

HEART FAILURE IN OBS

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NO RELEVANT DISCLOSURES



IRRELEVANT DISCLOSURES

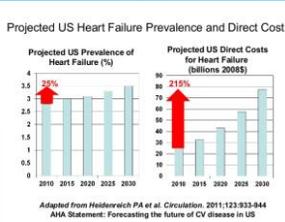
- ▶ 52 y.o. female with HTN, DM and CHF presents with DIB. She states she ran out of her medications 1 week ago.
- ▶ BP 172/90, HR 88, SaO2 98% RA
- ▶ PT appears slightly uncomfortable, + JVD, pulmonary Rales; 2+ LE edema
- ▶ PT presents to your ED frequently and has multiple admissions.
- ▶ Are there other options?

CASE

- ▶ Why Heart failure is a good idea for obs
- ▶ High-yield topics on patient selection
- ▶ Pitfalls in protocol design

OBJECTIVES

Projected US Heart Failure Prevalence and Direct Cost



- ▶ ED responsible for > 50% of AHF visits
- ▶ >80% of ED visits result in admission
- ▶ Hospitals penalized for readmits

WHY HEART FAILURE

Adapted from Heffner et al. Circulation. 2011;123:933-944
AMA Statement: Forecasting the future of CV disease in US

- ▶ Frequent hospitalizations
 - ▶ 83% hospitalized once
 - ▶ 43% hospitalized >4 times
 - ▶ 1/5 re-hospitalized in 30 days
- ▶ High mortality
 - ▶ 20% at 1 year
 - ▶ 50% at 5 years
 - Roger et al Circulation 2011
- ▶ Spectrum of disease
 - ▶ Hypertensive heart to transplant candidate

HEART FAILURE IS CHALLENGING

ED EVALUATION

- ▶ Identify precipitants
- ▶ Rule out co-morbid conditions
 - ▶ Pneumonia
 - ▶ Ischemia
- ▶ Begin Treatment
 - ▶ Diuresis
 - ▶ Afterload reduction

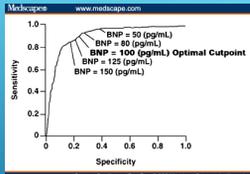
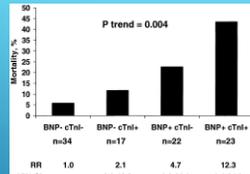


ED EVALUATION

- ▶ EKG
- ▶ CXR
- ▶ BNP
- ▶ Troponin
- ▶ CBC/Chem panel
- ▶ Bedside US

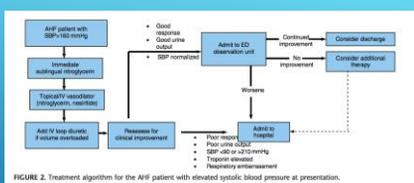


ED DIAGNOSTICS

Test Combination	n	RR	95% CI
BNP+ cTnl-	34	1.0	-
BNP+ cTnl+	17	2.1	0.3-16.6
BNP- cTnl-	22	4.7	0.8-26.9
BNP+ cTnl+	23	12.3	2.4-64.0

BNP AND TROPONIN



THERAPEUTICS

Kirk et al. Crit Pathw Cardiol 2008

IV loop diuretic

Reasons for vital improvement

- Purled response
- Elevated SBP

ACE IV vasodilator (if hypotensive, treat HF)

- Good response
- Good urine output
- Good vital function
- Normal SBP
- Troponin negative

ACE II (if not hypotensive)

- Poor response
- Poor urine output
- Poor vital function
- Elevated troponin
- Low SBP (<math>< 90</math> mmHg)
- Troponin negative

Admit to hospital

Consider medical therapy

Admit to hospital

Consider medical therapy

FIGURE 3. Treatment algorithm for the HF patient with normal systolic blood pressure at presentation.

Kirk et al. Crit Pathw Cardiol 2008

THERAPEUTICS

- IV loop diuretic dose = 1-2 x daily dose
- Avoid morphine

- ▶ History of CHF with dyspnea does not equal Acute HF
- ▶ Is CHF primary or secondary?
- ▶ Address Blood Pressure
- ▶ What is patient's EF?
- ▶ What is patient's volume status?

PITFALLS IN ED MANAGEMENT

DISPOSITION

- ▶ Diercks DB, Peacock WF, Kirk JD et al. ED patients with heart failure; identification of an observational unit-appropriate cohort. Am J Emerg Med **2006**
- ▶ Lee DS, Sittl A, Austin PC, et al. Prediction of heart failure mortality in emergent care: a cohort study. Ann Intern Med **2012**
- ▶ Stiell IG, Clement CM, Binson RJ et al. A risk scoring system to identify emergency department patients with heart failure at high risk for serious adverse events. Acad Emerg Med. **2013**
- ▶ Collins SP, Jenkins CA, Harrell FE et al. Identification of emergency department patients with acute heart failure at low risk for 30-day adverse events: the STRATIFY decision tool. JACC Heart Fail. **2015**

HF RISK SCORES

ORIGINAL CONTRIBUTION

GME Prospective and Explicit Clinical Validation of the Ottawa Heart Failure Risk Scale, With and Without Use of Quantitative NT-proBNP

Jan G. Swell, MD, MSc, Jeffrey J. Perry, MD, MSc, Catherine M. Clement, RN, Robert J. Braun, MD, MFR, Brian H. Rowe, MD, MSc, Shannon D. Aaron, MD, Andrew D. McRae, MD, PhD, Brijag Bongartz, MD, PhD, Lisa A. Calder, MD, MSc, Alan J. Forster, MD, MSc, and George A. Wells, MSc, PhD

- Prospective cohort
- 6 hospitals
- 30 day Serious Adverse Events
- 1100 patients
- 77.7 years old

Item	Points	Heart Failure Risk Categories for Serious Adverse Events within 30 days		
		Total Score	Risk	Incidence
1. Initial Assessment				
a) History of stroke or TIA	(1)	0	2.0%	Low
b) History of intubation for respiratory distress	(2)	1	3.1%	Medium
c) Heart rate on ED arrival ≥ 110	(2)	2	8.2%	Medium
d) Recent Atrial Fibril. $> 90\%$ on ECG or ED arrival	(1)	3	16.3%	High
2. Investigations				
a) ECG has acute ischemic changes	(2)	4	18.5%	High
b) Urine ≥ 25 mmol/L	(1)	5	26.7%	High
c) Serum $CO_2 \geq 35$ mmol/L	(2)	6	30.7%	High
d) Troponin I or T elevated to 99 level	(2)	7	38.8%	Very High
e) NT-proBNP $\geq 5,000$ ng/L	(1)	8	40.2%	Very High
3. With heart failure ED treatment				
a) $SaO_2 < 90\%$ on room air or nasal O_2 or $HR \geq 110$ during treatment with loop or beta-BL drugs	(1)	9	48.8%	Very High
		10	58.0%	Very High
Total Score (0-10)				

Figure 1. Ottawa Heart Failure Risk Scale (OHFRS) to identify ED patients with acute heart failure at high risk for serious adverse events. ECG = electrocardiogram; HF = hospital-acquired heart failure; OHFRS = Ottawa Heart Failure Risk Scale; TA = transient atrial fibrillation.

Results

- SAEs in 170 (15.4% of patients)
- 19.4% of admits
- 10.2% of discharges
- Admission threshold of OHFRS > 1 increases sensitivity and admissions
 - 71.8% vs 91.8%
 - 57.2% vs 77.4%
- NT-proBNP use improved both

OTTAWA HF RISK SCORE

HF SCORE LIMITATIONS

- ▶ Role of observation units?
- ▶ Score cumbersome
- ▶ Physician discomfort with use in 11.9% of cases

PATIENT SELECTION

Table III. Criteria to identify AHF patients for observation stay

Recommended

- Stable hemodynamic and respiratory status
- SBP > 110 mm Hg on presentation
- BUN < 40 mg/dL
- Creatinine < 3.0 mg/dL
- Absence of ischemic ECG changes and/or elevated cardiac troponin levels
- Pre-existing heart failure
- No intravenous vasoactive infusions being actively titrated
- No significant comorbidities requiring acute interventions
- Respiratory rate (<32 breaths/min) and not requiring non-invasive ventilation at the time of OU entry
- No signs of poor perfusion
- At least partial response to initial therapy with increased urine output and/or improvement in vital signs

Consider

- SBP > 120 mm Hg
- Adequate social support
- Adequate follow-up
- BNP < 1000 pg/mL or NTBNP < 5000 pg/mL

Acute Cardiac Care, 2009; 11: 13-20

HEART FAILURE

TRANSFER CRITERIA

- Previous history of CHF
- Acceptable VS: SBP > 100, RR < 32, HR < 130
- Pulse-ox > 95 on room air after initial treatment, correctable to > 92 on Oxygen by NC
- High likelihood of correction to baseline status within 24 hours with good home support
- No acute co-morbidities

EXCLUSION CRITERIA

- New onset CHF
- Acute cardiac ischemia (ECG changes, positive troponin, ongoing ischemic chest pain, unstable angina) or new arrhythmias
- Unstable VS after treatment (HR > 130, SBP < 85 or > 180, RR > 32, Pox < 92 on O2 by NC)
- Acute (or more subtle) - sepsis, pneumonia, new murmur, confusion
- Abnormal labs to consider (not strict exclusion) - Severe anemia (Hb < 8), renal failure (BUN > 40 or Cr > 3), Na < 135, BNP > 1,000
- Patient requiring vasoactive drips, invasive or noninvasive ventilation (BiPAP)
- Evidence of poor perfusion (confusion, cool extremity, weakness, N/V)
- Patients requiring provocative stress tests

INCLUSION/EXCLUSION

- ▶ Inclusion
 - ▶ "Off meds with volume overload"
- ▶ Exclusion
 - ▶ New-onset HF
 - ▶ Signs of poor perfusion
 - ▶ Ischemia/arrhythmia on EKG
 - ▶ Elevated troponin
 - ▶ AKI

GRAY AREAS

- ▶ New - onset HF
- ▶ Chronically elevated troponin
- ▶ Chronic kidney disease
- ▶ BNP cut-offs



RETURN TO CASE

- ▶ BNP 500
- ▶ Troponin < 0.04
- ▶ Review of patients chart shows multiple 1 day admissions for HF
- ▶ BP has improved to 160/85. She has diuresed 500cc

EDOU PATIENT MANAGEMENT

POTENTIAL INTERVENTION

- Cardiac monitoring, strict intake/output, vital signs Q4hr, weight on arrival
- Oxygen per respiratory guidelines with pulse oximetry (continuous)
- Serial EKGs, and cardiac markers (Tnl) - 3 and 6hrs from 1st lab draw.
- Repeat electrolytes q6 hours and pm
- Medication as indicated – IV diuretics (2X home dose), nitroglycerine paste, ASA
- Echocardiography (if not done within 30d) and cardiology consultation - as indicated
- CHF, smoking cessation, and low salt diet education

EMORY/GRADY PROTOCOL

- ▶ Over/undermedication
- ▶ Echo: from 2013 ACC/AHA Guideline for the management of Heart Failure
 - ▶ Class I
 - A 2-dimensional echocardiogram with Doppler should be performed during initial evaluation of patients presenting with HF to assess ventricular function, size, wall thickness, wall motion, and valve function. (Level of Evidence: C)
 - Repeat measurement of EF and measurement of the severity of structural remodeling are useful to provide information in patients with HF who have had a significant change in clinical status; who have experienced or recovered from a clinical event; or who have received treatment including GDMT. But might have had a significant effect on cardiac function; or who may be candidates for device therapy. (Level of Evidence: C)
 - ▶ Class II: No Benefit
 - Routine repeat measurement of LV function assessment in the absence of clinical status change or treatment interventions should not be performed (Level of Evidence: B)
- ▶ Education

MANAGEMENT CONSIDERATIONS

DISPOSITION

DISPOSITION

Home

- Subjective improvement – no chest pain, orthopnea, or exertional dyspnea above baseline
- Acceptable VS (O2 sat at baseline or >94%, RR <20HR¹⁰⁰, SBP >100 or baseline.)
- Negative serial ECGs and cardiac markers, good electrolytes, acceptable echo if done
- Evidence of adequate diuresis – 1L urine, decrease in weight, decrease in JVD
- CHF discharge checklist (ACEI, B-blocker, HF diet smoking education, close followup)

Hospital

- New ischemic EKG changes, arrhythmia, cardiac markers, or evidence of cardiac ischemia
- Persistent hypoxia, rales, dyspnea
- Poor response to therapy - Failure to improve subjectively
- Poor home support

Physician judgment

EMORY/GRADY PROTOCOL

- ▶ Subjective: how is the patient feeling?
- ▶ Objective
 - ▶ Urine output
 - ▶ Electrolytes
 - ▶ Diagnostic testing
 - ▶ Trial of ambulation

DISPOSITION CONSIDERATIONS

- ▶ The next morning, she is feeling better.
- ▶ She ambulates without difficulty
- ▶ HF team has seen her and provided education
- ▶ She is discharged

CASE RESOLUTION

- ▶ M.A. Ross, J.M. Hockenberry, R. Mutter, et al. **Protocol-driven emergency department observation units offer savings, shorter stays, and reduced admissions** Health Aff (Millwood), 32 (2013), pp. 2149-2156
- ▶ S.P. Collins, P.S. Pang, G.C. Fonarow, et al. **Is hospital admission for heart failure really necessary?: the role of the emergency department and observation unit in preventing hospitalization and rehospitalization** J Am Coll Cardiol, 61 (2013), pp. 121-126
- ▶ P.S. Pang, R. Jasse, S.P. Collins, et al. **Patients with acute heart failure in the emergency department: do they all need to be admitted?** J Card Fail, 18 (2012), pp. 900-903
- ▶ W.F. Peacock, J. Young, S. Collins, et al. **Heart failure observation units: optimizing care** Ann Emerg Med, 47 (2006), pp. 22-33
- ▶ J. Schragger, M. Wheatley, V. Georgiopoulou, et al. **Favorable bed utilization and readmission rates for emergency department observation unit heart failure patients** Acad Emerg Med, 20 (2013), pp. 554-561
- ▶ A.B. Starow, S.P. Collins, M.S. Lyons, et al. **Emergency department observation of heart failure: preliminary analysis of safety and cost** Congest Heart Fail, 11 (2005), pp. 46-72

HF OBS PERFORMANCE

- ▶ Low-risk HF patients are appropriate for EDOUs
- ▶ ED phase of care focus on ruling out other conditions and beginning treatment
- ▶ EDOU treatment centers around monitoring and therapeutics
- ▶ Further research needed to refine EDOU inclusion, discharge criteria and patient outcomes

CONCLUSIONS