Appendix 4 Kaplan-Meier Mortality Analyses 2021-22

Quality of in-patient care is also associated with improved short term and longer-term mortality.

In multivariable analyses, adjusted for age, not being admitted to a cardiology ward, lack of disease-modifying therapy and no access to echocardiography are independent predictors of worse survival when other common markers of disease severity are included in the model (see Cox Proportional Hazards and the Multivariable Analysis in Appendix 4 for in-hospital mortality, 30-day and one-year mortality).

The mortality rate at one year was 32% of people discharged alive following admission with heart failure (HF) [Figure 1]. As in previous years, mortality at one year was lower for patients admitted to cardiology wards at 26% [Figure 2]. Similarly, mortality at one year of follow-up was lower for those having cardiology follow-up at 24% [Figure 3] and for those seen by HF nurses (29% compared with 36% for no nurse follow-up) [Figure 4]. Referral to cardiac rehabilitation is also associated with a better outcome at one year, 22% compared to 33% for those not referred for rehabilitation [Figure 5]. This presumably reflects a selection bias for those being offered rehabilitation.

Figure 1: Kaplan Meier plot of all-cause mortality following discharge from hospital, 2021/22

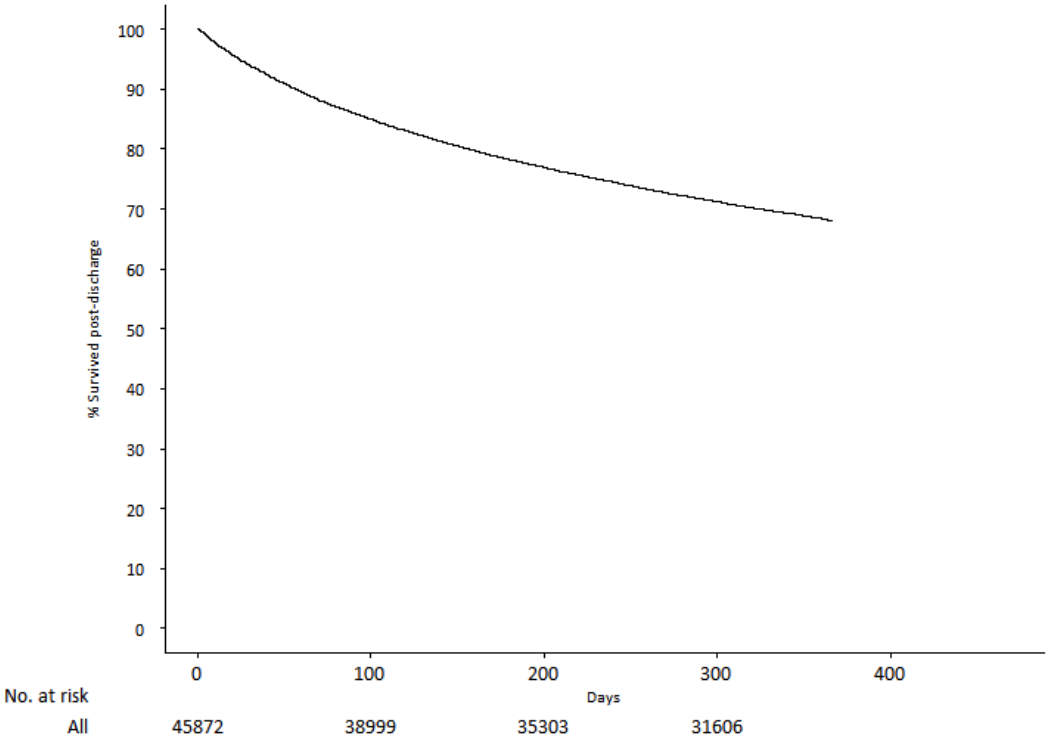
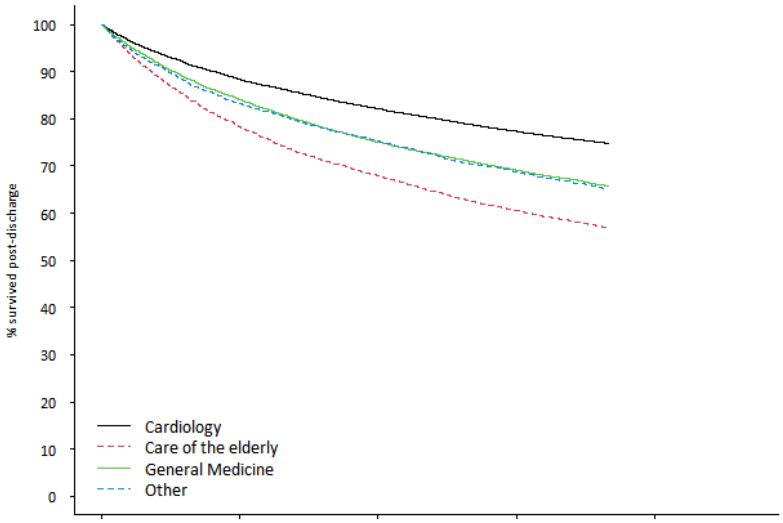
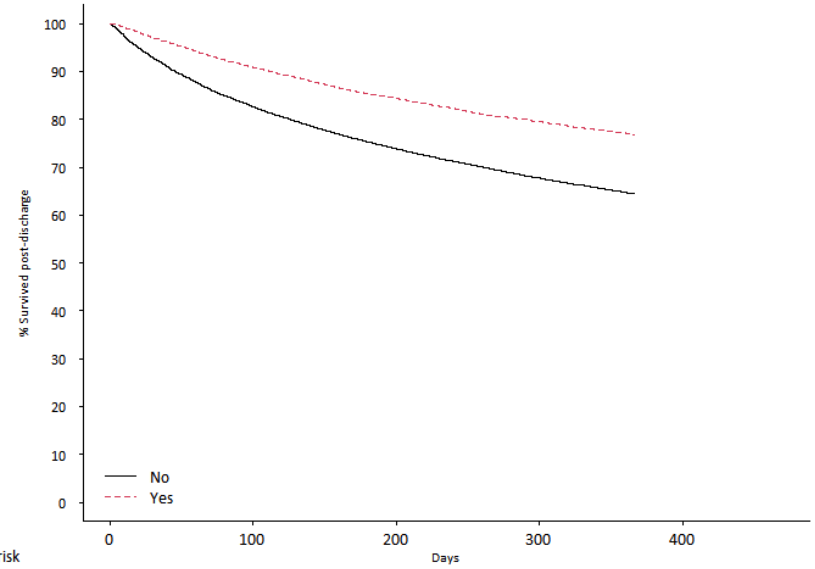


Figure 2: Kaplan Meier plot of all-cause mortality following discharge from hospital according to place of care during the admission, 2021/22



No. at risk				
Cardiology	18933	16746	15552	14152
Care of the elderly	6886	5401	4679	4029
General Medicine	15531	13073	11661	10415
Other	4215	3511	3175	2796

Figure 3: One-year mortality according to cardiology follow-up, 2021/22



No. at risk				
No	29877	24701	22070	19551
Yes	14204	12913	11986	10961

Figure 4: One-year mortality according to HF nurse follow-up, 2021/22

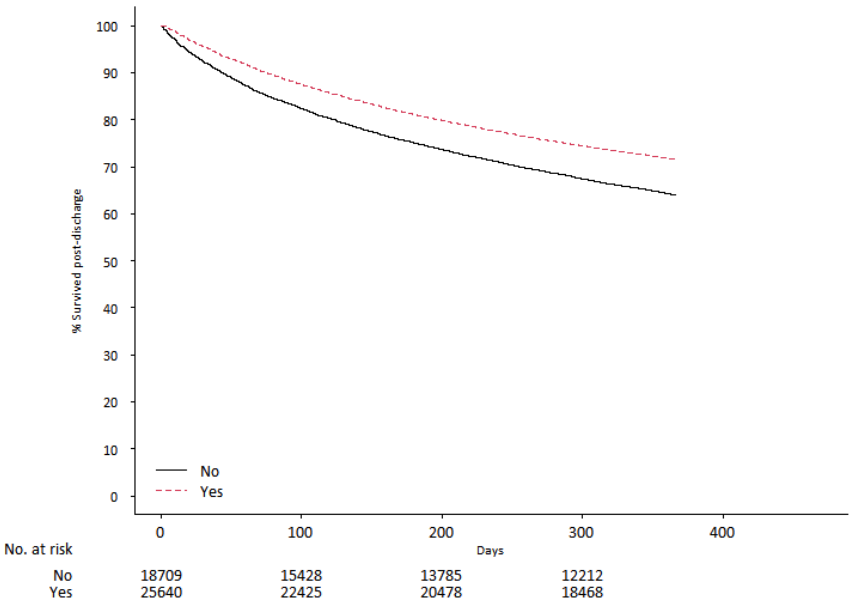
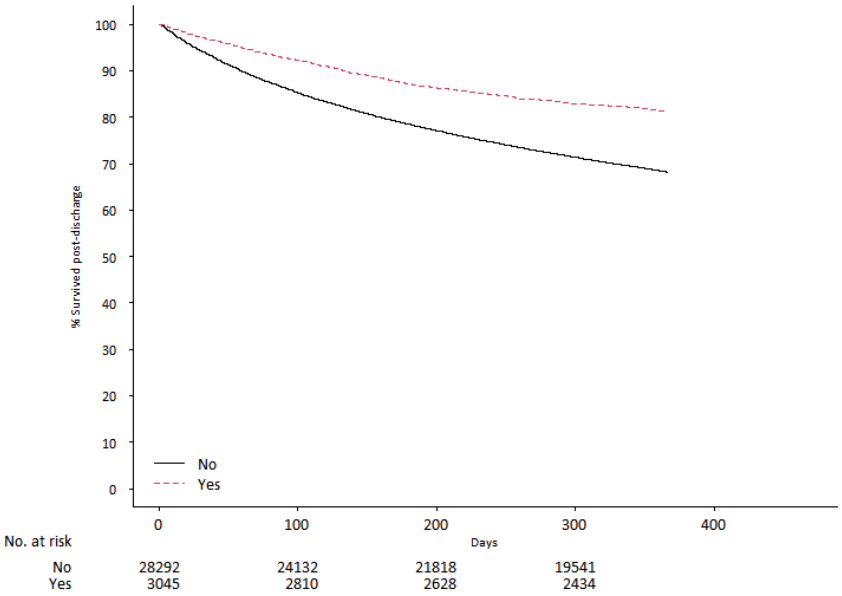
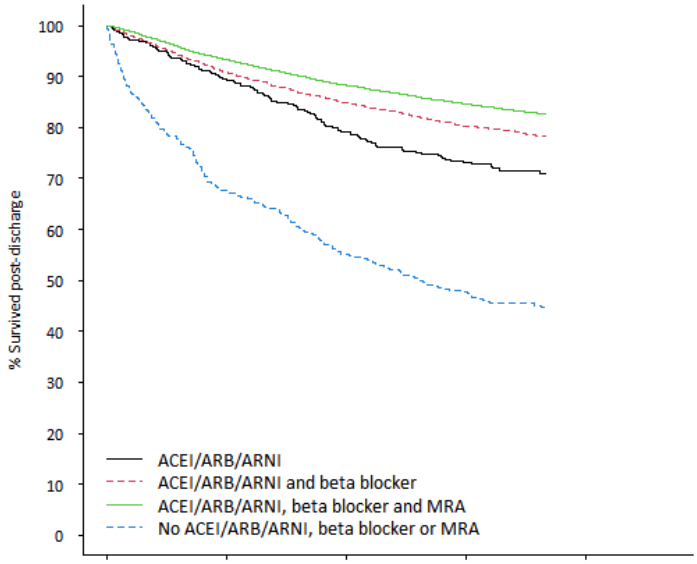


Figure 5: One-year mortality stratified by referral to cardiac rehabilitation, 2021/22



Mortality post-discharge is highly dependent upon the prescribing of each of three disease-modifying classes of drugs, with the greatest cumulative benefit seen in those who leave hospital on all three key modifying drugs [Figure 6].

Figure 6: Mortality post-discharge associated with prescribing for patients with HFrEF, 2021/22

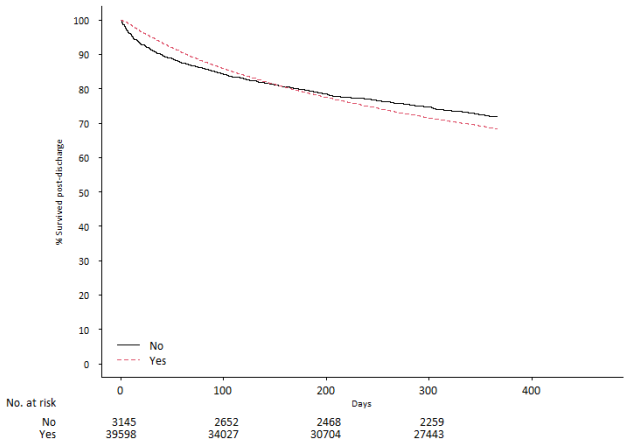


No. at risk				
ACEI/ARB/ARNI	446	399	353	311
ACEI/ARB/ARNI and beta blocker	3176	2885	2696	2473
ACEI/ARB/ARNI, beta blocker and MRA	7856	7331	6934	6458
No ACEI/ARB/ARNI, beta blocker or MRA	450	304	248	209

Those discharged on all three disease-modifying drugs had a one-year mortality rate of 18% compared to 48% for those leaving hospital without any of the three key drugs.

Interestingly, while the disease-modifying drugs for HFrEF are associate with better outcomes, there is a paradoxical effect with loop diuretics. They appear protective for short term outcomes but are associated with a poorer outcome long term. It may be that better decongestion predominates in the in-hospital and 30-day mortality but in the longer term, they are either harmful or associated with worsened disease. This requires further analysis in the future.

Figure 7: Loop diuretics and survival



The Cox Proportional Hazards Model for one-year mortality is shown in Appendix 4. Not being a cardiology in-patient, not having cardiology follow-up and not being on an ACEI/ARB or a beta- blocker are all independent predictors of worse one-year mortality. This appendix is available online here.