Prognosis in Heart Failure

Why do we need to know?

- Despite therapy, the mortality rate in patients with HF has remained unacceptably high.
  - Higher than most CV diseases – see fig)
  - Each year, people died from HF more than all cancer combine.
- HF population are inhomogeneous, variety of severity, we want to "select" right patient for right treatment.

CV disease (trial)	Death (all cause)	Mean F/U
Stage C HFrEF (PARADIG-HF NEJM 2014)	18.5 %	27 mo
ACS (PLATO NEJM 2009)	5.2 %	12 mo
Chronic AF (ARISTOTLE NEJM 2011)	3.7 %	22 mo
Stable CAD (FAME II NEJM 2012)	0.45 %	7 mo
Stable CAD + LV dysfunction (BEAUTIFUL Lancet 2008)	10.3 %	19 mo
Severe AS (suitable for Sx) (PARTNER A NEJM 2011)	25 %	12 mo

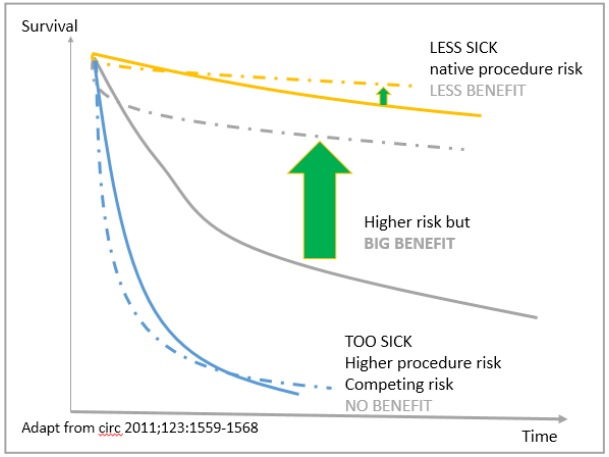
Mortality in HF

- Stage C = 10-25% mortality rate at 1 y
  ~ 50% die in 5 yrs
- Stage D = 75% mortality rate at 1 y
- Same mortality rate between HFrEF and HFpEF
- 4% in-hospital mortality for acute decompensated HF (ADHERE registry)
- Underappreciate because common mode of death is SCD (~50%)

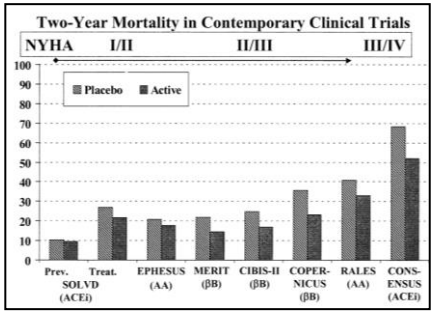
Benefit of knowing prognosis	Harm of prognosis
• Realistic expectation - Help setting goal of care - Promote open, honest communication - Benefit clinicians, patients, families • Appropriate allocation of resources - ICD (patient who is too sick will not benefit from ICD in MADIT-2 JACC 2008;51:288) - Transplant referral - Early "diagnosis" of stage D	• May not be accurate - The model is not from the same patient population - Not individualized to our patient (compliance, preference, goal) • New therapies may become available • Difficult to effectively explain • May Replace compassionate, passion clinical care • Some may treat all HF with similar treatment anyway!

Learning about predictor in HF

- Many variables have been shown to relate to outcome in HF (Eur H J 2012;33:1787)
- New markers are regularly identified.
- Learning about this may make you think about
  - Dependent vs. Independent predictor
  - Factor vs. marker
  - Surrogate marker in HF trials



Predictor of mortality in HF



- Demographic: Increased age, male, ~~race~~, low BMI
- Etiology of HF (nejm 2000;342: 1077)
  - Good prog: tachycardia induced, stress induced
  - Bad prog: HIV, infiltrative
- LVEF (each 10% reduction below 40% = HR 1.4)
- S&S
  - NYHA (functional capacity is one of the strongest predictor in any CV disease)
  - Increased JVP, S3 (nejm 2001; 345:574)
  - Low SBP, Higher HR (BEUATIFUL lancet 2010)
  - Clinical profile (wet cold)
- Comorbidity: DM, CKD, AF, breathing/sleep disorder, anemia, depression, COPD
- On appropriate treatment
  - Not able to on BB, ACEI, or aldo block
  - High dose diuretics
- Routine lab: ↓Na, ↑BUN, ↑Cr, ↓ CrCl, ↓ eGFR, ↓albumin, ↑LFT, ↑bil, ↑Uric, ↓Hb, ↓WBC, ↓chol, etc.
- ECG: QRS duration, LBBB, LVH, PVC, HR variability
- Imaging: LV size, vol, mass, LA size, diastolic dysfunction, RV dysfunction (PAS, TR), etc.
- Hemodynamics: ↓CI, ↑PCWP, see ESCAPE model
- Biomarker: BNP, troponin, renin activity, angiotensin II, aldosterone, catecholamines, endothelin-1, adrenomedullin, vasopressin, cytokines, IL-6, CRP, TNF-α, sST-2, Galectin-3, etc
- peakVO2 – cardiopulmonary exercise test – regard as one of the parameter use for HTx
  -If < 12-14 ml/kg/min = poor prognosis (circ 1991;83:778, circ. 2005;111:2313)

Multivariate prediction models

- Validated multivariable risk scores can be useful to estimate risk of mortality (class IIa-LoE B)
- HFSS - Heart Failure Survival Score (circ 1997;95:2660)
  - 7 factors: Ischemic etiology, EF, MAP, HR, QRS width, Na, peak VO2
  - Invasive HFSS + PCWP
- SHFM - Seattle Heart Failure Model (circ 2006;113(11):1424)
  - Many clinical variables but not include VO2
  - www.SeattleHeartFailureModel.org
- Models for Acute HF: ESCAPE, EFFECT, ADHERE

Consider refer to transplant center if (J Card Fail. 2006:12(1): 47-53.)

- ≥ 2 HF hospitalization in 1 year
- Inability to walk 1 block. Dyspnea with taking a shower, getting dress. NYHA III
- Intolerant or refectory to ACEi/ARB or, BB
- High dose of diuretic (>120 mg of furosemide/d)
- Na < 136, BUN > 40, Cr > 1.8
- CRT nonresponsive

Further reading

- Ketchum ES, Levy WC. Establishing Prognosis in Heart Failure. Prog Cardiovasc Dis 2011;54:86.
- Multivariate Risk Scores and Patient Outcomes in Advanced HF. Congest HF.2011;17:205.
- Delivering the Cumulative Benefits of Triple Rx to Improve Outcomes in HF. jacc 2003;7:1234.