Getting to the Heart of the Matter: Examination and Treatment Strategies for Individuals with Heart Failure
Student Conclave
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Learning Objectives

Upon completion of this presentation participants will be able to:
1. Identify basic anatomy structures of the heart.
2. Describe blood flow through the heart and to the body.
3. Discuss reasons for rehospitalization for individuals with HF.
4. Identify key aspects of a Cardiopulmonary Examination.
5. Differentiate between signs and symptoms of compensating versus decompensating HF.
6. Describe three common outcome measures used in individuals with HF.
7. Describe key components in an aerobic and resistive exercise program.
8. Identify self-management strategies for individuals with HF.
9. Compare and contrast common medications and their side effects used in HF.
Heart Failure Statistics

- CVD most common cause of death
- 17.3 M
- 5 year Mortality (Yancy, 2013)
- 80% over the age of 65
- 8.3 M living with HF (2011-2014)
- 8 M (Projected by 2030)
- Most common reason for hospitalization for Medicare Patients
- 25% Rehospitalized within 30 days of D/C (Keteyian, 2010)
- 50% Readmitted 6 Months Post D/C From Hospital

Heart Anatomy and Blood Flow

Major Causes of Heart Failure

- CAD/MI
- High Blood Pressure
- Diabetes

- Major Causes of Heart Failure
“Just a little heart attack”
Go Red For Women

Other Causes of Heart Failure

Heart Failure Descriptions:

- Right vs. Left:
  - Side failing
  - Fluid localizing

- Ejection Fraction:
  - HFrEF
  - HFpEF

- Systolic vs. Diastolic:
  - Systolic HF
  - Diastolic HF
Left and Right Sided Heart Failure

![Heart Failure Diagram]

Risk Factors for Re-Hospitalization of Heart Failure
(Chaudhry, 2013)

- Slow Gait (<.8 m/s)
- Decreased Grip Strength (<18.5 kg F; <28.5 kg M)
- Diabetes
- Depression
- Depressed Ejection Fraction
- Chronic Kidney Disease
- Class III or IV NY Heart Classification

Clinical Tip: Also Need To Consider Patients' Perspective (Sentell, 2016)

Qualitative Analysis of Patient Perspectives
(Sentell, 2016)

- Homeless, poverty, no social support
- Social Vulnerability
- Potentially Preventable Hospitalizations
- Breathing/ Health Issues
- Poor communication with providers
- Poor Health Literacy

Clinical Tip: Also Need To Consider Patients' Perspective (Sentell, 2016)
Clinical Tip: Use Motivational Interviewing Techniques (DARN; Change Talk)

AHA Stages and NYHA Functional Classifications

<table>
<thead>
<tr>
<th>AHA Stages</th>
<th>NYHA Functional Classifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A High risk for HF but w/o structural heart disease</td>
</tr>
<tr>
<td>B</td>
<td>Structural heart disease but no other evidence of HF</td>
</tr>
<tr>
<td>C</td>
<td>Structural heart disease with prior or current HF</td>
</tr>
<tr>
<td>D</td>
<td>Refractory HF requiring specialized interventions</td>
</tr>
</tbody>
</table>

- **AHA Stages:**
  - A: A High risk for HF but w/o structural heart disease
  - B: Structural heart disease but no other evidence of HF
  - C: Structural heart disease with prior or current HF
  - D: Refractory HF requiring specialized interventions

- **NYHA Functional Classifications:**
  - I: No limitation of physical activity (PA). Ordinary PA does not cause symptoms of HF
  - II: Slight limitation of PA. Comfortable at rest, but ordinary PA results in symptoms of HF
  - III: Marked limitation of PA. Comfortable at rest, but less than ordinary activity causes symptoms of HF
  - IV: Unable to carry on any physical activity without symptoms of HF or symptoms of HF at rest

See Appendix A For Medical Management Of Stages
### Patient Examination

<table>
<thead>
<tr>
<th>Systems Review/Test/Measures</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>History</td>
<td>Sleeping (Orthopnea/PND)</td>
</tr>
<tr>
<td>Blood Pressure, HR, Edema, RR</td>
<td>Twice/Radial/Apical/Pitting Edema/ Ausits</td>
</tr>
<tr>
<td>Lung Auscultations</td>
<td>Crackles/Increase in level</td>
</tr>
<tr>
<td>SpO₂</td>
<td>O₂ &lt;90% or decrease &gt;5%</td>
</tr>
<tr>
<td>Weight</td>
<td>Daily checks/Fluid Retention</td>
</tr>
<tr>
<td>Cardiorespiratory Fitness</td>
<td>2MST/6MWT</td>
</tr>
</tbody>
</table>

**Rehospitalization**

### Pitting Edema Scale  
(Hillegas, 2017)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1+</td>
<td>Barely perceptible pit</td>
</tr>
<tr>
<td>2+</td>
<td>Easily id. Depression (EID); rebounds to original contour 10-15 sec.</td>
</tr>
<tr>
<td>3+</td>
<td>EID (skin rebounds to it’s original contour (15-30 sec.)</td>
</tr>
<tr>
<td>4+</td>
<td>EID (rebound &gt;30 sec.)</td>
</tr>
</tbody>
</table>

Clinical Tip: Sometimes Graded As Mild, Mod., Severe But Better To Use Scale *

### Characteristic Signs and Symptoms of Heart Failure  
(Table 1)  
(Hillegas, 2017)

1. Dyspnea
2. Tachypnea
3. PND
4. Orthopnea
5. Peripheral Edema
6. Cold, pale, and possibly cyanotic extremities
7. Weight Gain
8. Hepatomegaly (tenderness on palpation/R upper quadrant of abdomen)
9. Jugular Venous Distension
10. Rales (crackles)
11. Tubular Breath Sounds and Consolidation
12. Presence of an S3 Heart Sound
13. Sina Tachycardia
14. Decreased Exercise Tolerance or Physical Work Capacity
**Outcome Measures**

![Diagram of Outcome Measures]

**Short Physical Performance Battery**

Short Physical Performance Battery (Putthoff, 2008, Pavasini, 2013)

- Assesses essential functions for independent living
- 3 Timed Tasks
  - Balance Subscale (Side-By-Side, Romberg and tandem stance; each held for 10 seconds)
  - Gait Speed (Four Meter Walk)
  - 5 Times Sit to Stand

Applicable For Patients with HF And Associated with 6MWT

**Score Classification**

<table>
<thead>
<tr>
<th>Score Classification</th>
<th>Degree of Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>Severe Limitation</td>
</tr>
<tr>
<td>4-6</td>
<td>Moderate Limitation</td>
</tr>
<tr>
<td>7-9</td>
<td>Mild Limitation</td>
</tr>
<tr>
<td>10-12</td>
<td>Minimal Limitation</td>
</tr>
</tbody>
</table>

**Key Point:** A Score Below 10 Predicts All-Cause Mortality In Different Clinical Setting And Is Independent Of Age
3/28/18

Video

2-Minute Step Test

- Imitates climbing stairs
- Validity with 6MWT in systolic HF (r = 0.45) (Wegrzynowska, 2016)
- Validity/Sensitivity with healthy population (r = 0.9; P < 0.01) (Haas, 2017)
- Related to quadriceps strength in systolic HF (r = 0.61)

Key Point: Related To Peak VO₂ And More Challenging Than 6MWT

2MST Norms (Jones, 2002)

<table>
<thead>
<tr>
<th>Age</th>
<th>Below Ave.</th>
<th>Average</th>
<th>Above Ave.</th>
<th>Age</th>
<th>Below Ave.</th>
<th>Average</th>
<th>Above Ave.</th>
</tr>
</thead>
<tbody>
<tr>
<td>60-64</td>
<td>&lt;78</td>
<td>87-115</td>
<td>&gt;115</td>
<td>60-64</td>
<td>&lt;78</td>
<td>75-107</td>
<td>&gt;107</td>
</tr>
<tr>
<td>65-69</td>
<td>&lt;87</td>
<td>86-116</td>
<td>&gt;116</td>
<td>65-69</td>
<td>&lt;73</td>
<td>73-107</td>
<td>&gt;107</td>
</tr>
<tr>
<td>70-74</td>
<td>&lt;90</td>
<td>86-110</td>
<td>&gt;110</td>
<td>70-74</td>
<td>&lt;88</td>
<td>68-101</td>
<td>&gt;101</td>
</tr>
<tr>
<td>75-79</td>
<td>&lt;93</td>
<td>75-109</td>
<td>&gt;109</td>
<td>75-79</td>
<td>&lt;88</td>
<td>68-100</td>
<td>&gt;100</td>
</tr>
<tr>
<td>80-84</td>
<td>&lt;71</td>
<td>71-103</td>
<td>&gt;103</td>
<td>80-84</td>
<td>&lt;60</td>
<td>60-91</td>
<td>&gt;91</td>
</tr>
<tr>
<td>85-89</td>
<td>&lt;59</td>
<td>59-91</td>
<td>&gt;91</td>
<td>85-89</td>
<td>&lt;55</td>
<td>55-85</td>
<td>&gt;85</td>
</tr>
<tr>
<td>90-94</td>
<td>&lt;32</td>
<td>52-86</td>
<td>&gt;86</td>
<td>90-94</td>
<td>&lt;44</td>
<td>44-72</td>
<td>&gt;72</td>
</tr>
</tbody>
</table>

Key Point: Assess BP/HR/RPE Prior And Post Test (Also, HR Recovery)
6MWT in Patients with HF (Mulgrew, 2018)

- Average of 310-427 m depending on severity of HF
- Distance inversely related to NYHA Functional Class
- 4-6 fold chance of death within 12 months if walks less than 218 m
- MCID = 45 m (147.6 feet)

Key Point: Assess BP/HR/RPE Prior And Post Test (Also, HR Recovery)

Kansas City Cardiomyopathy Questionnaire (KCCQ) (Joseph, 2013)

- 23-item self-administered instrument
- Physical Function, Symptoms, Social Function, Self-Efficacy, Knowledge, Quality of Life
- 0-100 with higher scores reflecting better health status
- Need Permission to use this test

Kansas City Cardiomyopathy Questionnaire (KCCQ) (CVO, 2017)

Mean Difference Of 5 Points = Clinically Significant Change In HF Status

10-Point Increase In Overall Summary Score = 12% Decrease In Hazard Of Death/Hospitalization

KCCQ 2.4X More Sensitive To Change Than Minnesota Living With Heart Questionnaire Or SF-12
Hmmm….Still Hanging In?

Strategies To Help Prevent Rehospitalization

- Aerobic
- Resistive
- Balance
- Grip Strength
- BP and HR
- Medication
- Zones
- Technology (not nurses)
- Smoking, BP Activity, Weight, Diet, Cholesterol, BG
- Acute Care-Rehab-Homecare-Outpatient
- Frequency, Intensity, Time, Type

Communication With Your Team Is The Most Important Strategy!
44% Ind. With HF Report Poor Communication with Providers and 42% Have Limited Health-Related Knowledge.

Be Active: Aerobic Exercise (Keteyian, 2010)
HF Is Also A Skeletal Muscle Dysfunction

<table>
<thead>
<tr>
<th>FITT</th>
<th>Frequency, Intensity, Time, Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>3-5 times per week</td>
</tr>
<tr>
<td>Intensity</td>
<td>Rate of Perceived Exertion (11-13 or 3-4), Talk Test (Appendix B)</td>
</tr>
<tr>
<td>Time</td>
<td>30-60 min, starting with intermittent bouts of 3-5 minutes</td>
</tr>
<tr>
<td>Type: Aerobic</td>
<td>Intervals (1:2 work/rest), continuous (walking, treadmills, bike, NuStep), 2 Minute Step Test</td>
</tr>
<tr>
<td>Warm-up and Cool-down</td>
<td>8-10 minutes</td>
</tr>
</tbody>
</table>

**Make Sure Your Patient Is Hemodynamically Stable And Safe To Exercise (Please See Appendix C)**
Significance of Improved Cardiorespiratory Fitness in Individuals with HF (Ross, 2016)

Take Home: Slight Improvement Makes a Difference

Clinical Tip: Patients with an ICD, Know Activation Threshold; Exercise HR Should Be At Least 10-15 BPM Below Threshold Rate

Be Active: Resistance Exercise Prescription (Williams, 2010)

<table>
<thead>
<tr>
<th>Frequency</th>
<th>2-3/wk.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensity</td>
<td>40-50% 1RM-progress to 70% 1RM</td>
</tr>
<tr>
<td>Sets</td>
<td>Start with 1-progess to 2</td>
</tr>
<tr>
<td>Reps</td>
<td>10-15</td>
</tr>
<tr>
<td>Rate</td>
<td>3 sec concentric-3 sec eccentric (Don't Hold Breath)</td>
</tr>
<tr>
<td>Type</td>
<td>Circuit 8-10 mm groups**avoid isometric</td>
</tr>
</tbody>
</table>

*An Aerobic Program Should Be Started Prior To Starting A Resistive Program

Sample Circuit

Program
- 2X Week
- Small Bouts
- Work/Rest Ratio

Goal 11-13/20 RPE or 55-75 HRR

Need To Monitor
*See Appendix B

Assessment Tool
Self-Assessment Scale

Circuit Style Program: Sustained Engagement
Be Active: Grip Strength

<table>
<thead>
<tr>
<th>Age</th>
<th>Norms, dominant hand (mean in kg)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Man</td>
</tr>
<tr>
<td>50-54</td>
<td>50.8</td>
</tr>
<tr>
<td>55-59</td>
<td>53.6</td>
</tr>
<tr>
<td>60-64</td>
<td>47.9</td>
</tr>
<tr>
<td>65-69</td>
<td>43</td>
</tr>
<tr>
<td>70-74</td>
<td>41.7</td>
</tr>
<tr>
<td>75-79</td>
<td>36.8</td>
</tr>
<tr>
<td>80-84</td>
<td>30.7</td>
</tr>
<tr>
<td>85+</td>
<td>27.6</td>
</tr>
</tbody>
</table>

Grip Strength is a good indicator of overall strength in the elderly (JAMA, 1999)

Grip Strength < 28.5 kilogram in men and < 18.5 in women = Independent Risk Factors For Hospitalization in HF (Chaudhry, 2013)

Self-Management

- “Active role rather than passive recipients of care”
- Grounded by theoretical framework of self-efficacy (Wright, 2003)

AHA (http://www.heart.org/HEARTORG/Conditions/HeartFailure/Heart-Failure-Guidelines-Toolkit_UCM_491412_SubHomePage.jsp)

Self-Management

A 65 year-old male with NYHA Classification II HF was recently d/c to home. On your first visit, what would your top three priorities be for self-management?

NYHA II: Slight limitation of PA. Comfortable at rest, but ordinary PA results in symptoms of HF
Self-Management: Fluid Retention

- Daily Weight Checks (same time, same type of cloth, prior to exercising)
- Check for swelling in ankles
- Are you more short of breath
- Are you having trouble sleeping?
- Coughing/crackles? (Yes,)

Set Weekly Goals That Are Attainable And Make Yourself Accountable. Use Teach Back Method

Self-Management: Blood Pressure

- Check BP regularly
- Know your numbers
- Automated Blood Pressure Cuff
- Use journal to record
- Bring journal to Dr.

Major Risk Factor For Stroke, Coronary Artery Disease, Kidney Disease
Affects 29% of U.S. Population/22% Are Unaware They Have High BP

New Blood Pressure Guidelines For Adults (Whelton, 2017)

<table>
<thead>
<tr>
<th>BP Category</th>
<th>SBP</th>
<th>DBP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;120 mm Hg</td>
<td>&lt;80 mm Hg</td>
</tr>
<tr>
<td>Elevated</td>
<td>120-129 mm Hg</td>
<td>&lt;80 mm Hg</td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage 1</td>
<td>130-139 mm Hg</td>
<td>80-89 mm Hg</td>
</tr>
<tr>
<td>Stage 2</td>
<td>≥140 mm Hg</td>
<td>≥90 mm Hg</td>
</tr>
</tbody>
</table>

* Individuals with SBP and DBP in 2 categories should be designated to the higher BP category

Key Clinical Point: BP indicates Blood Pressure (Based on Average of ≥ 2 Careful Readings Obtained on ≥ 2 Occasions)
Heart Rate

Radial pulse for 60 seconds

Importance of instructing your patient?

- Significance: Stroke and Secondary Stroke, HF
- HF and A-Fib often co-exist
- PT Role?
- Age-related maximum heart rate (ARMHR)

A HR Recovery of ≤12 bpm at 1-minute post exercise is prognostic of survival in patients with HF (Guazzi, 2010)

How often are we assessing this?

Clinical Tip: Check HR Manually And Teach Patient To Take Pulse (Self-Management)

Self-Management: Medication

- Take your medications!
- Know your medications
- Triple Cocktail for HF
  - Beta Blockers
  - Ace Inhibitors
  - Diuretics

Clinical Tip: Monitor Adherence To Prescribed Medications

Triple Cocktail

- Beta Blockers (olol)
  - Lowers HR, SBP
  - S E: Fatigue, weakness, tired, depression, edema

- ACE (prils)
  - Treat HF and high BP

- Diuretics (ties, ones)
  - High BP edema
  - S E: Dehydration, dizziness, weakness, muscle cramps

Inform Dr. and Health Care Professionals Of Side Effects
CardioMEMS HF System

Self-Management of Pulmonary Pressure Via Telehealth

Truth Is, It's Not That Simple! As A Health Care Professional, Be Intentional In Addressing Them!

Care Across the Continuum

Outpatient Cardiac Rehab For HF Is Covered For Stable Class III/IV
Bottom Line/Summary

The Balance of Compensating VS. Decompensating Heart Failure

Decompensating

Compensating

Exam/Assess, S/S,
Exercise, Self-
Management, Team
Work.

New or Worsening
of S/S (rise↑)

"Teach-Back" Method Was Associated With Associated With Greater Recall And A
Decrease In Hospital Re-admissions For Individuals With HF. (White, 2013)

Thank You/Questions!

Be Attentive, Be Receptive; Be A Better PT
Appendix A
Medical Management of HF Based on Stages

Medical Management
Stage A (Yancy, 2013)

• Goal: Primary Prevention
• Address Risk Factors
• Hypertension, DM, Metabolic Syndrome, Atherosclerotic Disease, Hypertension

Clinical Tip: Always Monitor BP and Teach Patient to Self-Monitor

Medical Management of Stage B HFrEF (Yancy, 2013)

• Goal: Treatment of specific structural abnormalities
• Examples could include Percutaneous interventions or bypass surgery to treat CAD
• Medications
  • ACE inhibitors, Beta Blockers, Statins
  • BP control
  • ICD Therapy
• Exercise
Medical Management
Stage C HFrEF (Yancy, 2013)

- Goals: Reduce morbidity and mortality
- Continued interventions for Stages A and B
- Education on self-care with HF
- Symptom Management (Diuretics)
- Exercise: Directed at HF

Medical Management
Stage C HFpEF (Yancy, 2013)

- Risk Factor Management
  - Hypertension
- Symptom Management (Diuretics)
- Comorbidity Management (A-fib, CAD, DM)
- Exercise directed at the HF
- **Outcomes have been better for patients with HFrEF rather than those with a diastolic dysfunction**

Medical Management
Stage D (Yancy, 2013)

- Continued interventions from Stages A, B, C
- For HFrEF
  - Options may be inotropic support, bridge to transplantation, mechanical circulatory support, evaluation for heart transplant
- Fluid Restriction 1.5-2 L/day
- Palliative Care
- Exercise: improving VO2 and QoL
Appendix B
Monitoring

Rate of Perceived Exertion

<table>
<thead>
<tr>
<th>Modified Scale</th>
<th>Ordinary Scale</th>
<th>Rate of Effort Scale</th>
<th>Talk Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>20% effort</td>
<td>Very, very light</td>
<td>Rest</td>
</tr>
<tr>
<td>2</td>
<td>30% effort</td>
<td>Very light</td>
<td>Gentle walking or &quot;strolling&quot;</td>
</tr>
<tr>
<td>3</td>
<td>40% effort</td>
<td>Fairly light</td>
<td>Steadily pace, not breathless.</td>
</tr>
<tr>
<td>4</td>
<td>50% effort</td>
<td>Fairly hard</td>
<td>Brisk walking, able to carry on a conversation</td>
</tr>
<tr>
<td>5</td>
<td>60% effort</td>
<td>Very hard</td>
<td>Unable to talk and keep your pace</td>
</tr>
<tr>
<td>6</td>
<td>70% effort</td>
<td>Moderately hard</td>
<td>Very brisk walking, must take a breath between groups of 4-5 words</td>
</tr>
<tr>
<td>7</td>
<td>80% effort</td>
<td>Hard</td>
<td>Very, very difficult</td>
</tr>
<tr>
<td>8</td>
<td>90% effort</td>
<td>Very, very hard</td>
<td>Exhaustion</td>
</tr>
</tbody>
</table>

Heart Rate Recovery (HRR)

- HR should decrease 12 bpm 1 min after maximal exercise
  (peak HR - 1 minute sitting down recovery)

- HR should decrease 42 bpm 2 min after submaximal exercise

- Poor recovery associated with CAD, mortality (Cole et al, 2000)

- HRR significant predictor in cardiac death in patients with HF(<170 bpm) (Guazzi et al, 2008)
Appendix C
Contraindications To Exercise

Contraindications To Exercise

Stage D HF, NYHA Class IV Symptoms
Unstable angina
Signs of acute cardiac decompensation such as a 1.8 kg or more increase in body mass or
worsening dyspnea over the previous 1-3 days
A-Fib with a poorly controlled or uncontrolled ventricular response
Complex arrhythmia at rest or one that increases with severity with exercise
Severe pulmonary hypertension.
Uncontrolled HTN
Symptomatic orthostatic BP drop of > 20 mm Hg

Contraindications to Exercise

(CSM, 2014)

Aortic dissection
Uncontrolled Metabolic Conditions
Moderate to severe aortic stenosis
Active pericarditis or myocarditis
Recent embolism
Thrombophlebitis
Significant ischemia at ± 2 METs of work
Co-morbidity that prevents exercise prescription
References

References

References