

The Heart Failure Epidemic: Strategies to Improve Outcomes and Prevent Re-Hospitalization

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Advanced Heart Failure, Transplant, and Mechanical Circulatory Support

Disclosure: none pertinent to this talk

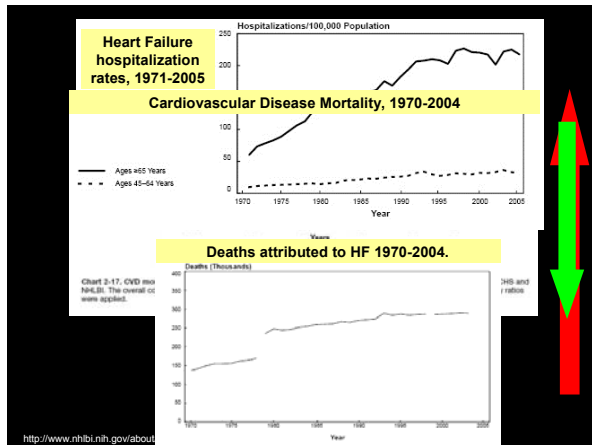


Heart Failure Statistics



- **5.8 million** Americans carried the diagnosis of heart failure in 2006

American Heart Association, Heart Disease and Stroke Statistics – 2010 Update, Dallas, Texas: American Heart Association, 2010. ©2010, American Heart Association.



Means of Reducing Heart Failure Admissions

- Identify the high risk patient
- Implementation of evidence based pharmacologic and nonpharmacologic therapies in the inpatient and outpatient setting
- Patient education
- Labs, gadgets and gizmos used for monitoring
- Consider multi-institutional care through referral to Advanced HF/Transplant Center.

Patient HF Mortality Risk Assessment

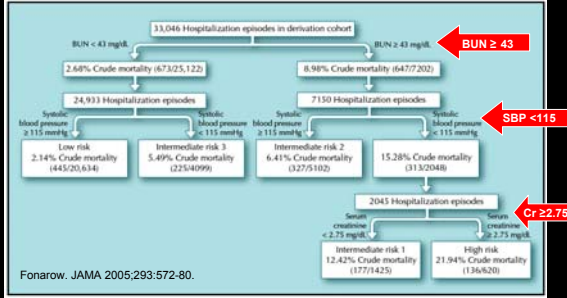
- Target outpatient resources to high risk HF patients
- Inpatient Mortality:
 - ADHERE risk score (JAMA 2005;293:572)
- Outpatient Mortality:
 - Seattle Heart Failure Model (Circulation 2006;113:1424)

“All models are wrong, some are useful”
-George Box

- Not meant to supplant clinical judgment
- Can be used to assist in risk stratification.
- Can also be used for serial patient (re)assessment to examine the slope an individual's HF decline.
- Can be used to educate patients on their risk of adverse outcome

ADHERE Registry: Inpatient Mortality

Evaluated over 39 clinical predictors of HF death 2001-03. Mean age 73 years and >40% had an EF >40%.



Inpatient HF Risk Studies

Author	n	Markers	1 year surv (%)
Chin	257	BP < 100, DM, non sinus rhythm	N/A
Alla	301	HR > 100, Na < 134, Creat > 2.0, Age > 70, prior hosp	57.6
Cowie	220	Age, crackles, low BP, high Creat	62
Jong	38,702	Male, age, malig, renal, dementia, cerebrovasc, rheum, periph vasc or pulm dis, ischemic etiology, DM	66.9
Bouvy	152	DM, high Creat, NYHA III/IV, low BMI, low BP, edema	N/A
Lee	4031	Age, low BP, high RR, high BUN, low Na	69.5
Kittleson	259	No ACE, low BP, low Na, high Creat	N/A
Felker	949	Age, low BP, NYHA IV, high BUN, low Na	N/A
Fonarow	37,772	BUN > 43, SBP < 115, Creat > 2.75	N/A
Rector	769	Age, low BP, low Hgb, low Na, high BUN	50% (high risk)
Rohde	779	Cancer, SBP < 124, Creat > 1.4, BUN > 37, Na < 136, age > 70	N/A

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Seattle Heart Failure Model Outpatient Risk Assessment

- Derivation of the SHFM:
 - demographic, lab and clinical data of 1125 patients enrolled into the PRAISE (EF < 30%, NYHA III-IV) study
 - hazard ratios for certain meds and devices obtained from previously published literature.
- Validated in 5 different cohorts of patients enrolled into other trials.

<http://depts.washington.edu/shfm/>

Levy et al. Circulation. 2006;113:1424-33.

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Outpatient Risk Studies

Author	n=	Markers
Mahon	585	Low CrCl, 6 MW < 262 m, low EF, recent hosp., diuretic
Eshaghian	1354	Low EF, low Na, low Hgb, high BUN, high Cr, diuretic dose
Greenberg	4280	NYHA III/IV, HF hosp, angina
Levy	1125	Diuretic dose, low BP, % lymph, Hgb < 16, ischemic etiol, EF, low chol, high uric acid/allopurinol, Na <138, NYHA, age, male sex
Teuteberg	160	High BUN, high Cr, low Na, low Hct, recent hosp, no ACE/BB
Aaronson	268	Heart rate, MAP, pVO ₂ , EF, low Na, QRS >120, ISCM

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In Summary:

- Predictors of **poor outcome** in advanced heart failure:
 - Important labs abnormalities:
 - Low Na, high BUN or Cr, high BNP
 - Others: Uric acid, anemia, transaminitis
 - Recurrent hospitalizations
 - Inability to tolerate **β-blocker**, ace-inhibitor/ARB therapies due to decompensation or symptomatic hypotension.
 - High risk cardiopulmonary stress testing: Low pVO₂ or high slope Ve/VCO₂

Implement and Titrate Evidence Based Therapy

- **LV Systolic Dysfunction:**
 - B-blockers (carvedilol, metoprolol succinate, bisoprolol) (**ACC/AHA class I, level A**)
 - Ace-inhibitor /ARB (**class I, level A**)
 - Aldosterone antagonists (class I, level B)
 - Hydralazine+nitrates in African Americans on OMM (**Class I, level B**) or those unable to tolerate higher ace/ARB doses (**Class IIa, level B**)
 - ICD +/- BiV support per CMS guidelines

ACC/AHA Heart Failure Guidelines. Circulation 2009;119:1977

Implement and Titrate Evidence Based Therapy

- **LV Diastolic Dysfunction (HF with preserved systolic function- HFPSF):** ?????
 - Treat potential causes
- **Address other risks:** hypertension, diabetes, dysrhythmias, substance abuse

Patient Education

- Diet- sodium and fluid restriction (**ACC/AHA class I, level C**)
- Medications:
 - What are they for?
 - Meds to avoid (motrin, some cold meds, Ca blockers, oral steroids; **class I, level B**)
 - Daily weight monitoring with diuretic sliding scale recommendations
 - "3 pounds in one day or 5 pounds in one week"
- When to call for assistance

Tools to help reduce admissions

- Telemanagement programs
 - Improve compliance, reduce hospital admissions, reduces cost. In general, do not reduce mortality^{1,2}
- BNP guided monitoring and therapy titration may reduce combined endpoint of hospitalization and death
 - **not meant to guide diuretics!!**



1. Int. J of Cardiology 2009;132:192. 2. Eur J Heart Fail 2003;5:583
3. J Am Coll Cardiol 2007;50:2097

Tools to help reduce admissions

- Fluid monitoring:
 - Impedance monitoring:
 - Know limitations: may not be accurate earlier after implant or sternotomy, pneumonia
 - Should prompt changes in diet and evidence based medications (not diuretics)



Impedance Monitoring

- **FAST** (Fluid Accumulation Status Trial): 115 patients with HF (85% NYHA Class II or III) for 18 months with impedance monitoring and weight monitoring
 - “fluid index threshold” via Optivol
 - 3 pds in 1 day or 5 pds in 3 days
- 417 fluid index crossing in 116 patients
- 890 changes in weight in 94 patients

1. Heart Failure Society of America 2009 Scientific Meeting; September 14, 2009; Boston, MA. Late Breaking Clinical Trials I.

FAST Trial

- N=65 heart failure events in 31 patients
 - 48 predicted by Optivol (76% sensitivity)
 - 13 predicted by weight monitoring (22% sensitivity)
 - 40 predicted by Optivol that were NOT predicted by weight monitoring
- 88% of impedance crossings were **not** associated with an event so we must be cautious with the “diuretic reflex” and add device information to other clinical data!!

PA monitors

- CardioMEMS Heart Sensor Allows Monitoring of Pressure to Improve Outcomes in NYHA Class III Patients (CHAMPION trial)
 - N=550 patients with NYHA class III heart failure and one admit in past 12 months usual care vs PA monitorin
 - Average followup of 15.5 months
 - Reduced HF hospitalizations by 30% at 6 months and 38% at 1 year²
 - Improved QOL

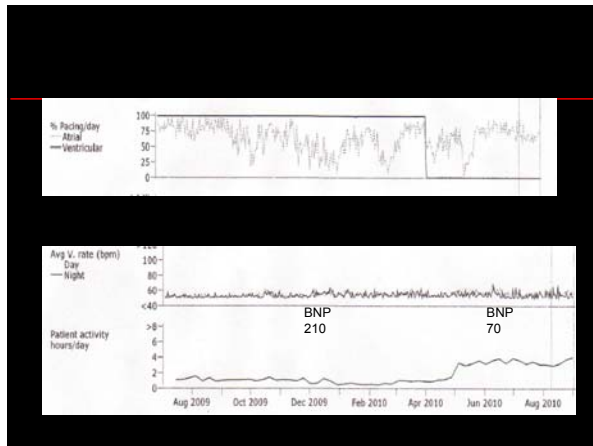


Heart Failure Congress 2010, European Society of Cardiology

COMPASS-HF- Chronical Implantable device in RVOT

- NYHA Class III-IV on OMM randomized to usual care (n=140) vs PA monitoring (n=134)
- N=176 HF events (86% were hospitalizations)
 - Chronical: n=70 Control: n=89
 - Chronical lead to a 22% reduction (RR 0.79) in events (p=0.27) and a 21% reduction in HF hospitalizations (p=0.029)
 - Greatest benefit in NYHA IIIII

J. Am Coll Cardiol 2008;51:1073



Multidisciplinary Care: Team Approach

- Referral to an advanced heart failure program is a **class I** indication with improvements demonstrated in HF outcomes
- Team approach (locally and with consulting advanced HF physicians) will likely lead to the best patient outcomes
 - Inter-practitioner communication is key!!

Discussion