A Rehab Therapy Approach to Managing the Post Acute Heart Failure Patient

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Objectives

• Identify vesicular, abnormal and adventitious heart and lung sounds
• Describe appropriate tests and measures used for diagnosis of heart failure
• Demonstrate standardized scales used to assess a patient with heart failure and how to integrate into treatment
• Discuss three standardized assessment strategies for the patient with heart failure
Objectives

• Discuss three important pieces of the treatment plan for the patient with heart failure
• Describe basic concepts of the medication regimen for a patient with heart failure
• Discuss appropriate Hospice referral based on qualifying criteria
Why is this important?

- 5.7 million adults in U.S. have HF
- About half that develop HF will die within 5 years

- Total cost for health care, medication, days of work missed, etc =

$30.7 BILLION
Know the Flow

1. De-oxygenated blood body -> heart through SUPERIOR/INFERIOR VENA CAVA
2. Into the RIGHT ATRIUM
3. Atrium contracts and blood goes through TRICUSPID VALVE
4. Into RIGHT VENTRICLE
5. Ventricle contracts and blood goes through PULMONARY VALVE
6. Into PULMONARY ARTERY out to the lung for oxygenation
7. Oxygenated blood comes back into the heart via the **PULMONARY VEIN**
8. Into the **LEFT ATRIUM**
9. When the atrium contracts the blood goes through the **MITRAL VALVE**
10. Into the **LEFT VENTRICLE**
11. When the ventricle contracts the blood goes through the **AORTIC VALVE**
12. Into the **AORTA**, carrying oxygenated blood to the body

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**Let's Listen**

- **Healthy Heart: S 1 and S 2**
  - The heart contracts from bottom up
  - S 1 = Mitral and Tricuspid valves closing
  - S 2 = Pulmonary and Aortic valves closing
Where do you listen?

• For S1 and S2:
  • Right side of sternal border
  • Second intercostal space
  • “lub” .. “dub”

• [http://www.easyauscultation.com/heart-sounds](http://www.easyauscultation.com/heart-sounds)
Rule out any myths

• Doesn’t mean:
  • The heart has stopped or will stop right away
  • This is not an electrical problem in and of itself – a.k.a. not an arrhythmia
  • This is not an issue with the coronary arteries: RCA, LAD, circumflex

CHF vs HF

• Congenital – minority of cases
• Congestive – some cases
• Therefore “Heart Failure”
  • Acute on Chronic
  • Chronic Diastolic
  • Chronic Systolic
  • Left side failure
  • Right side failure
What is HF?

• Chronic, progressive disease
• Heart cannot meet the Cardiac Output demand of the body
• Usually results in an enlarged heart

**American Heart Association – Watch, Learn and Live Library**
http://watchlearnlive.heart.org/CVML_Player.php?moduleSelect=hrtflr

Dig Deeper!

The beginning:
• The heart is weakened by disease or injury and the ventricle is stretched/dilated so far that it can’t efficiently contract/pump blood out to the body
OR
• The ventricle is made stiffer by disease or injury, and it cannot relax enough during diastole to fill fully between beats
What causes HF?

**Difficult to change**
- CAD
- MI
- HTN
- DM
- Myocarditis
- Valve Disease

**Easier to Change**
- Smoking
- Eating foods high in cholesterol, fat, and sodium
- Sedentary life style
- Obesity

Posteriors/Septal MI
Dig Deeper! – Forward Flow

Continuing Failure
• Ejection Fraction may be effected

EF = is the measure of blood leaving the left side of the heart vs. the amount remaining in the L ventricle. (LVEF)

Normal = 50-65% depending on source

Dig Deeper! – Forward Flow

Continuing Failure
• As the heart works harder to pump, it is a muscle, so it will get

B I G G E R

Bigger IS NOT Better!!!
Smaller area for blood to fill – less capacity
• Requires more pressure for the valves to open to push the blood into the ventricle

Dig Deeper!

Continuing Failure
• If the heart walls cannot produce the pressures in the chambers and vessels to keep the blood moving forward, it will move:
  BACKWARDS

Think about our frozen pipes!
Dig Deeper! – Backwards Flow

**Continuing Failure**
- Edema may be seen, a.k.a. congestion

- What is back stream on the Left?
  - Lungs

- What is back stream on the Right?
  - Kidney, Liver, Abdominal Cavity (Ascites)
  - Neck, Brain
  - Lower Extremities, Upper Extremities

Dig Deeper! – Backwards Flow

What is this congestion?
- Is it blood?
- Is it interstitial fluid?
- Is it something else?

**IT DEPENDS!!**
### Types of Heart Failure

<table>
<thead>
<tr>
<th>Types of Heart Failure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left-Sided HF</td>
<td>Fluid may back up in your lungs causing shortness of breath</td>
</tr>
<tr>
<td>Right-Sided HF</td>
<td>Fluid may back up into your abdomen, legs and feet, causing swelling</td>
</tr>
<tr>
<td>Systolic HF</td>
<td>The left ventricle can’t contract vigorously, indicating a pumping problem</td>
</tr>
<tr>
<td>Diastolic HF (also called HF with preserved EF)</td>
<td>The left ventricle can’t relax (i.e. fill) fully, indication a filling problem</td>
</tr>
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</table>

### Let’s Listen

- **Heart Failure: S 3**
  - Occurs right after the S 2 in a patient with HF if congestion is present.
  - “ken-tu-CKY” “CKY” = S3
  - Caused by the extra blood staying in the ventricle
Where do you listen?

- For S3:
  - Left side of sternal border
  - Fifth intercostal space
  - “lub”….“dub”..”DUB”
  - [http://www.easyauscultation.com/heart-sounds](http://www.easyauscultation.com/heart-sounds)

Why do we listen to lungs?

- Left-sided heart HF comes first
- Backs up “into” lungs, really???

- NO:
  - Oxygenated blood flows back instead of forward
  - All HgB are full, but body is O2 deprived
  - The enlarging heart encroaches on the small pleural cavity
  - The enlarged vessels can squeeze fluid into that pleural cavity
Pleural Cavity

Where do you listen?

DIAPHRAGM
- Attaches at:
  - Rib 6
  - Rib 8
  - T10
Where do you listen?

http://www.easyauscultation.com/heart-sounds

Now you just listen to the posterior side; bilaterally. And denote how far up you hear crackles.

Test and Diagnosis
Diagnostic Tests

• Labs: BNP
  • Measures the level of B-type Natriuretic Peptide in the blood
  • Secreted when pressures are changed in the heart due to damages
  • Normal:
    • <125 pg/ml 0-74 y/o
    • <450pg/ml 75-99 y/o
  • Indicative of HF:
    • >450pg/ml under 50 y/o
    • >900pg/ml 50 and older

Diagnostic Tests

• Chest X-Ray
  • See the enlarged heart
  • Fluid build up around lungs
Diagnostic Tests

• EKG
  • HF is not an electrical problem
  • There could be underlying problems that weakened heart

![EKG Images](image)

Diagnostic Tests

• Echocardiogram
  • Transthoracic
  • Transesophageal (TEE)

• Measures
  • EF
  • Filling problem (diastolic HF) vs. Pumping problem (systolic HF)
  • Size of the heart, walls, circumference
  • Condition of valves
Echo

Diagnostic Tests

- Other valuable tests:
  - Coronary angiogram
  - Myocardial biopsy
  - Stress test
**NY HF Classification**

<table>
<thead>
<tr>
<th>Class</th>
<th>Patient Symptoms</th>
</tr>
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<tbody>
<tr>
<td>I</td>
<td>No limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, dyspnea (shortness of breath).</td>
</tr>
<tr>
<td>II</td>
<td>Slight limitation of physical activity. Comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnea (shortness of breath).</td>
</tr>
<tr>
<td>III</td>
<td>Marked limitation of physical activity. Comfortable at rest. Less than ordinary activity causes fatigue, palpitation, or dyspnea.</td>
</tr>
<tr>
<td>IV</td>
<td>Unable to carry on any physical activity without discomfort. Symptoms of heart failure at rest. If any physical activity is undertaken, discomfort increases.</td>
</tr>
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<tr>
<th>Class</th>
<th>Objective Assessment</th>
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<tbody>
<tr>
<td>A</td>
<td>No objective evidence of cardiovascular disease. No symptoms and no limitation in ordinary physical activity.</td>
</tr>
<tr>
<td>C</td>
<td>Objective evidence of moderately severe cardiovascular disease. Marked limitation in activity due to symptoms, even during less-than-ordinary activity. Comfortable only at rest.</td>
</tr>
<tr>
<td>D</td>
<td>Objective evidence of severe cardiovascular disease. Severe limitations. Experiences symptoms even while at rest.</td>
</tr>
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**Standardized Scales**
Standardized Scales - RPE

• RPE Scale – Measures Exertion (App A)
  • Generally never over
    • Borg – 13
    • Modified – 6

• May be best to use if primary complaint = fatigue

Standardized Scales - Dyspnea

• Scales(App B):
  • ACS M Dyspnea – subjective rating
  • Ventilatory Response Index – objective rating

• May be best to use if primary complaint = shortness of breath
Standardized Scales - Angina

- ACSM Angina Scale (App C)
  - 1-4 scale
  - Recommended to stop at 2, but can go to 3 depending on how stable the angina
  - If angina does not subside, begin NTG protocol
  - This is important if MI was the original cause of injury that precipitated HF

Standardized Scales - IC

- ACSM Intermittent Claudication Scale (App D)
  - 1-4 scale
  - Recommended to stop at 2, but can go to 3 depending on how stable the level and tolerance to pain
  - This is important if vessel disease was the original cause of injury that precipitated HF
Assessment

- Full set of vitals every visit:
  - BP
  - HR and PR
  - Temp
  - RR
  - Heart and Lung sounds
  - What is the most important biometric for this patient?

WEIGHT
**Assessment - WEIGHT**

- Where will weight accumulate FIRST?
  ASCITES – in the mid-section!!!

- “How do your pants fit today? Are they any tighter than usual?”

**Assessment - WEIGHT**

M1060 Height and Weight:
- Has to be done on the SOC/ROC visit
- Can’t be taken from the hospital/SNF/rehab paperwork
- Can’t be self reported from the pt

ADMITTING CLINICIAN HAS TO DO AT THAT VISIT!!!
Assessment - WEIGHT

• Where will weight accumulate NEXT?
  JVD – in the neck!!!

• You will assess the level of JVD

• Direct correlation between pressure in J V and pressure in R side of heart

Assessment – WEIGHT - JVD
Assessment - WEIGHT

• Where will weight accumulate LAST?
The extremities – especially the feet/ankles

• It will be:
  • Bilateral
  • Pitting
  • Can measure the duration and the severity

Assessment – LE Edema

<table>
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<tr>
<th>Grade</th>
<th>Definition of Duration</th>
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</thead>
<tbody>
<tr>
<td>1+</td>
<td>2mm or less: slight pitting, no visible distortion, disappears rapidly</td>
</tr>
<tr>
<td>2+</td>
<td>2-4 mm indent: somewhat deeper pit, no readably detectable distortion, disappears in 10-25 seconds</td>
</tr>
<tr>
<td>3+</td>
<td>4-6mm: pit is noticeably deep. May last more than a minute. Dependent extremity looks swollen and fuller</td>
</tr>
<tr>
<td>4+</td>
<td>6-8mm: pit is very deep. Lasts for 2-5 minutes. Dependent extremity is grossly distorted</td>
</tr>
</tbody>
</table>
Assessment – LE Edema

<table>
<thead>
<tr>
<th>Grade</th>
<th>Definition of Severity</th>
</tr>
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<tbody>
<tr>
<td>1+</td>
<td>Mild: both ankles/feet</td>
</tr>
<tr>
<td>2+</td>
<td>Moderate: both feet, ankle, lower legs. And lower arms</td>
</tr>
<tr>
<td>3+</td>
<td>Severe: generalized bilateral pitting edema, including both legs, arms, feet, and face</td>
</tr>
</tbody>
</table>

Assessment – Aerobic Capacity

- Balance and MMT – OK
- Aerobic Capacity is the meat and potatoes:
  - 6MW
  - Symptom limited TM
  - Symptom limited bike
Assessment – Aerobic Capacity

- **PRE-TEST**
  - Heart and Lung sounds
  - Warm up 5-7 min
  - Test
    - Heart and Lung sounds
  - Cool down 5-7 minutes
    - Heart and Lung Sounds

**DID YOU SEND THEM INTO MORE FAILURE?**

Assessment – Aerobic Capacity

- If no: great you can build your HEP from there
- If yes: you need to start HEP at lower level

Example: Mrs. Smith is Class II HF patient and prior to 6MW you did not hear any crackles in her lungs and no S3. After 5 min warm up, she was able to walk 2 min x 2 with 35 sec rest break x 1 and after second walk she sat until 6 min mark. After test you noted that S3 is now present and crackles are ½ way up the lung field. After 7 minutes of cool down, S3 is gone, but crackles are still present 1/3 way up lung field, pt is still a 4 on modified RPE. At 5 min post test, pt reports she is 1 on modified RPE, still slight crackles in lowest part of lungs but Mrs. Smith appears clinically to be back at pre-test level.
Assessment – Aerobic Capacity

Test: 2 min x 2, 35 sec rest x 1 and then sat rest of test

What should her prescription be:

General Rule

Start Low, Go Slow
Goals - FUNCTIONAL

Start Low, Go Slow

- Goal 1: Patient able to demo improved functional aerobic tolerance as evidenced by ability to shower with RPE score of __/10 and VSS in 6 weeks.
- Goal 2: Patient to tolerate 10 minutes of dynamic standing activity with ACSM dyspnea scale score of__/4 and vital signs stable to simulate improved aerobic tolerance for walking to mailbox, in 4 weeks.
Treatment – Food for thought

• SHORT intervals, MULTIPLE times per day!!!
• Use the diary for accountability
• Praise small progress; it will be a slow process
• We cannot fix the heart but can make the whole pump more efficient!
• Be ok with just educating if they are having a “bad” day

Treatment – Exercise

WARM UP and COOL DOWN ARE ESSENTIAL!!!!
Treatment – Exercise

- Make sure to do **strength and aerobic both**, not one or the other

- Strength - concentrate on the big muscle grps
  - Supine program for bad days
  - Seated program for moderate days
  - Standing program for GOOD days

Treatment – Exercise

- Make sure to do **strength and aerobic both**, not one or the other

- Aerobic:
  - Advance your test tool
  - Restorator
  - Utilize the patient goal
Treatment – Managing SOB

- Pursed Lip Breathing
  - In through nose (smell the flower)
  - Out through **PURSED LIPS** (like blowing a kiss)
  - Exhale to Inhale ratio is 2:1
  - You can incorporate diaphragm if it is viable
  - Why do it?
    - Keeps air in lungs longer for gas exchange
    - Provides positive pressure to pop open any closed alveoli
    - Is proven to bring BP/HR/RR down (i.e., relaxation) if done progressively slower

- Is a learned skill!
- Teach in supine->sit ->stand->walking->functional mobility
- Will need repeated training for carry over from all disciplines!!
- You can use Sniffing as a technique to cue PLB
Sniffing as a treatment for controlled deep breathing (diaphragmatic if possible, otherwise just PLB)

- Position the patient for success and keep your voice quiet
- Ask the patient to place a hand on the lowest point of breathing
- Quietly ask patient to sniff 3 times
- Draw attention to the patient’s pattern of breathing and what you would like the pattern to be with verbal or tactile cues
- Have them sniff 3 times again, then “let it out slowly”.
- Now “sniff in twice and a little deeper”, note any increase in chest wall excursion
- Continue to “one long, slow sniff”, then “more quietly”, then “more slowly”, and “even quieter”, etc…
- In the end, you are getting quality PLB, with prolonged time for gas exchange and maximizing exhale
- Also works as a relaxation technique

Pursed Lip Breathing (PLB) - Devices

- Bubbles!
- Pinwheels!!
- Kazoos!!
Breathlessness Positions

• Breathlessness Positions
• Remember the diaphragm has 2 jobs
  • Posture
  • Breathing
• Purpose of Breathlessness Positions is to eliminate the postural role so that patient can just use diaphragm, or chest wall muscles, to breathe
• Use in conjunction with PLB

Breathlessness Positions

Any position that allows the diaphragm to only work on breathing, doesn't have to do posture also.
Treatment – Education

- What is HF
- Low sodium diet
- Take medication even when you feel good
- Weigh every day – after you pee, before you eat
  - Generally: call if you gain 2lbs in 24hrs or 5lbs in a week
  - Help them understand the use of the O2

Treatment – Education

- Utilize the HF ZONE TOOL to help patient/caregiver learn self-management (App F)
  - Green
  - Yellow
  - Red
Medications

• ACE Inhibitors: vasodilator
  • Lowers BP, improves blood flow and decreases work load on the heart
  • E.g. Enalapril, Lisinopril, Captopril

• Angiotensin II Blockers: these act in the same way as ACE inhibitors and are for pts that cannot tolerate ACE inhibitors
  • E.g. Cozaar, Diovan
Medications

• Beta Blockers:
  • Slows the heart rate, reduces blood pressure
  • May also limit or reverse some of the damage to the heart caused by Systolic HF
  • Reduce risk of some abnormal rhythms
  • E.g. Carvedilol (Coreg), metoprolol (Lopressor), bisoprolol (Zebeta)

Medications

• Diuretics:
  • Make you urinate more often to avoid fluid build up
  • E.g. Lasix, furosemide
  • Once the pt cannot tolerate these there are more potassium-sparing versions
    • Aldactone, Inspra
Medications

• **Inotropes**
  - Infused drugs to help improve heart function and maintain blood pressure
  - Usually administered in the hospital for the first time

  • **Digoxin (Lanoxin):**
    - Increases the strength of the hearts contractions
    - Slows the heart rate
    - Reduces Systolic HF symptoms

Other Medical Treatments

• **CABG, with or without valve repair**
• **Pacemaker or defibrillator implants**
• **CRT: Cardiac resynchronization therapy**
• **LVAD**
• **Transplant**
• **End of Life Care**
Consider Hospice Referral

• This is a progressive disease, we want to help pt/family meet their goals through all stages of the diseases

• Comfort and symptom management become the number one goal towards the end stages and we can provide that in the home through Hospice!
Consider Hospice Referral

• It is not an exact science but some common indicators that pt will qualify for Hospice include
  • Decreasing serum albumin or cholesterol
  • Dysphagia leading to recurrent aspiration pneumonia and/or inadequate intake
  • Dyspnea with increasing resp rate
  • Intractable coughing
  • Intractable nausea, vomiting, diarrhea
  • Pain requiring increased use of major analgesics more than before
  • Progressive pressure ulcers

You documentation of decline rather than progress will also help Hospice CM determine appropriateness
Case Studies

Questions
Nikki Krueger, PT, COS-C
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References:

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