

Understanding and Preventing re-admission with Heart Failure: Identifying the Risk Factors and Developing Optimal Treatment Programs

Objectives of Course

- Discuss HF readmission statistics and risk factors for readmission and predictors of poor outcomes
- Discuss HF diagnosis including symptoms diagnostic tests, staging, prognosis and treatments including medications
- Define frailty and measurement of frailty
- Discuss treatment of de-compensated HF in the Acute Care setting
- Determine information the therapist in post hospitalization setting needs to obtain from hospital chart
- Define optimal initial assessment and interventions for the HF patient in post hospital setting
- Define red flags in post hospital setting for risk for readmission as well as indications to contact MD/NP

Overview of Hospital Readmissions

- Heart Failure re-hospitalizations after discharge are #1 among readmission diagnoses in USA
- ~ 50% of ALL readmissions are for heart failure, other cardiac-related reasons, and renal disorders
- Respiratory diseases are within the top 10 readmission diagnoses

Ramifications of HF Readmissions

- Health Care policies are based on the research-based premise that the majority of readmissions are avoidable, thus reflective of hospital performance and quality
- If a hospital's readmission rate is higher than the national average, CMS will levy a financial penalty the following year against that facility

Heart Failure Readmission: The Problem

- Leading cause of Hospitalization for individuals > 65 years old
- > 1 million hospitalized/year with diagnosis of HF
- Cost to Medicare: \$15-17 billion/year
- >50% readmitted within **6 months** of discharge
- 2009: Medicare required public reporting of all-cause readmission rates after HF admission; 2010 instituted penalties for readmission within 30 days.

Desai Circulation
2012
Bradley Circ CV 2013

HF Readmission statistics

- Readmission rates within 30 days are ~ 24% across the country
 - Days 0-30 are particularly vulnerable
 - Days 0-15 represent time frame with largest proportion (58.6% to 68%) (Bradford 2016, Dharmarajan 2013)
 - Days 2, 3, and 4 following discharge appear to be ***most prevalent*** for readmission (Bradford 2016, Dharmarajan 2013, Galloway 2016)

What are Factors Related to Readmission?

- Retired or disabled
- Had at least 1 ED visit in past 90 days
- Had a hospital LOS > 5 days
- At D/C, had BUN > 45 mg/dL (nl = 7-20 mg/dL)
- Inconclusive Factors: age, gender, race, marital status, payer type

(Bradford 2016)

Non-adherence to Recommendations

- Dietary nonadherence commonly identified by patients and physicians
- Reasons: socioeconomic challenges, lack of health care, low health literacy, psychosocial comorbidities
- Improved adherence through HF disease management programs with close follow-up and continuous education

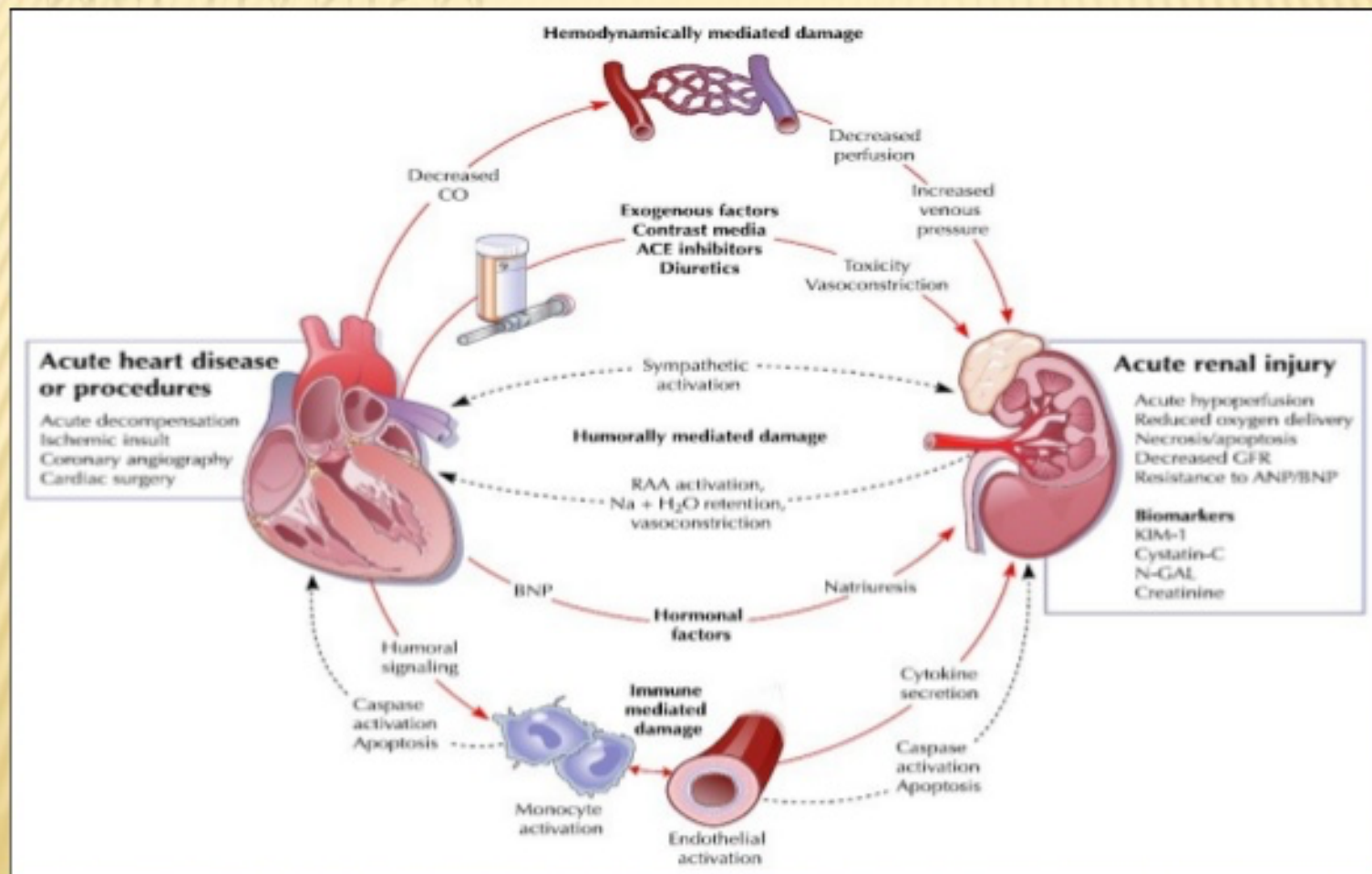
Heart Failure: diagnostic tests,
symptoms, staging of HF, prognosis,
medications and treatment

HF: how is diagnosed?

- Lab Values
 - BUN shows increased volume
 - Creatinine shows renal dysfunction/failure
 - BNP and NT-proBNP show stretch on the myocardium
 - Will be increased in decompensated HF
- Diagnostic Procedures
 - EF shows systolic and/or diastolic dysfunction

Cardiorenal relationship

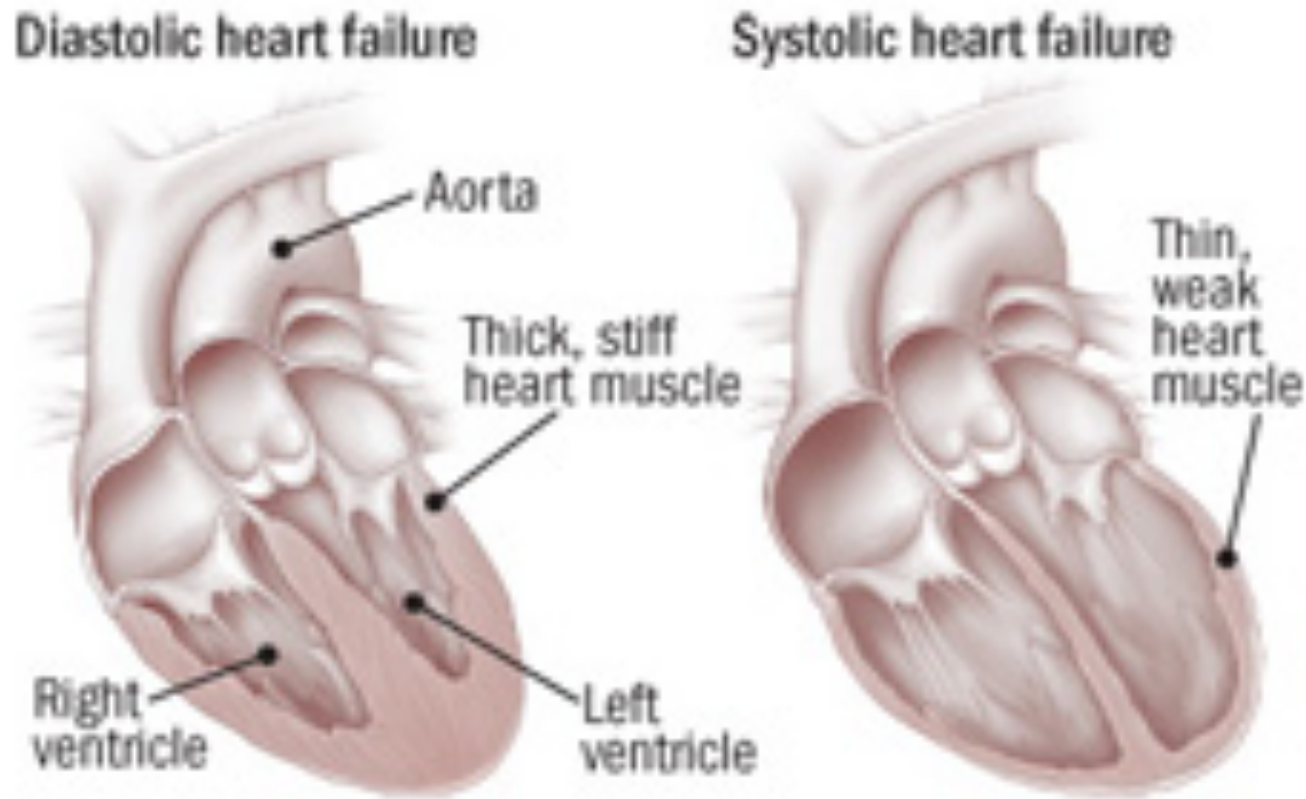
MECHANISM



Systolic versus Diastolic Pathology

- Systolic failure (HFREF):
 - Heart failure REDUCED Ejection Fraction
 - Left ventricular hypertrophy: often decreased ability to pump blood OUT often due to overstretched myocardium (dilated) or scarred myocardium or reduced chamber size from a hypertrophic wall
- Diastolic failure (HFPEF)
 - Heart Failure PRESERVED Ejection Fraction
 - LV dysfunction due to risk factors (Diabetes, long standing hypertension, increased age) or due to increased ventricular wall thickness and decreased SV. Preserved EF at rest, dysfunction during activity
 - Often converts to HFREF over time

Diastolic (HFPEF) vs Systolic (HFREF)



HFPEF

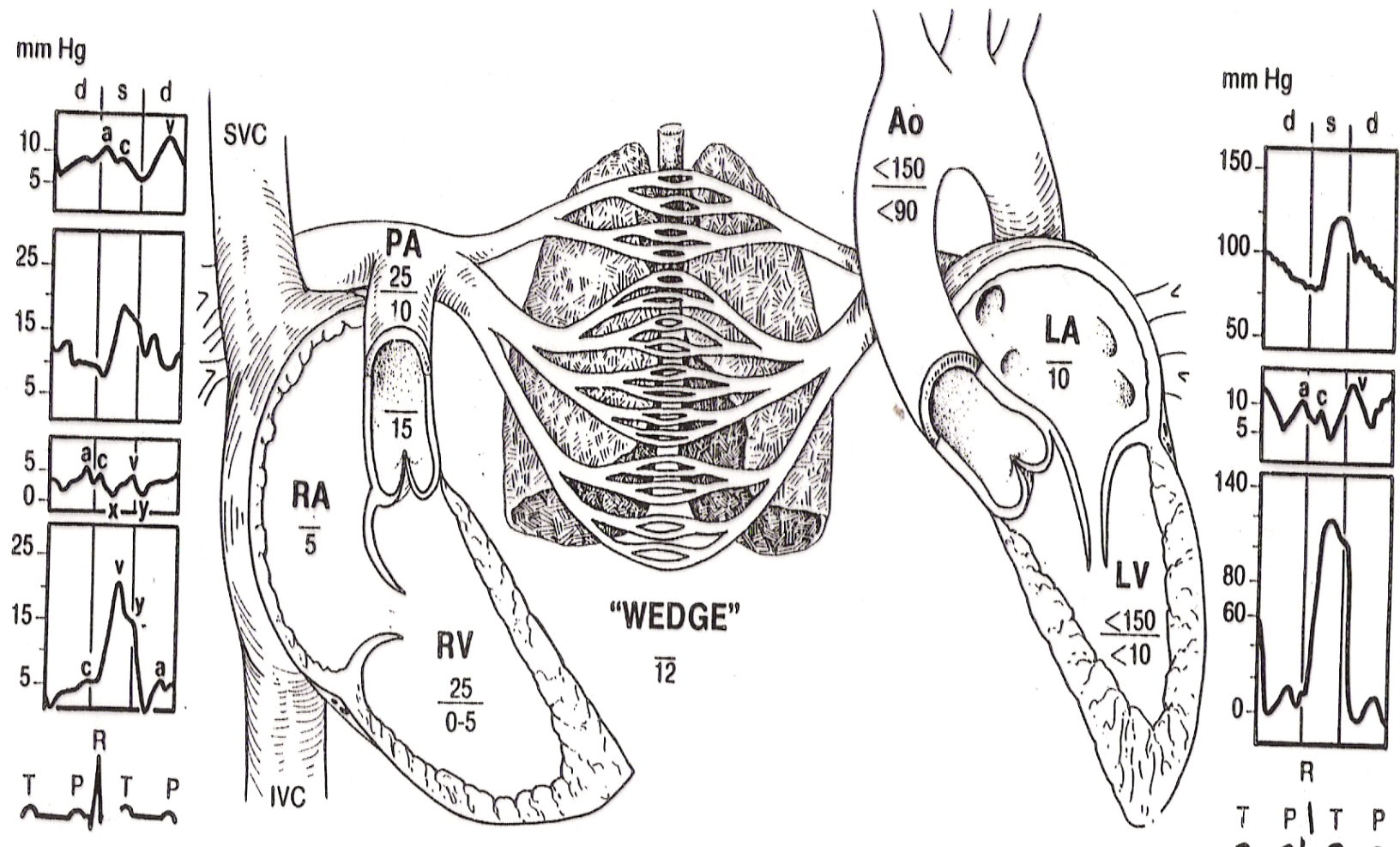
- Little available therapy for those with HFpEF
 - These individuals are 1/2 of overall burden of re-hospitalization

Krumholz Circ 2006
Peterson
Desai NEJM 2011

Pathophysiology

- Depends on which side of heart in failure
 - Left heart failure: decreased ejection/SV to rest of body, decreased ex tolerance, backup to lungs
 - Right heart failure: decreased ejection to lungs, decreased gas exchange, decreased ex tolerance, backup to periphery

Pathophysiology



Left versus Right HF

LEFT SIDED ♥ FAILURE

- Paroxysmal Nocturnal Dyspnea
 - Elevated Pulmonary Capillary Wedge Pressure
 - Pulmonary Congestion
 - Cough
 - Crackles
 - Wheezes
 - Blood-Tinged Sputum
 - Tachypnea
 - Restlessness
 - Confusion
 - Orthopnea
 - Tachycardia
 - Exertional Dyspnea
 - Fatigue
 - Cyanosis
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RIGHT SIDED ♥ FAILURE (Cor Pulmonale)

- Fatigue
 - ↑ Peripheral Venous Pressure
 - Ascites
 - Enlarged Liver & Spleen
 - May be secondary to chronic pulmonary problems
 - Distended Jugular Veins
 - Anorexia & Complaints of GI Distress
 - Weight Gain
 - Dependent Edema
- 
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HF Classifications

- Classification of Severity: New York Heart Association (NYHA): similar to ABCD of American College of Cardiology
 - Class I: No physical limitations
 - A: at high risk, but no structural changes
 - Class II: Slight limitation of physical activity in which ordinary physical activity leads to fatigue, palpitation, dyspnea, or angina pain, the person is comfortable at rest
 - B: Structural changes but without signs or symptoms
 - Class III: Marked limitation of physical activity in which less than ordinary activity results in fatigue, palpitation, dyspnea, or angina pain, the person is comfortable at rest
 - C: Structural heart disease with prior or current symptoms of HF
 - Class IV: Inability to carry out any physical activity without discomfort but also symptoms of heart failure or angina syndrome at rest, with increased discomfort if any physical activity is undertaken
 - D: Refractory HF requiring specialized interventions

What is Compensated Heart Failure?

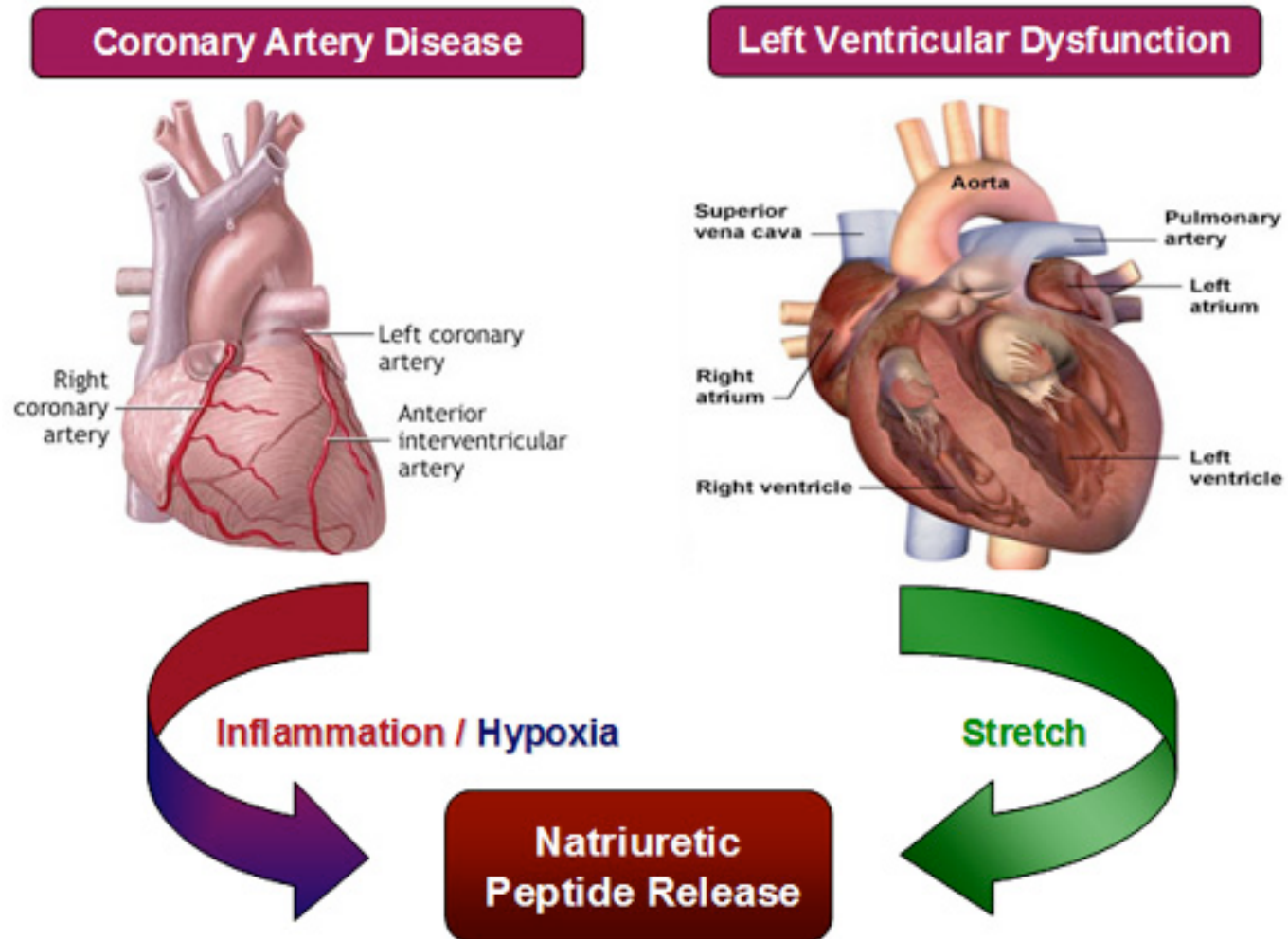
What is Decompensated Heart Failure?

Which one can you work with as a PT and why?

Compensated Vs Decompensated

- Compensated HF:
 - HF, but controlled on meds and NOT symptomatic at rest
- Decompensated HF:
 - May be on meds for HF but not controlled as they are Symptomatic at rest
- Which one for PT?
 - NOT decompensated!!!!
 - Evaluate your patients daily as may have developed decompensation overnight or since last treatment

BNP: compensated vs decompensated



What is Natural History?

- HF worsens over time
 - HFPEF often leads to HFREF
 - EF may decrease over time
 - Signs/symptoms and exercise tolerance decrease, exacerbations increase
 - Risk for frequent re-hospitalization with reduced EF
 - May end up on IV inotropes, VAD or heart transplant
 - Patients with reduced EF (<30) are at greater risk of sudden death and may benefit from ICD implantation

What is Prognosis?

- Prognosis actually related to EF in systolic failure or HFREF
- Advanced heart failure: greater risk of mortality and morbidity versus mild heart failure
- Prognosis with HFPEF and Diastolic dysfunction: if fluid balance not carefully watched, may develop fluid overload frequently and end up back in hospital with pulmonary edema
- Progression of advanced heart failure: with less tolerance to activity and increased rehospitalization one often sees:
 - IV inotropes
 - Workup to see if any surgical intervention appropriate such as valvular repair or revascularization
 - Cardiac resynchronization with pacemakers
 - Workup for ventricular assist devices
 - Workup for transplant
 - Palliative care referral

What other Diagnostic Tests?

- Chest Xray discusses fluid back up in lungs as well as size of heart
- Invasive monitoring: helps with information on PA pressures
 - With increasing PA pressures, workup may be underway to see if surgical repair of valve or revascularization would improve pump
 - Without indication for surgical intervention, inotropes or VADs are the only alternative
- Echocardiography: reports EF as well as size of both L and R heart and integrity of valves

Medical Treatment

- Medications: Triple cocktail PLUS
 - Beta Blocker – decrease work load on heart, decrease neuroendocrine input
 - Diuretic – decrease volume which decreases preload
 - ACE inhibitor – decreases afterload by inducing vasodilation plus decreases volume and works on renin-angiotensin system
 - Spironolactone(alactone) – aldosterone inhibitor
 - If above unable to keep patient out of NY classification stage IV or decompensated HF, then IV inotropes added

Implications for PT

- Identify cardiac pathology: systolic vs diastolic and left versus right.
- Understand pathophysiology
 - This will determine monitoring during activity
- Understand importance of vital sign monitoring with all these patients
- Develop exercise and education protocols to improve lifestyle long term and reduce re-hospitalizations

What do you NEED to ask or know about your patient?

- Echo report
 - What is EF?
 - NL: above 55-60%?
 - What is relaxation of heart like: diastolic dysfunction (DD)
 - Ask about Left atrial pressure – if elevated probably DD)
 - Is it called a hyperdynamic heart? (probably DD)
 - IF DD, are there prior or current symptoms of HF
 - IF $EF < 35\%$
 - Reduced ejection fraction

What do you NEED to ask or know about your patient?

- Lab Values
 - What was BNP in hospital?
 - How is their kidney function? Check Creatinine
 - Other co-morbidities?
 - Diabetes
 - Neuromuscular
 - Pulmonary
 - Other
 - Other cardiac problems: valve function?
Arrhythmias (afib)? Pacemaker? Previous or recent MI, CABG, stent, ischemic events?

Abnormal responses found in HF

- HR/BP
 - Depending on patient's medications.... An abnormal response is an elevated HR response to activity with a flattened or dropping systolic BP
- Symptoms
 - Patient will report dyspnea on exertion or shortness of breath when HR rises and BP drops and patient is unable to handle activity.

Patients are admitted due to following:

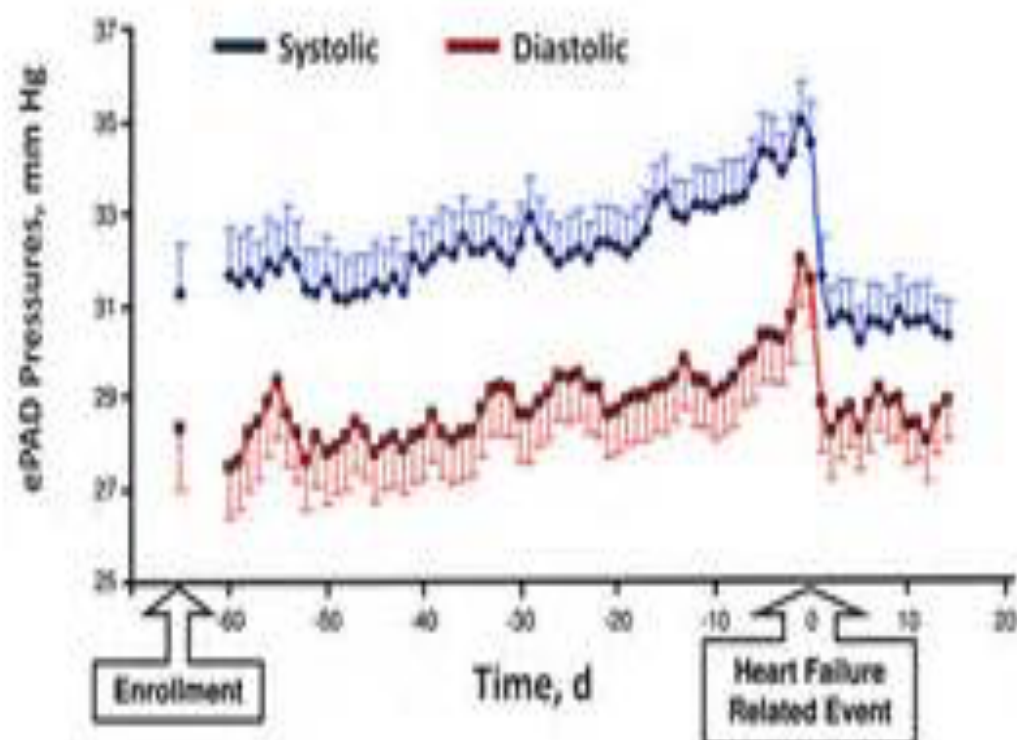
- Congestion: lung congestion (pulmonary edema) or peripheral congestion (peripheral edema)
 - Need for stabilization of fluid balance on oral diuretics
 - May have exacerbating factors (increased kidney dysfunction, arrhythmias, angina, etc)
 - Titrate neuro-hormonal Antagonists and other medications
 - These patients require comprehensive D/C planning
 - Should follow-up with MD within 7-10 days
 - Nearly ½ readmissions happened before first ambulatory visit
- Hernandez JAMA 2010

HF Re-admission Pathophysiology

- Re-hospitalization preceded by gradual rise in ventricular filling pressures
 - Begins > 2weeks post hospitalization
 - Starts **before** noticeable changes in weight or overt clinical symptoms
 - Documented this with implanted hemodynamic monitoring
 - As risk of HF events is related to **degree of chronic filling pressure elevation**
 - Risk gets progressively higher when PA diastolic pressure rises > 18 mm Hg.

- Stephenson Circulation 2010, Zile Circulation 2008

Gradual Rise in Filling Pressures Before Hospitalization, Whatever the EF



Zile MR, et al. *Circulation*. 2008;118:1433-1441.³⁰

Rise in ventricular filling pressures

- Clinical symptoms ***not sufficiently reliable*** to detect early decompensation
 - There is a strong relationship of weight gain to fluid retention
 - There is a lag in weight gain following decompensation
 - Studies have shown intensive weight and vital sign monitoring has NOT reduced rehospitalization

Cardio MEMS trial

- Implantable monitors measured PA pressures directly
- Allowed individuals to adjust diuretics
- Results: 39% reduction in HF hospitalization

Abraham; Lancet 2011

Heart Failure Predictors of Readmission and
Poor Outcomes:
Who needs closer monitoring?

Predictors of higher event rates

- Elevated filling pressures
 - Increased JVP
 - On physical assessment look for JVD while semirecumbant
 - Orthopnea (short of breath laying flat)
 - Echocardiography showing problems with relaxation (diastolic dysfunction)
 - Learn to read ECHO reports to identify DD
 - Biomarkers that remain high at discharge
 - BNP, troponin
- Low levels of Na
 - Increased renin angiotensin system metabolites
 - Increased circulating catecholamines



Indicators of disease progression and/or worsening clinical outcomes

- Increased diuretic needs
- Intolerance of neurohumoral antagonists (beta blockers, ACE)
 - Patients demonstrate increasing renal dysfunction
 - How do you know this? Check Creatinine levels over time
 - Patients demonstrate hypotension
 - Follow resting BPs in morning and s/s of hypotension
- Renal impairment and worsening renal function when patient hospitalized: predictor of adverse outcomes and increased risk of readmission

Other indicators of poor outcomes or higher readmission

- Other diagnoses
 - Atrial fibrillation, ischemic heart disease, hypertension
- Co-morbidities
 - Chronic kidney, pulmonary dysfunction, diabetes, anemia
- Functional Limitations
 - Physical frailty
 - Decreased QOL
- Psychosocial +/- socioeconomic factors
 - These limit adherence, compliance with meds, self monitoring and follow-up
 - Look for family support and knowledge and physician involvement in case

Flint 2012
Lewis 2010

Frailty Measures

Flint: Circ Heart Fail 2012

- Fried criteria (J Geront A Biol Sci Med Sci 2004)
- Short Physical Performance Battery
- Gait Speed
- Handgrip Strength
- Lee criteria (Circulation 2010)
- Frailty Index- Comprehensive Geriatric Assessment (Jones Am Ger Soc 2004)
- Comprehensive Assessment Frailty (Sundermann Eur J Card Surg 2011)
- Frailty Staging System (Cacciatore Eur J Clin Invest 2005)
- Robinson (Ann Surg 2009)
- Edmonton Frailty Scale (Dasgupta; Arch Gerontol Geriatri 2009)

Fried Criteria for Frailty

- Unintentional weight loss
- Weak handgrip strength
- Self reported exhaustion
- Slow gait speed
- Low self reported physical activity

Short Physical Performance Battery (SPPB)

- Series of 3 physical performance tests designed to capture the limitations in lower extremity functioning that relate to gait, balance and strength.

Components: Balance

- Stand Side-by-side
- Stand Semi-tandem
- Stand Tandem

B. Semi-Tandem Stand

- Held for 10 sec ☐ 1 point
- Not held for 10 sec ☐ 0 points
- Not attempted ☐ 0 points (*circle reason above*)

If 0 points, end Balance Tests

Number of seconds held if less than 10 sec: _____.____sec

A. Side-by-side-stand

- Held for 10 sec ☐ 1 point
- Not held for 10 sec ☐ 0 points
- Not attempted ☐ 0 points

If 0 points, end Balance Tests

Number of seconds held if
less than 10 sec: _____.____sec

C. Tandem Stand

- Held for 10 sec ☐ 2 points
- Held for 3 to 9.99 sec ☐ 1 point
- Held for < than 3 sec ☐ 0 points
- Not attempted ☐ 0 points (*circle reason above*)

Number of seconds held if less than 10 sec: _____.____sec

D. Total Balance Tests score _____ (sum points)

Components: Gait Speed

- Choose 3 vs. 4 meters.
- Create a start and finish.
- Demonstrate this to pat.
- Have them complete 2 trials

Length of walk test course: Four meters ☐ Three meters ☐

A. Time for First Gait Speed Test (sec)

1. Time for 3 or 4 meters _____._____sec
 2. If participant did not attempt test or failed, circle why:
 - Tried but unable 1
 - Participant could not walk unassisted 2
 - Not attempted, you felt unsafe 3
 - Not attempted, participant felt unsafe 4
 - Participant unable to understand instructions 5
 - Other (Specify) _____ 6
 - Participant refused 7
- Complete score sheet and go to chair stand test

3. Aids for first walk.....None ☐ Cane ☐ Other ☐

For 4-Meter Walk:

- If time is more than 8.70 sec: ☐ 1 point
- If time is 6.21 to 8.70 sec: ☐ 2 points
- If time is 4.82 to 6.20 sec: ☐ 3 points
- If time is less than 4.82 sec: ☐ 4 points

For 3-Meter Walk:

- If time is more than 6.52 sec: ☐ 1 point
- If time is 4.66 to 6.52 sec: ☐ 2 points
- If time is 3.62 to 4.65 sec: ☐ 3 points
- If time is less than 3.62 sec: ☐ 4 points

Component: Strength

- Have patient complete 5x chair rise
- Pt must complete without use of arms

Scoring the Repeated Chair Test

Participant unable to complete 5 chair stands or completes stands in >60 sec:	☐ 0 points
If chair stand time is 16.70 sec or more:	☐ 1 points
If chair stand time is 13.70 to 16.69 sec:	☐ 2 points
If chair stand time is 11.20 to 13.69 sec:	☐ 3 points
If chair stand time is 11.19 sec or less:	☐ 4 points

Results

Scoring for Complete Short Physical Performance Battery

Test Scores

Total Balance Test score _____ points

Gait Speed Test score _____ points

Chair Stand Test score _____ points

Total Score _____ points (sum of points above)

What does it mean?

- General idea of lower body function. Gives good indication of overall frailty.
- ≤ 9 is considered frail
- Correlated with risk to lose ability to walk 400 m
- Used as pre-op frailty screen for LVAD patients
 - Low- 9-12
 - Medium 5-8
 - High 0-4

Bandinelli S, Lauretani F, Boscherini V, Gandi F, Pozzi M, Corsi AM, Bartali B, Lova RM, Guralnik JM, Ferrucci L. A randomized, controlled trial of disability prevention in frail older patients screened in primary care: the FRASI study. Design and baseline evaluation. *Aging Clin Exp Res.* 2006;18(5):359–66.

Physical Activity and Rehospitalization

- Waring J. Cardiopulmonary Rehab 2016:
 - Using accelerometers to measure activity levels after discharge
 - Those in lower physical activity group were more likely to be readmitted within 30 days ($p=.02$)
- Chawla Ann Am Thor Soc 2014
 - Minutes of higher physical activity were less in group that were re-hospitalized (42 min/day vs. 114 min/day) and progressively decreased over time in those that were re-hospitalized

Treatment of De-compensated HF in the Acute Care setting

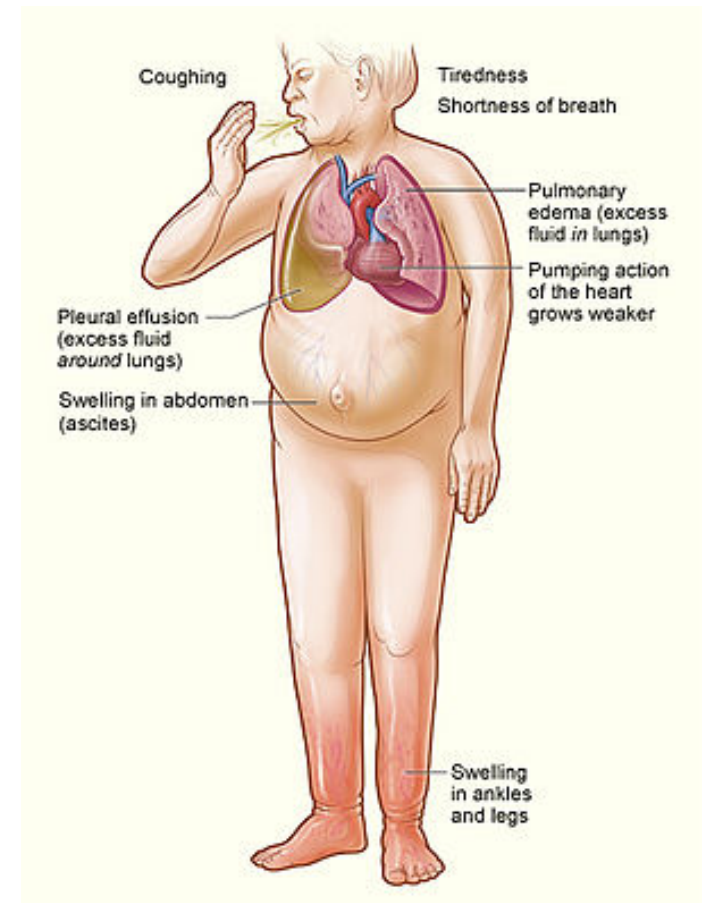
Understanding the Acute Care setting
helps in the development of home
program

HF Case

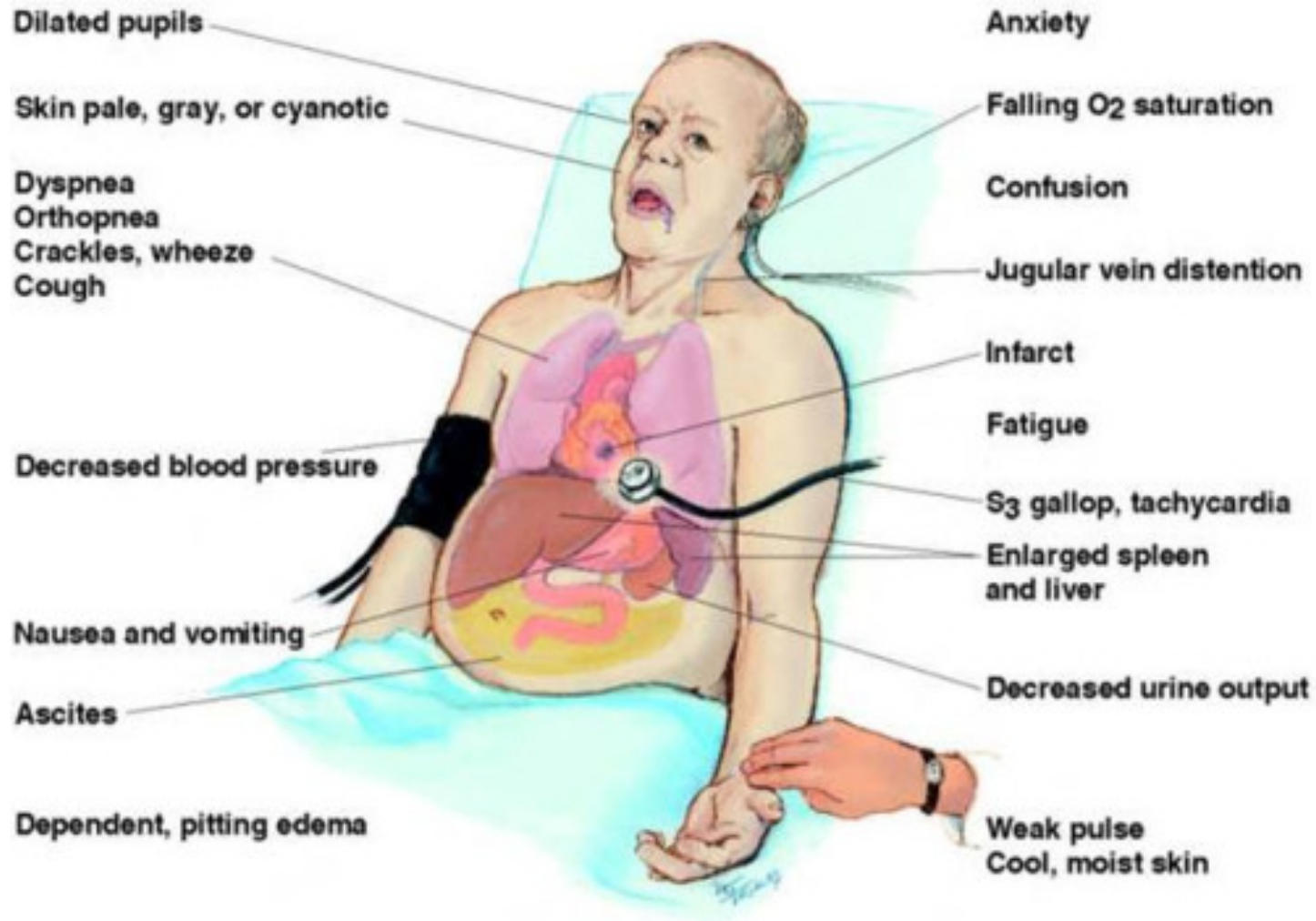
- Patient is a 58 year old male admitted to hospital for decompensated HF. Hx of large anterior MI in 2012, 2 stents in 2014 to RCA and first diagonal branch of L, EF 22%, still working as CEO and travels occasionally. Patient had been having increasing difficulty sleeping, requiring sleeping upright past few nights and getting up suddenly a few times in night due to shortness of breath. Weight gain of 8 lbs.
- On admission HR 100, BP 80/60, SpO2 86, CXR with extensive bibasilar edema, BNP 1400 on admission, c/o difficulty with urination, and exhaustion.
- Are there any risk factors or predictors of poor outcomes or higher readmission rates in this case?

Acute De-compensated HF

- Clinical presentation
 - Dyspnea
 - Paroxysmal Nocturnal Dyspnea
 - Orthopnea



Acute Decompensated HF



Hospitalization Recommended

- Evidence of severely de-compensated HF
 - Hypotension
 - Worsening renal function
 - Altered mentation
- Dyspnea at rest
 - Typically reflected by resting tachypnea
 - Less commonly reflected by O2 sat < 90%
- Hemodynamically significant arrhythmia
 - Including new onset of rapid atrial fibrillation

Medical Management of HF

- Framingham Classification: dx based on 2 major criteria or 1 major and 2 minor criteria
- Major Criteria
 - Paroxysmal nocturnal dysnea (PND)
 - Acute pulmonary edema
 - Weight gain of 4.5 kg (9.9 lbs)
 - JVD
 - Rales
 - S3 Gallop
 - Hepatojugular reflux
 - CVP greater than 16
 - Radiographic cardiomegaly

Medical Management of HF

- Minor Criteria
 - Nocturnal cough
 - Dyspnea on ordinary exertion
 - Decrease in vital capacity by 1/3 the maximal recorded value
 - Pleural effusion
 - Tachycardia (rate of 120)
 - Hepatomegaly
 - Bilateral ankle edema

De-compensated HF Treatment

- Patients with fluid overload: IV diuretics over oral
 - Current research is looking at ultrafiltration (CRRT) instead of diuretics to normalize fluid overload
- Watch for development of other side effects:
 - Renal dysfunction, electrolyte abnormality, symptomatic hypotension, gout
- All patients receiving diuretic therapy need constant hemodynamic monitoring to prevent adverse effects from excessive volume loss.
- Routine administration of supplemental oxygen in presence of hypoxemia.

De-compensated HF Treatment

- Use of Noninvasive Positive Pressure Ventilation is indicated in presence of hypoxemia and pulmonary edema with severe dyspnea
- Use of VTE prophylaxis (who are not already anti-coagulated) to prevent proximal DVT and PE in patients admitted with acute de-compensated HF
- In absence of symptomatic hypotension, IV nitroglycerin, nitroprusside or nesiritide (natrecor) should be started (in addition to diuretics) in individuals with congestion
- In individuals with severe pulmonary edema or severe hypertension initiation of IV vasodilators and diuretics.

Pharmacologic Treatment

- Heart Failure Cocktail
 - Diuretic- to reduce blood volume and venous pressure
 - Beta Blocker- arrhythmia prevention, rate control
 - ACE/ARB- neurohumoral modification, vasodilation, improvement in LVEF
 - Hydralazine and nitrates improves symptoms, ventricular dysfunction, and exercise capacity in those that cannot tolerate ACE/ARB
- Other options
 - Aldosterone antagonist- 2nd diuretic
 - Digoxin- can increase CO, anti-arrhythmia
 - Anticoagulant- decrease risk of thromboembolism
 - Inotropic agents- restore organ perfusion and reduce congestion
 - Hemodialysis/Ultrafiltration/CRRT

De-compensated HF Treatment

- IV inotropes (milrinone, dobutamine) should be initiated in individuals with advanced HF, dilated LV, reduced LVEF, diminished peripheral perfusion and end organ dysfunction to reduce symptoms and improve end organ function
- Patients admitted with decompensated failure should be evaluated for atrial fibrillation or other serious arrhythmias, exacerbation of hypertension, myocardial ischemia, exacerbation of pulmonary dysfunction, anemia, thyroid dysfunction, drug interactions or other intervening factors.

Monitoring during hospitalization

Frequency	Specific Monitoring
daily	Determine weight after morning void and monitor food intake
Daily	Fluid intake and output
Throughout day	VS monitoring: watch for hypotension, O2 saturation
Daily	Symptom check: dyspnea, cough, fatigue, PND, lightheaded
Daily	Electrolyte monitoring: Na, K
Daily	Renal Function: BUN, serum creatinine

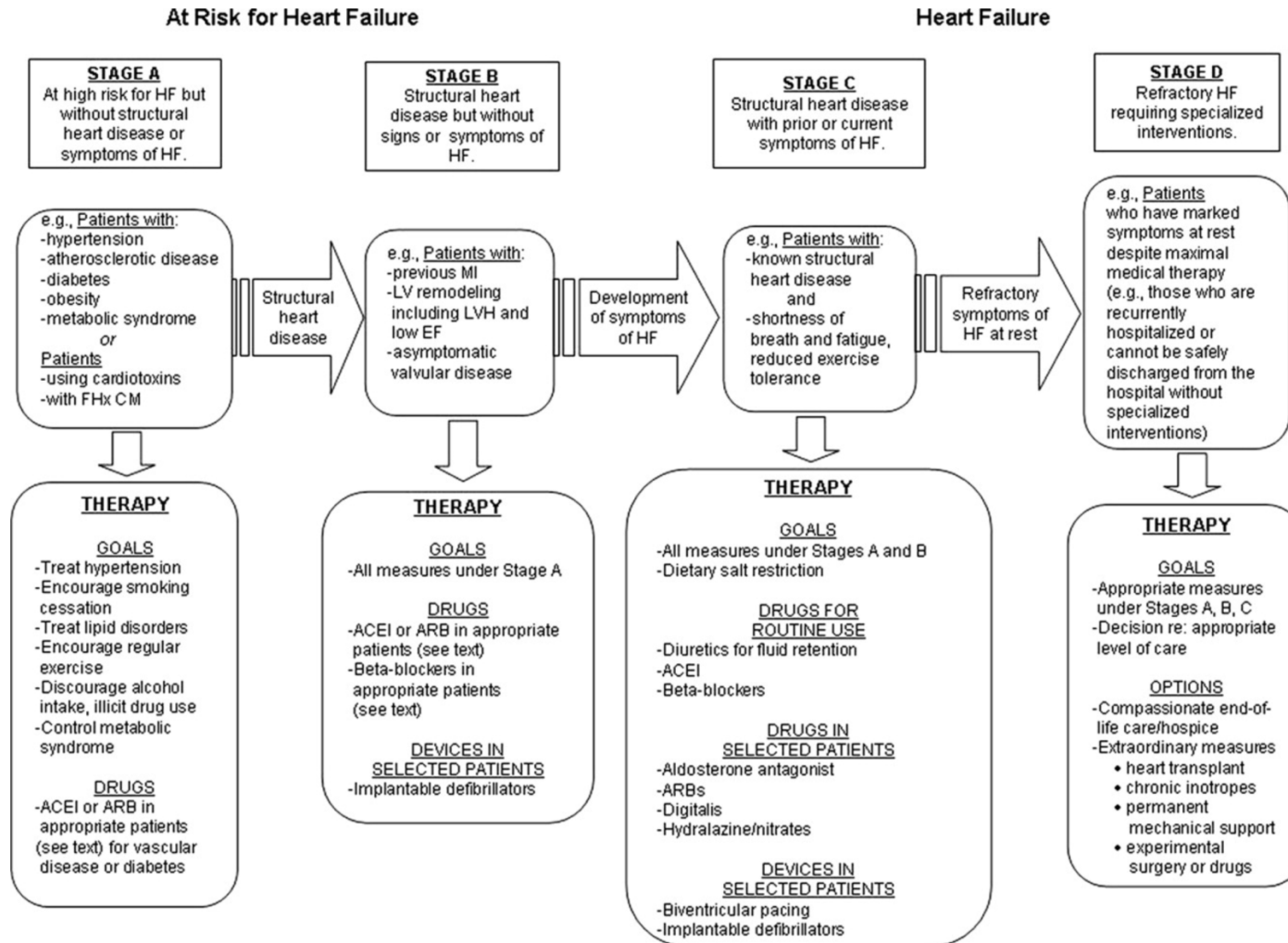
Non-pharmacological treatment

- ACCF/AHA Stage A at high risk for HF
 - Focused prevention/reduction of risk factors
 - Treat HTN, DLP
 - Smoking cessation
 - Prevent/control DM, insulin resistance
 - ***Encourage physical activity***
 - Encourage weight reduction
- ***Patient education on adverse effects of non-adherence***
- Dietary Na 2-3 gms per day / Fluid restriction 2L per day

2016

Yancy

Therapy by stage



Role of PT in hospital

- EARLY assessment...as soon as stabilized on meds when on bedrest
- Monitoring of ALL activities: ADLs, gait, stairs
- Immediate communication to all healthcare providers or normal OR abnormal responses
- Monitoring of ALL medication changes and assessing all activities when medication changes occur
- EDUCATION

Assessment of Frailty

- Assess frailty and make a plan for decreasing frailty upon discharge
 - Options: SPPB, Gait speed alone, 5 min walk, or any other option



HF Case

- Our patient was seen by PT on day 2. Patient underwent IV diuresis, and on .35 IV milrinone. (Down from .75 mg milrinone). VS 100/80, HR 86 and SpO2 96% at rest. Pt still c/o fatigue/weakness.
- Initial eval: patient tolerated upright and OOB to chair with flat BP responses, and was assessed with walking 50 feet with flat BP response.
- Performed SPPB: performed 5x sit to stands in 32 seconds, lost balance during tandem position of balance test and gait speed was 0.5 meters/sec.
- Results of SPPB places patient in highly frail category

Discharge planning should address the following issues

- Details regarding medication, dietary sodium restriction, and rec. activity level
- Follow-up by phone or clinic visit early after discharge to reassess volume status
- Medication and dietary adherence
- Alcohol moderation and smoking cessation
- Monitoring of body weight, electrolytes and renal function
- Consideration of referral for formal disease management.
- Plan to decrease frailty

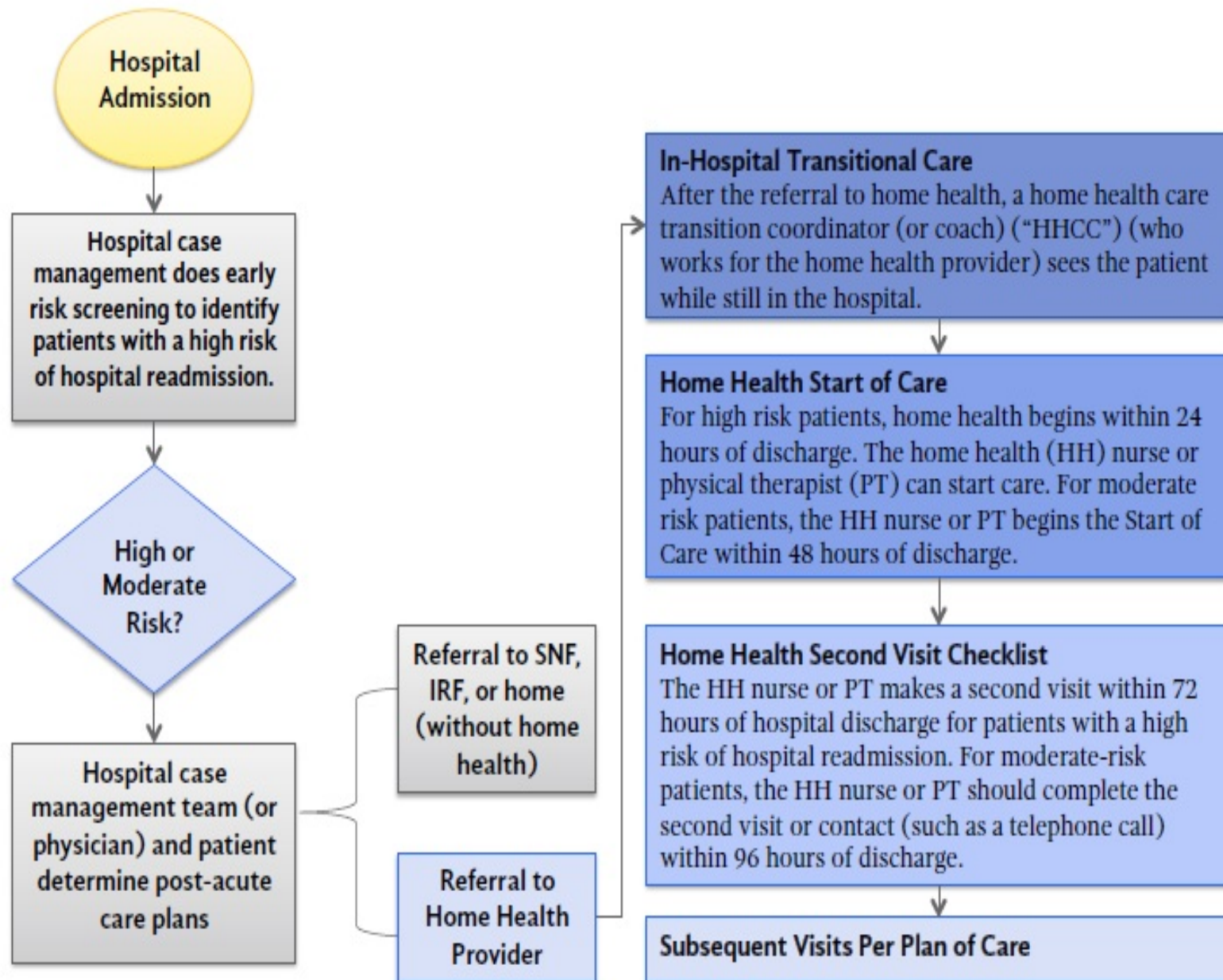
Hospital Readmission Risk Factors (during transition to home)

- Medical complexity
- Age
- Comorbidities
- Access to care
- Hospital length of stay
- Social support
- Impaired physical function

Optimal Transfer of information

- Transfer of information between therapists is key.
 - Information between upstream and downstream providers must be available, accurate, and timely
 - Information between therapists and the other interdisciplinary team members in the same practice setting must be available, accurate, and timely

Home Health Model of Care Transitions Work Flow



HF Case

- Our patient was seen by PT in home on day 2.
- Hospital summary:
 - Patient tolerated initial PT in hospital and progressed to walking 100 ft x3 (3 rests) with flat BP response, HR increased to 100, RPE 13, patient weaned off milrinone. Pt limited by c/o fatigue/weakness.
 - Due to frailty identified on SPPB, sit to stands were performed daily with PT and patient progressed to tolerating three bouts of 5 times sit to stand/day.
 - ADLs still reports dyspnea of 2-3 with all ADLs
 - D/c Medications included Coreg, Lisinopril, Lasix, Aldactone, vytorin

Initial Evaluation

Initial Evaluation

- Interview
 - Assess risk for re-hospitalization
 - Assess for changes in symptoms since hospitalization
- Physical Exam
 - Auscultation of lung and heart sounds
 - Assess for JVD, peripheral edema
 - Instruct in dyspnea scale to use daily at rest and with activities
 - Assess all vital signs with changes in position and activity (supine-sit-stand-ADL-gait-stairs)
 - Assess frailty
 - Assess balance, strength, sensation, etc.
 - Perform additional outcome measures or QOL survey

Monitoring during Post hospitalization treatments

Monitoring during post-hospitalization

Frequency	Specific Monitoring
daily	Determine weight after morning void and monitor food intake
Daily	Fluid intake and output
Throughout treatments	VS monitoring: watch for hypotension, O2 saturation
Daily	Symptom check: dyspnea (use scale for rest and activity), cough, fatigue, PND, lightheadedness, orthopnea

Interventions

Interventions to begin

- Determine impairments from initial evaluation
 - Based on level of frailty, the three most important activities usually include
 - Endurance with walking: develop ex prescription based on bouts of walking
 - Sit to stand repetitions for LE strengthening
 - Balance activities: static and dynamic
 - With all activities monitor level of dyspnea and keep dyspnea with activity to a moderate level (5-6/10)

Physical Activity Recommendations

- 150 Minutes per week – Moderate Intensity

Progression of interventions

Interventions to progress to

- Progress bouts of walking by increasing duration of walks with self monitoring of dyspnea
- Progress bouts of sit to stand
- Consider increasing activity if remains symptom free to adding short bouts of higher intensity by adding inclines or stairs
- Consider increasing UE and LE strengthening bouts

Outcome Measures

Outcome Measures

- SPPB
- TUG
- QOL like Living with Heart Failure
- Activity self report
- 6 minute walk

Red Flags

Red flags

- Dyspnea at rest
 - Typically reflected by resting tachypnea
 - Less commonly reflected by O2 sat < 90%
- Hemodynamically significant arrhythmia
 - Including new onset of rapid atrial fibrillation
- Abnormal VS at rest and with activity
- Elevated filling pressures
 - Increased JVP
 - On physical assessment look for JVD while semirecumbant
 - Orthopnea (short of breath laying flat)
 - Echocardiography showing problems with relaxation (diastolic dysfunction)
 - Learn to read ECHO reports to identify DD
 - Biomarkers that remain high at discharge
 - BNP, troponin
- Low levels of Na
 - Increased renin angiotensin system metabolites
 - Increased circulating catecholamines

Summary of risk factors or predictors to look for

- Increased diuretic needs
 - Increasing weight or fluid imbalance
- Intolerance of neurohumoral antagonists (beta blockers, ACE)
 - Patients demonstrate increasing renal dysfunction
 - Patients demonstrate hypotension
- Other diagnoses
 - Atrial fibrillation, ischemic heart disease, hypertension
- Co-morbidities
 - Chronic kidney, pulmonary dysfunction, diabetes, anemia
- Functional Limitations
 - Physical frailty
 - Decreased QOL
- Psychosocial +/- socioeconomic factors
 - These limit adherence, compliance with meds, self monitoring and follow-up
 - Look for family support and knowledge and physician involvement in case

What are indications to contact
physician, NP or PA?

Indications to contact MD/NP

- Change (increase) in dyspnea at rest and with activity since previous treatment
- Change in fluid balance: increase in weight, auscultation findings in lungs, peripheral edema
- Abnormal heart rhythm compared to previously
- Change in sleep tolerance (orthopnea, PND)
- Non-adherence to meds or fluid restriction
- Change in mentation
- Abnormal VS/symptoms with activity