SUPPLEMENTAL MATERIAL

Supplemental Methods

Analysis considering death as competing risk (Fine and Gray model)

The cumulative incidence function of the event of interest *CIF(t)* in the Fine and Gray competing-risks regression model, which keeps subjects who experience competing events "at risk" so that they can be adequately counted as not having any chance of failing), is given by the formula:

$$CIF(t) = 1 - e^{-H(t)}$$

where *H(t)* is the cumulative hazard for the event of interest ("subhazard") at time *t*. It can be shown that the cumulative subhazard *H(t)*, similarly to the cumulative hazard in standard Cox regression, is a function of the baseline cumulative subhazard $H_0(t)$ (that for covariates set to zero) and the prognostic index *PI* (assuming proportional hazards):

$$H(t) = H_0(t)e^{PI}$$

In the Health ABC Study, we estimated that the baseline cumulative subhazard at 5 years for a participant with zero sum of covariates (*PI=0*) was 0.03492 (which is close to the Kaplan-Meier failure estimate at 5 years, 1-0.9658=0.0342). In turn, the predicted cumulative incidence of heart failure over 5 years becomes:

$$CIF = 1 - e^{-0.03492\exp(PI)}$$

Missing Value Analysis

The Supplemental Table 1 summarizes the performance of the model in the 5 imputed datasets In this analysis, number of participants at risk is 5613 (all CHS participants without heart failure at baseline; the number of observed 5-year heart failure events is 426, and the observed 5-year incidence is 7.6%. Not surprisingly, the H-L statistic yields higher values now because of the increased sample size and number of events.[1] However, predictions were not materially affected from a clinical perspective; the predicted to observed ratio was 0.91-0.92 and the C index was 0.74. Predicted risk was within the pre-specified range across risk categories in all datasets (data not shown).
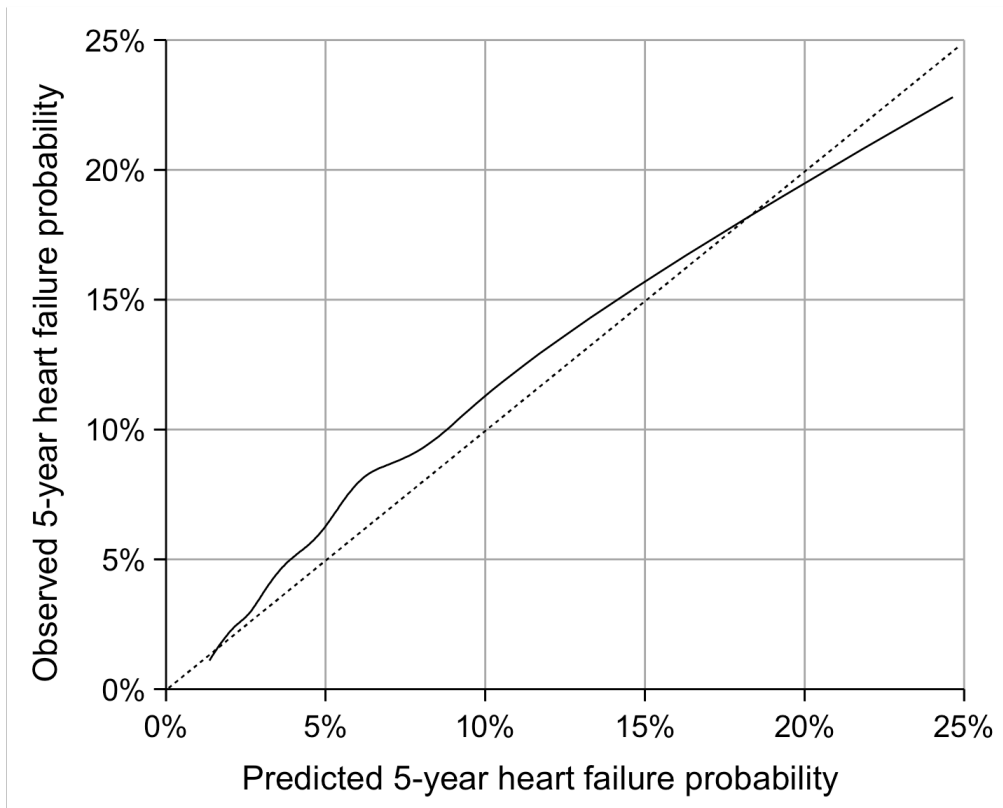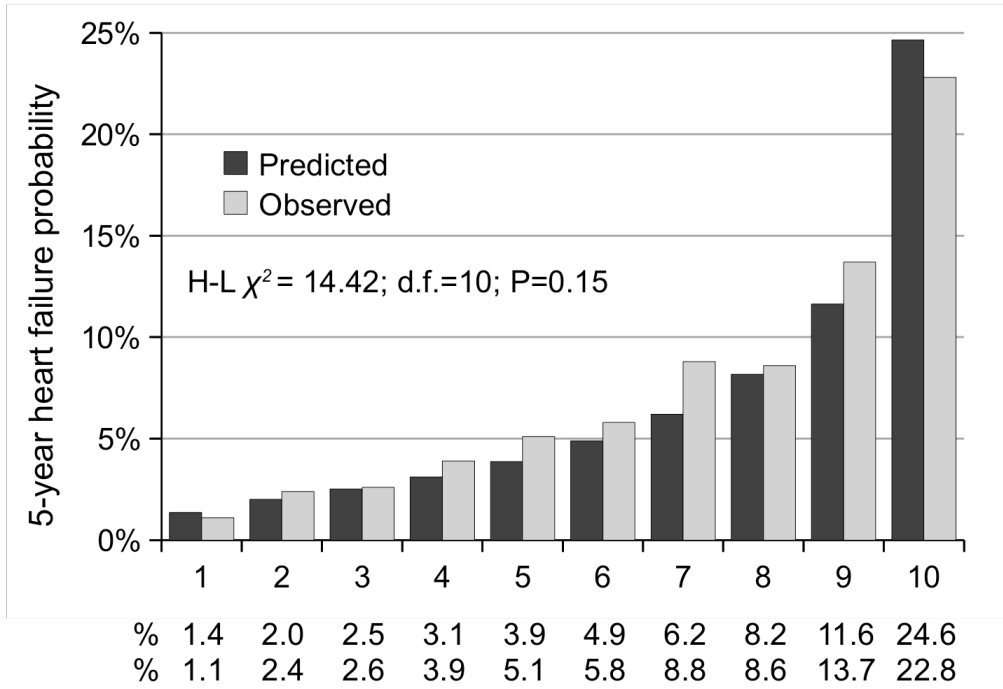
Supplemental Tables

Supplemental Table 1. Model performance summary in imputed datasets

Imputation	Predicted events, n (%)	Ratio*	H-L χ^2	P	C (95% CI)
#1	389.6 (6.9)	0.92	18.22	0.051	0.74 (0.72-0.76)
#2	389.1 (6.9)	0.91	17.41	0.066	0.74 (0.72-0.76)
#3	389.3 (6.9)	0.91	19.75	0.032	0.74 (0.72-0.76)
#4	390.3 (7.0)	0.92	16.94	0.076	0.74 (0.72-0.76)
#5	389.4 (6.9)	0.91	19.43	0.035	0.74 (0.72-0.76)

* Predicted to observed ratio. Number of persons at risk is 5613; number of observed 5-year events is 426; observed 5-year event incidence is 7.6%.

Supplemental Figure 1

H-L χ^2 = 14.42; d.f.=10; P=0.15

		1	2	3	4	5	6	7	8	9	10
%		1.4	2.0	2.5	3.1	3.9	4.9	6.2	8.2	11.6	24.6
%		1.1	2.4	2.6	3.9	5.1	5.8	8.8	8.6	13.7	22.8

Supplemental Figure Legends

Supplemental Figure 1. Calibration of the Health ABC HF model with death as a competing event. Upper panel: Predicted and observed 5-year heart failure probabilities across deciles of predicted risk. The numbers below each decile represent predicted (first row) and observed (second row) 5-year probabilities for each decile. Lower panel: smoothed plot of observed against predicted probabilities; the dashed 45º line represents optimal calibration.

Supplemental References

1.   Kramer AA, Zimmerman JE. Assessing the calibration of mortality benchmarks in critical care: The Hosmer-Lemeshow test revisited. *Crit Care Med.* 2007;35:2052-2056.