Acute and Chronic Heart Failure Management

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Description

- Heart failure is a progressive disease which is associated with high mortality, the goal of therapy is to stabilize cardiac function in an effort to manage symptoms and improve quality of life.

- During this presentation we will discuss evidence based guidelines for managing heart failure with reduced and preserve d ejection fraction and analyze case scenarios during acute and chronic episodes.

Objectives

- Describe five significant signs, symptoms or exam findings in a patient with acute heart failure.
- Discuss three evidence based diagnostic tests used in managing heart failure.
- Analyze heart failure case scenarios to determine if the patient is acute, chronic or acute on chronic.
- Apply knowledge of evidence based pharmacologic therapy for heart failure to both acute and chronic situations.

Definitions of Heart Failure

- HF is a syndrome caused by cardiac dysfunction.
- Myocardial remodeling often precedes the clinical syndrome of HF.
- HF is progressive and often fatal
- Patients can be stabilized and myocardial dysfunction may improve either spontaneously or as a consequence of therapy
- Clinical symptoms may vary substantially during the course of the disease process and may not correlate with changes in underlying cardiac function.

- Lindefeld, J., et al. Adapted from the Journal of Cardiac Failure Vol. 16 No. 6 2010

Definitions

- HFrEF (Systolic HF)
  - EF< 40%
    - Most treatments are directed toward this type of HF.

Failure in emptying

- HFpEF (Diastolic HF)
  - EF≥50%
    - Diagnosis of exclusion
  - Mid Range 41 to 49%
    - Outcomes similar to HFpEF
  - Improved > 40%
    - Prior low EF with recovery which is different than those with preserved or reduced EF.

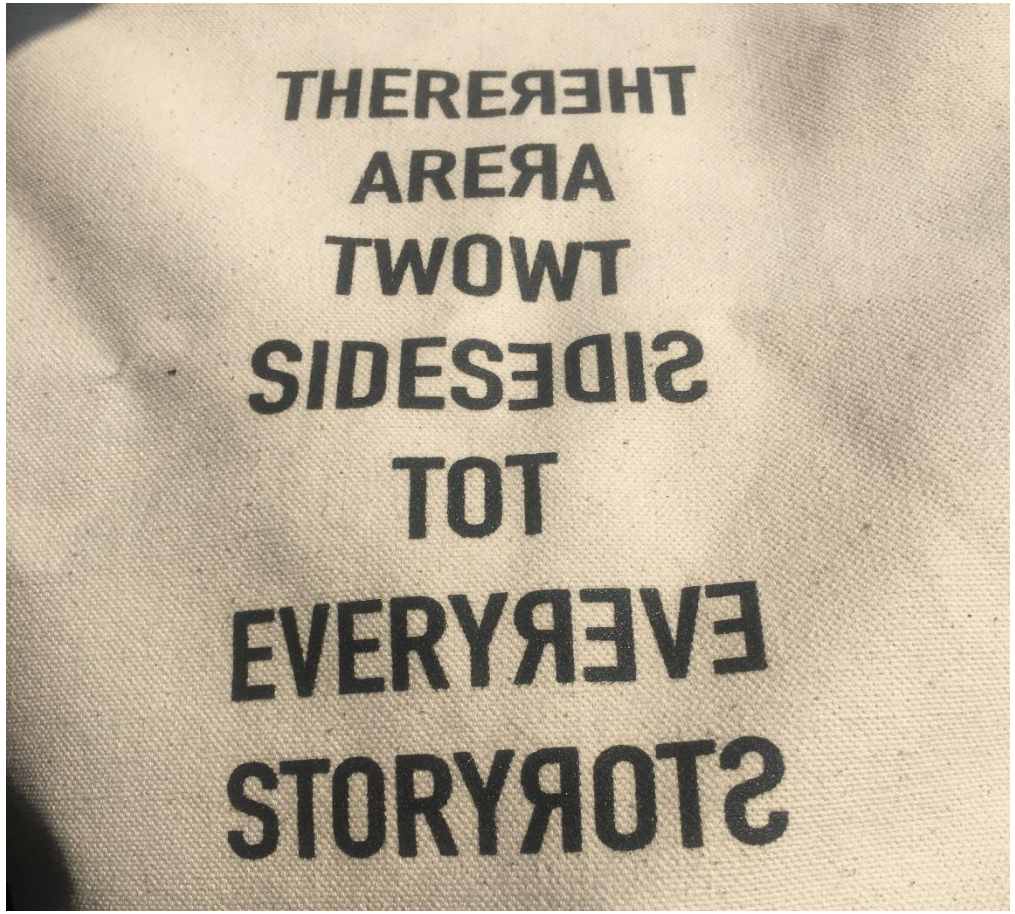
Failure in filling

What you may not know?

- Acute symptoms- redistribution of blood volume vs. overload.
  - Splanchnic system holds 20-50% blood volume. (venous)
  - In acute event there is dysregulation which shifts venous volume into pulmonary and cardiac bed.
  - May be a results of neurohormonal activation of cardiac and hepatorenal systems.
- What does this mean for you? Increase in extravascular edema

Murphy, N., shanks, M. and Alderman, P. Management of Heart Failure With Outpatient Technology. 2019. *The Journal for Nurse Practitioners 15*(1): 12-18.

Acute and Chronic Exacerbations



Photos: Personal Bowers with approval

Triage tool

Evidence for Congestion

Orthopnea
Elevated JVD
+S3
Edema
Ascites
Rales (maybe)
Hepatojugular reflux

Evidence for Low Perfusion

Cool extremities
Narrow pulse pressure
Symptomatic hypotension
Declining renal function
Confusion, somnolence

Warm and Dry	Warm and Wet
Cold and Dry	Cold and Wet

Adapted from: Nohria, A., Lewis, EF, and Stevenson, LW. *Medical Management of Advanced Heart Failure. JAMA, 2002, 287: 628-640.*

Determining Risk

Predictive of both in hospital and post discharge events

- Systolic BP- <115 mmHg
- Hyponatremia - <133 mEq/L
- Renal function- BUN >43 mg/dl strongest predictor of in hospital death
  Cr increase by >0.3 mg/dl
- Biomarkers- Increased troponin and BNP
- Residual congestion

Greenberg, G. (2012) Acute Decompensated Heart Failure: Treatments and Challenges

Acute Decompensated HF (ADHF)

- General clinical characteristics of pt. population
  - Age 75
  - Female
  - Systolic BP >140 mm Hg
  - PMH: CAD, DM, Htn, Afib, renal disease

Greenberg, G. (2012) Acute Decompensated Heart Failure: Treatments and Challenges

Clinical Identifiers for Advanced HF

Change in Labs

- Worsening kidney function
- Serum sodium <133 mEq/L
- Freq. SBP <90

Change in Signs and Symptoms

- Cardiac cachexia
- Incessant dyspnea with ADLs
- Worsening fatigue with limited activity

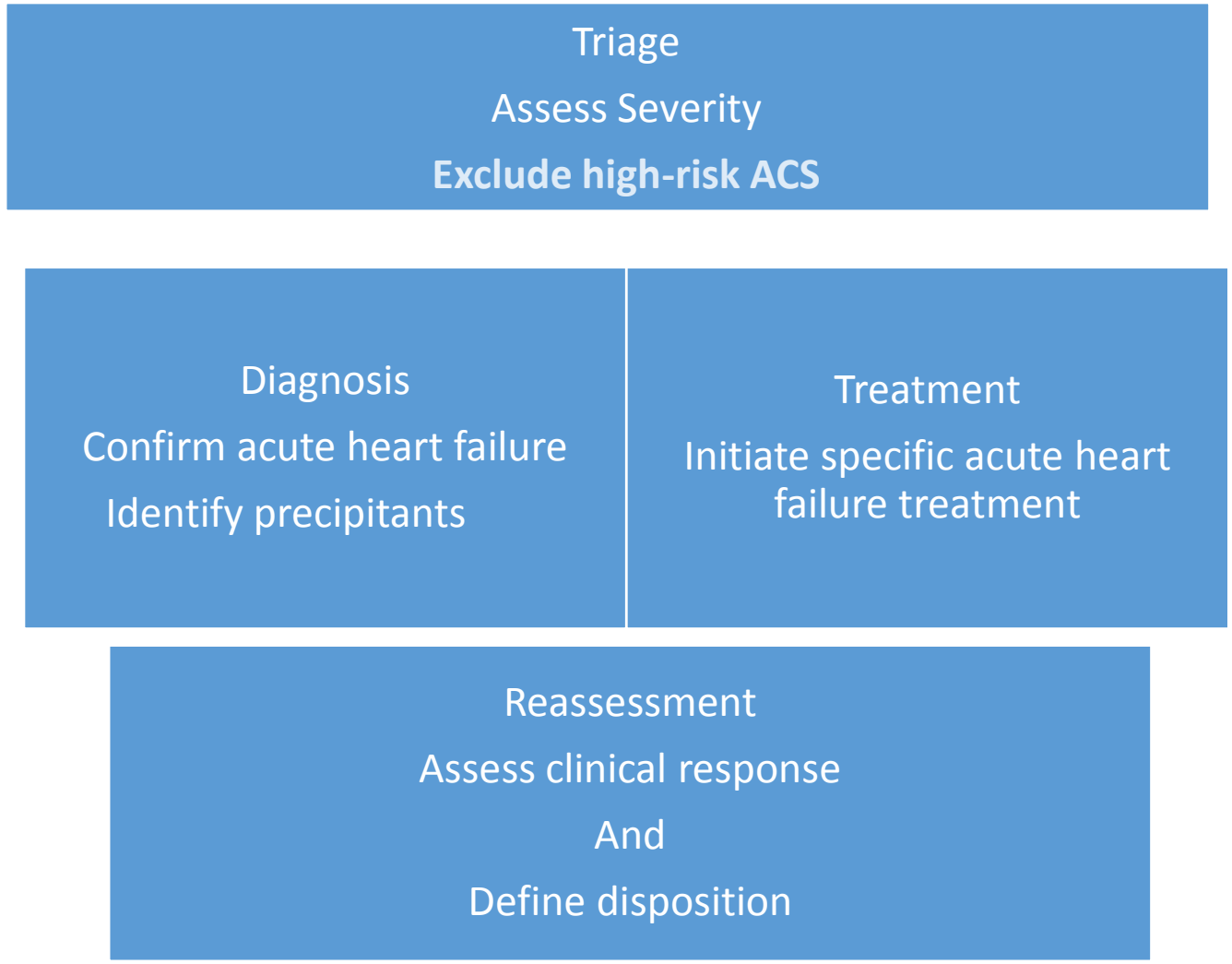
Intolerance to Meds

- Beta blockers d/t dec. BP or ADHF
- ACE-I or ARB d/t dec. BP
- Diuretic escalation without response

Change in status

- More than 2 hospitalizations or ED visits in 12 months
- Increased ICD shocks

Early Management of Acute Decompensated Heart Failure



Adapted from: European Heart Journal Supplements, Volume 18, issue suppl G, 28 December 2016, Pages G11-G18

Diagnostic evaluation of heart failure

6 minute walk test- <300 m poor prognostic indicator

EKG- rate, rhythm, conduction abnormalities, hypertrophy

Echo- ejection fraction, valve function, wall motion abnormalities, wall thickness.

Diagnostic evaluation of heart failure

Cardiac MRI- structure, function, ischemia/infarct

Level I CPX- oxygen consumption, cardia/pulmonary, both or deconditioning

Right and left heart catheterization- pressures and coronary vessel patency

21 year old female college athlete with 3 week h/o URI with cough and persistent DOE, orthopnea and fatigue.

EKG: Sinus Tachycardia without acute EKG changes

BP 106/64 HR 110 SpO2 93% RA Wt. 148 lbs. BMI 22.5

Tachycardic rate/regular rhythm. No S3 or S4. JVP elevated to angle of jaw, + hepatojugular reflux

Clear to auscultation bilaterally

Soft, nondistended, + hepatomegaly, +BS

Warm, 1+ bilateral lower extremity edema, 2+ distal pulses bilaterally

134	28	18	88
4.1	98	0.9	

No medications

NT- Pro BNP 5600 pg/ml

(Normal = Less than 125 pg/ml for age 0-74)

CXR= Cardiomegaly with diffuse infiltrates

Acute management in the hospital

- IV diuresis
  - Bolus
  - Infusion
- Diagnostics
  - Right and left heart catheterization
- BP support
  - Inotropes
  - Mechanical Circulatory Support

DOSE Trial

- Prospective double blind RCT
- Compared IV bolus vs infusion of furosemide with high dose (2.5 x oral) or low dose (equivalent to oral)
- N=308
- Outcome measures- Global assessment of symptoms and change in creatinine at 72 hrs

- ADHF- no significant difference in global assessment of symptoms or change in creatinine in any of the study arms.

Plan of Care

- Determine etiology
  - Labs and diagnostics
- Decongest
- Start ARNi/ACE-I, ARB
- Mineralocorticoid receptor antagonist
- Beta blocker when euvolemic

Evidence

- Natriuretic Peptides, Thyroid function, CMP, CBC, U/A, Iron studies
- If anemic, treatment with IV Iron to improve QOL
- Diuretics- no mortality benefit
- Mortality benefit in multiple trials
- Cardiac Rehabilitation

Iron infusions

- **Ferric Gluconate-** IV dosing 250mg in 2 hr infusion twice a day

- **HEART-FID –** Investigates the efficacy and safety of Injectafer (Ferric carboxymaltose) as treatment for heart failure with iron deficiency.

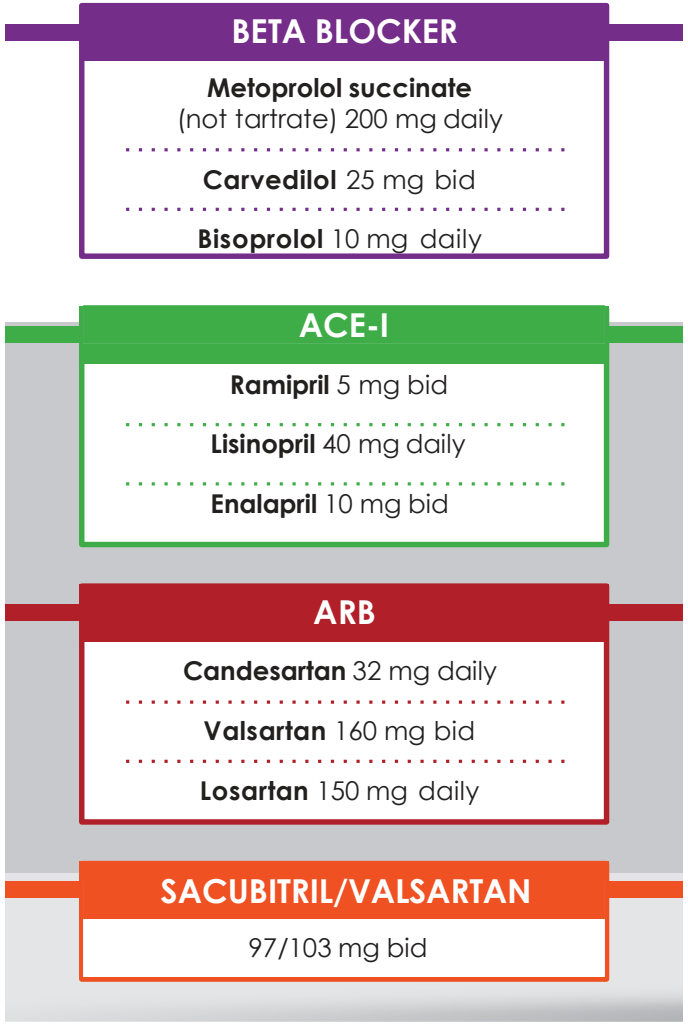
Making the Connection

1. Viral infection activates immune response. (Viral cardiomyopathy)
2. Reduced cardiac output stimulates SNS (Beta blocker)
3. Decreased contractility leads to volume retention (loop diuretics)
4. RAAS (ACE inhibitor, ARB, Neprilysin inhibitor)
5. Ventricular remodeling (MRA)

Prior to discharge

- HFrEF
  - ARNi/ACE-I/ARB initiate or titrate
  - Beta Blocker initiate or titrate
  - Mineralocorticoid receptor antagonist
  - Decongest
  - Obtain BNP level
  - Educate on symptom recognition and management
  - Schedule follow up appointment within 5-7 days

What is the target dose of evidence based drugs in these classes?

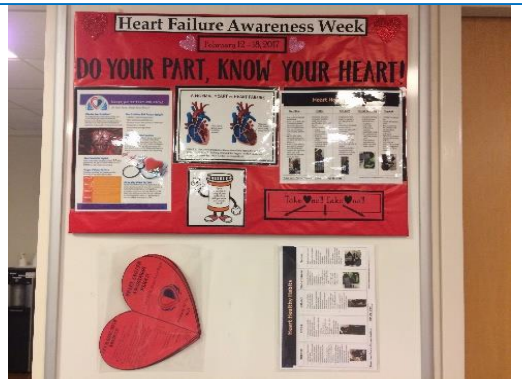


Used with Permission: Dr. Adam Devore PI CONNECT HF trial

Titration of GDMT

Used with Permission: Dr. Adam Devore
PI CONNECT HF trial

Multiple Models and Mechanism to Reduce HF Readmissions



- Community Education and Outreach
- Risk Assessment in Clinic
- Disease Management
- Case Management
- Telephonic Follow-Up
- Home Care
- Self Management Tools

- HF Triage Protocols
- Coordination with HF Clinic
- Patient Resource Manager in ER

- Transition Checklist
- Readmission Risk Assessment
- Risk-Based Mitigation Plans
- Hand-Off Key Barriers to Post-dc Caller

- Early Clinic Follow-Up
- Care Plans for Complex Patients
- Coordination with Home Health and Community Care
- Telemonitoring

Photos: Personal Bowers

Heart Center Communications Protocol

Source: DUMC, Cardiology Associates, Adult Telephone Triage Protocol. “Shortness of breath”

Semi-Urgent	Intervention/Advice
• Fever > 101 F for 48 hours or more • Difficulty taking a deep breath because of severe pain • Exposure to that which previously caused reaction • New or Increase edema in legs, arms, face, abdomen • On diuretics • History of CHF • Pink tinge frothy sputum	1. Refer to PCP for immediate appointment 2. Acute care Appointment with CAD or ED for further evaluation 3. Refer to physician extender 4. Same day appointment text page extender (970-1243)

Source: DUMC, Cardiology Associates, Adult Telephone Triage Protocol. “Edema/Swelling”

Semi-Urgent	Intervention/Advice
• Is the area warm, and/or tender • Area cold and/or bluish • Rings cutting into skin due to increased swelling • Vomiting and/or diarrhea	1. Seek medical care within 2-4 hours if history of heart failure with CAD, or PCP or Urgent Care
• Recent trauma and unexpected swelling • History of one kidney • Swelling and fever with no other symptoms • Calf of swollen leg is tender • Pain when flexing ankle	1. Seek medical care with PCP within 24 hours.
• Persistent fluid retention unresponsive to diuretics • Weight gain of 2 pounds in 24 hours with respiratory distress/DOE • Cough that is worse when lying down • Chronic breathing problem that is worsening • Ankle swelling and increased difficulty breathing while lying flat.	1. Acute care Appointment with CAD or ED for further evaluation 2. Refer to physician extender 3. Same day appointment text page extender (970-1243)

Transitions in Care: Pearls for first visit post discharge

1. Patient centered care with a focus on medication reconciliation.
2. Symptom perception
3. Physical exam
4. Symptom management
5. Precipitants to hospitalization
6. Intensifying therapy

Waters, S. and Giblin, E. Acute Heart Failure: Pearls for the First Posthospitalization Clinic Visit. 2019. *The Journal for Nurse Practitioners. 15(1*) 80-86.

68 yo male hospitalized 4 times/12mo with a h/o NICM, Htn, DM2, Renal insufficiency, S/P ICD now 2 days post discharge.

Sx: PND, Orthopnea, DOE, early satiety, lower leg and scrotal edema. EDW=? (198 lbs- 1 yr ago)

BP 110/80 HR 98 Afebrile SpO2 94% RA Wt. 228 lbs. BMI: 33

Rapid rate/regular rhythm. + S3 , no S4. JVP elevated to angle of jaw, + hepatojugular reflux

Clear to auscultation bilaterally

Ascites with + fluid wave, distended, unable to assess hepatomegaly, diminished BS

Warm, 2+ bilateral lower extremity edema, 2+ distal pulses bilaterally

Self reported scrotal edema

135	30	10	103
4.0	98	1.0	

NT Pro BNP 20,000

Lisinopril 40mg po daily
Furosemide 60 mg (2) po twice daily
Amlodipine 10 mg po daily
Carvedilol 25 mg every 12 hours
Lantus insulin 10 units at bedtime
Simvastatin 20 mg po bedtime
Spironolactone 12.5 mg po daily
Digoxin 0.125mg po daily

Most recent Echo: EF 25% with Grade II diastolic dysfunction, Mod MR, no focal WMA

EKG; NSR with QRS>130

To Admit or not to Admit

Evidence for Congestion

Orthopnea
Elevated JVD
+S3
Edema
Ascites
Rales (maybe)
Hepatojugular reflux

Evidence for Low Perfusion

Cool extremities
Narrow pulse pressure
Symptomatic hypotension
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Adapted from: Nohria, A., Lewis, EF, and Stevenson, LW. *Medical Management of Advanced Heart Failure. JAMA, 2002, 287: 628-640.*

Plan of Care

- Stop Amlodipine
- Start Hydralazine and ISDN
- Stop Furosemide and start Torsemide
- Repeat Echo
- Consider right heart cath
- Consider Level I CPX
- Consider sleep study

Evidence

- AHEFT trial with decrease mortality
- Torsemide with better bioavailability than furosemide
- Evaluate for changes in TR and pulmonary pressures
- Guide therapy and assess need for advanced HF therapies

Acute Treatment in Chronic Patient

- Utilization of IV diuretics bolus – at least equivalent to oral dose
- Consider premedication with metolazone
- Utilization of continuous 8 hour IV diuretic infusions – 15-20mg/hr
- Monitoring and titration of evidenced base therapies
- Treating and evaluating acute and chronic medical illnesses
- Coordination of care and pt./family education

Buckley, LF. Carter, DM, Matta, L, Cheng, JW, Stevens, C., Belenkiy, RM…….Desai, AS. Intravenous Diuretic Therapy for the Management of Heart Failure and Volume Overload in a Multidisciplinary Outpatient Unit. JACC: Heart Failure 2016: 4:1: 1-8.

Acute Access Clinic

- Follow-up care
  - Phone calls 24-48 hours post-discharge and as needed (i.e. after IV diuretics)
  - Office visit biweekly, weekly, every 4 weeks until stable
  - Hospital follow-up visits
    - Within 3-7 days of discharge

“I NEED HELP”

I: Intravenous inotropes
N: New York Heart Association (NYHA) class IIIB/IV or persistently elevated natriuretic peptides
E: End-organ dysfunction
E: EF ≤35%
D: Defibrillator shocks
H: Hospitalizations >1
E: Edema despite escalating diuretics
L: Low systolic BP ≤90, high heart rate
P: Prognostic medication; progressive intolerance or down-titration of guideline-directed medical therapy [GDMT])

Yancy, CW, Januzzi, JL, Allen, LA, et al. 2017

TRANSFORM-HF Trial

- To compare the treatment strategy of furosemide vs. torsemide on long term clinical outcomes among patients hospitalized for heart failure.
- Projected enrollment 6,000 over 50 sites
- Randomized, unblended, two-arm, multicenter trial
- Followup- NO EXTRA VISITS!
  - Phone calls at 30 days, 6 and 12 months
  - Measuring: interval hospitalizations, QOL and adherence

- Endpoint- All cause mortality using National Death Index searches as secondary source.

Eisenstein, EL, Prather, K., Greene, SJ…….Anstron, KJ. Death: The Simple Clinical Trial Endpoint**.** *Studies in Health Technology and Informatics 2019, 257*: 86-91.

Acute on Chronic- Beyond Noncompliance

- Comorbidities that may trigger an exacerbation

- Ischemia-- Get an EKG
- Rhythm change- Get an EKG
- Hypertension- Manage BP
- Metabolic disorder- Get labs
- Anemia- Get labs and treat with IV iron

84 yo female with a h/o HFrEF EF 20%, Anterior MI in 2017, Htn, COPD and Osteoarthritis and resides in skilled nursing facility

Sx: Orthopnea, dyspnea with minimal activity, bendopnea, lower leg edema and wt gain. EDW= 210 lbs (212 lbs 3 weeks ago)

BP 190/96 HR 102 Afebrile RR 22 SpO2 92% RA Wt. 240 lbs. BMI 41

Rapid rate/irregular rhythm. no S3 , + S4. No audible murmur. JVP elevated to earlobe, + HJR

Crackles 1/3 up on right clear on left

Soft, nontender, nondistended, + hepatomegaly, + BS

Warm, 1+ bilateral lower extremity edema, 2+ distal pulses bilaterally

136	30	17	222
4.4	95	1.0	

NT Pro BNP 8,000

Ramipril 10mg po daily
ASA 81 mg daily
Atorvastatin 40 mg daily
Torsemide 40mg po twice daily
Carvedilol 25 mg every 12 hours
Spironolactone 12.5 mg po daily
Nitro 0.4 mg sl prn chest pain

Echo: EF 20% with mild MR, anterior wall akinesis, all other walls hypokinetic

EKG; Atrial fibrillation

Plan of Care

- Anticoagulate
- Rate control
- Decongest
- Would you consider admitting pt?

Evidence

- CHA_2DS_2-VASc score = 5
  - **Risk of stroke/TIA/systemic embolism= 10%**
  - **Risk of ischemic stroke= 7.2%**
- Consider change to Metoprolol succinate
- Older adults have altered physiologic responses to medications

Home Health or Skilled Nursing?

- Team approach for home care
  - Nursing, PT and OT
- Skilled or Assisted Living
  - Rehabilitation vs Long term care
  - Cardiac consultation
  - Disease management

Photos: Personal Bowers

Invasive Technology in Heart Failure

Impedance monitor within ICD

- Thoracic tissue has higher impedance than body fluid or blood
- Inc in LV filling pressure results in inc. intrathoracic fluid and drop in impedance.
- Intrathoracic impedance measured in ICD may indicate fluid retention up to 2 weeks prior to edema and/or weight gain.
- Confounding factors- false alarm with pneumothorax, pneumonia and positive pressure ventilation.

Implantable pulmonary artery monitors

Murphy, N., shanks, M. and Alderman, P. Management of Heart Failure With Outpatient Technology. 2019. *The Journal for Nurse Practitioners 15*(1): 12-18.

Noninvasive Technology in Heart Failure

Wearables

- IMPEDANCE-HF trial
  - Surge in pulmonary congestions 14 days before hospitalization
- Wearable vest-sensors can be placed on clothing
- Data from 2 trials- patients discharged with residual congestion are at inc. risk of readmission

Murphy, N., shanks, M. and Alderman, P. Management of Heart Failure With Outpatient Technology. 2019. *The Journal for Nurse Practitioners 15*(1): 12-18.

Virtual Technology in Heart Failure

Telehealth

- Measure weight, vital signs, symptoms of heart failure with remote transmission.
- Nursing followup by phone
- Effective at managing QOL but did not impact readmission rates.

- Stay tuned- Virtual visits

Murphy, N., shanks, M. and Alderman, P. Management of Heart Failure With Outpatient Technology. 2019. *The Journal for Nurse Practitioners 15*(1): 12-18.

Clinical Trials enrolling

- Clinicaltrials.gov

- **REHAB-HF:** Evaluates whether physical function is improved through an exercise training program (as measured by the Short Physical Performance Battery- SPPD)
-
- **LIFE**- Hypothesizes that in patients with systolic heart failure, that treatment with LCZ696 (sacubitril and valsartan) for 24 weeks will improve PBNP levels, compared to treatment with valsartan alone.
-
- **TARGET**- tests a personalized mHealth intervention designed to increase physical activity and improve medication adherence in a randomized controlled trial of an at-risk population with concomitant heart failure and diabetes mellitus.

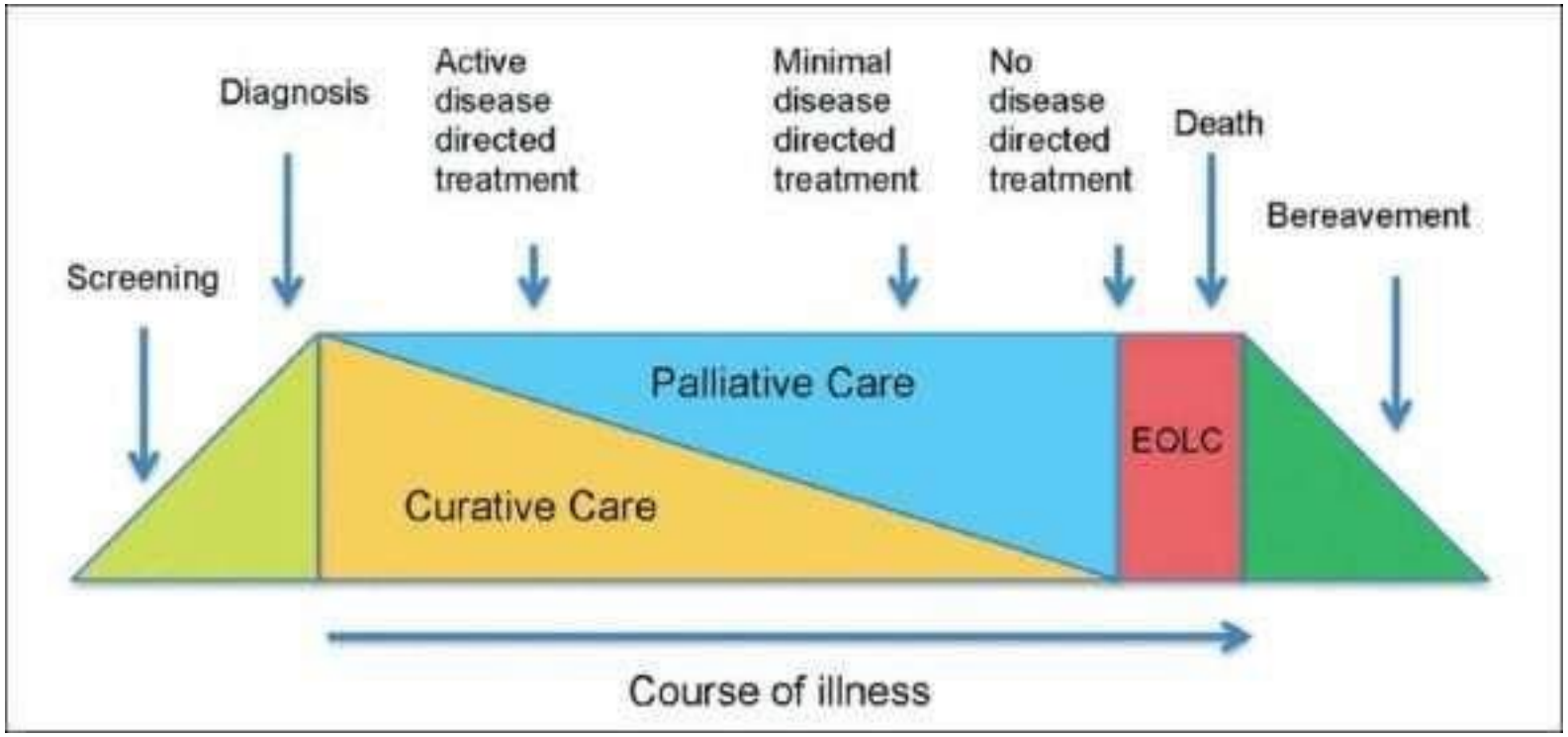
Clinical Trials

- **SPIRRIT** – to assess whether the initiation of spironolactone plus standard of care compared to standard of care alone improves outcomes in patients with Heart Failure with Preserved Ejection Fraction (HFpEF).

- **CONNECT** - The primary objective of this trial is to assess the effect of 2 QI initiatives compared with usual care on heart failure (HF) outcomes (ie, composite of HF readmissions or all-cause mortality) and HF quality metrics (ie, as assessed by an opportunity-based composite score) in the year following discharge for participants with acute HF and reduced ejection fraction (EF).

Palliative Care

- Who
- What
- When
- Where



CC: https://i1.wp.com/lifeinthefastlane.com/wp-content/uploads/2018/04/continuum-of-palliative-care-and-curative-care.jpg?fit=590,276&ssl=1

Cost of Heart Failure Care

- Direct medical cost estimate projected at $53 billion by 2030
- High percentage are patients on Medicare
- Hospitalization associated with majority of cost.
- Outpatient options for low risk patients should be considered.

Fitch, K, Lau, J., Engel, T., Medicis, J, Mohr, J and Weintraub, W. The cost impact to Medicare of shifting treatment of worsening heart failure from inpatient to outpatient management settings. 2018. *ClinicoEconomics and Outcomes Research, 10*: 855-863.

Implications for advanced practice providers

- Bundled payments in a pay-for performance model.
- Focus on prevention and early intervention
- Engaging the patient in shared decision making early in the disease trajectory.
- Define goals of care at each visit

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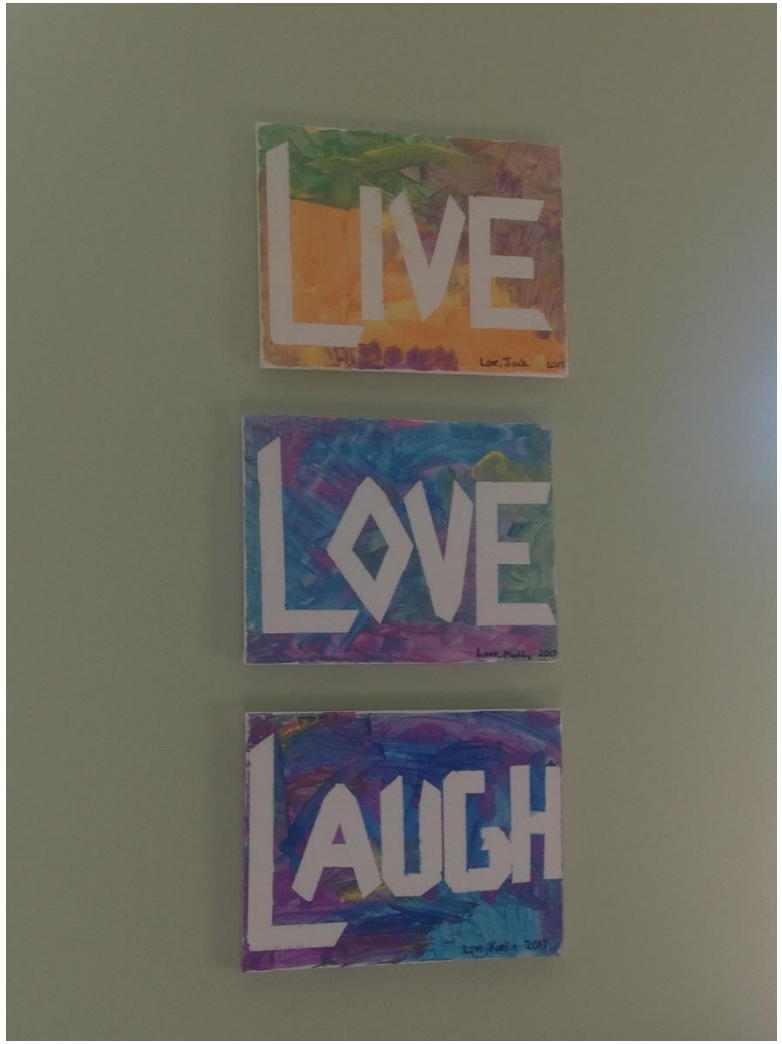

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Clinicaltrials.gov

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Yancy, CW, Januzzi, JL, Allen, LA, et al. 2017 ACC Expert Decision Pathway for Optimization of Heart Failure Treatment: Answers to 10 Pivotal Issues about Heart Failure With Reduced Ejection Fraction. *J Am Coll Cardiol* 2017; Dec. 22.