



[Print](#) :: [Close](#)

## FAST FACTS AND CONCEPTS #143

**Author(s):** Gary M Reisfield MD and George R Wilson MD

**Background** This Fast Fact reviews prognostication data in Heart Failure (HF). Although the Framingham Heart Study (1990-1999) showed a 5-year mortality rate of 50% for newly identified cases, providing accurate prognostic data for 6-12 month mortality in HF has been nearly impossible. Reasons cited include: 1) an unpredictable disease trajectory with high incidence (25-50%) of sudden death; 2) disparities in the application of evidence-based treatment guidelines; 3) inter-observer differences in New York Heart Association (NYHA) classification; and 4) heterogeneous study populations in the HF literature.

**NYHA Classification** The NYHA classification remains the major gauge of disease severity. Based on data from SUPPORT, Framingham, IMPROVEMENT, and other studies, 1-year mortality estimates are as follows:

- Class II (mild symptoms): 5-10%.
- Class III (moderate symptoms): 10-15%.
- Class IV (severe symptoms): 30-40%.

**General Predictors of Shorter Prognosis** The following indicators have been independently associated with a limited prognosis in HF:

- Recent cardiac hospitalization (triples 1-year mortality).
- Elevated BUN (defined by upper limit of normal) and/or creatinine  $\geq 1.4$  mg/dl (120  $\mu$ mol/l).
- Systolic blood pressure  $< 100$  mm Hg and/or pulse  $> 100$  bpm (each doubles 1-year mortality).
- Decreased left ventricular ejection fraction (linearly correlated with survival at LVEF  $\leq 45\%$ ).
- Ventricular dysrhythmias, treatment resistant.
- Anemia (each 1 g/dl reduction in hemoglobin is associated with a 16% increase in mortality).
- Hyponatremia (serum sodium  $\leq 135$ -137 mEq/l).
- Cachexia.
- Reduced functional capacity.
- Co-morbidities: diabetes, depression, COPD, cirrhosis, cerebrovascular disease, cancer, and HIV-associated cardiomyopathy.

**Hospice Eligibility Guidelines** The National Hospice and Palliative Care Organization's 1996 guidelines for heart disease admission criteria include: a) symptoms of recurrent HF at rest (NYHA class IV) and b) optimal treatment with ACE inhibitors, diuretics, and vasodilators (*contemporary optimal treatment now includes  $\beta$ -blockers, aldosterone antagonists, and device therapies*). The NHPCO guide indicates that an ejection fraction  $< 20\%$  is "helpful supplemental objective evidence," but not required. The NHPCO guidelines also assert that each of the following further decreases survival: treatment resistant ventricular or supraventricular arrhythmias, history of cardiac arrest in any setting, history of unexplained syncope, cardiogenic brain embolism, and concomitant HIV disease.

**Prognostic Models** Since publication of the NHPCO's guidelines, several models have been developed for predicting short- and/or long-term mortality among HF patients. Two recent models purport to predict mortality among patients *hospitalized with acutely decompensated HF*. Fonarow et al (2005), using a model based on admission BUN ( $\geq 43$  mg/dl), creatinine ( $\geq 2.75$  mg/dl), and systolic BP ( $< 115$  mmHg), identified in-hospital mortality rates ranging from about 2% (0/3 risk factors) to 20% (3/3 risk factors). Lee et al (2003), using a model based on admission physiologic variables and co-morbidities (almost all from above list of indicators) identified

30-day mortality and 1-year mortality rates ranging from <1% and <10%, respectively, for the lowest risk patients to >50% and >75%, respectively, for the highest risk patients. While both models are applicable to bedside use, neither has been applied prospectively or in independent patient samples, nor do they address HF treatments as predictive variables. More recently, Levy et al (2006) developed a 24-variable risk model using the PRAISE1 (n=1125) database and validated it on preexisting ELITE2, ValHeFT, UW, RENAISSANCE, and IN-CHF (n=9942) databases. The model purports to accurately estimate mean 1-, 2-, and 3-year survival and, importantly, *dynamically* incorporates clinical and laboratory variables, HF medications, and device therapies. It awaits independent, prospective evaluation in unselected HF patients. A web-based interactive calculator can be accessed at <http://www.seattleheartfailuremodel.org>.

**Bottom Line** Meticulous application of medication and device therapies can and will continue to change HF prognosis. HF follows an unpredictable disease trajectory, one which is highly mutable by application of evidence-based therapies, yet still marked by a high incidence of sudden death. The 1996 NHPCO criteria are not accurate predictors of 6-month mortality. Several models have recently been developed to aid in determining short- and long-term mortality in HF patients. These models await independent, prospective validation in unselected ambulatory HF patients and will need periodic updating to control for continually evolving standards of HF care. At present, accurate prognostication remains problematic.

## References

1. Anand I, McMurray JJV, Whitmore J. Anemia and its relationship to clinical outcome in heart failure. *Circulation*. 2004; 110:149-154.
2. Anker SD, Ponikowski P, Varney S, et al. Wasting as an independent risk factor for mortality in chronic heart failure. *Lancet*. 1997; 349:1050-1053.
3. Curtis JP, Sokol SI, Wang Y, et al. The association of left ventricular ejection fraction, mortality, and cause of death in stable outpatients with heart failure. *J Am Coll Cardiol*. 2003; 42(4):736-742.
4. Fonarow GC, Adams KF, Abraham WT, et al. Risk stratification for in-hospital mortality in acutely decompensated heart failure. *JAMA*. 2005; 293(5):572-580.
5. Horwich TB, Fonarow GC, Hamilton MA, et al. Anemia is associated with worse symptoms, greater impairment in functional capacity and a significant increase in mortality in patients with advanced heart failure. *J Am Coll Cardiol*. 2002; 39(11):1780-1786.
6. Kearney MT, Fox KAA, Lee AJ. Predicting death due to progressive heart failure in patients with mild-to-moderate chronic heart failure. *J Am Coll Cardiol*. 2002; 40(10):1801-1808.
7. Lee DS, Austin PC, Rouleau JL, et al. Predicting mortality among patients hospitalized for heart failure. *JAMA*. 2003; 290(19):2581-2587.
8. Levenson JW, McCarthy EP, Lynn J, et al. The last six months of life for patients with congestive heart failure. *J Am Geriatr Soc*. 2000; 48(Suppl 5):S101-S109.
9. Levy D, Kenchaiah S, Larson MG, et al. Long-term trends in the incidence of and survival with heart failure. *NEJM*. 2002; 347(18):1397-1402.
10. Levy WC, Mozaffarian D, Linker DT, et al. The Seattle Heart Failure Model. Prediction of Survival in Heart Failure. *Circulation*. 2006; 113:1424-1433.
11. Muntwyler J, Abetel G, Gruner C, et al. One-year mortality among unselected outpatients with heart failure. *Eur Heart J*. 2002; 23:1861-1866.
12. Stuart B, et al. Medical Guidelines for determining prognosis in selected non-cancer diseases. 2nd Edition. Alexandria, VA: National Hospice Organization; 1996.
13. Zannad F, Briancon S, Julliere Y. Incidence, clinical and etiologic features, and outcomes of advanced chronic heart failure: the EPICAL study. *J Am Coll Cardiol*. 1999; 33(3):734-742.

**Fast Facts and Concepts** are edited by Drew A Rosielle MD, Palliative Care Center, Medical College of Wisconsin. For more information write to: [drosiell@mcw.edu](mailto:drosiell@mcw.edu). More information, as well as the complete set of Fast Facts, are available at EPERC: [www.eperc.mcw.edu](http://www.eperc.mcw.edu).

**Version History:** This Fast Fact was originally edited by David E Weissman MD and published in October 2005. It was updated in December 2006 to reflect the newly published 'Seattle Heart Failure Model.' Current version

re-copy-edited in April 2009.

**Copyright/Referencing Information:** Users are free to download and distribute Fast Facts for educational purposes only. Reisfield GM, Wilson GR. Prognostication in Heart Failure. Fast Facts and Concepts. October 2005; 143. Available at: [http://www.eperc.mcw.edu/fastfact/ff\\_143.htm](http://www.eperc.mcw.edu/fastfact/ff_143.htm).

**Disclaimer:** Fast Facts and Concepts provide educational information. This information is not medical advice. Health care providers should exercise their own independent clinical judgment. Some Fast Facts cite the use of a product in a dosage, for an indication, or in a manner other than that recommended in the product labeling. Accordingly, the official prescribing information should be consulted before any such product is used.

**ACGME Competencies:** Medical Knowledge, Patient Care

**Keyword(s):** Prognosis

© 2008 Medical College of Wisconsin

---

**Medical College of Wisconsin**

8701 Watertown Plank Road, Milwaukee, WI 53226

[www.mcw.edu](http://www.mcw.edu) | 414.456.8296

[Print](#) :: [Close](#)