Upon Tyne Hospitals NHS Foundation Trust	FRE	Freeman Hospital /Royal Victoria Infirmary	253	71	85.7	86.4	96.4	73.5	89.1	97.9
The North West London Hospitals NHS Trust	CMH	Central Middlesex Hospital	94	56.6	67.9	65.4	75.6	46.5	72	44.4
The North West London Hospitals NHS Trust	NPH	Northwick Park Hospital	187	61.2	72.6	75.9	39.3	45.2	55.5	35.1
The Princess Alexandra Hospital NHS Trust	PAH	Princess Alexandra Hospital	0	NA	NA	NA	NA	NA	NA	NA
The Queen Elizabeth Hospital King's Lynn NHS Foundation Trust	QKL	Queen Elizabeth Hospital (King's Lynn)	170	57.1	86.1	88.6	87.6	25.5	31.3	56.5
The Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust	BOU	Royal Bournemouth General Hospital	267	67.8	83.6	75.4	71.4	3.7	3.3	55
The Royal Wolverhampton Hospitals NHS Trust	NCR	New Cross Hospital	97	69.2	73.6	74.5	65.9	42	48.1	49.3
The Whittington Hospital NHS Trust	WHT	Whittington Hospital	129	87.5	92.5	77.1	81.8	63.8	73.6	65.8
United Lincolnshire Hospitals NHS Trust	GRA	Grantham and District Hospital	90	66.7	81.4	86.4	100	34.2	46.8	68.4
United Lincolnshire Hospitals NHS Trust	LIN	Lincoln County Hospital	90	68	88	81.5	93.9	24.3	36	50
United Lincolnshire Hospitals NHS Trust	PIL	Pilgrim Hospital	122	66.7	70	67.7	89.8	26.3	41.2	43.6

Trust name	NICOR Hospital code	Hospital name	Heart failure admissions (n)	ACEI on discharge (%)	ACEI/ ARB on discharge (%)	Beta blocker on discharge (%)	Received discharge planning (%)	Referral to HF liaison service (%)	Referral to HF liaison service (LVSD only) (%)	Referral to cardiology follow-up (%)
University College London Hospitals NHS Foundation Trust	UCL	University College Hospital	304	98.3	99.3	94	99	84.2	93	88.5
University Hospital of North Staffordshire NHS Trust	STO	University Hospital of North Staffordshire	222	60.9	65.5	58.3	88	96.1	97.1	76.8
University Hospital of South Manchester NHS Foundation Trust	WYT	Wythenshawe Hospital	299	92.4	94.7	89.4	96.9	54.3	64	59.2
University Hospital Southampton NHS Foundation Trust	SGH	Southampton General Hospital	254	71.2	84.8	82.4	94.6	10.1	12.1	48.7
University Hospitals Birmingham NHS Foundation Trust	QEB	Queen Elizabeth Hospital (Edgbaston)	241	53.3	71.7	67.5	57.7	49.8	65.9	39.9
University Hospitals Bristol NHS Foundation Trust	BRI	Bristol Royal Infirmary	362	73.5	83	75.9	95.1	68.7	68.1	69
University Hospitals Coventry and Warwickshire NHS Trust	RUG	Hospital of St Cross	8	*	*	*	*	*	*	*
University Hospitals Coventry and Warwickshire NHS Trust	WAL	University Hospital Coventry	389	72.2	86.9	85.1	78.7	59.9	76.2	38.8
University Hospitals of Leicester NHS Trust	GRL	Glenfield Hospital	411	55.8	69.6	76.8	28	30.9	32.7	53.9
University Hospitals of Leicester NHS Trust	LER	Leicester Royal Infirmary	0	NA	NA	NA	NA	NA	NA	NA
University Hospitals of Morecambe Bay NHS Foundation Trust	FGH	Furness General Hospital	0	NA	NA	NA	NA	NA	NA	NA
University Hospitals of Morecambe Bay NHS Foundation Trust	RLI	Royal Lancaster Infirmary	37	*	*	*	*	*	*	*
Walsall Healthcare NHS Trust	WMH	Manor Hospital	258	100	100	100	98.8	99.6	100	63.4
Warrington and Halton Hospitals NHS Foundation Trust	WDG	Warrington Hospital	195	73.3	91.7	89	87.4	90.4	96.2	68.8
West Hertfordshire Hospitals NHS Trust	WAT	Watford General Hospital	266	100	100	98.4	96.6	75.7	90.8	93.3
West Middlesex University Hospital NHS Trust	WMU	West Middlesex University Hospital	241	53.7	77.1	75.2	98.5	69.2	79	33.3
West Suffolk NHS Foundation Trust	WSH	West Suffolk Hospital	218	62.1	83	72.6	93.8	38.4	41.9	35.8

Western Sussex Hospitals NHS Trust	STR	St Richard's Hospital	313	72.2	91	78.8	83.5	34.6	47	34.6
Western Sussex Hospitals NHS Trust	WRG	Worthing Hospital	300	96.2	97.2	95.7	85.3	70.3	78.3	43.1
Weston Area Health NHS Trust	WGH	Weston General Hospital	56	40.9	45.5	39.1	12.5	0	0	23.3
Wirral University Teaching Hospital NHS Foundation Trust	WIR	Arrowe Park Hospital	250	80.2	99	92.4	100	85.8	89.3	52.9
Worcestershire Acute Hospitals NHS Trust	RED	Alexandra Hospital	243	54.2	71.4	73.7	86.9	26	34.6	49.7
Worcestershire Acute Hospitals NHS Trust	WRC	Worcestershire Royal Hospital	92	80.4	91.1	89.5	100	52.9	72.4	51.7
Wrightington, Wigan and Leigh NHS Foundation Trust	AEI	Royal Albert Edward Infirmary	443	71.1	92.6	94.3	90.6	64.9	78.1	71.8
Wye Valley NHS Trust	HCH	County Hospital Hereford	100	54.2	79.2	75	95.5	31.4	50	37.5
Yeovil District Hospital NHS Foundation Trust	YEO	Yeovil District Hospital	232	75.6	90	75.3	97.1	97	99.1	34.7
York Teaching Hospital NHS Foundation Trust	SCA	Scarborough General Hospital	0	NA	NA	NA	NA	NA	NA	NA
York Teaching Hospital NHS Foundation Trust	YDH	The York Hospital	141	82.4	85	70	15	20.3	32.4	36.4

Table 41: Clinical practice in Wales (discharge)

Trust name	NICOR Hospital code	Hospital name	Heart failure admissions (n)	ACEI on discharge (%)	ACEI/ ARB on discharge (%)	Beta blocker on discharge (%)	Received discharge planning (%)	Referral to HF liaison service (%)	Referral to HF liaison service (LVSD only) (%)	Referral to cardiology follow-up (%)
England and Wales			**40050**	**73**	**85**	**82**	**83**	**59**	**69**	**52.7**
Abertawe Bro Morgannwg University Health Board	MOR	Morriston Hospital	0	NA	NA	NA	NA	NA	NA	NA
Abertawe Bro Morgannwg University Health Board	NGH	Neath Port Talbot Hospital	4	*	*	*	*	*	*	*
Abertawe Bro Morgannwg University Health Board	POW	Princess Of Wales Hospital	75	65.8	92.1	79.4	89.2	14.8	22.9	47.6
Abertawe Bro Morgannwg University Health Board	SIN	Singleton Hospital	0	NA	NA	NA	NA	NA	NA	NA
Aneurin Bevan Health Board	NEV	Nevill Hall Hospital	191	85.7	89.9	84.9	66.2	39.7	49	31.4
Aneurin Bevan Health Board	GWE	Royal Gwent Hospital	67	100	100	92.6	35.4	13.6	15.8	31.8
Aneurin Bevan Health Board	YYF	Ysbyty Ystrad Fawr	0	NA	NA	NA	NA	NA	NA	NA
Betsi Cadwaladr University Health Board	CLW	Glan Clwyd Hospital	81	75	91.9	82.2	51.6	34.4	43.8	54
Betsi Cadwaladr University Health Board	LLA	Llandudno General Hospital	0	NA	NA	NA	NA	NA	NA	NA
Betsi Cadwaladr University Health Board	WRX	Wrexham Maelor Hospital	222	57.8	71.5	73.8	85.1	73	81.3	48.6
Betsi Cadwaladr University Health Board	GWY	Ysbyty Gwynedd	0	NA	NA	NA	NA	NA	NA	NA
Cardiff and Vale University Health Board	LLD	University Hospital Llandough	176	94.3	97.7	83.7	41.1	36.2	49.5	33.6
Cardiff and Vale University Health Board	UHW	University Hospital of Wales	222	96.9	97.4	91.5	48.6	46.9	54.3	58.9
Cwm Taf Health Board	PCH	Prince Charles Hospital	148	62.8	78.2	77.8	56.3	46.7	53.7	72.5
Cwm Taf Health Board	RGH	Royal Glamorgan Hospital	127	75	86.1	56.2	73.6	43.7	50.7	41.4
Hywel Dda Health Board	BRG	Bronglais General Hospital	101	100	100	100	94.3	98.7	100	42.1
Hywel Dda Health Board	PPH	Prince Philip Hospital	91	73.1	90.4	88.5	96.3	40.6	50	33.3
Hywel Dda Health Board	WWG	West Wales General Hospital	61	67.7	84.4	64.5	70.2	64.4	73.5	56.8
Hywel Dda Health Board	WYB	Withybush General Hospital	102	84	88	77.3	46.3	0	0	17.1

5 Outcomes

There are five separate mortality measures reported at the national level in this report:

- In-hospital mortality for the 2012/13 population
- In-hospital mortality for the 2009-13 population
- 30-day mortality for survivors to discharge for the 2012/13 population
- Cumulative mortality for survivors to discharge for the 2012/13 population
- Cumulative mortality for survivors to discharge for the 2009-13 population

For each measure, we have produced a Cox proportional hazards model, to show the hazards associated with risk factors for each group of patients. The risk adjustment carried out this year is much more thorough than that performed in previous years. The process of developing the models started with a literature review; the main risks associated with acute heart failure are very well documented, so the factors to be included in the model were selected from the literature, rather than being chosen based on statistical significance in the data.

For the continuous variables (e.g. systolic blood pressure, haemoglobin, heart rate) we had to determine how much of an increase or decrease the hazard should be measured against. For blood pressure, a 10 mmHG increase is used as standard in the literature, for other variables, we looked at the spread of the data to determine what unit increase to use – e.g. haemoglobin had a very small spread, so a decrease of 1g/dL was used as a measure of hazard; creatinine had a very large spread, so an increase of 10umol/L was used).

Potassium is a U-shaped variable, with both low and high values conferring an increased risk. Therefore four levels were used to measure the hazard of different potassium levels, which were determined based on clinical judgement of normal measurements. Consistently having a low potassium (<3.5 mEq/L) was a greater hazard than having a slightly high potassium level (4.5-5.5 mEq/L), and having a very high potassium (>5.5 mEq/L) is associated with the greatest hazard. Length of stay was also separated out into four levels, based on the quartiles of length of stay in the data. Length of stay appeared to be a linear variable, with a higher mortality hazard associated with a longer length of stay, although in 30-day analyses significance was not reached for some of the levels.

In April 2012 a dataset revision included a series of new fields in the audit, covering heart rate and systolic blood pressure and the relevant aspects of a full blood count. Blood pressure, heart rate and blood count are measured at discharge, whereas NYHA class is recorded on admission.

The mortality measures which look at 2012/13 data alone include these factors, and so offer a more sophisticated risk adjustment. The analyses which cover 2009-13 data cannot use these factors, as they are only present in sufficient quantities in the 2012/13 population, so used a smaller group of risks. The hazards associated with these risks may therefore be exaggerated, as they do not take into account these other confounding factors. For the analysis looking at survival post discharge, all-cause and cardiovascular mortality is distinguished.

The proportionality assumption was checked in all models, so the hazard ratios can be assumed to be good estimates. For the one-year hazards models computational imputation was used.

In the data which we used to generate the survival model for the 2012/2013 analysis, 40% of patient records had complete data on all variables. We employed multiple imputation so that we were not restricted to complete case only. Multiple imputation is the process of generating more than one potential dataset which the data could have been (as opposed to single imputation which fills in missing data once). The imputed datasets are then analysed, and their results combined appropriately to give a final result.

The low proportion of complete records in the Cox regression analysis was mainly because of the newly added core fields which are established risk factors. For 38 (18.9%) hospitals there were no records which were eligible for a complete-case multivariate Cox regression analysis as a result of missing data (especially in the new core fields). 29 of these hospitals submitted at least 30 records to the audit in the report year.

At least 90% of records submitted by Colchester General Hospital, Derby Royal Infirmary, Royal Glamorgan and Harefield hospital contributed to the regression analyses, but on average 38.8% of the data submitted by hospitals contributed to the regression analysis. It is important that data is submitted more fully. Currently 72 (36.4%) hospitals submitted at least 50% of valid post-discharge data in all regression analysis fields. We expect hospitals to submit 50% of information required in the regression fields by 2013/2014 and 70% by 2014/2015.

As a result of high level of missingness a more thorough analysis is probably required, but there were similarities in results obtained from both imputed and complete case analyses.

Multiple imputation was done using the ice command in Stata.[19] We performed 60 imputations.

5.1 In-hospital mortality

5.1.1 In-hospital mortality (2012/13)

In hospital mortality has dropped from 11.1% in 2011/12 to 9.4% in 2012/13. This is a relative reduction of 15.3%, and an absolute reduction of 1.7%. This increased survival is recorded despite a very similar patient group to previous years, in terms of age, severity of symptoms and co-morbidities. It also seems to correspond to increased rates of prescription for ACE inhibitors and beta blockers, and higher levels of referral to specialist follow-up, slightly more patients being treated on cardiology wards. Predictably, in-hospital mortality rates increase with age, with patients over 75 years being more than twice as likely to die in hospital as those in the under-75 age group (table 43).

The cox proportional hazards model for in hospital mortality in the 2012/13 population shows that being older, having a high potassium level and not being a cardiology in-patient are the strongest predictors of in-hospital mortality (table 42). Being in NYHA III/IV (i.e. having worse symptoms of heart failure) is also, unsurprisingly, a strong predictor. Being female is associated with increased risk of death, though this did not reach statistical significance.

Table 42: In-hospital mortality cox proportional hazards model (2012/13)

Variable (n=15452)	Hazard ratio	Lower 95% CI	Upper 95% CI	p-value
Age	2.07	1.80	2.38	<0.001
Not a cardiology in-patient	1.54	1.38	1.72	<0.001
NYHA III/IV	1.20	1.04	1.38	0.014
Systolic blood pressure (10 mm Hg decrease)	1.19	1.18	1.20	<0.001
Valve disease	1.19	1.06	1.33	0.003
Sodium (5 mEq/L decrease)	1.18	1.16	1.19	<0.001
Urea (5 mg/dL increase)	1.12	1.12	1.12	<0.001
Female	1.10	0.99	1.23	0.077
Heart rate (bpm)	1.07	1.06	1.07	<0.001
Haemoglobin (g/dL decrease)	1.04	1.01	1.07	0.004
Creatinine (10 umol/L increase)	1.03	1.03	1.03	<0.001
Potassium ≤3.5 (mEq/L)	1.55	1.27	1.88	<0.001
Potassium 3.5-4.5 (mEq/L)	1.00			
Potassium 4.5-5.5 (mEq/L)	1.33	1.18	1.50	<0.001
Potassium >5.5 (mEq/L)	2.00	1.65	2.42	<0.001

Table 43: In-hospital mortality (2012/13)

Analysis	Variable	Records (n)	Deaths (n)	Mortality (%)
Overall mortality	In-hospital mortality	32991	3109	9.4
Age	16-44	674	9	1.3
Age	45-54	1311	35	2.7
Age	55-64	2803	93	3.3
Age	65-74	6375	419	6.6
Age	75-84	11884	1134	9.5
Age	85+	9944	1419	14.3
Age	16-74	11163	556	5.0
Age	75+	21828	2553	11.7
Sex	Women	14385	1432	10.0
Sex	Men	18585	1677	9.0
Main place of care	Cardiology	16514	1150	7.0

Analysis	Variable	Records (n)	Deaths (n)	Mortality (%)
Main place of care	General Medicine	13221	1499	11.3
Main place of care	Other	3182	457	14.4
Specialist input	No specialist input	6906	997	14.4
Specialist input	Specialist input	25214	1896	7.5

5.1.2 In-hospital mortality (2009-13)

For the 2009-13 in-hospital mortality, very similar factors were shown to be hazards as in the 2012/13 population (table 44). These figures will, however, be slightly exaggerated, as other risk factors have not been taken into account, which we know from table 41 to be associated with significant hazards. In the 2009-13 model being male was associated with an increased hazard, but again, this did not reach statistical significance.

Overall, mortality rates were very similar to the 2012/13 group, indicating that the data collected by the audit has remained fairly stable over the last four years (table 45).

Table 44: In-hospital mortality cox proportional hazards model (2009-13)

Variable	Hazard ratio	Lower 95% CI	Upper 95% CI	p-value
Age	2.31	2.17	2.45	<0.001
Not a cardiology in-patient	1.58	1.50	1.65	<0.001
NYHA III/IV	1.38	1.30	1.46	<0.001
Valve disease	1.17	1.11	1.23	<0.001
Ischaemic heart disease	1.08	1.03	1.13	0.001
Male	1.01	0.96	1.05	0.799

Table 45: In-hospital mortality (2009-13)

Analysis	Variable	Records (n)	Deaths (n)	Mortality (%)
Overall mortality	In-hospital mortality	103750	9797	9.4
Age	16-44	2167	40	1.8
Age	45-54	4132	98	2.4
Age	55-64	9420	322	3.4
Age	65-74	20417	1259	6.2
Age	75-84	37139	3532	9.5
Age	85+	30470	4546	14.9
Age	16-74	36136	1719	4.8
Age	75+	67609	8078	11.9
Sex	Women	45405	4713	10.4
Sex	Men	58296	5079	8.7
Main place of care	Cardiology	49699	3376	6.8
Main place of care	General Medicine	43109	4916	11.4
Main place of care	Other	10771	1498	13.9

5.2 30-day events for survivors to discharge (2012/13)

5.2.1 30-day all-cause mortality for survivors to discharge (2012/13)

For the first time this year, the National Heart Failure Audit has published 30-day mortality for survivors to discharge.

The strongest predictors of mortality for 30-day all-cause mortality for survivors to discharge were not being prescribed an ACE inhibitor or an ARB on discharge, age, not receiving cardiology follow-up, not being prescribed a beta blocker, and having low blood pressure and sodium levels on discharge (table 46).

Length of stay appears to be a linear variable, with worse outcomes associated with longer lengths of stay, although the lower lengths of stay do not reach statistical significance. It is clear, however, that patients staying in for more than 16 days have an increased mortality hazard. As the major confounding factors associated with heart failure have been accounted for, this may indicate that many of these patients have a comorbidity other than heart failure which is keeping them in hospital.

Overall 6.1% of the patients who were discharged from hospital alive following an admission with acute heart failure died within 30 days of discharge - this is looking at all-cause mortality, so includes patients who died from non-cardiovascular causes (table 47). When added to the in-hospital mortality, 14.9% of patients died either in hospital or in the month following discharge, which is almost one in seven patients.

Table 46: 30-day all-cause mortality cox proportional hazards model (2012/13)

Variable (n=12279)	Hazard ratio	Lower 95% CI	Upper 95% CI	p-value
No ACE inhibitor and/or ARB	2.02	1.70	2.39	<0.001
Age	1.74	1.41	2.14	<0.001
No cardiology follow-up	1.58	1.32	1.90	<0.001
No beta blocker	1.35	1.14	1.61	0.001
Not a cardiology in-patient	1.25	1.05	1.50	0.013
NYHA III/IV	1.24	1.00	1.54	0.045
No loop diuretic	1.23	0.91	1.64	0.152
COPD	1.21	0.99	1.48	0.06
Sodium (5 mEq/L decrease)	1.21	1.19	1.23	<0.001
Systolic blood pressure (10 mm Hg decrease)	1.16	1.16	1.17	<0.001
Urea (5 mg/dL increase)	1.09	1.09	1.10	<0.001
Male	1.07	0.90	1.26	0.449
Haemoglobin (g/dL decrease)	1.03	0.99	1.08	0.13
Creatinine (10 umol/L increase)	1.01	1.01	1.01	0.069
Length of stay 0-4 days	1.00			
Length of stay 5-8 days	1.20	0.93	1.54	0.16
Length of stay 9-16 days	1.20	0.94	1.55	0.15
Length of stay>=16 days	1.91	1.52	2.39	<0.001

Fig 6: 30-day all-cause mortality (KM curve)

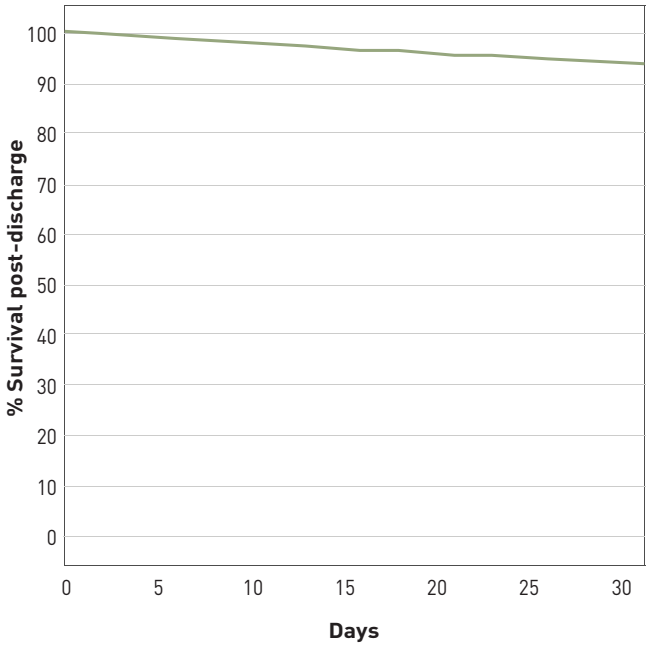


Fig 7: 30-day all-cause mortality by place of care (KM curve)

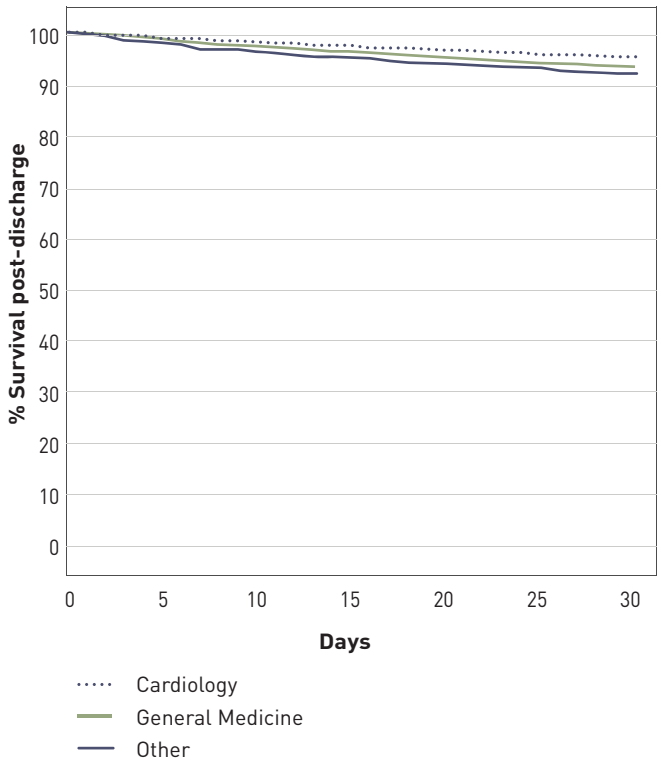


Fig 8: 30-day all-cause mortality by additive drug treatment on discharge (LVSD) (KM curve)

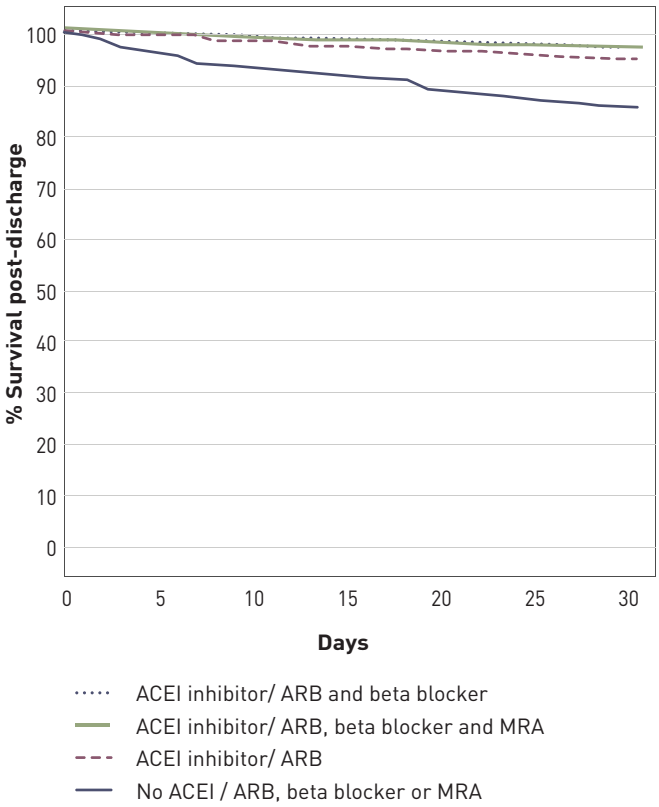


Fig 9: 30-day all-cause mortality by discharge planning (KM curve)

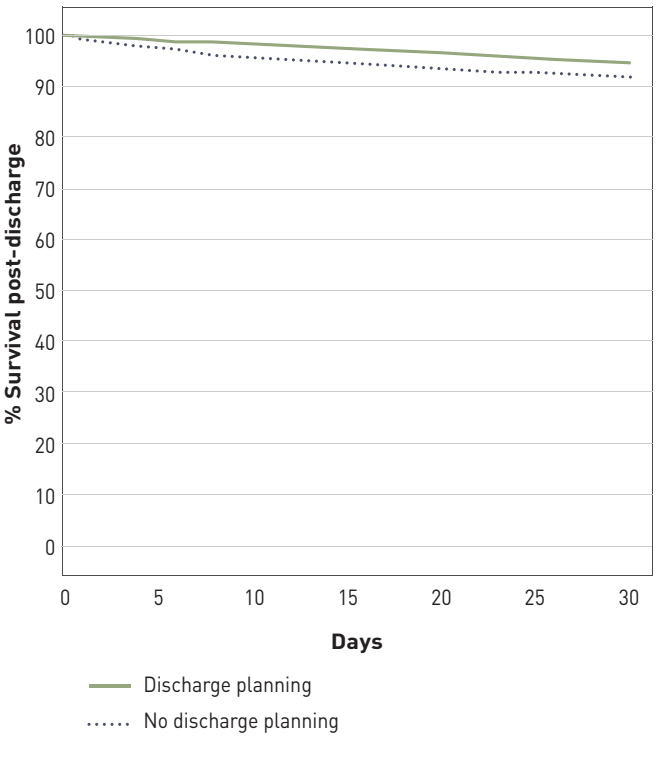


Fig 10: 30-day all-cause mortality by referral to heart failure nurse follow-up (KM curve)

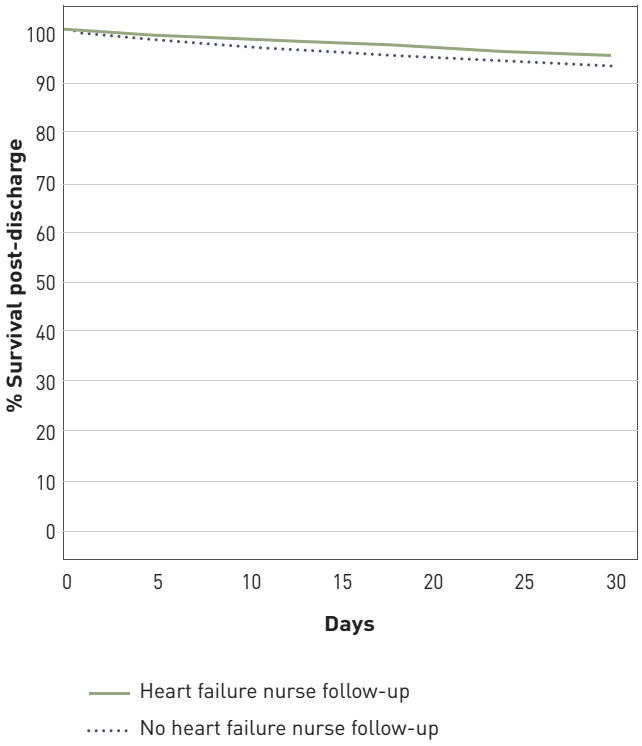


Fig 11: 30-day all-cause mortality by referral to cardiology FU (KM curve)

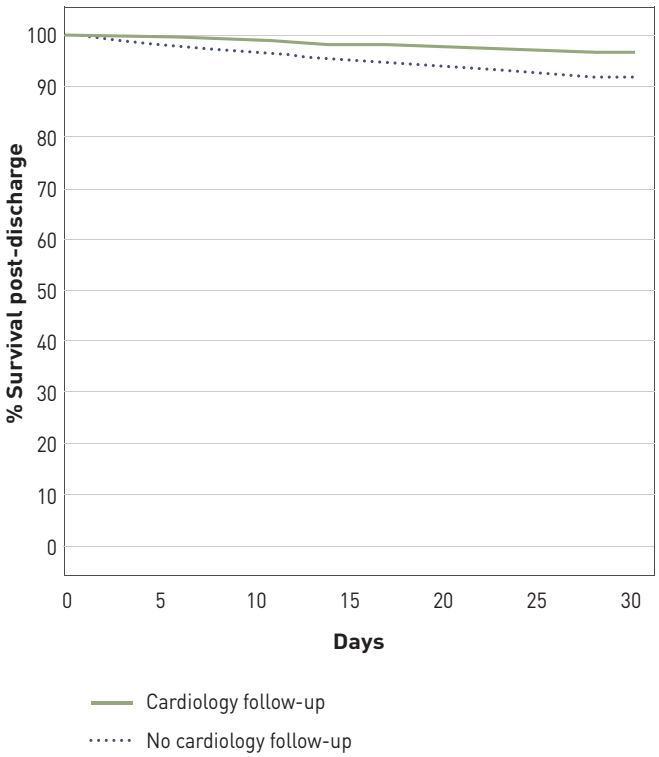


Table 47: 30-day all-cause mortality for survivors to discharge (2012/13)

Analysis	Variable	Records (n)	Deaths (n)	Mortality (%)
Overall mortality	30-day deaths	29882	1811	6.1
Sex	Women	12953	775	6.0
Sex	Men	16908	1035	6.1
Age	16-44	665	4	0.6
Age	45-54	1276	24	1.9
Age	55-64	2710	77	2.8
Age	65-74	5956	259	4.3
Age	75-84	10750	673	6.3
Age	85+	8525	774	9.1
Age	16-74	10607	364	3.4
Age	75+	19275	1447	7.5
Main place of care	Cardiology	15364	767	5.0
Main place of care	General Medicine	11722	812	6.9
Main place of care	Other	2725	227	8.3
Specialist input	No specialist input	5909	454	7.7
Specialist input	Specialist input	23318	1309	5.6
Diagnosis	No LVSD	9946	626	6.3
Diagnosis	LVSD	19326	1134	5.9

Analysis	Variable	Records (n)	Deaths (n)	Mortality (%)
ACE inhibitor (all)	No ACE inhibitor	8150	640	7.9
ACE inhibitor (all)	ACE inhibitor	16626	626	3.8
ACE inhibitor (LVSD only)	No ACE inhibitor	4451	361	8.1
ACE inhibitor (LVSD only)	ACE inhibitor	11830	448	3.8
ACEI/ARB (all)	No ACEI or ARB	5082	513	10.1
ACEI/ARB (all)	ACEI and/or ARB	20550	769	3.7
ACEI/ARB (LVSD only)	No ACEI or ARB	2469	274	11.1
ACEI/ARB (LVSD only)	ACEI and/or ARB	14397	548	3.8
Beta blocker (all)	No beta blocker	6056	468	7.7
Beta blocker (all)	Beta blocker	20099	916	4.6
Beta blocker (LVSD only)	No beta blocker	3038	252	8.3
Beta blocker (LVSD only)	Beta blocker	14118	622	4.4
Loop diuretic (all)	No loop diuretic	2280	125	5.5
Loop diuretic (all)	Loop diuretic	26335	1480	5.6
Loop diuretic (LVSD only)	No loop diuretic	1663	81	4.9
Loop diuretic (LVSD only)	Loop diuretic	16766	919	5.5
Additive drugs (all)	No ACEI/ARB, beta blocker or MRA	1501	191	12.7
Additive drugs (all)	ACEI/ARB only	2265	109	4.8
Additive drugs (all)	ACEI/ARB and beta blocker	6822	216	3.2
Additive drugs (all)	ACEI/ARB, beta blocker and MRA	6905	233	3.4
Additive drugs (LVSD only)	No ACEI/ARB, beta blocker or MRA	589	89	15.1
Additive drugs (LVSD only)	ACEI/ARB only	1198	66	5.5
Additive drugs (LVSD only)	ACEI/ARB and beta blocker	4654	149	3.2
Additive drugs (LVSD only)	ACEI/ARB, beta blocker and MRA	5651	192	3.4
Discharge planning (all)	No discharge planning	3050	261	8.6
Discharge planning (all)	Discharge planning	24349	1370	5.6
HF nurse follow-up	No HF nurse follow-up	11665	845	7.2
HF nurse follow-up	HF nurse follow-up	16790	842	5.0
Cardiology follow-up	No cardiology follow-up	13125	1132	8.6
Cardiology follow-up	Cardiology follow-up	15569	564	3.6

5.2.2 30-day cardiovascular mortality for survivors to discharge (2012/13)

The same analysis that was produced for all-cause 30-day mortality is shown here for cardiovascular 30-day mortality.[ii]

The regression model is not greatly different from the all-cause version (table 48). Medical history becomes a more significant hazard when looking at cardiovascular deaths, as opposed to all-cause deaths, with a history of valve disease and ischaemic heart disease being high mortality hazards. There was also a higher risk of cardiovascular death associated with having a low blood pressure than in the all-cause model.

The hazard associated with a long length of stay has reduced from a 91% increased hazard to an 81% increased hazard in this group, which supports the hypothesis that many of the patients staying in hospital for a long time have non-cardiovascular comorbidities.

Of the 1811 deaths within 30 days, 1150, or 63.5% were cardiovascular (table 48). Of the non-cardiovascular deaths, the main causes of death were pneumonia, cancer and sepsis.

Table 48: 30-day CV mortality cox proportional hazards model (2012/13)

Variable (n=12200)	Hazard ratio	Lower 95% CI	Upper 95% CI	p-value
No ACE inhibitor and/or ARB	1.91	1.54	2.38	<0.001
No cardiology follow-up	1.45	1.17	1.8	0.001
No beta blocker	1.43	1.14	1.78	0.002
Age	1.41	1.1	1.8	0.006
Loop diuretic	1.37	0.97	1.95	0.077
Ischaemic heart disease	1.31	1.06	1.61	0.011
Valve disease	1.29	1.03	1.61	0.026
Sodium (5 mEq/L decrease)	1.26	1.24	1.28	<0.001
NYHA III/IV	1.23	0.93	1.62	0.14
COPD	1.21	0.93	1.56	0.151
Systolic blood pressure (10 mm Hg decrease)	1.18	1.18	1.19	<0.001
Male	1.14	0.92	1.42	0.227
Urea (5 mg/dL increase)	1.09	1.08	1.1	<0.001
Creatinine (10 umol/L increase)	1.02	1.01	1.02	0.035
Length of stay 0-4 days	1.00			
Length of stay 5-8 days	1.17	0.85	1.6	0.344
Length of stay 9-16 days	1.31	0.96	1.78	0.088
Length of stay ≥16 days	1.81	1.36	2.42	<0.001

iii. Cause of death was considered cardiovascular when it was given as any of the following: heart failure, acute coronary syndrome, ischaemic heart disease, cerebrovascular accident, sudden cardiac death, pulmonary embolus, valve diesease, aortic dissection and aneurysm, peripheral vascular disease, cor pulmonale, endocarditis, atrial fibrillation, heart block, heart transplant related or 'other cardiovascular'.

Fig 12: 30-day CV mortality

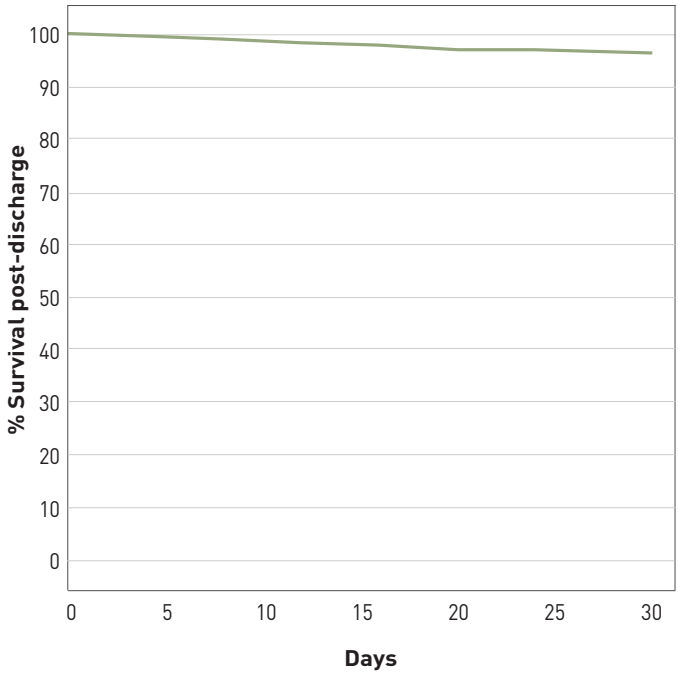


Fig 13: 30-day CV mortality by place of care (KM curve)

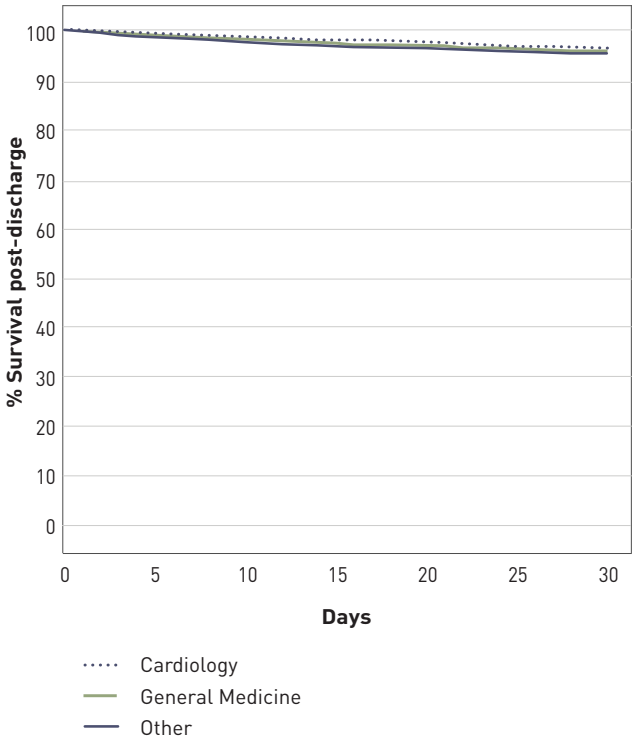


Fig 14: 30-day CV mortality by additive drug treatment on discharge (LVSD) (KM curve)

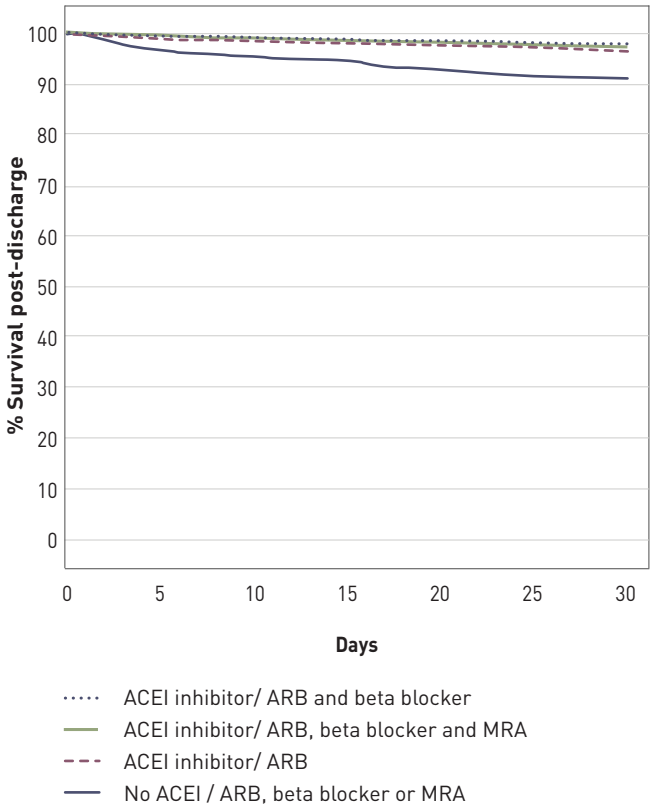


Fig 15: 30-day CV mortality by discharge planning (KM curve)

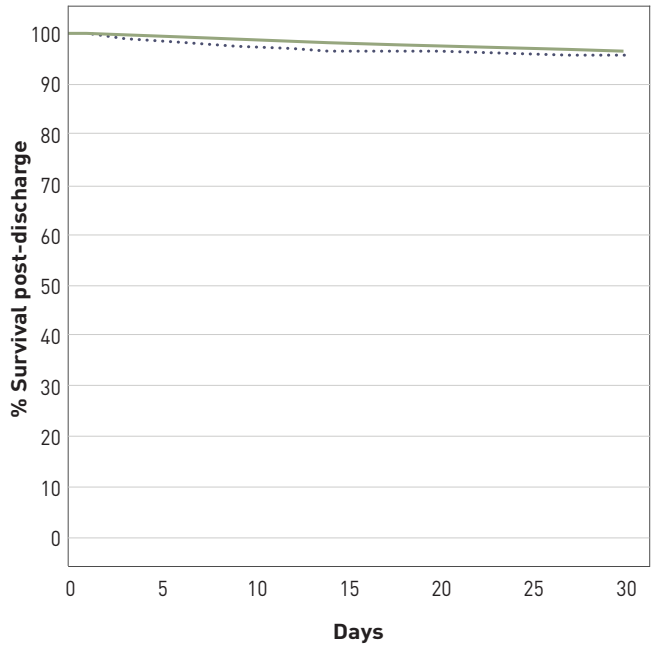


Fig 16: 30-day CV mortality by referral to heart failure nurse follow-up (KM curve)

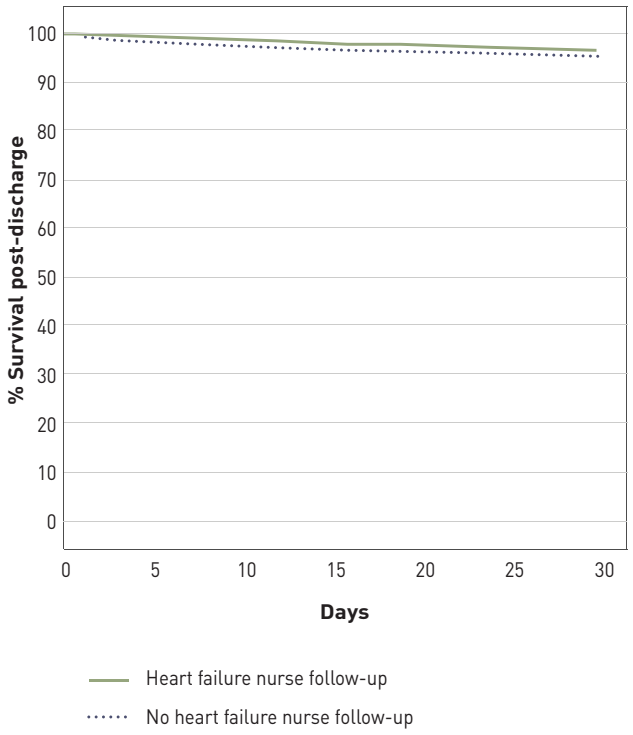


Fig 17: 30-day CV mortality by referral to cardiology FU (KM curve)

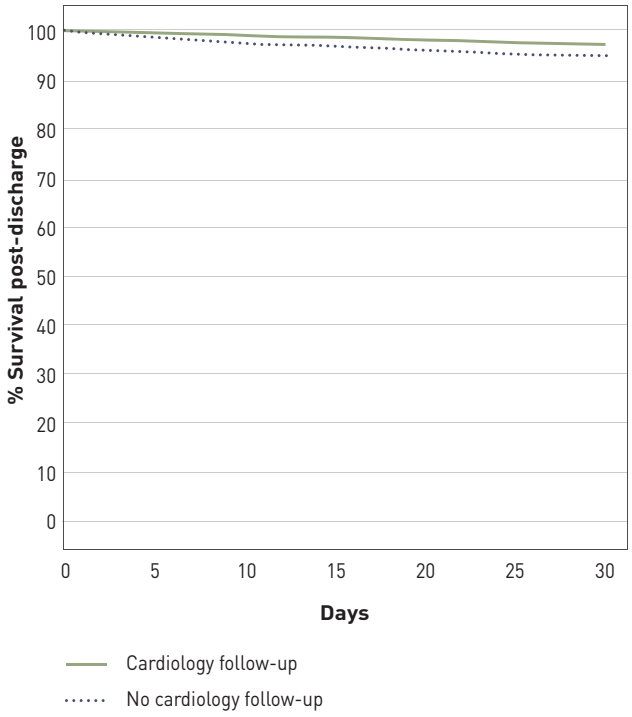


Table 49: 30-day CV mortality for patients who survived to discharge (2012/13)

Analysis	Variable	Records (n)	Deaths (n)	Mortality (%)
Overall mortality	30-day deaths	29221	1150	3.9
Sex	Women	12648	470	3.7
Sex	Men	16552	679	4.1
Age	16-44	663	2	0.3
Age	45-54	1268	16	1.3
Age	55-64	2690	57	2.1
Age	65-74	5882	185	3.1
Age	75-84	10521	444	4.2
Age	85+	8197	446	5.4
Age	16-74	10503	260	2.5
Age	75+	18718	890	4.8
Main place of care	Cardiology	15160	563	3.7
Main place of care	General Medicine	11369	459	4.0
Main place of care	Other	2623	125	4.8
Specialist input	No specialist input	5691	236	4.1
Specialist input	Specialist input	22895	886	3.9
Diagnosis	No LVSD	9676	356	3.7
Diagnosis	LVSD	18955	763	4.0
ACE inhibitor (all)	No ACE inhibitor	7883	373	4.7

Analysis	Variable	Records (n)	Deaths (n)	Mortality (%)
ACE inhibitor (all)	ACE inhibitor	16407	407	2.5
ACE inhibitor (LVSD only)	No ACE inhibitor	4318	228	5.3
ACE inhibitor (LVSD only)	ACE inhibitor	11691	309	2.6
ACEI/ARB (all)	No ACEI or ARB	4856	287	5.9
ACEI/ARB (all)	ACEI and/or ARB	20289	508	2.5
ACEI/ARB (LVSD only)	No ACEI or ARB	2362	167	7.1
ACEI/ARB (LVSD only)	ACEI and/or ARB	14231	382	2.7
Beta blocker (all)	No beta blocker	5854	266	4.5
Beta blocker (all)	Beta blocker	19785	602	3.0
Beta blocker (LVSD only)	No beta blocker	2941	155	5.3
Beta blocker (LVSD only)	Beta blocker	13929	433	3.1
Loop diuretic (all)	No loop diuretic	2224	69	3.1
Loop diuretic (all)	Loop diuretic	25807	952	3.7
Loop diuretic (LVSD only)	No loop diuretic	1628	46	2.8
Loop diuretic (LVSD only)	Loop diuretic	16478	631	3.8
Additive drugs (all)	No ACEI/ARB, beta blocker or MRA	1412	102	7.2
Additive drugs (all)	ACEI/ARB only	2220	64	2.9
Additive drugs (all)	ACEI/ARB and beta blocker	6746	140	2.1
Additive drugs (all)	ACEI/ARB, beta blocker and MRA	6845	173	2.5
Additive drugs (LVSD only)	No ACEI/ARB, beta blocker or MRA	550	50	9.1
Additive drugs (LVSD only)	ACEI/ARB only	1171	39	3.3
Additive drugs (LVSD only)	ACEI/ARB and beta blocker	4605	100	2.2
Additive drugs (LVSD only)	ACEI/ARB, beta blocker and MRA	5611	152	2.7
Discharge planning (all)	No discharge planning	2923	134	4.6
Discharge planning (all)	Discharge planning	23872	893	3.7
HF nurse follow-up	No HF nurse follow-up	11305	485	4.3
HF nurse follow-up	HF nurse follow-up	16531	583	3.5
Cardiology follow-up	No cardiology follow-up	12659	666	5.3
Cardiology follow-up	Cardiology follow-up	15410	405	2.6

5.3 2012/13 events for survivors to discharge

As shown in previous years, specialist care and prescription of recommended disease modifying therapies has a significant impact on outcomes. This is true for both all-cause and cardiovascular mortality, and can be seen across a one-year and four-year follow-up period.

5.3.1 All-cause mortality for survivors to discharge (2012/13)

Similar variables are indicative of increased mortality hazard in the longer term all-cause mortality model as in the 30-day models (table 50). Medical history appears to become a more important predictor of death, and age remains the strongest hazard in this model. Not being a cardiology in-patient has a lower risk, but not being prescribed an ACE inhibitor/ARB and beta blocker, and not being referred to cardiology follow-up were important hazards in this model. These factors are clearly some of the main reasons that being on a cardiology ward confers an added benefit to heart failure patients, but the fact that not being treated on a cardiology ward is a risk above and beyond not getting the recommended medicines and referrals shows that specialist treatment has added value. This may be because consultant cardiologists are able to diagnose heart failure more quickly, or because they are better at managing and up-titrating therapies.

Age is consistently a high risk factor, but interestingly variables that can be affected, such as prescription of recommended therapies and referral to cardiology follow-up have more impact than patient characteristics, such as medical history or blood measurements, in this model.

Table 50: All cause post-discharge mortality cox proportional hazards model (2012/13)

	Complete case, n=11805				Imputed, n=29882 (60 imputations)			
	Hazard ratio	Lower 95% CI	Upper 95% CI	p-value	Hazard ratio	Lower 95% CI	Upper 95% CI	p-value
Age	1.91	1.73	2.11	<0.001	1.81	1.70	1.92	<0.001
No ACE inhibitor and/or ARB	1.48	1.36	1.61	<0.001	1.38	1.30	1.46	<0.001
No cardiology follow-up	1.40	1.29	1.52	<0.001	1.49	1.41	1.57	<0.001
No beta blocker	1.31	1.20	1.42	<0.001	1.24	1.17	1.31	<0.001
COPD	1.21	1.10	1.33	<0.001	1.23	1.16	1.31	<0.001
Valve disease	1.19	1.09	1.30	<0.001	1.25	1.18	1.32	<0.001
Ischaemic heart disease	1.17	1.08	1.26	<0.001	1.17	1.11	1.23	<0.001
Not a cardiology in-patient	1.17	1.08	1.27	<0.001	1.13	1.07	1.19	<0.001
NYHA III/IV	1.14	1.03	1.26	<0.001	1.15	1.08	1.23	<0.001
Systolic blood pressure (10 mm Hg decrease)	1.12	1.12	1.12	<0.001	1.12	1.12	1.12	<0.001
Sodium (5 mEq/L decrease)	1.09	1.08	1.09	<0.001	1.11	1.10	1.11	<0.001
Urea (5 mg/dL increase)	1.07	1.07	1.07	<0.001	1.09	1.08	1.08	<0.001
Male	1.06	0.98	1.15	0.136	1.06	1.01	1.12	0.016
Haemoglobin (g/dL decrease)	1.05	1.03	1.05	<0.001	1.04	1.03	1.06	<0.001
Creatinine (10 umol/L increase)	1.01	1.01	1.01	<0.001	1.01	1.01	1.01	<0.001
Potassium ≤3.5 (mEq/L)	1.19	1.03	1.38	0.019	1.13	1.01	1.25	0.025
Potassium 3.5-4.5 (mEq/L)	1.00				1.00			
Potassium 4.5-5.5 (mEq/L)	1.04	0.96	1.14	0.325	1.05	0.99	1.11	0.094
Potassium >5.5 (mEq/L)	1.32	1.10	1.58	<0.001	1.18	1.04	1.35	0.009
Length of stay 0-4 days	1.00				1.00			
Length of stay 5-8 days	1.10	0.98	1.23	0.096	1.07	1.00	1.15	0.048
Length of stay 9-16 days	1.21	1.08	1.35	<0.001	1.26	1.18	1.35	<0.001
Length of stay ≥16 days	1.63	1.46	1.81	<0.001	1.62	1.52	1.73	<0.001

Fig 18: All cause post-discharge mortality (KM curve)

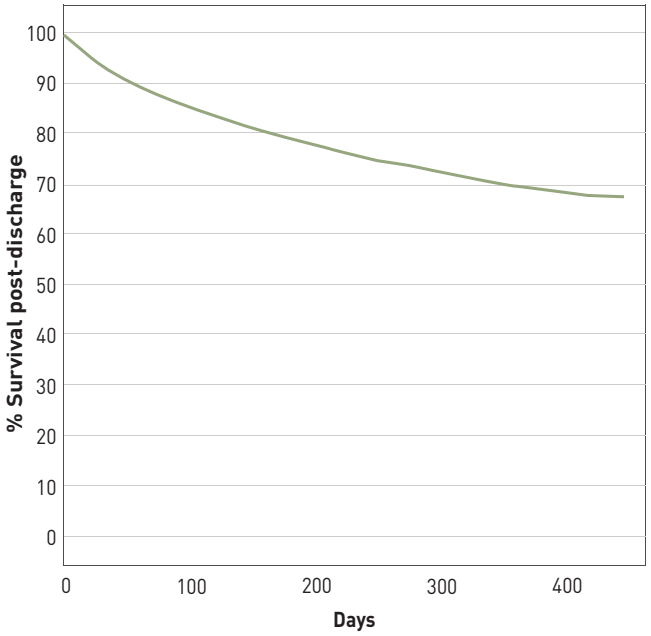


Fig 19: All cause post-discharge mortality by place of care (KM curve)

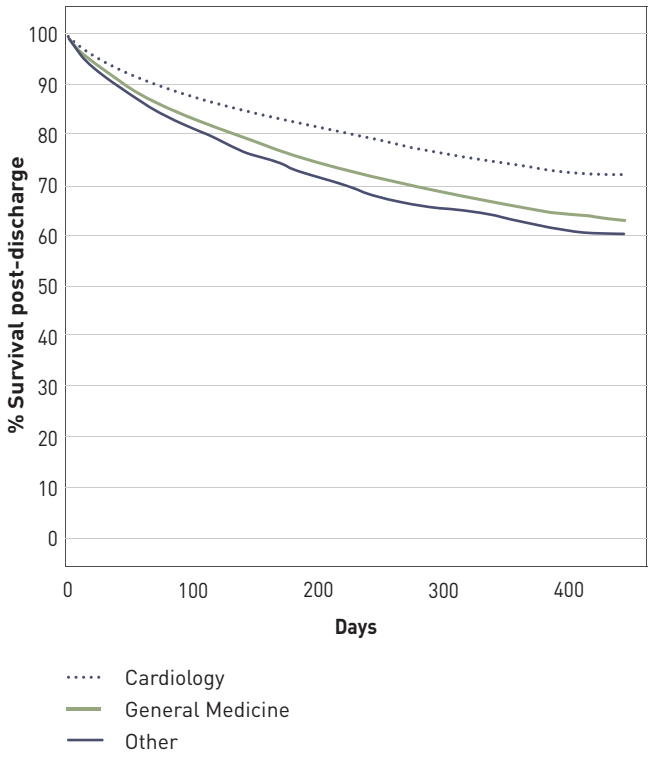


Fig 20: All cause post-discharge mortality by additive drug treatment on discharge (LVSD) (KM curve)

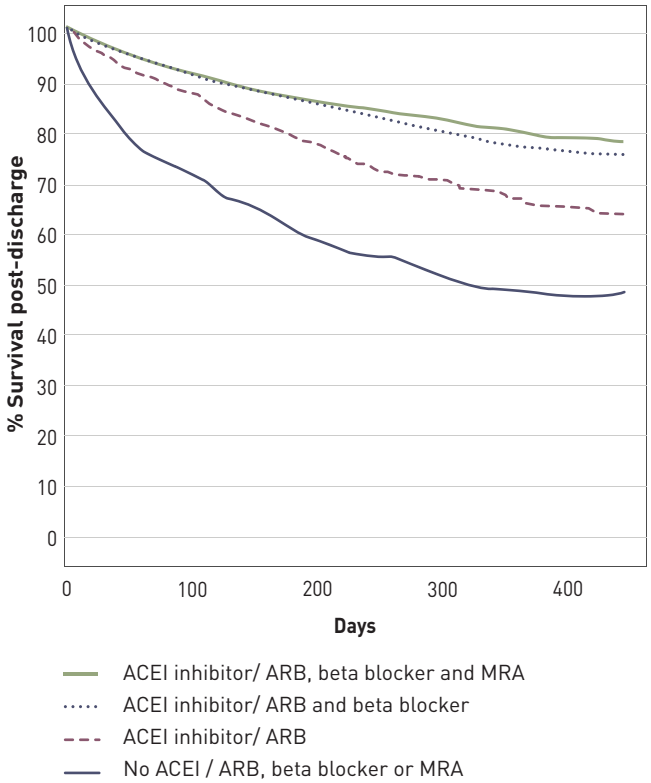


Fig 22: All cause post-discharge mortality by referral to heart failure nurse follow-up (KM curve)

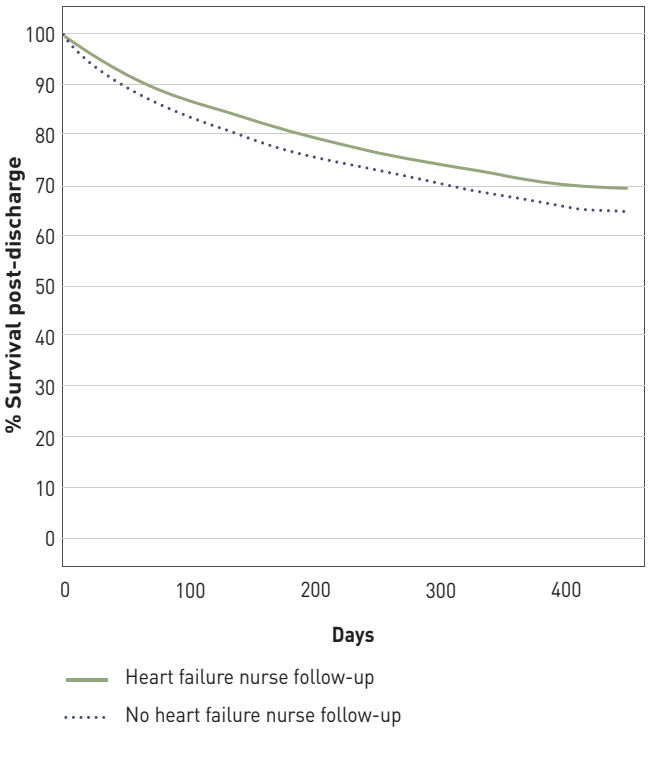


Fig 23: All cause post-discharge mortality by referral to cardiology follow-up (KM curve)

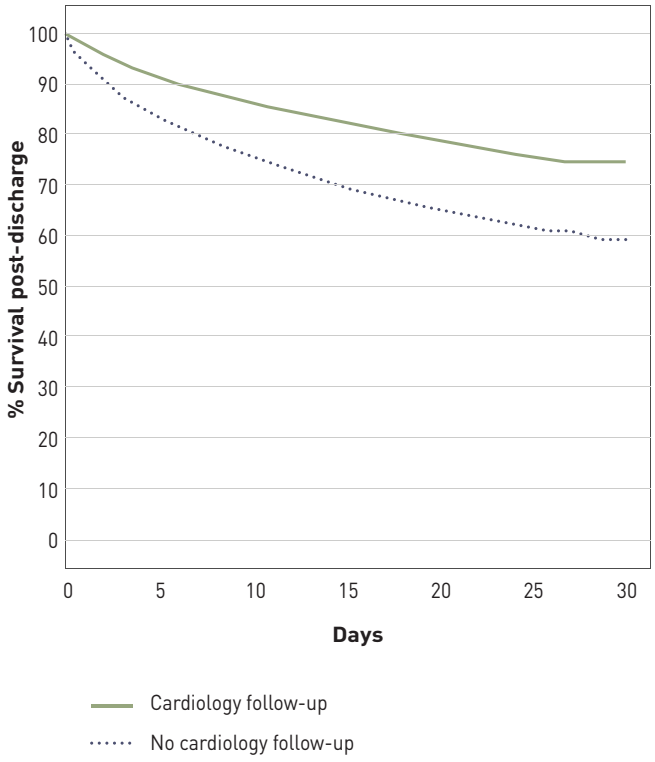


Fig 24: All cause post-discharge mortality by referral to cardiac rehab (KM curve)

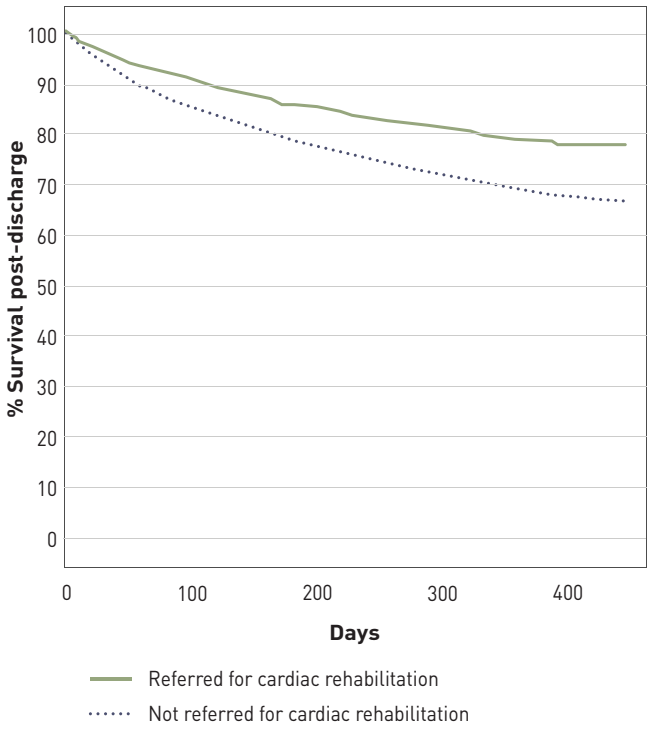


Table 51: All-cause mortality for patients who survived to discharge (2012/13)

Analysis	Variable	Records (n)	Deaths (n)	Mortality (%)	Median follow-up (days)
Overall mortality	Death following discharge	29882	7351	24.6	186
Sex	Women	12953	3220	24.9	206
Sex	Men	16908	4123	24.4	206
Age	16-44	665	36	5.4	249
Age	45-54	1276	95	7.4	238
Age	55-64	2710	330	12.2	239
Age	65-74	5956	1095	18.4	226
Age	75-84	10750	2710	25.2	208
Age	85+	8525	3085	36.2	174
Age	16-74	10607	1556	14.7	233
Age	75+	19275	5795	30.1	191
Main place of care	Cardiology	15364	3207	20.9	217
Main place of care	General medicine	11722	3298	28.1	198
Main place of care	Other	2725	834	30.6	185
Specialist input	No specialist input	5909	1750	29.6	198
Specialist input	Specialist input	23318	5411	23.2	209
Diagnosis	No LVSD	9946	2633	26.5	199
Diagnosis	LVSD	19326	4538	23.5	210

Analysis	Variable	Records (n)	Deaths (n)	Mortality (%)	Median follow-up (days)
ACE inhibitor (all)	No ACE inhibitor	8150	2357	28.9	195.5
ACE inhibitor (all)	ACE inhibitor	16626	3264	19.6	218
ACE inhibitor (LVSD only)	No ACE inhibitor	4451	1288	28.9	196
ACE inhibitor (LVSD only)	ACE inhibitor	11830	2240	18.9	223
ACEI/ARB (all)	No ACEI or ARB	5082	1724	33.9	181
ACEI/ARB (all)	ACEI and/or ARB	20550	4029	19.6	219
ACEI/ARB (LVSD only)	No ACEI or ARB	2469	879	35.	175
ACEI/ARB (LVSD only)	ACEI and/or ARB	14391	2737	19.0	223
Beta blocker (all)	No beta blocker	6056	1840	30.4	196
Beta blocker (all)	Beta blocker	20099	4267	21.2	213
Beta blocker (LVSD only)	No beta blocker	3038	968	31.9	195
Beta blocker (LVSD only)	Beta blocker	14118	2853	20.2	218
Loop diuretic (all)	No loop diuretic	2280	401	17.6	215.5
Loop diuretic (all)	Loop diuretic	26335	6561	24.9	206
Loop diuretic (LVSD only)	No loop diuretic	1663	268	16.1	217
Loop diuretic (LVSD only)	Loop diuretic	16766	4023	24.0	211
Additive drugs (all)	No ACEI/ARB, beta blocker or MRA	1501	564	37.6	173
Additive drugs (all)	ACEI/ARB only	2265	565	24.9	206
Additive drugs (all)	ACEI/ARB and beta blocker	6822	1225	18.0	223
Additive drugs (all)	ACEI/ARB, beta blocker and MRA	6905	1165	16.9	223
Additive drugs (LVSD only)	No ACEI/ARB, beta blocker or MRA	589	257	43.6	159
Additive drugs (LVSD only)	ACEI/ARB only	1198	318	26.5	206
Additive drugs (LVSD only)	ACEI/ARB and beta blocker	4654	827	17.8	226
Additive drugs (LVSD only)	ACEI/ARB, beta blocker and MRA	5651	911	16.1	224
Discharge planning	No discharge planning	3050	876	28.7	188
Discharge planning	Discharge planning	24349	5810	23.9	209
HF nurse follow-up	No HF nurse follow-up	11665	3147	27.0	202
HF nurse follow-up	HF nurse follow-up	16790	3857	23.0	211
Cardiology follow-up	No cardiology follow-up	13125	4100	31.2	189
Cardiology follow-up	Cardiology follow-up	15569	2887	18.5	221
Cardiac rehabilitation	No cardiac rehabilitation	22965	5731	25.0	206
Cardiac rehabilitation	Cardiac rehabilitation	2835	468	16.5	220

5.3.2 Cardiovascular mortality for survivors to discharge (2012/13)

As observed in the 30-day models, medical history presents higher hazard when looking at cardiovascular mortality only, compared with all-cause mortality (table 52). In this model, low blood pressure is also associated with an increased hazard.

While length of stay is less of a hazard than in the 30-day models, here it is clearly a linear variable, with all levels reaching statistical significance.

Table 52: CV post-discharge mortality cox proportional hazards model (2012/13)

	Complete case, n=11805				Imputed, n=29882 (60 imputations)			
	Hazard ratio	Lower 95% CI	Upper 95% CI	p-value	Hazard ratio	Lower 95% CI	Upper 95% CI	p-value
Age	1.74	1.54	1.96	<0.001	1.72	1.60	1.86	<0.001
No ACE inhibitor and/or ARB	1.48	1.32	1.65	<0.001	1.36	1.25	1.47	<0.001
No cardiology follow-up	1.35	1.22	1.50	<0.001	1.44	1.35	1.54	<0.001
Valve disease	1.33	1.20	1.49	<0.001	1.39	1.29	1.49	<0.001
No beta blocker	1.28	1.14	1.44	<0.001	1.21	1.11	1.30	<0.001
Ischaemic heart disease	1.28	1.15	1.41	<0.001	1.31	1.23	1.40	<0.001
NYHA III/IV	1.21	1.06	1.38	0.006	1.26	1.16	1.38	<0.001
Systolic blood pressure (10 mm Hg decrease)	1.16	1.16	1.16	<0.001	1.16	1.15	1.16	<0.001
COPD	1.13	0.99	1.29	0.007	1.12	1.03	1.22	0.007
Sodium (5 mEq/L decrease)	1.11	1.10	1.13	<0.001	1.15	1.14	1.15	<0.001
Male	1.11	1.00	1.24	0.051	1.08	1.01	1.15	0.027
Urea (5 mg/dL increase)	1.09	1.09	1.10	<0.001	1.11	1.10	1.11	<0.001
Haemoglobin (g/dL decrease)	1.04	1.02	1.07	0.001	1.02	1.00	1.04	0.019
Creatinine (10 umol/L increase)	1.02	1.02	1.02	<0.001	1.02	1.02	1.02	<0.001
Length of stay 0-4 days	1.00				1.00			
Length of stay 5-8 days	1.16	1.01	1.35	0.041	1.15	1.04	1.26	0.004
Length of stay 9-16 days	1.25	1.08	1.45	0.002	1.28	1.17	1.40	<0.001
Length of stay>=16 days	1.61	1.40	1.86	<0.001	1.67	1.53	1.82	<0.001

Fig 25: CV post-discharge mortality (KM curve)

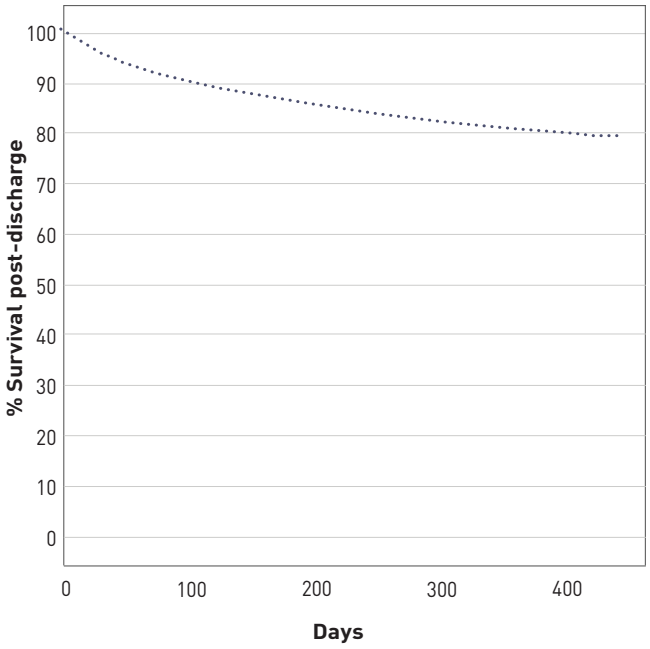


Fig 26: CV post-discharge mortality by place of care (KM curve)

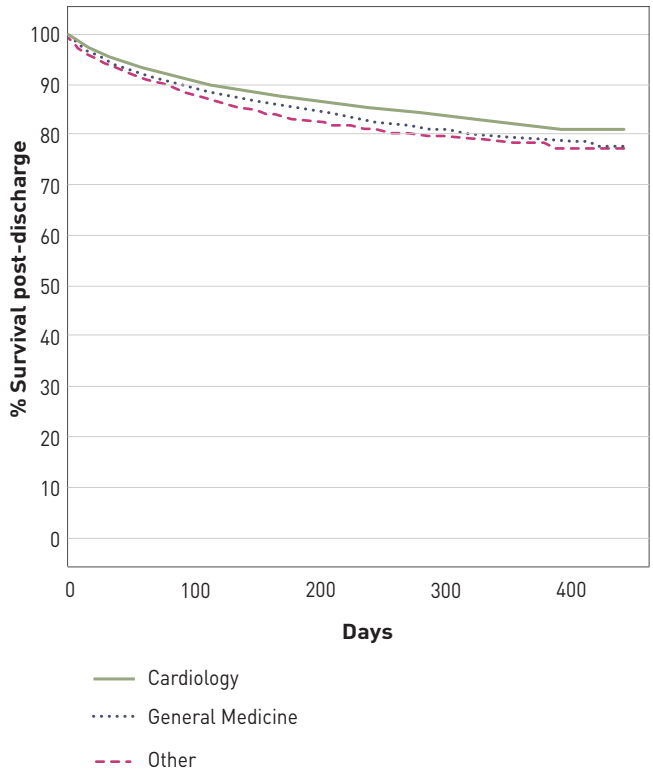


Fig 27: CV post-discharge mortality by additive drug treatment on discharge for LVSD (KM curve)

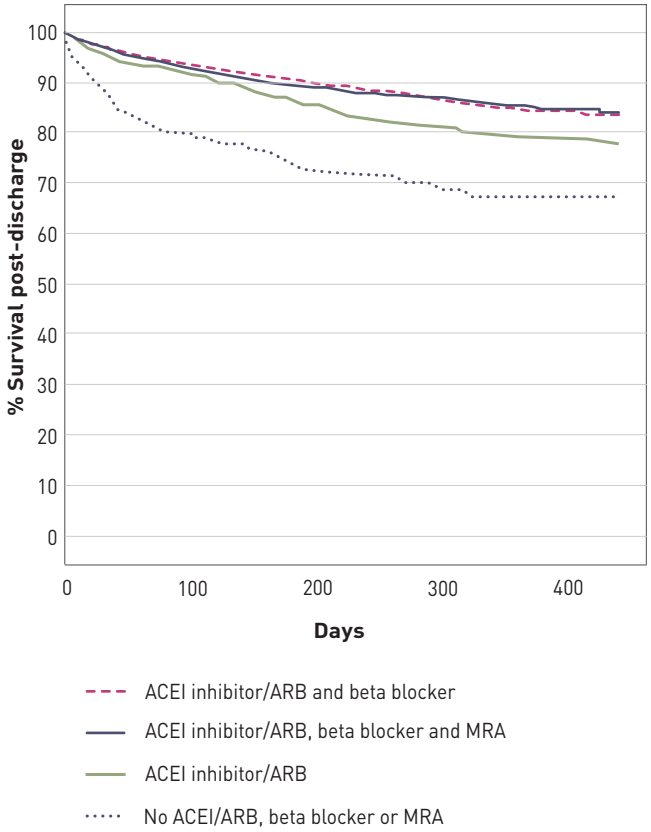


Fig 29: CV post-discharge mortality by referral to HF nurse follow-up (KM curve)

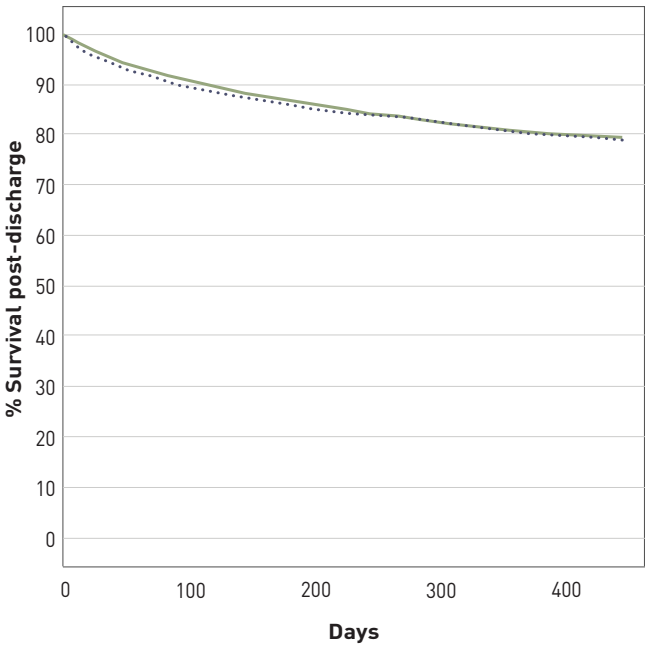


Fig 30: CV post-discharge mortality by referral to cardiology follow-up (KM curve)

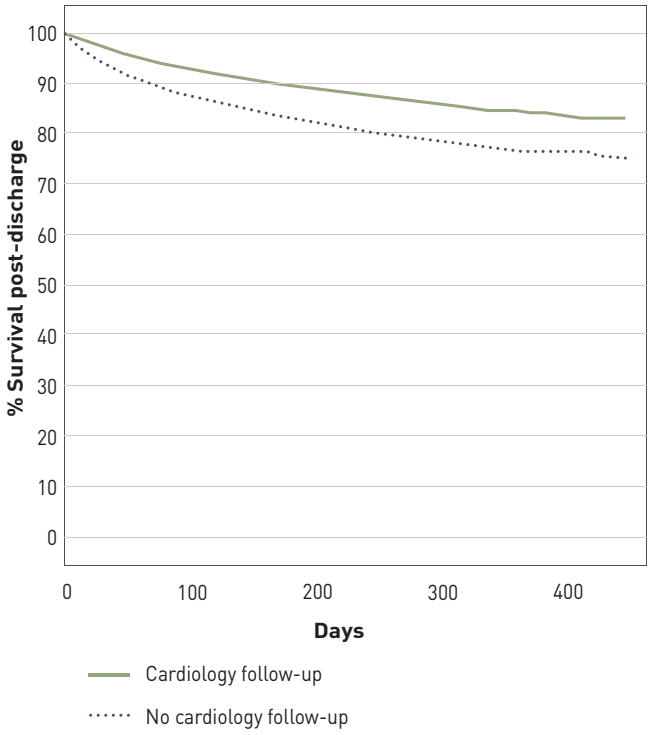


Fig 31: CV post-discharge mortality by referral to cardiac rehab (KM curve)

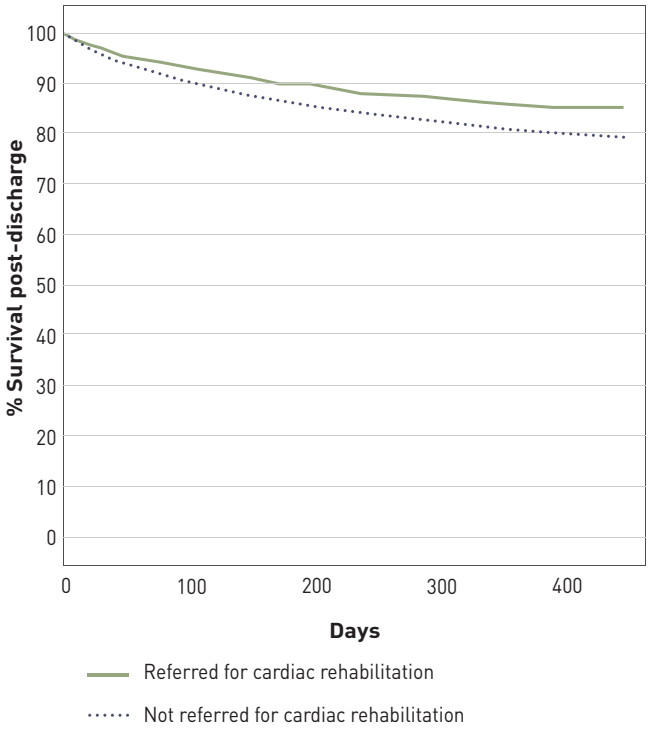


Table 53: Cardiovascular mortality for patients who survived to discharge (2012/13)

Analysis	Variable	Records (n)	Deaths (n)	Mortality (%)	Median follow-up (days)
Overall mortality	Death following discharge	26711	4180	15.6	222
Sex	Women	11461	1728	15.1	223
Sex	Men	15234	2449	16.1	220
Age	16-44	653	24	3.7	254
Age	45-54	1245	64	5.1	244
Age	55-65	2599	219	8.4	245
Age	65-74	5544	683	12.3	239
Age	75-84	9661	1621	16.8	220
Age	85+	7009	1569	22.4	194
Age	16-74	10041	990	9.9	241
Age	75+	16670	3190	19.1	210
Main place of care	Cardiology	14218	2061	14.5	226
Main place of care	General medicine	10121	1697	16.8	219
Main place of care	Other	2306	415	18.0	204
Specialist input	No specialist input	4974	815	16.4	221
Specialist input	Specialist input	21177	3270	15.4	223
Diagnosis	No LVSD	8636	1323	15.3	218
Diagnosis	LVSD	17549	2761	15.7	223

Analysis	Variable	Records (n)	Deaths (n)	Mortality (%)	Median follow-up (days)
ACE inhibitor (all)	No ACE inhibitor	7065	1272	18.0	216
ACE inhibitor (all)	ACE inhibitor	15244	1882	12.3	230
ACE inhibitor (LVSD only)	No ACE inhibitor	3921	758	19.3	216
ACE inhibitor (LVSD only)	ACE inhibitor	10962	1372	12.5	232
ACEI/ARB (all)	No ACEI or ARB	4259	901	21.2	204
ACEI/ARB (all)	ACEI and/or ARB	18860	2339	12.4	231
ACEI/ARB (LVSD only)	No ACEI or ARB	2088	498	23.9	198
ACEI/ARB (LVSD only)	ACEI and/or ARB	13358	1698	12.7	232
Beta blocker (all)	No beta blocker	5160	944	18.3	217
Beta blocker (all)	Beta blocker	18365	2533	13.8	225
Beta blocker (LVSD only)	No beta blocker	2622	552	21.1	215
Beta blocker (LVSD only)	Beta blocker	13046	1781	13.7	227
Loop diuretic (all)	No loop diuretic	2077	198	9.5	227
Loop diuretic (all)	Loop diuretic	23542	3768	16.0	222
Loop diuretic (LVSD only)	No loop diuretic	1538	143	9.3	226
Loop diuretic (LVSD only)	Loop diuretic	15220	2477	16.3	224
Additive drugs (all)	No ACEI/ARB, beta blocker or MRA	1195	258	21.6	205
Additive drugs (all)	ACEI/ARB only	1973	273	13.8	226
Additive drugs (all)	ACEI/ARB and beta blocker	6292	695	11.0	233
Additive drugs (all)	ACEI/ARB, beta blocker and MRA	6496	756	11.6	230
Additive drugs (LVSD only)	No ACEI/ARB, beta blocker or MRA	460	128	27.8	188.5
Additive drugs (LVSD only)	ACEI/ARB only	1050	170	16.2	220.5
Additive drugs (LVSD only)	ACEI/ARB and beta blocker	4317	490	11.4	237
Additive drugs (LVSD only)	ACEI/ARB, beta blocker and MRA	5358	618	11.5	230
Discharge planning (all)	No discharge planning	2595	421	16.2	209
Discharge planning (all)	Discharge planning	21942	3403	15.5	223
HF nurse follow-up	No HF nurse follow-up	10133	1615	15.9	221
HF nurse follow-up	HF nurse follow-up	15296	2363	15.4	223
Cardiology follow-up	No cardiology follow-up	11178	2153	19.3	211
Cardiology follow-up	Cardiology follow-up	14502	1820	12.5	230
Cardiac rehabilitation	No cardiac rehabilitation	20454	3220	15.7	222
Cardiac rehabilitation	Cardiac rehabilitation	2673	306	11.4	227

5.4 2009-13 events for survivors to discharge

The mortality analysis associated with the 2009-13 patient group uses the smaller set of risk factors, meaning that the impact of each variable may be exaggerated. Loop diuretic prescription becomes a significant predictor of mortality in these models (tables 54 and 56), which may be indicative of the increased risk of mortality associated with long-term diuretic use. Being a man also shows as a significant hazard in these models, although this may be primarily due to the absence of other important risk factors.

5.4.1 2009-13 all-cause mortality for survivors to discharge

Table 54: All cause post-discharge mortality cox proportional hazards model (2009-13)

	Hazard ratio	p-value	Hazard ratio	p-value
Age	1.91	1.86	1.98	<0.001
No ACE inhibitor and/or ARB	1.49	1.45	1.53	<0.001
No cardiology follow-up	1.37	1.34	1.41	<0.001
No beta blocker	1.27	1.24	1.31	<0.001
Loop diuretic	1.25	1.20	1.32	<0.001
Ischaemic heart disease	1.25	1.22	1.28	<0.001
Valve disease	1.25	1.21	1.29	<0.001
Male	1.16	1.13	1.19	<0.001
Cardiology in-patient	1.14	1.11	1.18	<0.001
NYHA III/IV	1.13	1.09	1.16	<0.001
Length of stay 0-4 days	1.00			
Length of stay 5-8 days	1.22	1.18	1.27	<0.001
Length of stay 9-16 days	1.49	1.44	1.55	<0.001
Length of stay>=16 days	1.92	1.85	1.99	<0.001

Fig 32: All cause post-discharge mortality (KM curve)

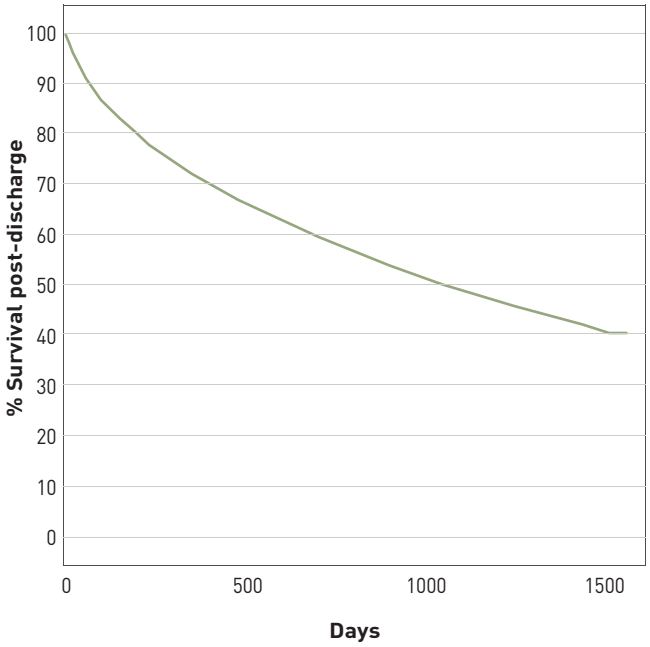


Fig 33: All cause post-discharge mortality by place of care (KM curve)

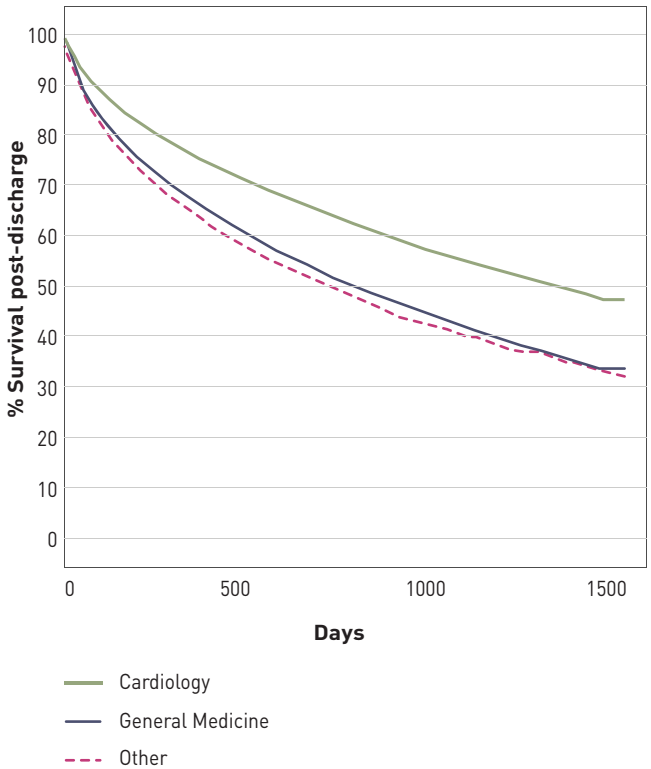


Fig 34: All cause post-discharge mortality by additive drug treatment on discharge for LVSD (KM curve)

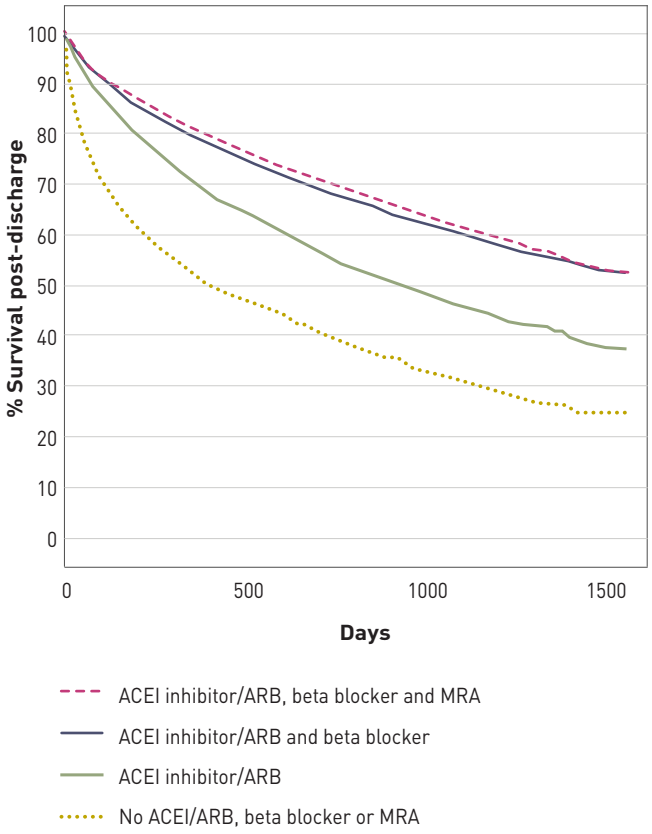


Fig 35: All cause post-discharge mortality by referral to HF nurse follow-up (KM curve)

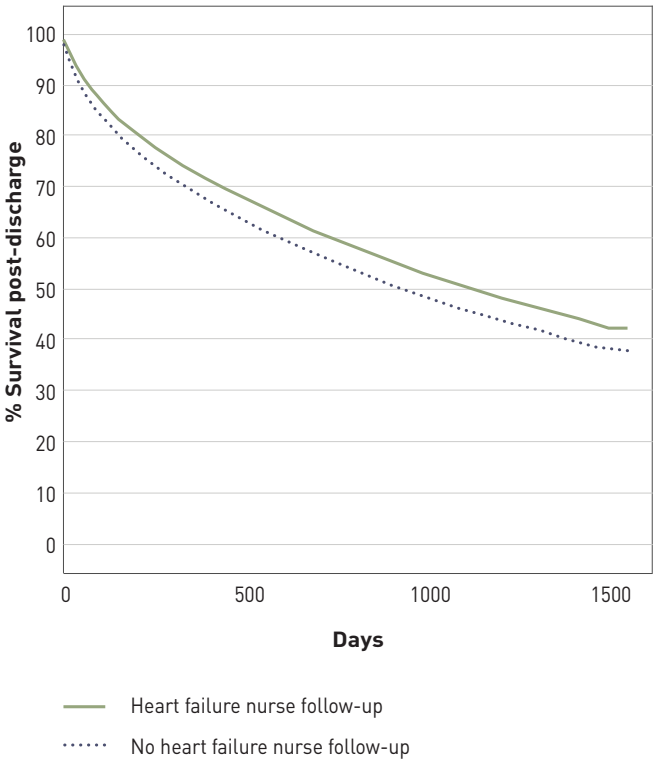


Fig 36: All cause post-discharge mortality by referral to cardiology follow-up (KM curve

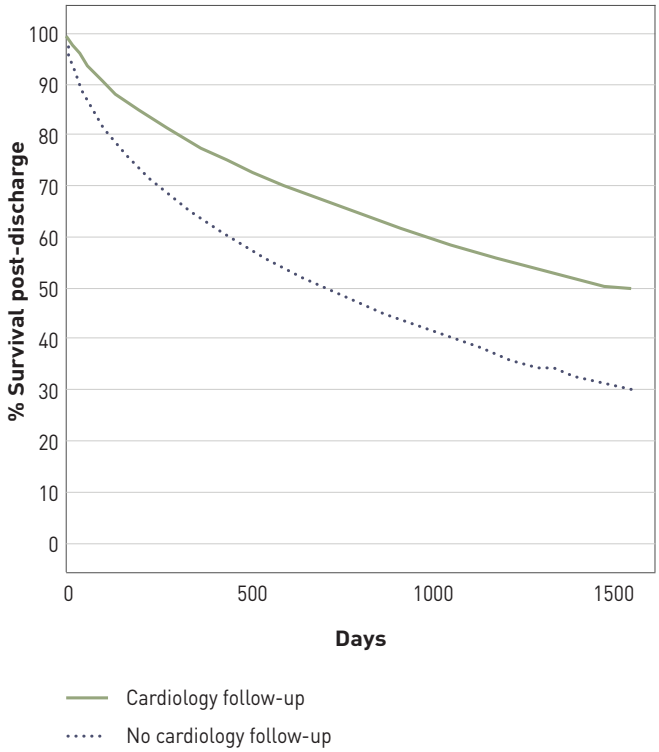


Table 55: All-cause mortality for patients who survived to discharge (2009-13)

Analysis	Variable	Records (n)	Deaths (n)	Mortality (%)	Median follow-up (days)
Overall mortality	Death following discharge	93953	37760	40.2	363
Sex	Women	40692	16785	41.2	415
Sex	Men	53217	20957	39.4	428
Age	16-44	2127	237	11.1	671
Age	45-54	4034	605	15.0	617
Age	55-65	9098	1984	21.8	586
Age	65-74	19158	6016	31.4	497
Age	75-84	33607	14151	42.1	414
Age	85+	25924	14764	57.0	295
Age	16-74	34417	8842	25.7	545
Age	75+	59531	28915	48.6	360
Main place of care	Cardiology	46323	15812	34.1	455
Main place of care	General medicine	38193	17476	45.8	397
Main place of care	Other	9275	4427	47.7	383
Diagnosis	No LVSD	31817	13967	43.9	400
Diagnosis	LVSD	59126	22339	37.8	433
ACE inhibitor (all)	No ACE inhibitor	27397	12880	47.0	385
ACE inhibitor (all)	ACE inhibitor	54451	19084	35.0	475
ACE inhibitor (LVSD only)	No ACE inhibitor	14248	6577	46.2	379
ACE inhibitor (LVSD only)	ACE inhibitor	37975	12532	33.0	484
ACEI/ARB (all)	No ACEI or ARB	17410	9211	52.9	330.5
ACEI/ARB (all)	ACEI and/or ARB	66439	23287	35.1	473
ACEI/ARB (LVSD only)	No ACEI or ARB	8069	4308	53.4	315
ACEI/ARB (LVSD only)	ACEI and/or ARB	45498	15173	33.3	479
Beta blocker (all)	No beta blocker	25765	12946	50.2	415
Beta blocker (all)	Beta blocker	57952	19944	34.4	441
Beta blocker (LVSD only)	No beta blocker	12791	6434	50.3	408
Beta blocker (LVSD only)	Beta blocker	40447	13171	32.6	454
Loop diuretic (all)	No loop diuretic	8389	2586	30.8	517
Loop diuretic (all)	Loop diuretic	81787	33568	41.0	418
Loop diuretic (LVSD only)	No loop diuretic	5918	1568	26.5	546
Loop diuretic (LVSD only)	Loop diuretic	50747	19848	39.1	424
Additive drugs (all)	No ACEI/ARB, beta blocker or MRA	6453	3702	57.4	328
Additive drugs (all)	ACEI/ARB only	10652	4779	44.9	505
Additive drugs (all)	ACEI/ARB and beta blocker	22878	7208	31.5	500
Additive drugs (all)	ACEI/ARB, beta blocker and MRA	18790	5501	29.3	462
Additive drugs (LVSD only)	No ACEI/ARB, beta blocker or MRA	2440	1468	60.2	289
Additive drugs (LVSD only)	ACEI/ARB only	5472	2494	45.6	490
Additive drugs (LVSD only)	ACEI/ARB and beta blocker	15730	4791	30.5	513
Additive drugs (LVSD only)	ACEI/ARB, beta blocker and MRA	15081	4168	27.6	468

Analysis	Variable	Records (n)	Deaths (n)	Mortality (%)	Median follow-up (days)
HF nurse follow-up	No HF nurse follow-up	40102	17219	42.9	419
HF nurse follow-up	HF nurse follow-up	48951	18484	37.8	426
Cardiology follow-up	No cardiology follow-up	41811	20329	48.6	366
Cardiology follow-up	Cardiology follow-up	48330	15581	32.2	479

5.4.2 2009-13 cardiovascular mortality for survivors to discharge

Table 56: Cardiovascular post-discharge mortality cox proportional hazards model (2009-13)

	Hazard ratio	Lower 95% CI	Lower 95% CI	p-value
Age	1.84	1.77	1.92	<0.001
No ACE inhibitor and/or ARB	1.49	1.43	1.55	<0.001
Ischaemic heart disease	1.46	1.41	1.51	<0.001
Valve disease	1.37	1.32	1.42	<0.001
Loop diuretic	1.36	1.27	1.45	<0.001
No cardiology follow-up	1.31	1.26	1.36	<0.001
No beta blocker	1.28	1.24	1.33	<0.001
Male	1.20	1.16	1.25	<0.001
NYHA III/IV	1.19	1.14	1.24	<0.001
Not a cardiology in-patient	1.07	1.03	1.11	0.001
Length of stay 0-4 days	1.00			
Length of stay 5-8 days	1.26	1.20	1.33	<0.001
Length of stay 9-16 days	1.56	1.48	1.64	<0.001
Length of stay ≥16 days	2.04	1.95	2.15	<0.001

Fig 37: CV post-discharge mortality (KM curve)

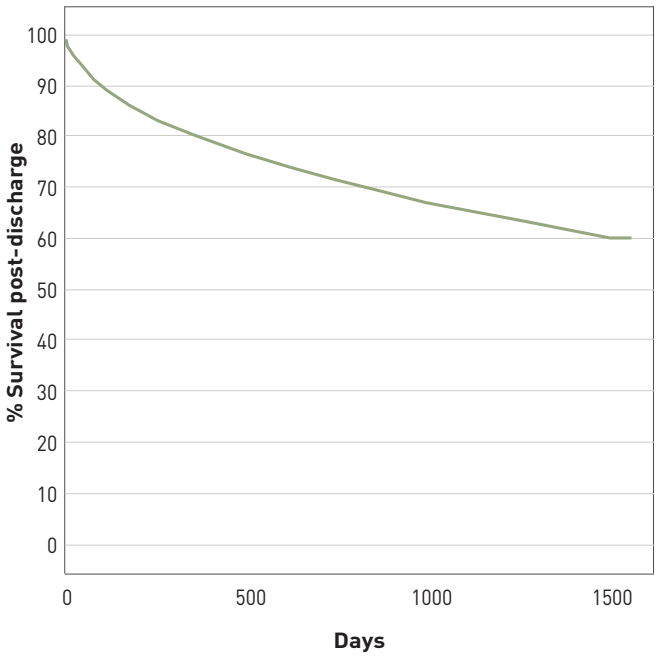


Fig 38: CV post-discharge mortality by place of care (KM curve)

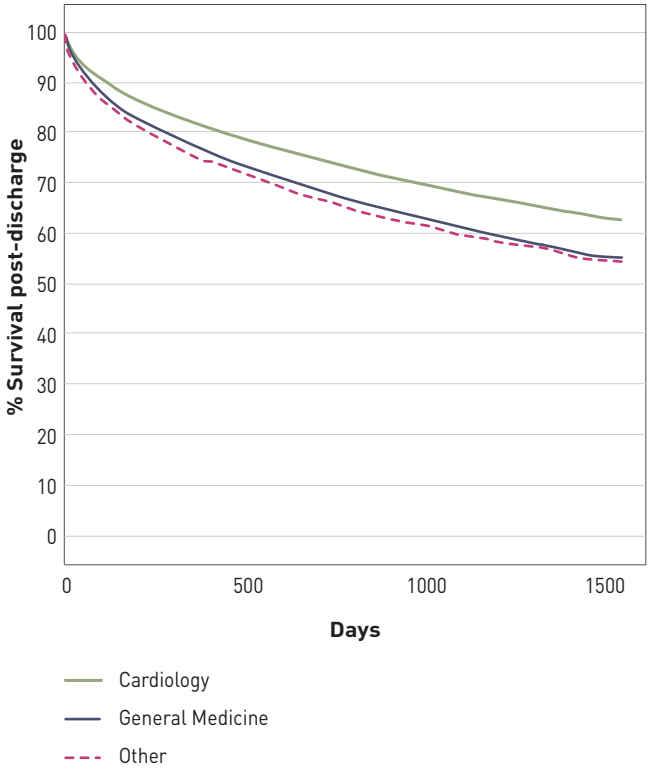


Fig 39: CV post-discharge mortality by additive drug treatment on discharge for LVSD (KM curve)

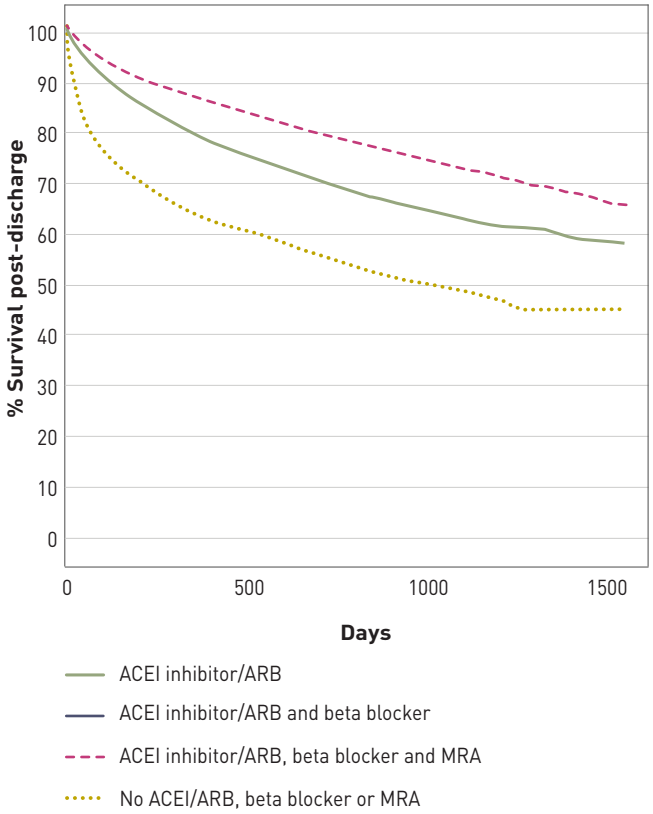


Fig 40: CV post-discharge mortality by referral to HF nurse follow-up (KM curve)

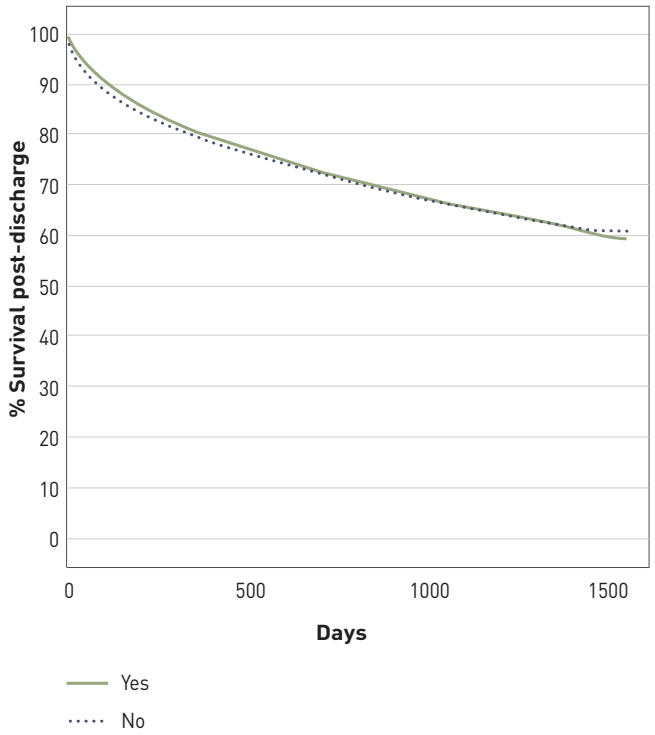


Fig 41: CV post-discharge mortality by referral to cardiology follow-up (KM curve)

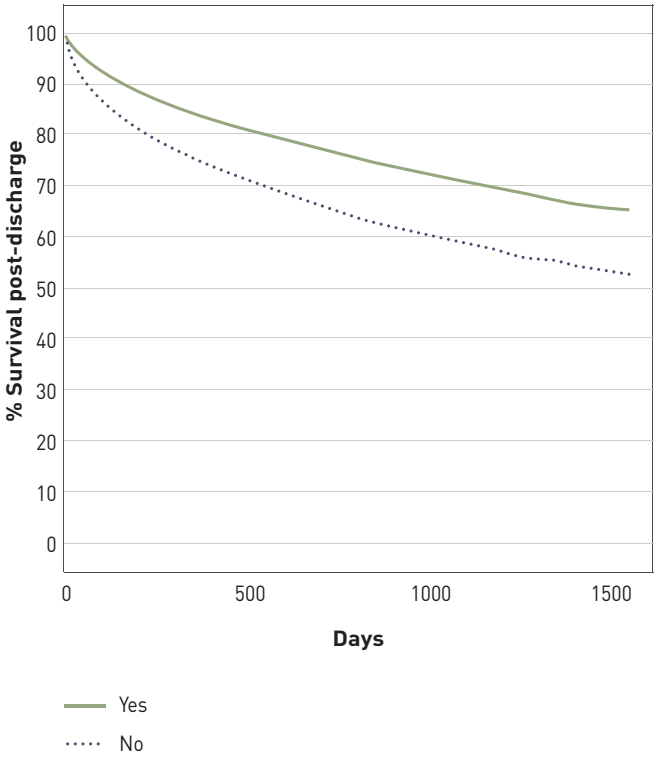


Table 57: Cardiovascular mortality for patients who survived to discharge (2009-13)

Analysis	Variable	Records (n)	Deaths (n)	Mortality (%)	Median follow-up (days)
Overall mortality	Death following discharge	76293	20100	26.3	476
Sex	Women	32407	8500	26.2	470
Sex	Men	43850	11590	26.4	480.5
Age	16-44	2041	151	7.4	686
Age	45-54	3828	399	10.4	637
Age	55-65	8375	1261	15.1	618
Age	65-74	16606	3464	20.9	545
Age	75-84	27219	7763	28.5	461
Age	85+	18220	7060	38.7	348
Age	16-74	30850	5275	17.1	586
Age	75+	45439	14823	32.6	414
Main place of care	Cardiology	39877	9366	23.5	495
Main place of care	General medicine	29270	8553	29.2	458
Main place of care	Other	7008	2160	30.8	455
Diagnosis	No LVSD	24509	6659	27.2	460
Diagnosis	LVSD	49494	12707	25.7	482
ACE inhibitor (all)	No ACE inhibitor	21133	6616	31.3	451

Analysis	Variable	Records (n)	Deaths (n)	Mortality (%)	Median follow-up (days)
ACE inhibitor (all)	ACE inhibitor	45724	10357	22.7	520
ACE inhibitor (LVSD only)	No ACE inhibitor	11384	3713	32.6	436
ACE inhibitor (LVSD only)	ACE inhibitor	32602	7159	22.0	527
ACEI/ARB (all)	No ACEI or ARB	12784	4585	35.9	404
ACEI/ARB (all)	ACEI and/or ARB	55828	12676	22.7	519
ACEI/ARB (LVSD only)	No ACEI or ARB	6117	2356	38.5	377
ACEI/ARB (LVSD only)	ACEI and/or ARB	39055	8730	22.4	521
Beta blocker (all)	No beta blocker	19234	6415	33.4	503
Beta blocker (all)	Beta blocker	49169	11161	22.7	483
Beta blocker (LVSD only)	No beta blocker	9850	3493	35.5	492
Beta blocker (LVSD only)	Beta blocker	34968	7692	22.0	492
Loop diuretic (all)	No loop diuretic	7056	1253	17.8	586.5
Loop diuretic (all)	Loop diuretic	66246	18027	27.2	468
Loop diuretic (LVSD only)	No loop diuretic	5178	828	16.0	597
Loop diuretic (LVSD only)	Loop diuretic	42266	11367	26.9	470
Additive drugs (all)	No ACEI/ARB, beta blocker or MRA	4446	1695	38.1	429.5
Additive drugs (all)	ACEI/ARB only	8109	2236	27.6	594
Additive drugs (all)	ACEI/ARB and beta blocker	19577	3907	20.0	549
Additive drugs (all)	ACEI/ARB, beta blocker and MRA	16667	3378	20.3	491
Additive drugs (LVSD only)	No ACEI/ARB, beta blocker or MRA	1717	745	43.4	377
Additive drugs (LVSD only)	ACEI/ARB only	4251	1273	29.9	573
Additive drugs (LVSD only)	ACEI/ARB and beta blocker	13635	2696	19.8	560
Additive drugs (LVSD only)	ACEI/ARB, beta blocker and MRA	13532	2619	19.4	496
HF nurse follow-up	No HF nurse follow-up	31259	8376	26.8	489
HF nurse follow-up	HF nurse follow-up	41064	10597	25.8	465
Cardiology follow-up	No cardiology follow-up	31423	9941	31.6	429
Cardiology follow-up	Cardiology follow-up	41913	9164	21.9	518

6 Case studies

6.1 The power of data

Jayne Masters, Lead Heart Failure Nurse Specialist, University Hospital Southampton NHS Foundation Trust

> "Data can be powerful and very persuasive"

This was a message I took home from a British Heart Foundation (BHF) conference in 2006. Careful data collection ensured that I was in a position to write a business case when BHF funding ran out for my community post. Ensuring that the improved patient outcomes were substantiated and presented to the commissioners ensured funding continued for this post.

In 2008 I moved into secondary care as the nursing lead for the heart failure service. In 2005 a Healthcare Commission audit showed that our Trust had an in-patient mortality of 30%, higher than the national average. The aim of the newly created heart failure team (HFT) was to provide specialist in-patient care wherever the patients presented. Data collection continued to be an important part of my role; I also became responsible for the National Heart Failure Audit data submitted by the Trust.

The service commenced in April 2008. In the first year of the service 211 in-patients were seen by the HFT. In the preceding 6 months 215 patients were coded with a primary diagnosis for heart failure. Subsequent case note review confirmed that 196 patients had been correctly coded. The baseline characteristics of these two sets of patients were as follows:

Variable	Pre HFT	Post HFT
Number of patients	196	211
Mean age years	73.5 (±14.7)	72.0 (±13.0)
Female %	36	40
Ischaemic heart disease %	51	53
Diabetes %	26	28
Mean heart rate bpm	87 (±21)	89 (±26)
Mean systolic blood pressure mmHg	126 (±28)	126 (±25)
Mean QRS duration ms	117 (±37)	116 (±44)
Inpatient echo %	82	79
Moderate/severe LVSD %	63	70
Preserved ejection fraction %	17	15
Mean Na[iv] mmol/L	135 (±6)	135 (±6)
Mean urea mmol/L	11 (±12)	12 (±12)
Mean eGFR	48 (±23)	51 (±22)
Mean Hb g/L	122 (±22)	124 (±23)
Mean LOS days	17 (±19)	19 (±18)

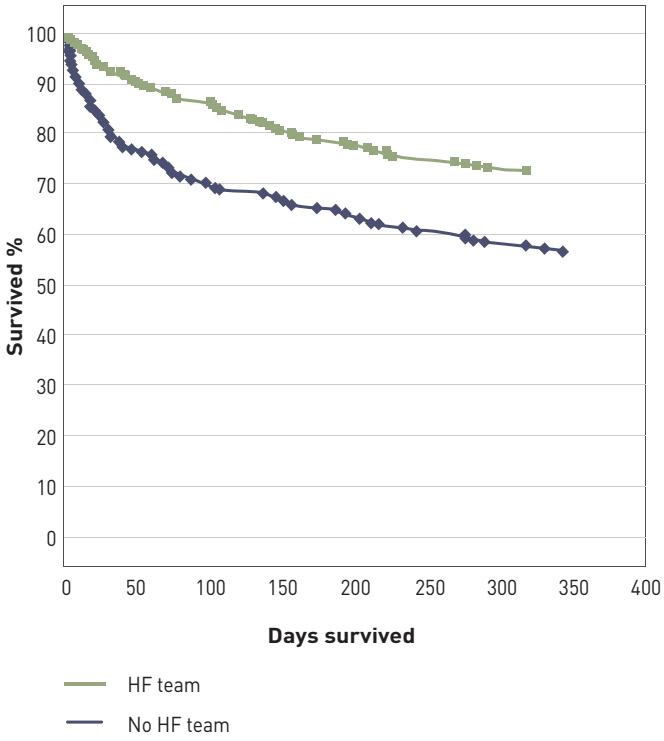
Despite very similar baseline characteristics and LOS, outcomes were very different:

Variable	Pre HFT	Post HFT	p-value
Inpatient mortality %	23	6	p<0.001
Mean loop diuretic dose (bumetanide or equivalent) mg/d	1.6 (±1.2)	2.4 (±1.5)	p<0.001
IV diuretics during hospitalisation %	76	88	p=0.002
Thiazide diuretics on discharge %	5	17	p=0.001
ACE inhibitor/ARB on discharge %	83	91	p<0.05
MRA on discharge %	44	68	p<0.001
Beta blocker on discharge %	59	63	ns

iv. All bloods recorded on admission

The introduction of a specialist Heart Failure Team dramatically reduced in-patient mortality (fig. 1). Improved use of evidence based therapies, together with more aggressive diuretic use, may contribute to the difference in patient outcomes.

Fig 42: Survival after admission to hospital by input from heart failure team



The contribution of audit in this case cannot be overestimated. Following the success of the HFT in the first year we were given an award by the Strategic Health Authority for Innovations in Acute Care. In turn this allowed us to apply for Innovations funding, which enabled us to be the first Trust in the UK to offer ultrafiltration therapy to heart failure patients with significant fluid overload. It became apparent that more heart failure nurses were needed and so we were able to recruit another 2.0 wte heart failure nurses and 1 Healthcare Assistant over the next three years.

Audit should not only be used to demonstrate what works. It should also be used to show gaps in service provision. A recent audit carried out in Southampton has clearly demonstrated to the commissioners a need to have a seven day heart failure service and to improve services for end stage heart failure patients of all aetiologies. As a result we are submitting a business case to provide a seven day heart failure service and a palliative care service for our patients.

As I said earlier "Data is powerful and very persuasive"...watch this space.

6.2 Using the National Heart Failure Audit to improve your inpatient heart failure service

Janine Beezer, Heart Failure Pharmacist, and John Baxter, Consultant Geriatrician, Sunderland Royal Hospital

Sunderland Royal Hospital is a moderate-sized district general serving a population of 330,000 patients. There are approximately 450 admissions per year where the primary coded diagnosis is heart failure. Sunderland began contributing to the National Heart Failure Audit in 2010.

For each year, we have taken the opportunity to undertake a local analysis of our activity. This was aided in 2011-12 by the publication of hospital-level data by the national audit which allowed us to bench mark our service against other Trusts.

Our analysis in 2010 highlighted that 25% of heart failure admissions were managed by cardiology, the remainder divided amongst Care of the Elderly, GIM specialities and Acute Physicians. For all specialities, there was under-utilisation of echo, effective medication, and heart failure service follow-up. The analysis did show that the small proportion of patients who received all of these interventions were less likely to be re-admitted to hospital within 30 and 90 days.[21]

The clinical team leading on heart failure set about trying to improve outcomes for all heart failure patients. Issues were raised with City Hospitals Sunderland Management and the Primary Care Trust Commissioners. Data from the National Heart Failure Audit, including the comparison to other Trusts, helped inform the process and an agreement to fund a pilot inpatient CHF service was reached. Local commissioners incorporated NICE Quality Standards for Heart Failure into a local heart failure CQUIN bundle to provide a financial driver to improve outcomes for CHF patients.

The inpatient service consists of a Heart Failure Nurse, a Heart Failure Pharmacist and sessional input from Consultant Geriatrician and Consultant Cardiologist together with echocardiography and secretarial support. It became operational in August 2012.

The continued contribution to the National Heart Failure Audit has enabled service evaluation, providing information to present to the new local Clinical Commissioning Group. It showed improvements in the process of care. Local analysis of outcomes has continued to show improvements in both inpatient mortality and a reduction in 30 day readmission rates (table 1). These outcome variables helped inform a commissioning decision to continue to fund the CHF service.

Table 1: Sunderland Royal Hospital service evaluation, 2011-13

	2011-12	2012-13
% patients managed by cardiologist/ specialist	24	38
% patients diagnosis confirmed by echo	85	96
% assessed for ACE/ARB	81	83
% assessed for beta blocker	77	87
% referred to CHF liaison service	31	73
% follow up in cardiology clinic	50	64
Inpatient mortality (%)	13	8*
30 day readmission rate (%)	24	15*

*Quarter 3 and 4 results

The National Heart Failure Audit data is key in evaluating our evolving service, to allow us to redesign pathways, and strive to continue to improve. Hospital level comparison data is very helpful for that process.

In summary the initial involvement with the National Heart Failure Audit started a service development programme which has significantly improved outcomes for heart failure patients admitted to City Hospitals Sunderland. We would strongly recommend that your hospital continues to contribute to the National Heart Failure Audit. It allows any concerns to be highlighted with inpatient management, and provides a benchmark of quality data that can inform commissioning decisions within the Clinical Commissioning Group.

6.3 Using National Heart Failure Audit Data to Understand and Improve the Provision of Care across the South Central Cardiovascular Network

Alison Griffiths, Project Manager, South Central Cardiovascular Network, Dr Jeremy Dwight, Consultant Cardiologist, Oxford University Hospitals and Jo Wall, Data Analyst, South Central Cardiovascular Network

In the South Central Region (now split in to two: Thames Valley and Wessex) data from the National Heart Failure Audit was used to understand the provision of care across the region and allowed staff to bench mark their performance and share best practice.

The South Central region consisted of 9 provider Trusts situated as far south as the Isle of Wight to as far north as Stoke Mandeville Hospital. The South Central Heart Failure Steering Group, which was hosted through the South Central Cardiovascular Network, gained agreement from all Trusts to present data from the newly released National Heart Failure Audit Online Analysis Tool alongside other available data, to build a picture of the provision of heart failure care across the region. The aim being to:

- Raise an awareness of the availability of real time data through the Online Analysis Audit Tool
- Ensure Trusts were able to use the Audit Tool
- Offer the opportunity to visualise performance in relation to other Trusts
- Allow for clinical discussion with colleagues
- Promote clinical ownership of the data
- Reduce variation in practice

Data from the National Heart Failure Audit Online Analysis Tool, the National Heart Failure Audit Report (2011/12), Quality and Outcomes Framework (QOF) and SEPHO (South East Public Health Observatory) report (2012) was analysed and presented to the Steering Group for discussion. The visual format not only allowed for discussion at the meeting but could be circulated afterwards, providing the opportunity for staff to take the presentation back to their clinical areas and discuss locally with colleagues.

There were a number of benefits to this approach:

- Staff could view the successes of their service and could take this back to their respective teams
- It promoted discussion in a non-threatening manner about variation in practice
- It enabled links to be made between clinicians to share best practice
- It enabled trusts with the least resources to have up-to-date quality audit data to make a case-for-change

The continued contribution of hospital data to the National Heart Failure Audit has been crucial in promoting the benefits of good quality clinical audit. Clinical ownership of the data has ensured sustainable improvements can be made for the benefit of all heart failure patients across the region.

7 Research use of data

The prime reason for clinical audit is to improve patient care by revealing to providers and carers contemporary data on the current management and outcomes of patients with heart failure. Data collected by the National Heart Failure Audit (NHFA) audit provides this information.

These very aims also are supported and enhanced by associated research projects and programmes of research put forward both by contributors to the audit and by external individuals and agencies. These research opportunities have been greatly enhanced by the co-location at NICOR of all the cardiovascular audits and registries formerly initiated by the Central Cardiac Audit Databases (CCAD) programme. The NHFA research programme encompasses a range of differing but complementary approaches deemed by our internal research committee as being likely, directly or indirectly, to improve patient care.

1. Data Sharing Agreements are collaborative projects both with personnel contributing to the audit and external academic institutions and agencies. Examples include:
    a. The UNVEIL-CHF project from Oxford University which will describe associations between processes of care and outcomes
    b. Impact of measurements of B type natriuretic peptide (BNP) on outcomes, a project from the University of Bristol
    c. Differences in outcomes among patients with sinus rhythm and atrial fibrillation, both paroxysmal and established, and their relationships to heart rate, medications and other treatments, from a team working at Manchester University
    d. A project at the University of Hull investigating outcomes according to severity of oedema on admission, particularly looking at those with severe oedema and mild breathlessness
2. Evaluation of Heart Failure Units based on the consistently better outcomes in terms of survival and readmission of patients who were managed in a specialist cardiology setting. To provide more information and support for a randomized controlled trial of Heart Failure Units compared to usual care, a 'Bootstrap' analysis of our current data which will allow for confounding factors is being performed by the audit team.
3. Collaborative studies among the various cardiovascular audits is a major reason for co-location at NICOR. Data from the NHFA clearly show that an unscheduled urgent admission to hospital for the treatment of worsening heart failure heralds an advanced stage of heart failure. Therefore, prevention of heart failure and its progression to an advanced stage are priorities. In a major programme of work entitled 'MAPP' (Multiple Audit Prevention Programme) we shall identify people with various severities of heart failure from other cardiovascular audits including MINAP (Myocardial Infarction National Audit Programme) and Primary Care through the Clinical Practice Research Datalink (CPRD). The determinants of the onset and progression of cardiac dysfunction and its progression to heart failure will be identified. Following on from that could be large randomized clinical trials to prevent onset and progression of heart failure.
4. Improving our methodology has been a constant activity from the outset. In association with and with funding from the Heart Failure Association of the European Society of Cardiology (ESC) we have embarked on a project to embed the ESC Guideline on Heart Failure in our electronic audit platform. We believe this, together with other other changes including web enablement, will produce a simpler and more interesting audit tool that will facilitate both data capture, but also clinical practice.
5. After two decades of failure to show benefit in patients with acute heart failure, several 'new chemical entities' (potential new medicines) have shown promise in Phases 1–3 clinical trials. Serelaxin, an analogue of relaxin, the naturally occurring pregnancy hormone, has shown promise in clinical trials when given soon after admission to hospital. Therefore data on admission characteristics, especially blood pressure, are now essential if such medicines are to be used safely. The manufacturer of serelaxin has funded a study in three large centres in NHFA to estimate the likely proportion of patients suitable for serelaxin which has been helpful not only to them but also to our programme since, in future, the NHFA is to be a prospective rather than retrospective audit.

In conclusion, the NHFA is research active and it is likely that this aspect will continue to grow as further research questions arise. We welcome further proposals from direct contributors to the data collection and all others with something to contribute to the further success of this large national project.

8 Appendices

A. National Heart Failure Audit Project Board Membership

Name	Job title and organisation	Stakeholder
Theresa McDonagh	Consultant Cardiologist and Professor of Heart Failure (KCH) and National Heart Failure Audit Clinical Lead	National Heart Failure Audit
Suzanna Hardman	Consultant Cardiologist (Whittington Hospital) and Chair of British Society of Heart Failure (BSH)	BSH
Henry Dargie	Honorary Professor of Cardiology (U. of Glasgow) and chair of HALO	HALO
John Cleland	Professor of Cardiology (U. of Hull)	HALO
Polly Mitchell	National Heart Failure Audit Project Manager	NICOR
Marion Standing	Developer for National Heart Failure Audit	NICOR
Nadeem Fazal	National Clinical Audit Services Manager	NICOR
Jackie Austin	Nurse Consultant (Aneurin Bevan Health Board) and Lead Nurse South Wales Cardiac Network	Cardiac network/Heart Failure Nurse Specialist (Wales)
Gemma Baldock-Apps	Cardiology Audit and Data Manager (East Sussex Healthcare NHS Trust)	Audit and clinical effectiveness/ database user
Janine Beezer	Heart Failure Specialist Clinical Pharmacist (City Hospitals Sunderland)	Heart Failure Specialist Clinical Pharmacist /database user
Jim Moore	General Practitioner and GP with Special Interest, Gloucestershire Heart Failure Service	Primary care physician
Dawn Lambert	Heart Failure Nurse Specialist (Portsmouth Hospitals NHS Trust)	Heart Failure Nurse Specialist/ database user
Kathy Simmonds	Heart Failure Nurse Specialist (Kettering General Hospital NHS Foundation Trust)	Heart Failure Nurse Specialist/ database user
Richard Mindham	Heart failure patient	Patient representative
Helen Laing	National Clinical Audit Lead (HQIP)	HQIP
Lailaa Carr	Contract and Project Officer (HQIP)	HQIP

B. Heart failure Audit anaLysis and Outcomes (HALO) membership

Name	Job title and organisation	Stakeholder
Henry Dargie	Honorary Professor of Cardiology (U. of Glasgow) and chair of HALO	HALO
John Cleland	Professor of Cardiology (U. of Hull)	HALO
Theresa McDonagh	Consultant Cardiologist and Professor of Heart Failure (KCH) and National Heart Failure Audit Clinical Lead	National Heart Failure Audit
Suzanna Hardman	Consultant Cardiologist (Whittington) and chair of BSH	BSH
Adam Timmis	MAG chair and Professor of Clinical Cardiology at London Chest Hospital	MAG/MINAP
Chris Gale	NIHR Clinician Scientist Award Associate Professor of Cardiovascular Health Research (University of Leeds), Honorary Reader (UCL) and Honorary Consultant Cardiologist (York Teaching Hospital)	NICOR
Ian Ford	Professor of biostatistics and Director of the Robertson Centre for Biostatistics (U. of Glasgow)	External statistician
Polly Mitchell	National Heart Failure Audit Project Manager	National Heart Failure Audit

9 Glossary

Word	Acronym or abbreviation	Definition
(Acute) Myocardial Infarction	(A)MI	Commonly known as a heart attack, a myocardial infarction results from the interruption of blood supply to part of the heart, which causes heart muscle cells to die. The damage to the heart muscle carries a risk of sudden death, but those who survive often go on to suffer from heart failure.
Angiotensin II receptor antagonist/ angiotensin receptor blocker	ARB	A group of drugs usually prescribed for those patients who are intolerant of ACE inhibitors. Rather than lowering levels of angiotensin II, they instead prevent the chemical from having any effect on blood vessels.
Angiotensin-converting enzyme inhibitor	ACE inhibitor/ ACEI	A group of drugs used primarily for the treatment of high blood pressure and heart failure. They stop the body's ability to produce angiotensin II, a hormone which causes blood vessels to contract, thus dilating blood vessels and increasing the supply of blood and oxygen to the heart.
Beta blocker		A group of drugs which slow the heart rate, decrease cardiac output and lessen the force of heart muscle and blood vessel contractions. Used to treat abnormal or irregular heart rhythms, and abnormally fast heart rates.
British Society of Heart Failure	BSH	The professional society for healthcare professionals involved in the care of heart failure patients. The BSH aims to improve care and outcomes for heart failure patients by increasing knowledge and promoting research about the diagnosis, causes and management of heart failure.
Cardiac resynchronisation therapy	CRT	CRT, also known as biventricular pacing, aims to improve the heart's pumping efficiency by making the chambers of the heart pump together. 25-50% of all heart failure patients have hearts whose walls do not contract simultaneously. CRT involves implanting a CRT pacemaker or ICD (implantable cardioverter-defibrillator) that has a lead positioned in each ventricle. Most devices also include a third lead which is positioned in the right atrium to ensure that the atria and ventricles contract together.
Chronic obstructive pulmonary disease	COPD	The co-occurrence of chronic bronchitis and emphysema, a pair of commonly co-existing lung diseases in which the airways become narrowed. This leads to a limitation of the flow of air to and from the lungs, causing shortness of breath (dyspnoea). In contrast to asthma, this limitation is poorly reversible and usually gets progressively worse over time.
Contraindication		A factor serving as a reason to withhold medical treatment, due to its unsuitability.
Diuretic		A group of drugs which help to remove extra fluid from the body by increasing the amount of water passed through the kidneys. Loop diuretics are often used in heart failure patients to ease symptoms of oedema and breathlessness.
Echocardiography	Echo	A diagnostic test which uses ultrasound to create two dimensional images of the heart. This allows clinicians to examine the size of the chambers of the heart and its pumping function in detail, as well as examine valves and the myocardium (heart muscle).
Electrocardiography	ECG/EKG	A diagnostic test which records the rhythm and electrical activity of the heart. Electrodes (sticky patches, connected to wires which lead to a recording machine) are attached to the arms, legs and chest, and pick up electrical signals produced by each heartbeat. ECGs are sometimes taken whilst a patient is excercising on a treadmill or exercise bike. Information from exercise tests can help doctors to plan treatment, understand the severity of heart disease in the patient, and determine an optimal cardiac rehabilitation programme.
European Society of Cardiology	ESC	The ESC is a professional association for cardiologists across Europe, which aims to facilitate improved diagnosis and treatment of cardiovascular disease in Europe. It runs numerous education and training events, and edits and publishes nine journals on cardiology. The ESC has produced a Clinical Practice Guideline for acute and chronic heart failure, and a set of standards for delivering heart failure care, which the audit uses, along with NICE guidance, as a benchmark for good practice.

Heart failure		A syndrome characterised by the reduced ability of the heart to pump blood around the body, caused by structural or functional cardiac abnormalities. The condition is characterised by symptoms such as shortness of breath and fatigue, and signs such as fluid retention. Acute heart failure refers to the rapid onset of the symptoms and signs of heart failure, often resulting in a hospitalisation, whereas in chronic heart failure the symptoms develop more slowly.
Hospital Episode Statistics	HES	The national statistical data warehouse for England of the care provided by NHS hospitals and for NHS hospital patients treated elsewhere. HES is the data source for a wide range of healthcare analysis for the NHS, government and many other organisations. The National Heart Failure Audit uses HES data to calculate case ascertainment.
Left ventricular dysfunction	LVD	Any functional impairment of the left ventricle of the heart.
Left ventricular ejection fraction	LVEF	A measurement of how much blood is pumped out of the left ventricle with each heartbeat. An ejection fraction of below 40% may be an indication of heart failure.
Left ventricular systolic dysfunction	LVSD	A failure of the pumping function of the heart, characterized by a decreased ejection fraction and inadequate ventricular contraction. It is often caused by damage to the heart muscle, for example following a myocardial infarction (heart attack).
Medical Research Information Service	MRIS	A Health and Social Care Information Centre service which links datasets at the level of individual patient records for medical research projects. NICOR uses MRIS to determine the life status of patients included in the audit, so as to calculate mortality rates. MRIS also provides the audit with HES data for this report.
Mineralocorticoid receptor antagonist	MRA	A group of diuretic drugs, whose main action is to block the response to the hormone aldosterone, which promotes the retention of salt and the loss of potassium and magnesium. MRAs increase urination, reduce water and salt, and retain potassium. They help to lower blood pressure and increase the pumping ability of the heart.
National Clinical Audit and Patient Outcomes Programme	NCAPOP	A group of 40 national clinical audits, funded by the Department of Health and overseen by HQIP that collect data on the implementation of evidence based clinical standard in UK Trusts, and report on patient outcomes.
National Institute for Cardiovascular Outcomes Research	NICOR	Part of the National Centre for Cardiovascular Prevention and Outcomes, based in the Institute of Cardiovascular Science at University College London. NICOR manages six national clinical audits, including the National Heart Failure Audit, and three new technology registries.
New York Heart Association class	NYHA class	NYHA classification is used to describe degrees of heart failure by placing patients in one of four categories based on how much they are limited during physical activity: Class I (Mild): No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, or dyspnoea (shortness of breath). Class II (Mild): Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in fatigue, palpitation, or dyspnoea. Class III (Moderate): Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes fatigue, palpitation, or dyspnoea. Class IV (Severe): Unable to carry out any physical activity without discomfort. Symptoms of cardiac insufficiency at rest. If any physical activity is undertaken, discomfort is increased.
Oedema		An excess build-up of fluid in the body, causing tissue to become swollen. Heart failure patients often suffer from peripheral oedema, affecting the feet and ankles, and pulmonary oedema, in which fluid collects around the lungs.
Patient Episode Database of Wales	PEDW	The national statistics database for Wales, collecting data on all inpatient and outpatient activity undertaken in NHS hospitals in Wales, and on Welsh patients treated in English NHS Trusts.

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