



NCAP

NATIONAL CARDIAC AUDIT PROGRAMME

**NATIONAL HEART
FAILURE AUDIT
2016/17 SUMMARY
REPORT**

NICOR

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EXECUTIVE SUMMARY

This year's Heart Failure (HF) audit is based on 73,616 admissions to hospitals in England and Wales between April 2016 and March 2017. This represents 86% of HF admissions as the patient's primary diagnosis in England and 75% in Wales.

During hospital admission, more than 89% of patients get an echocardiogram, a key diagnostic test. However, rates are higher for those admitted to Cardiology (96%) rather than General Medical (84%) wards. Specialist input, irrespective of the place of admission is associated with higher rates (94%) of echocardiography.

The prescription of key disease-modifying medicines for patients with heart failure and a reduced left ventricular ejection fraction (HFrEF) remains high, including beta-blockers (87%) and mineralocorticoid antagonists (53%); treatments that are both life-saving and inexpensive.

Prescription rates for all three key disease modifying medications for patients with HFrEF has increased further from 50% to 55% for those admitted to Cardiology wards over the last year.

Irrespective of the place of admission, 47% of patients with HFrEF seen by a member of the specialist HF team as an inpatient, were prescribed all three disease modifying drugs, a key performance indicator (KPI) albeit with considerable room for further improvement. This has improved from 45% last year.

The number of patients seen by HF specialists has increased to over 80% this year. In particular HF nurses saw more HF patients admitted onto general medical wards (36%) than last year (24%). This is important as specialist care is associated with improved survival.

The mortality of patients hospitalised with heart failure remains high overall at 9.4%. However with many more patient episodes being recorded in the audit and a trend towards increasing age, we would have expected an increase in mortality. This has not happened.

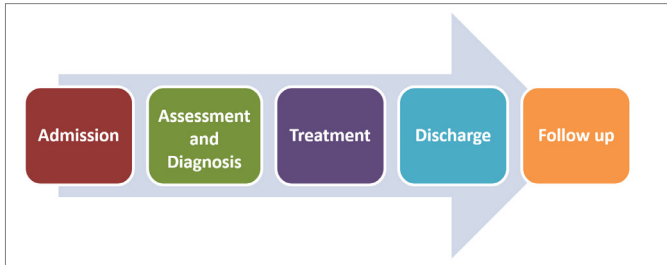
Mortality rates in hospital are better for those admitted to Cardiology wards.

Post discharge mortality rates at one year are independently associated with admission to a cardiology ward, cardiology follow up and the use of key disease-modifying medicines for HFrEF.

THE NATIONAL HEART FAILURE AUDIT 2016/17 RESULTS

The results will be presented as they relate to the patient journey for hospitalised people with HF following the scheme below.

Figure 1: The patient pathway for a typical patient entered into the National Heart Failure Audit



PATIENTS ADMITTED WITH HEART FAILURE

Data were provided on 73,616 deaths and discharges from April 2016 to March 2017 - an increase of approximately 4.6% when compared to 66,695 such events in the previous annual report.

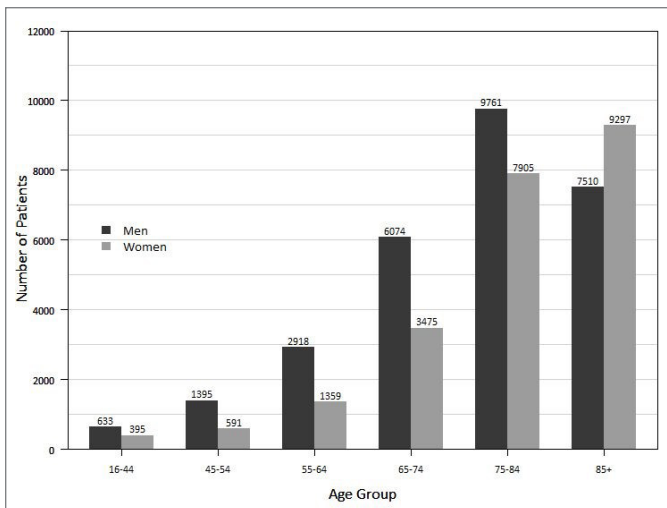
Table 1: Records submitted and case ascertainment in 2016/17

Region	Records submitted	HES/PEDW total HF discharges 2016-17	Case ascertainment (%)
Overall	73,616	86,466	85%
England	70,086	81,759	86%
Wales	3,530	4,707	75%

DEMOGRAPHICS

The median age of patients was 80.6 years overall but slightly higher for women and lower for men. There were more men in each age category other than the 85+ age group where women were in the majority (Figure 2).

Figure 2: Age and gender demographics at first admission



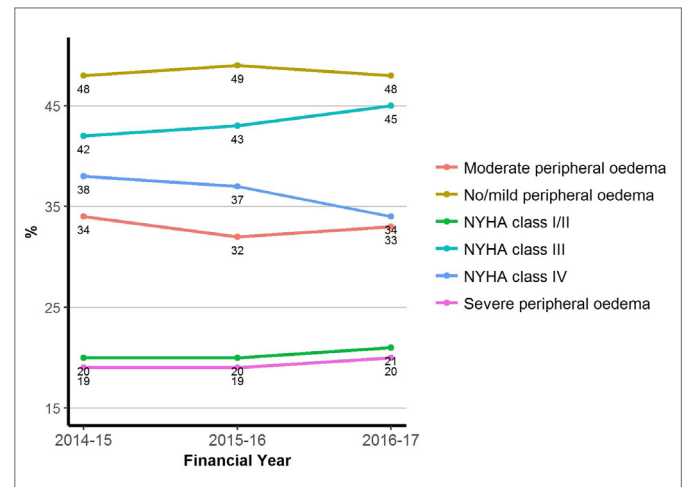
Mean age - 78 years
Median age - 80.6 years

Mean age men - 76.2 years
Mean age women - 80.3 years

TRENDS IN SYMPTOMS

The pattern of symptoms and signs of HF has remained fairly consistent over the years. Just over one third of admissions were associated with symptoms at rest or with minimal exertion (NYHA Class III-IV). Approximately half of admissions were associated with moderate or severe oedema. As peripheral oedema usually accumulates over days or weeks there is possibly an opportunity to reduce admissions through better control of congestion in the community. As peripheral oedema is associated with longer lengths of stay, better management of congestion might shorten or avoid admissions.

Figure 3: Trends in symptoms and signs of HF over 3 years



CAUSES AND COMORBIDITIES OF HEART FAILURE

66.8% of patients are reported to have HFrEF (reduced from 70% last year). As in previous years ischaemic heart disease (IHD) and prior myocardial infarction are more common in those with HFrEF, whereas hypertension and valve disease are associated with HFpEF. Of note is the high co-morbidity burden, nearly one third of patients has diabetes and just under 20% has chronic obstructive pulmonary disease (Table 2).

Table 2: Causes and Comorbidities of Heart Failure

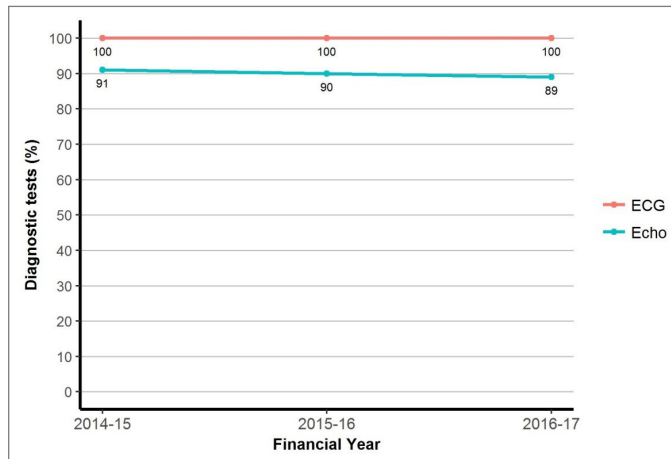
Medical History	HFrEF (%)	HFpEF (%)	p value
IHD	46	36	<0.001
Atrial fibrillation	25	50	<0.001
Myocardial Infarction	31	16	<0.001
Valve disease	24	31	<0.001
Hypertension	51	60	<0.001
Diabetes	33	34	0.159
COPD	17	19	<0.001

ASSESSMENT AND DIAGNOSIS

ECGs and echocardiograms are done in 100% and 89% of patients respectively, in line with the key performance indicators (KPIs) for accurate diagnosis. These high levels have been maintained over the last three years. This still leaves 11% of patients not accessing echocardiography in hospital and having no record of a recent echo within the last 6 months (Figure 4).

ECG AND ECHO DIAGNOSTIC TESTS

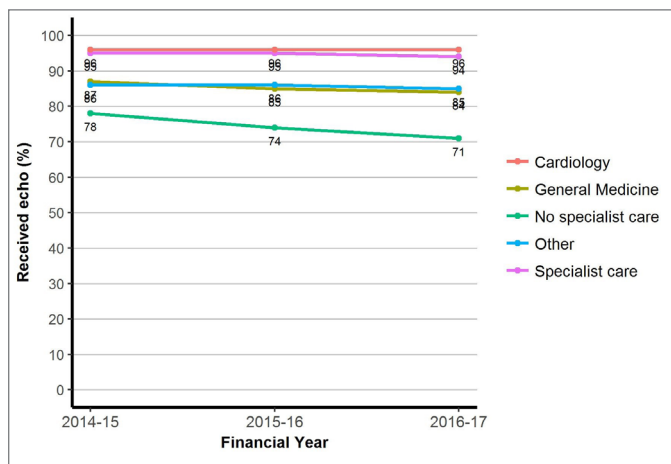
Figure 4: HF patients receiving ECG and echo diagnostics tests over 3 years



Patients admitted to cardiology wards were more likely to have echocardiography than those admitted to general medical wards. However it should be noted that patients receiving specialist input to their care no matter where they are admitted have similar rates of echocardiography as those on cardiology wards (Figure 5).

ACCESS TO DIAGNOSTIC TEST BASED ON PLACE OF CARE

Figure 5: Percentage of patients receiving echo by place of care (or with specialist input regardless of the place of care) from 2014-2017



ECHO DIAGNOSIS

Echocardiography provides important information on the underlying aetiology of HF. In this audit, most patients have HFrEF as in previous years. There has been an increase in reports of left ventricular hypertrophy (LVH), valve disease,

diastolic dysfunction and other diagnoses. This may be an early indicator of a rise in the proportion of HFpEF or could reflect more awareness of echo measures of diastolic dysfunction (Table 3).

Table 3: Overall echo diagnosis breakdown (2016/17)

Diagnosis	Total (%)
Normal Echo	2.5
Left ventricular systolic dysfunction (LVSD)	66.8
Left ventricular hypertrophy (LVH)	6.8
Valve disease	36.4
Diastolic dysfunction	11.7
Other diagnosis	15.5

TRENDS IN PLACE OF CARE

Place of care is a key quality metric for HF. In this audit cycle, as in the preceding three, just under half of patients were admitted to Cardiology wards.

Figure 6: Trends in place of care over 3 years (2014-2017)

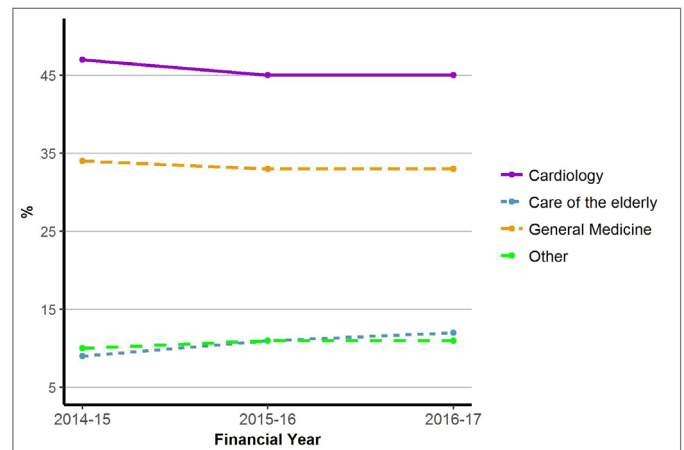
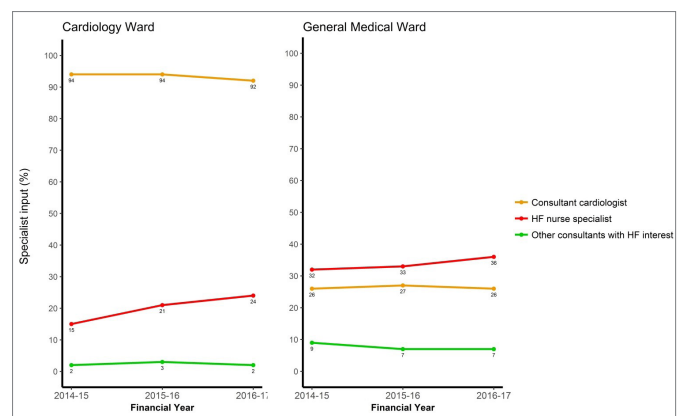


Figure 7: 3 year specialist input trends by Place of Care (2014 -2017)



TRENDS IN INPUT BY HF SPECIALISTS

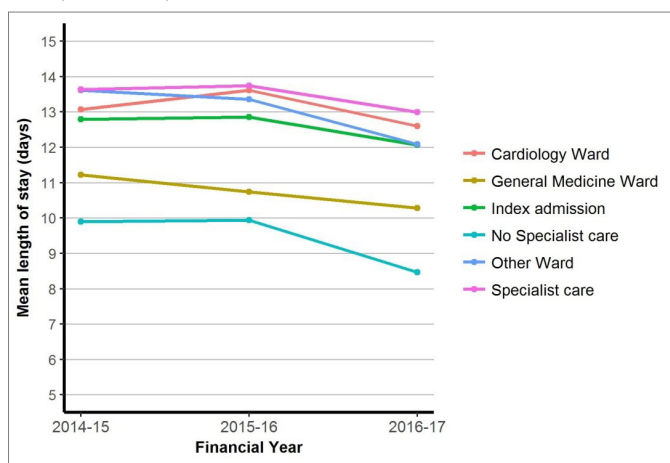
80.3% of patients are seen by a HF specialist during the admission. This can either be a consultant cardiologist, another consultant with specialist HF interest (usually a geriatrician) or a HF specialist nurse. 31% of patients now see a HF specialist nurse during their admission, an increase of over 5% since last year.

For those on Cardiology wards, 92% are seen by Consultant Cardiologists. There has been a continued trend for increasing HF specialist nurse input both in Cardiology and in General Medicine. Last year HF specialist nurses saw 24% of patients in Cardiology wards and 36% in the General Medical wards. See Figure 7.

TRENDS IN LENGTH OF STAY

The median length of stay (LOS) in 2016/17 was 9 days for those admitted to Cardiology wards and 6 days for those in General Medicine. Those receiving specialist care also have a higher median LOS at 9 days compared to 4 days for patients not seeing specialists. LOS has remained static for Cardiology wards and those seeing specialists, but is becoming shorter for those in General Medical wards and those not being reviewed by specialists. The longer length of stay for patients receiving specialist care might reflect referral of more severe cases for expert care, higher rates of implementation of disease modifying therapies and greater care to ensure that the patient is stable prior to discharge (Figure 8).

Fig 8: 3 year trend of mean length of stay based on place of care and specialist input 2014-2017



TREATMENT

Prescription of ACEI, beta-blockers and MRAs are key performance indicators for patients with HFrEF. This year high standards were again achieved with 83% being discharged on ACEI or angiotensin receptor blockers (ARBs), 87% on beta-blockers and 53% on MRA. However, arguably a more relevant and challenging target is the number discharged on all three medicines which is only 44% (see Table 4). However, this has increased from 42% last year.

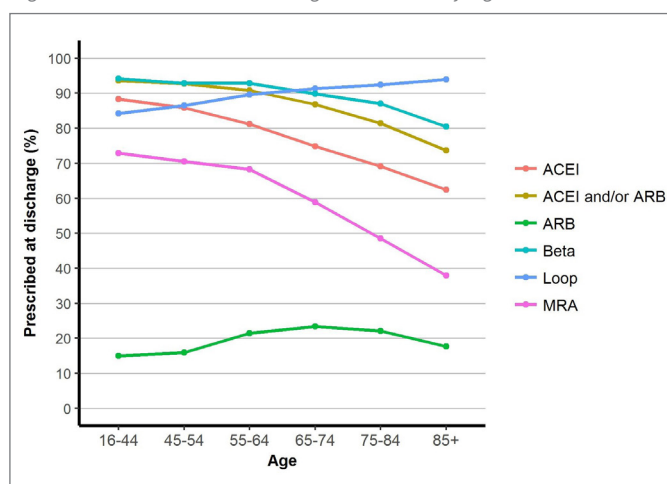
TREATMENT AT DISCHARGE FOR HFrEF

The differential prescribing of disease modifying treatment with ACE/ARB, BB and MRA with age was also seen again this year (Figure 9). The inflexion point for reduction in these drugs is in the 55-64 age group. This is an area for targeting better practice in the next few years.

Table 4: Treatment on discharge for LVSD in 2016/17

Medication	Total prescribed (%)
ACE inhibitor	72
ARB	20
ACE or ARB	83
Beta blocker	87
MRA	53
ACEI or ARB, beta blocker and MRA	44
Loop diuretic	92
Thiazide diuretic	5
Digoxin	21

Figure 9: Treatment on discharge for HFrEF by age in 2016/17

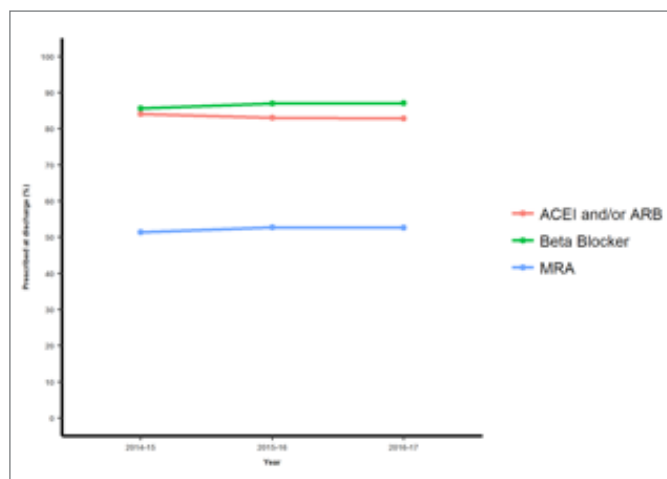


ACEI, angiotensin converting enzyme inhibitor; ARB, angiotensin receptor blocker; MRA, mineralocorticoid (aldosterone) receptor antagonist

TRENDS IN PRESCRIBING FOR HFrEF

The trends in prescribing of the three key medicines over the last 3 years remain favourable; in particular the prescription of beta-blockers has improved markedly with 87% of patients with HFrEF now being discharged on these. MRA are now prescribed to >50% of patients but should probably be substantially greater (see Figure 10). Achieving higher prescription rates for MRA should be a goal for many Trusts.

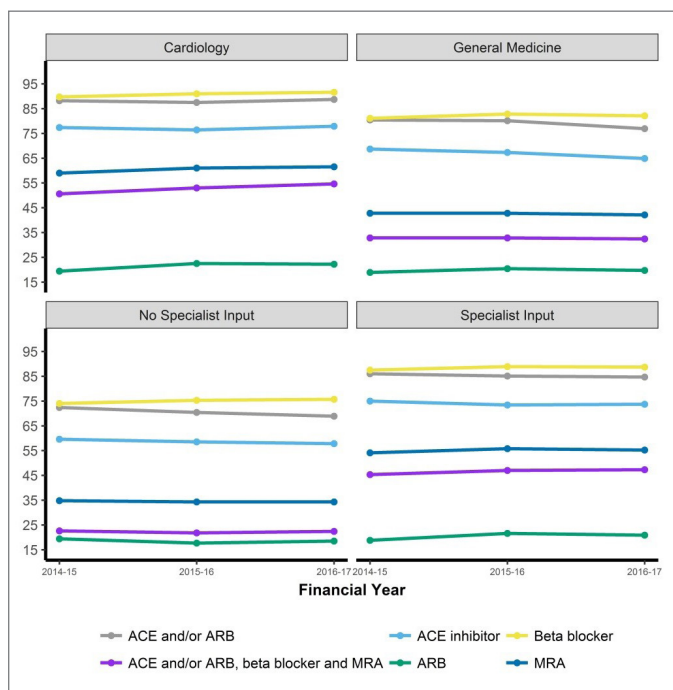
Figure 10: 3-year trends in prescription of disease modifying therapies for HFrEF



TRENDS IN TREATMENT BY PLACE OF CARE AND SPECIALIST INPUT

The rate of prescription of all three disease-modifying medicines in combination has increased from 50% to 54% over the last two years on cardiology wards but remains static at 32% on general medical wards (Figure 11). For those seen by a specialist, there was an increase from 45% to 47% of patients being on all 3 medicines, compared to only 22% of those not seen by a specialist (20% last year) irrespective of their ward allocation. Thus, outreach services to other wards can improve care. The trend seen over the last 3 years is for an increase in the prescription of BB, MRA and their combination in patients who have specialist input. Prescription rates for those who lack specialist input are static or falling.

Figure 11: 3 year trends of treatment of LVSD on discharge by place of care and specialist input (2014-17)



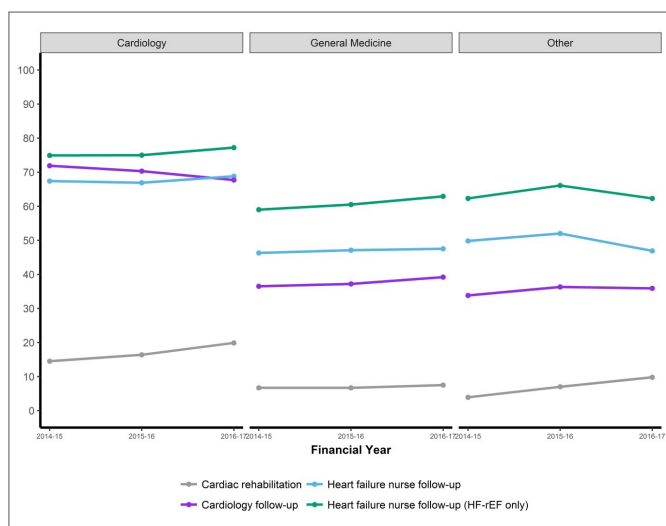
DISCHARGE AND FOLLOW UP

People admitted to hospital because of HF should be discharged only when stable and should receive a clinical assessment from a member of a multidisciplinary HF team within 2 weeks of discharge.

Overall 47% of those discharged have Cardiology follow up, and 57% have HF specialist nurse appointments post discharge. These rates are higher for those being admitted to Cardiology wards at 64% and 69% respectively. Trends in follow up for both Cardiology and HF nurse are static (Figure 12). This is a key area for future improvement as such follow up has been demonstrated repeatedly by this audit to be associated with improved outcomes.

Fewer than 20% of patients are referred for cardiac rehabilitation during hospitalization. Many more are referred after discharge by community teams; however the audit does not capture this.

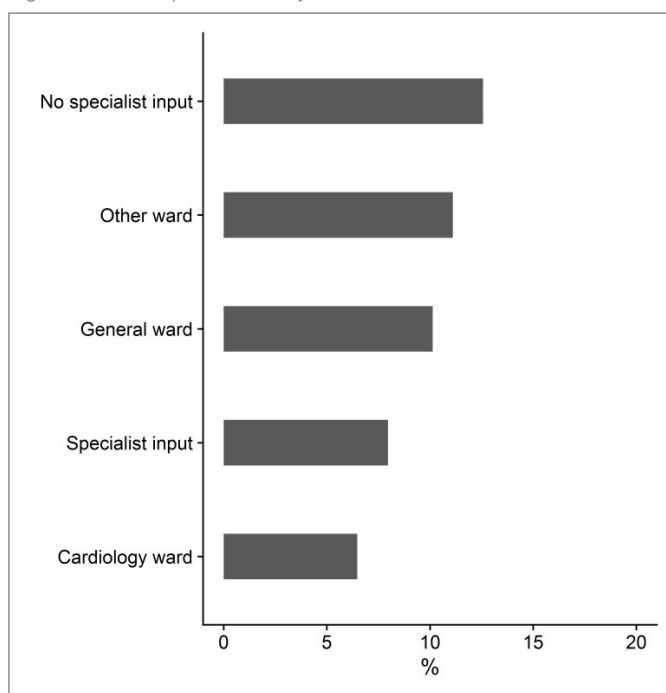
Figure 12: Trends in multidisciplinary HF team follow up post discharge



IN-HOSPITAL MORTALITY

In-hospital mortality this year was 9.4%. Mortality varies with age, being 4.4% for those <75yrs and 11.2% for those ≥75yrs. As in previous years outcomes are better for patients admitted to Cardiology (6.5%) compared to General Medical (10.1%) wards and for those accessing specialist care (8.0%) compared to those who do not (12.6%) (Figure 13).

Figure 13: In-hospital mortality (2016/17)



There is great variation between hospital survival/mortality rates. This may be due to differences in patient characteristics or variations in care. A risk adjustment model has been derived using data from the audit from its inception. This will be validated in this year's audit data. Once the risk adjustment model is robust, funnel plot analysis will be carried out to detect outliers for mortality.

TRENDS IN IN-HOSPITAL MORTALITY

Figure 14: 3 year trends of in-hospital mortality by specialist care, age and ward allocation.

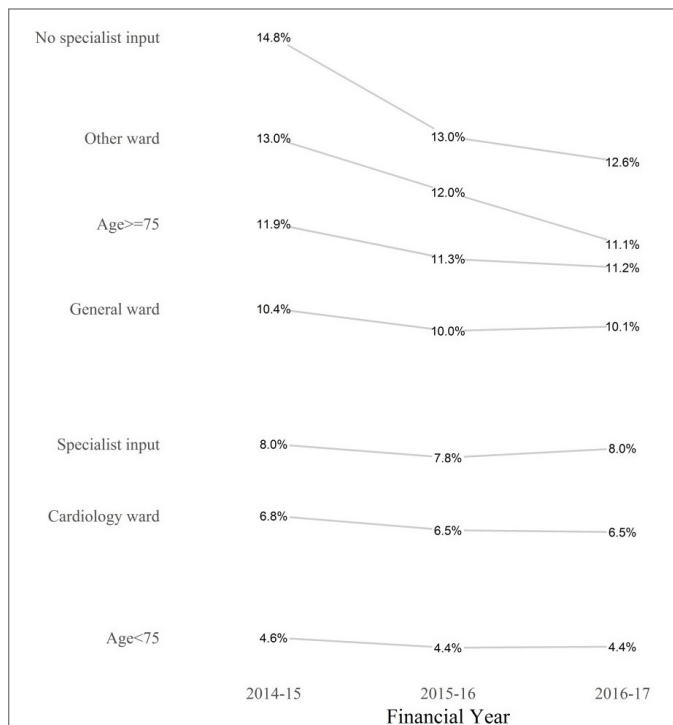
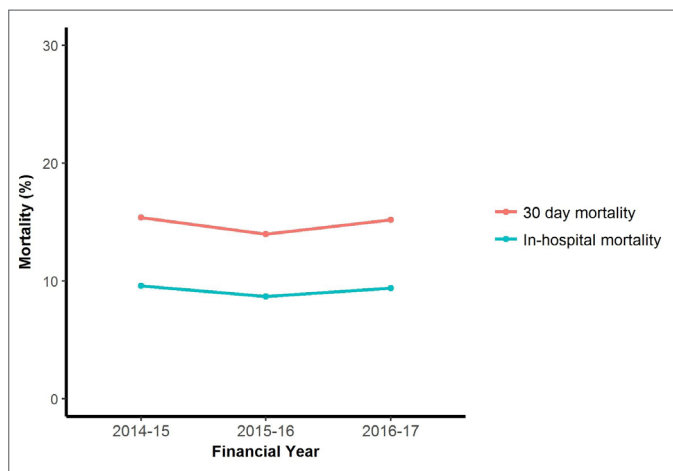


Fig 15: 3 year trends of in-hospital mortality and 30 day mortality from admission (2014-2017)



In multivariable analyses adjusted for age, not being admitted to a Cardiology ward (HR 1.65, $p < 0.001$) continues to be an independent predictor of worse survival when other common markers of disease severity are included in the model (see Cox Proportional Hazards Table 5)

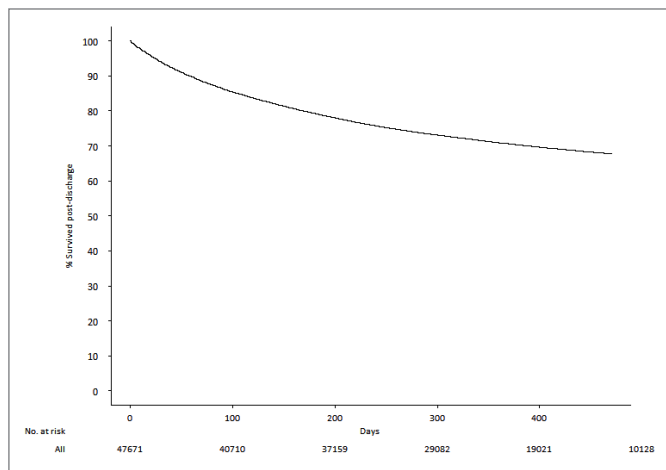
Inpatient, 30 day and 1 year mortality rates have been fairly unchanged over the last 3 years (Figure 15). Clearly the aim is to drive improvements in this in the years to come. However, the audit has become larger and more representative of all patients admitted with HF, and there has been a trend towards increasing age, so an increased mortality would have been expected. This has not happened to date suggesting a more comprehensive service delivery is beginning to emerge.

Table 5: In-Hospital mortality Random Effects Cox proportional hazards model

	Hazard Ratio	Lower	Upper	p
Age ≥ 75	2.08	1.79	2.42	<0.001
NYHA III/IV	1.01	0.88	1.17	0.84
Systolic Blood Pressure (10 mHg decrease)	1.17	1.14	1.21	<0.001
COPD	1.14	1.00	1.30	0.044
Ischaemic Heart Disease	1.16	1.04	1.29	0.0066
Valve Disease	1.14	1.02	1.29	0.024
Urea (5mEq/dL increase)	1.16	1.13	1.18	<0.001
Sodium electrolytes (5mEq/dL increase)	1.15	1.10	1.21	<0.001
Haemoglobin (g/dLincrease)	1.01	0.99	1.04	0.38
Creatinine (10 umol/L increase)	1.02	1.02	1.03	<0.001
Potassium <3.5 (mEq/L)	1.54	1.29	1.84	<0.001
Potassium 3.5-4.5 (mEq/L)	1.00	1.00	1.00	<0.001
Potassium 4.5-5.5 (mEq/L)	1.79	1.59	2.02	<0.001
Potassium >5.5 (mEq/L)	4.05	3.33	4.93	<0.001
Not cardiology in patient	1.65	1.47	1.85	<0.001
Female	1.03	0.87	1.09	0.65
Heart rate (5 bpm increase)	1.16	1.14	1.18	<0.001

POST DISCHARGE MORTALITY

Figure 16: Kaplan Meier plot of all-cause mortality following discharge from hospital (2016/17)



The mortality rate at one year was 23.3% of people admitted with HF (Figure 16). As in previous years, mortality at 1 year was lower for patients admitted to Cardiology wards (20.6%), Figure 21. Similarly mortality at 1 year of follow-up was lower for those having Cardiology follow up at 19% (c.f. 27% without - Figure 17) and for those seen by HF Nurses - 22% c.f. 26% for no nurse follow up (Figure 18). Referral to Cardiac Rehabilitation is also associated with a better outcome at one year: 18% compared to 24% for those not referred for rehabilitation (Figure 19).

Figure 17: 1 year mortality according to Cardiology Follow Up

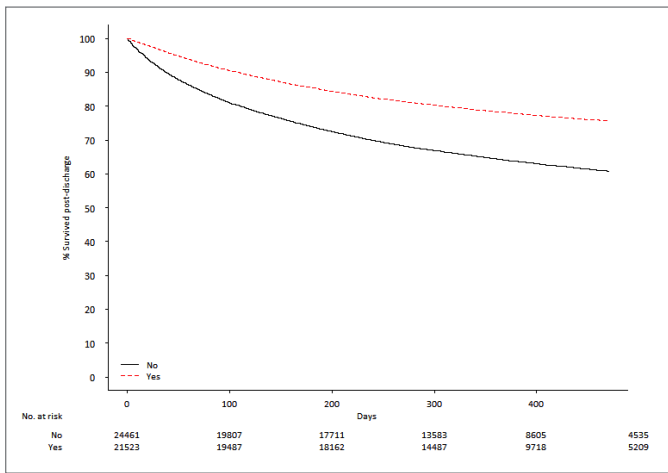


Figure 18: 1 year Mortality according to HF Nurse Follow Up

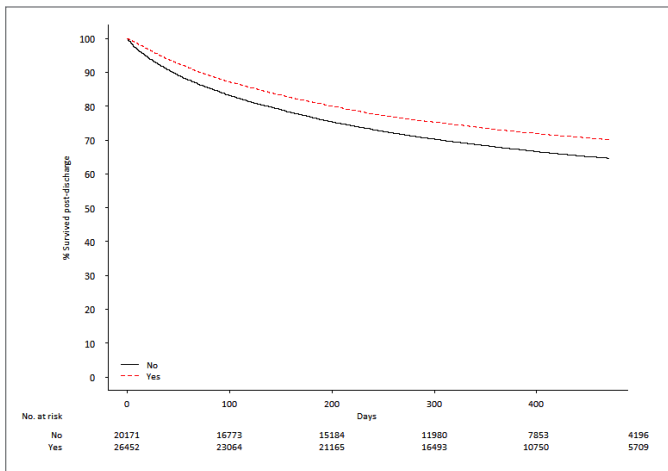
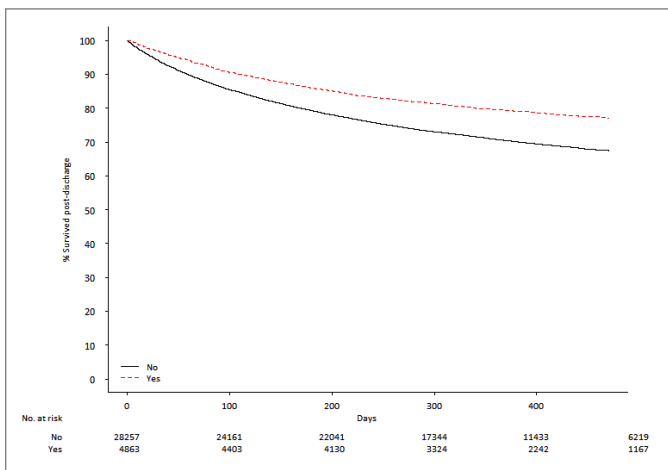
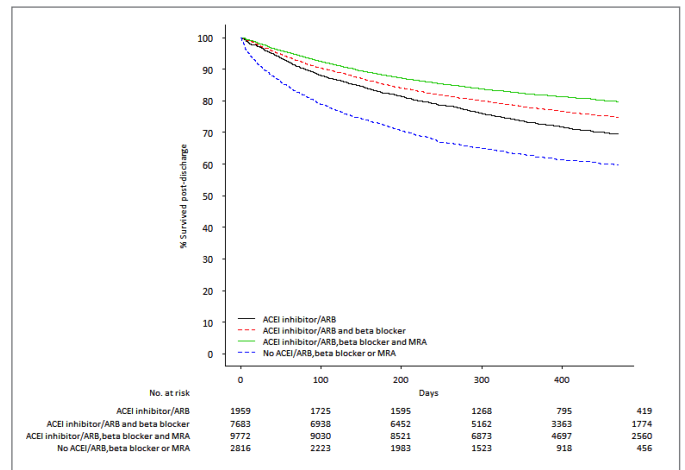


Figure 19: 1 Year Mortality Stratified by Referral to Cardiac Rehabilitation



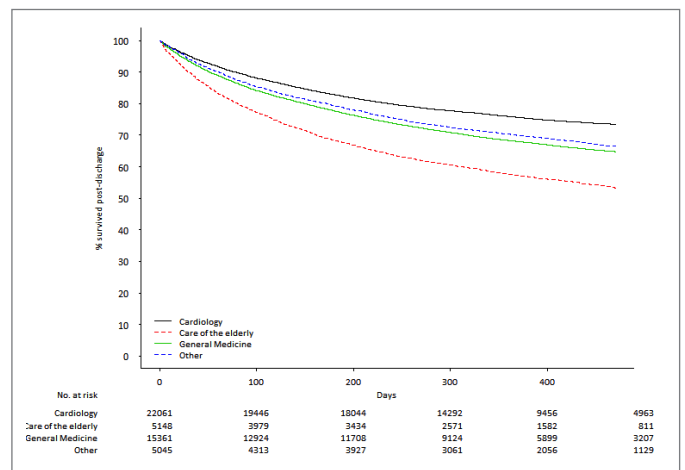
Mortality post-discharge is highly dependent upon the prescribing of each of three disease modifying drugs, with the greatest cumulative benefit seen in those who leave hospital on all three key modifying drugs (Figure 20).

Figure 20: Mortality post-discharge prescribing for patients with LVSD



Those discharged on all three disease-modifying drugs had a 1-year mortality rate of 15% compared to 30% for those leaving hospital without any of the three key drugs.

Figure 21: Kaplan Meier plot of all-cause mortality following hospital discharge by place of care (2016/17)



KEY PERFORMANCE INDICATORS (KPIs)

In summary regarding the KPIs in this audit cycle:

- Application of diagnostic tests remains high
- Prescribing rates of key disease modifying medicines for those with HFrEF have increased
- The proportion of patients admitted to cardiology wards is static at <50%, but the proportion of patients who have input from a HF specialist has increased to >80% and more patients have HF specialist nurse input.
- Despite a trend towards increasing age, mortality remains static, albeit high.