EXERCISE PRESCRIPTION: Just do it! Effective therapy for chronic medical problems

SGIM National Meeting
April 25, 2013
Heidi Powell, MD
Deb Greenberg, MD
University of Washington
Workshop Objectives

1. Understand the overall long-term health benefits of exercise, physical activity, and cardiovascular fitness

2. Know the amount and type of exercise studied for specific medical problems including diabetes, cardiovascular disease, osteoarthritis, and depression

3. Know how to personalize an exercise prescription for patients based on their medical problems, functional abilities, and goals.
Almost 50% of US adults have one or more chronic medical problems

Hypertension
CAD
Cerebrovascular disease
Diabetes
Obesity (>30% of adults)
Metabolic Syndrome
Hyperlipidemia
Benefits of Exercise

Improves:
- Mood
- Blood sugar control
- Lipid profile
- Stamina and muscular strength
- Balance
- Energy level
- Sleep

Reduces:
- Mortality
- Cognitive decline
- Development of osteoporosis
- CV events
- Blood pressure
- Symptoms of osteoarthritis
Benefits of Exercise

Lowers risk of:

- Breast cancer
- Colon cancer
- Lung cancer
- Endometrial cancer
- Hip fracture
Physical activity as compared with inactivity is associated with:

- 33% lower risk of overall mortality
- 35% lower risk of CVD mortality

Lack of activity destroys the good condition of every human being, while movement and methodical physical exercise save it and preserve it.

Plato
Exercise Recommendations

American Heart Association, CDC, US Department of Health and Human Services, and WHO recommend:

- ≥ 150 minutes per week of moderate exercise or 75 minutes per week of vigorous exercise

- Strengthening activities that are moderate or high intensity and involve all major muscle groups on 2 or more days a week
How well are we doing?

- Less than 10% of the adult population achieves the 150 minutes a week of moderate exercise.

- Self reported estimates of physical activity are 6-fold greater than objective measures.

- In 2010, only about 1/3 of patients were advised by their health care provider to increase their physical activity

NCHS Data Brief. 2012;86:1-8
Types of exercise

Aerobic and Resistance Training
Aerobic Exercise

Aerobic exercise is any activity:

- that uses large muscle groups
- can be maintained continuously for extended periods of time
- and is rhythmic in nature
Types of Aerobic Exercise

- Walking
- Bicycling
- Running
- Rowing
- Swimming
- Basketball
- Soccer
- Cross country skiing
- Jump rope
- Stationary bike
- Elliptical
- Treadmill
- Stairmaster
- Tennis
### Moderate vs. Vigorous Aerobic Exercise

<table>
<thead>
<tr>
<th></th>
<th>Moderate</th>
<th>Vigorous</th>
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<tbody>
<tr>
<td>Breathing and speaking</td>
<td>• Working hard enough to raise your heart rate and break a sweat&lt;br&gt;• Can still talk</td>
<td>• Breathing hard and fast&lt;br&gt;• Unable to say more than a few words without pausing for a breath</td>
</tr>
<tr>
<td>Maximum Heart Rate MHR= 220-age</td>
<td>• 55-70 percent of MHR</td>
<td>• 70-90 percent MHR</td>
</tr>
<tr>
<td>METS=Metabolic Equivalents</td>
<td>• 3-6 METS</td>
<td>• &gt;6 METS</td>
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</table>

One MET is defined as 1 kcal/kg/hour and is roughly equivalent to the energy cost of sitting quietly.
Moderate vs. Vigorous Exercise

- Walking at a moderate or brisk pace of 3 to 4.5 mph on level ground
- Walking—5 mph or faster
- Jogging or running
- Wheeling your wheelchair
- Walking and climbing briskly up a hill

http://www.cdc.gov/nccdphp/dnpa/physical/pdf/PA_Intensity_table_2_1.pdf
Moderate:

- Gardening and yard work: raking the lawn, bagging leaves, digging, planting trees and stacking wood
- Pushing a power lawn mower or tiller

Vigorous:

- Gardening and yard work: heavy or rapid shoveling or carrying heavy loads
- Hand-splitting logs or trimming trees
- Using a push-mower
Resistance training

Strength training is the use of resistance to induce muscular contraction which:
- Builds strength
- Increases anaerobic endurance
- Increases the size of skeletal muscles

Isotonic
Moving a joint/muscle through a range of motion
Ex. lifting and lowering a dumbbell in a biceps curl

Isometric
Muscle contraction in a static position
Ex. Holding a weight in a fixed position or pushing against a wall
Equipment used in resistance training

- Calisthenics
- Elastic bands
- Cuff/hand weights
- Dumbbells
- Free weights
- Wall pulleys
- Weight machines
Exercise Prescription

Exercise prescription should specify:

- Frequency (F)
- Intensity (I)
- Time (T)
- Type (T)
- Progression (P)
Exercise Prescription

For aerobic exercise:
F: 3-5 days/wk
I: 50-80 percent of MHR
T: 20 minutes
T: Walking

P: Increase to 30 minutes after 6 weeks
Exercise Prescription

For resistance exercise:
F: 2-3 days/wk
I: 8-10 repetitions per set to moderate fatigue
T: 1 set of 8-10 different upper and lower body exercises
T: Calisthenics

P: Increase to 10-15 repetitions after 4 weeks
Walking is the best possible exercise. Habituate yourself to walk very fast.

Thomas Jefferson
Case 1

A 61 year old woman was discharged from the hospital 2 days ago for a NSTEMI.

-Hyperlipidemia
-Hypertension
-No heart failure. Nonsmoker.
-Meds: aspirin, pravastatin, lisinopril, metoprolol

BP 153/73
What do you recommend?

A. Rest for the next 1-2 weeks and then start a graded exercise program
B. Start a cardiac rehab program now
C. Titrate her lisinopril until sys BP is <140 and then start a graded exercise program
D. Rest for 1-2 weeks then start cardiac rehab
What do you recommend?

A. Rest for the next 1-2 weeks and then start a graded exercise program
B. Start a cardiac rehab program now
C. Titrate her lisinopril until sys BP is <140 and then start a graded exercise program
D. Rest for 1-2 weeks then start cardiac rehab
Cardiac Rehab

- CHD is the leading cause of death for both men and women in the US.

- Meta-analyses of RCTs have consistently shown that participation in Cardiac Rehab programs improves mortality and morbidity outcomes.
What is Cardiac Rehab?

A 12 week program (36 visits) with a focus on exercise training.

- Symptom-limited exercise testing prior to participation
- Risk stratify to determine the level of supervision and monitoring during exercise training
- Individualized exercise prescription for aerobic and resistance training based on risk stratification and co-morbidities
Indications for Outpatient Cardiac Rehab

Covered by Medicare and most insurance plans:

- Post–MI and acute coronary syndrome
- Post–coronary artery bypass grafting
- Post–percutaneous coronary intervention
- Stable angina pectoris
- Valve replacement/repair
- Heart or heart/lung transplant
Other Benefits of Cardiac Rehab

- Decreases depression
- Improves aerobic and functional capacity
- Decreases frailty
- Improves lipids, blood pressure, and glucose control
- Helps with weight reduction
- Reduces hospitalization
Cochrane Systematic Review and Meta-analysis

- 10,794 patients from 47 RCTs
- Follow up > 6 months
- Secondary prevention
- Cardiac rehab program vs. usual care
Cardiac Rehab vs. Usual Care

At 12 or more months follow-up, exercise-based cardiac rehabilitation reduced:

- Overall mortality by 13%  RR 0.87  (CI 0.75-0.99)
- CV mortality by 26%  RR 0.74  (CI 0.63-0.87)
- Hospital admissions by 31%  RR 0.69  (CI 0.51-0.93)
43,193 participants from 11 RCTs comparing statin vs. placebo for secondary prevention

Overall, statin drug treatment reduced:

- Coronary mortality in women by 27%  RR 0.73 (CI 0.55-0.96)
- Coronary mortality in men by 27%  RR 0.73 (CI 0.65-0.81)
- All cause mortality in women by 8%  RR 0.92 (CI 0.76-1.13)
- All cause mortality in men by 21%  RR 0.79 (CI 0.72-0.87)

Arch Intern Med. 2012;172:909-919
## Statins vs. Cardiac Rehab

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<thead>
<tr>
<th></th>
<th>Statins</th>
<th>Cardiac Rehab</th>
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<tbody>
<tr>
<td>↓ All-cause mortality</td>
<td>21% (men)</td>
<td>13%</td>
</tr>
<tr>
<td></td>
<td>8% (women)*</td>
<td></td>
</tr>
<tr>
<td>↓ CV mortality</td>
<td>23%</td>
<td>26%</td>
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</tbody>
</table>

*not statistically significant*
She is concerned about having another heart attack if she enrolls in a cardiac rehab program. What do you tell her?

The risk of having a non-fatal heart attack is
A. One in 5,000 patient hours
B. One in 10,000 patient hours
C. One in 150,000 patient hours
D. One in 300,000 patient hours
She is concerned about having another heart attack if she enrolls in a cardiac rehab program. What do you tell her?

The risk of having a non-fatal heart attack is about
A. One in 5,000 patient hours
B. One in 10,000 patient hours
C. One in 150,000 patient hours
D. One in 300,000 patient hours
Outcomes in Rehab Programs

A survey of 167 supervised programs showed the following:

- Cardiac arrest: 1 per 112,000 patient-hrs
- Nonfatal MI: 1 per 294,000 patient-hrs
- Mortality rate: 1 per 784,000 patient-hrs

JAMA. 1986;256:1160-1163
CAD/Exercise Pearls

- Cardiac rehab is very safe and effective!
- Decrease in all-cause mortality and CV mortality with Cardiac Rehab is in the range of statin therapy
- Refer patients with stable angina or after MI, PCI, CABG, heart transplant, or valve replacement/repair
Case 2

A 42 year old woman with type 2 diabetes:

- HbA1c is 7.9%.
- Goal is closer to 7%.
- She has made dietary changes.
- No CAD or microvascular complications
What do you recommend?

A. 150 minutes of structured exercise (aerobic and/or resistance) each week
B. Glipizide 2.5 mg and 150 minutes of structured exercise each week
C. Low dose glargine at night with resistance training 3 times a week
D. Acarbose TID with 150 minutes of aerobic exercise
What do you recommend?

A. 150 minutes of structured exercise (aerobic and/or resistance) each week
B. Glipizide 2.5 mg and 150 minutes of structured exercise each week
C. Low dose glargine at night with resistance training 3 times a week
D. Acarbose TID with 150 minutes of aerobic exercise
Systematic review and meta-analysis

47 RCTs, 8538 patients with type 2 diabetes

- Structured exercise vs. controls:
  - resistance training
  - aerobics
  - aerobics and resistance training

- Outcomes: Change in HbA1c

JAMA. 2011;305:1790-98
Change in HbA1c
Structured Exercise vs. Control

- Aerobic exercise: -0.73%
- Resistant training: -0.57%
- Aerobic and resistant training: -0.51%
- Exercise less than 150 min/week: -0.36%
- Exercise >150 minutes per week: -0.89%
- Overall: -0.67%
How do these results compare with individual anti-diabetic oral drugs?

<table>
<thead>
<tr>
<th>Drug Class</th>
<th>Decrease in HbA1c %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfonylureas</td>
<td>1 to 2</td>
</tr>
<tr>
<td>Metformin</td>
<td>1 to 2</td>
</tr>
<tr>
<td>TZDs</td>
<td>0.5 to 1.4</td>
</tr>
<tr>
<td>DPP-4 inhibitors</td>
<td>0.5 to 0.8</td>
</tr>
<tr>
<td>Alpha-glucosidase inhibitors</td>
<td>0.5 to 0.8</td>
</tr>
<tr>
<td>Glinides</td>
<td>0.5-1.5</td>
</tr>
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Diabetes Care. 2009; 32:193-203
Mortality and Physical Activity vs. Inactivity in Diabetes

- 5859 individuals with diabetes followed for 9.5 years
- Evaluated total physical activity and grouped into quartiles: inactive, moderately inactive, moderately active, and active
- Moderate physical activity was associated with a reduction in:
  - All-cause mortality by 38%  HR 0.62 (CI 0.49-0.78)
  - CVD mortality by 49%  HR 0.51 (CI 0.32-0.81)

Arch Intern Med. 2012;172(17):1285-1295
Pre-exercise Evaluation

- CAD
- Peripheral neuropathy
- Retinopathy
- Peripheral vascular disease
- Hypoglycemia

How do you counsel her?

- What are her goals?
- What type of exercise does she enjoy?
- Any limitations (time, physical, access or financial problems to join a fitness center)?
- Would an exercise partner or group be motivating?
Exercise Prescription for Aerobic Workout

F: 5 days/wk
I: Moderate exertion (HR 90-115)
T: 10 minutes
T: Fast walk

P: Increase to 30 minutes/day over 8-12 weeks
Exercise Prescription for Resistance Training

**F:** Two times a week

**I:** 8 repetitions per set to moderate fatigue

**T:** One set of 5-10 different upper and lower body exercises

www.exrx.net/WeightTraining/Guidelines.html

**T:** 3 lb dumbbells

**P:** Increase to 10-15 repetitions in 2-4 weeks, change to 5 lb dumbbells in 8 weeks
Structured exercise \( \geq 150 \) minutes a week can lower HbA1c by approximately 0.9%.

This is similar to many anti-diabetic oral medications.

Exercise advantages over medications:
- Lower cost to both patient and society
- No drug interactions
- Minimal adverse side effects
- No Allergic reactions
To many persons exercise seems a luxury, but a diabetic is fortunate in that he must always consider exercise a necessity.

Elliot P. Joslin, MD
Case 3

A 73 year old man with:
- bilateral knee stiffness in the AM
- pain with activity
- curtailing activities to avoid pain

History and exam are consistent with osteoarthritis
BMI 34
What do you recommend?

A. Scheduled NSAIDs
B. LE Strengthening exercises
C. Aerobic exercise
D. Aerobic and LE strengthening exercises
What do you recommend?

A. Scheduled NSAIDs
B. LE Strengthening exercises
C. Aerobic exercise
D. Aerobic and LE strengthening exercises
Osteoarthritis


Individuals with OA tend to back off on physical activity and become sedentary.

Exercise is the cornerstone of therapy for OA as recommended by the American College of Rheumatology and other organizations.

Arthritis Care & Research. 2012;64(4):465-74
Exercise for Knee OA: Land-based Exercise vs. Control

- 32 RCTs:
  - 3616 participants for knee pain outcome
  - 3719 participants for self-reported physical function outcome

- There was marked variability of the studies (symptom duration, participants recruited, exercise interventions)

Fransen Cochrane Database Syst Rev 2008:CD004376
Exercise for Knee OA: Land-based Exercise vs. Control

- Beneficial treatment effect with a standardized mean difference of:
  - 0.40 (CI 0.30-0.40) for knee pain
  - 0.37 (CI 0.25-0.49) for physical function

- The magnitude of the effect is small; however, it is similar to the estimated reported effects of NSAIDs.
He wants to know if aquatic exercise would be more effective than land-based exercise for knee OA?

A. Yes, aquatic exercise is more effective
B. No, land-based is more effective
C. They are equally effective
D. Unknown, these have not been compared
He wants to know if aquatic exercise would be more effective than land-based exercise for knee OA?

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Land-based vs. aquatic exercise on knee pain from OA?

- 84 participants, randomized to control, aquatic, or land-based exercise, 60 minutes 3x a week for 12 weeks

- Significant improvement in pain symptoms and quality of life in both exercise groups compared to control group.

- Aquatic group was not different from the land group at weeks 6 and 12.

He jogged/hiked until he was 70. Does exercise cause knee OA in obese people?

A. Yes, but it depends on the patient’s BMI
B. Yes, but only with land-based exercise
C. No
He jogged/hiked until he was 70. Does exercise cause knee OA in obese people?

A. Yes, but it depends on the BMI
B. Yes, but only with land-based exercise
C. No
Effect of BMI and Exercise on OA

- Prospective cohort study of >15,000 women and >14,000 men age >20 with no pain or physical impairment at baseline

- Two health surveys: 1984-6 and 1995-97

- 1.4% women and 0.9% of men diagnosed with knee OA

- Determined RR of OA by BMI categories and physical activity and intensity of physical activity

BMI, Knee OA, and Exercise

- Physical exercise (of any intensity) does not increase the risk of OA at any level of BMI.

- BMI is related to risk of knee OA (comparing obese to normal weight people).
  - RR of 4.37 in women
  - RR of 2.78 in men
Aerobic exercise for knee OA

- Both high and low intensity aerobic exercises have been found to be equally effective in reducing pain and improving a patient’s functional status.

- Walking programs, aquatic exercise, yoga, and Tai Chi are all effective.

- Stair stepper and elliptical machines which minimize the impact on the knee joints are great options.
Strengthening exercises for knee OA

- Quad and hamstring strengthening exercises
- No evidence to favor one type of strengthening exercise over another
- Facility based supervised exercise may be superior to an independent home based program
- YouTube videos can be helpful
Exercise prescription

He is interested in a structured aquatic exercise program as he is hesitant to try land-based exercises.

- **Osteoarthritis Foundation Center**

- **YMCA**

- Other local community centers
Resistance training

You can refer him to PT or watch exercise videos: http://www.exrx.net/WeightTraining/Guidelines.html

F: 2X/week
I: Start with 6-8 repetitions
T: One set each of hamstring and quadriceps strengthening exercises (squats, lunges)
T: Calisthenics

P: Slowly increase repetitions to 10-15 over 4 weeks, after 12 weeks increase sessions to 3x/week
Knee OA/Exercise Pearls

- Exercise (both aerobic and strengthening) is the first line of treatment for mild to moderate knee OA.

- Exercise does not cause knee OA in patients with high BMI.

- Exercise (aerobic/resistance) is similar in efficacy as NSAIDs for knee OA.
Case 4

56 year old woman is concerned about developing memory issues like several of her older friends and relatives.

- No medications
- No chronic medical problems
She wants to know if there are any preventive measures she can do now?

A. Maximize her cardiovascular fitness
B. Walk 30 minutes a day and take 800 IU of vitamin E
C. Resistance training 2-3 x week and 1000 mg omega 3
D. Aerobic exercise 30 minutes 3x/week and ginkgo
She wants to know if there are any preventive measures she can do now?

A. Maximize her cardiovascular fitness
B. Walk 30 minutes a day and take 800 IU of vitamin E
C. Resistance training 2-3 x week and 1000 mg omega 3
D. Aerobic exercise 30 minutes 3x/week and ginkgo
Fitness in midlife and risk of dementia when older

- Cooper Institute (specializes in preventive care)
- 19,000 people who visited the institute between 1970-2009, average follow-up 9 years
- Dementia diagnosis was made through Medicare claims data
- Those most fit in their late 40s as determined by a treadmill test were 36% less likely to develop dementia in their 70s and 80s.

Ann Intern Med. 2013;158;162-8
Exercise and dementia

- 16 prospective trials
- 163,797 with normal cognition at baseline
- 2731 eventually diagnosed with dementia
- Those in the highest physical activity category were 28% less likely to develop dementia than those in the lowest physical activity group.

RR 0.72 (CI 0.60-0.86 p<.001)

Psychological Medicine. 2009;39:3-11
Exercise and Memory

- Meta-analyses of 29 RCTs
- Evaluated exercise in adults without dementia
- Significantly improved scores in memory, attention, processing speed, and executive function
- Benefits accrued during 1-12 months of exercise

Psychosom Med. 2010;72:239-252
She brings in her 79 year old mother who has mild cognitive impairment (MCI). What do you recommend to prevent dementia?

A. Aerobic exercise and a cholinesterase inhibitor
B. Resistance training, aerobic exercise, and mentally stimulating games
C. Omega 3, stretching exercises, and mentally stimulating games
D. Resistance training and mentally stimulating games
She brings in her 79 year old mother who has mild cognitive impairment (MCI). What do you recommend to prevent dementia?

A. Aerobic exercise and a cholinesterase inhibitor
B. Resistance training, aerobic exercise, and mentally stimulating games
C. Omega 3, stretching exercises, and mentally stimulating games
D. Resistance training and mentally stimulating games
Mild Cognitive Impairment

- Both aerobic and resistance training improve cognitive function in those with MCI.

- Patients with MCI appear to be at risk for dementia. A conservative estimate of the risk is 10 percent per year.

- No medications have been shown to prevent the development of MCI or dementia.
Exercise and MCI

- RCT of 86 senior women ages 70-80 with MCI
- 60 minutes classes (2x/week) for 6 months
  - Aerobic
  - Resistance training
  - Balance and tone
- Outcomes:
  - associative memory performance
  - everyday problem solving ability
  - functional brain plasticity
  - physical function

Arch Intern Med.2012;172:666-8
Exercise and MCI

- Resistance Exercise improved:
  - Selective attention/conflict resolution
  - Associative memory performance
  - Functional brain plasticity

- Aerobic Exercise improved:
  - Physical functioning
  - CV fitness
Aerobic exercise and MCI

- 170 pts with memory concerns
- Intervention: 150 minutes moderate-intensity physical activity weekly for 6 months vs. usual care

Results:
- 6 months: ADAS-Cog score improved by 0.26 usual activity worsened by 1.04
- 18 months: ADAS-Cog improved by 0.73 usual activity improved by 0.04.

JAMA. 2008;300:1027-37
Exercise Prescription

She prefers to use a stationary bike (at home) and is not interested in gyms or fitness centers. She is somewhat reluctant to start weight training and wants to know more about it.

**Aerobic exercise**

- **F:** 5 times a week
- **I:** Moderate (HR 70-100)
- **T:** 5-10 minutes
- **T:** Cycling

**P:** Increase by 5 minutes every 4 weeks until 30 minutes is reached
Exercise Prescription

Progressive resistance training is very important for older adults: increases muscle mass and strength which stabilizes joints and prevents falls and other injuries.

You recommend that she watch the following YouTube videos:

1. Exercise is power: Resistance training for older adults Teresa Liu-Ambrose (University of British Columbia)

2. Senior Health: building muscle and strength into the golden years (University of Michigan)
MCI/Exercise Pearls

- Both aerobic and resistance training improve cognitive function in individuals with and without MCI.

- There is an inverse relation between CV fitness and development of MCI/dementia.

- This benefit can occur at any age.
An early-morning walk is a blessing for the whole day

Henry David Thoreau
Case 5

A 34 year old woman works as a software engineer.

- healthy and without medical problems
- Works out for one hour 5 days a week.
- Sits behind a computer 8-10 hrs/day
She is doing a great job of exercising 5 hours a week and further activity is not recommended.

A. True
B. False
She is doing a great job of exercising 5 hours a week and further activity is not recommended.

A. True
B. False
Screen based time, All-cause Mortality and CV events

- 4512 men and women >35 years old

- Average screen time over 4 years
  - 2 hr/day
  - 2-4 hr/day
  - >4 hr/day

- Outcomes:
  - CVD events
  - All-cause mortality

JACC. 2011;57:292-299
Screen based time, All-cause Mortality, and CV events

For participants engaged in >4 hr screen time as compared to those with <2 hr screen time:

- HR all-cause mortality was 1.52 (CI 1.96-2.16)
- HR CV events was  2.30 (CI 1.33-3.96)
- Adjusting for physical activity attenuated these associations only slightly

JACC. 2011;57:292-299
Sitting Time and All-Cause Mortality Risk

- 222,497 men and women in Australia
- Linked prospective questionnaire study to mortality data 2006-2010.
- All-cause mortality as compared to participants who sat <4 hr/day
  - 4-8 hr/day    HR 1.02
  - 8-11 hr/day   HR 1.15
  - >11 hr/day    HR 1.40

Arch Intern Med. 2012;172:494-500
Sedentary/Exercise Pearls

- Sedentary time can attenuate the benefits of regular exercise

- Sedentary time is associated with an increase in all-cause mortality (independent of exercise)

Advice:
- take breaks throughout the day
- stand up while talking on the phone
- take short walks
- take stairs as opposed to elevator
Case 6

A 68 year old woman:
- ischemic cardiomyopathy, EF 30%
- on maximal medical therapy
- dyspnea with minimal activity
- difficulty with her ADLs

She wants to know what else she can do to feel better?
What do you recommend?

A. Nothing- she is already on maximal therapy. She should move to assisted living

B. Aerobic exercise 30 minutes 5 days a week at 60-70% maximal HR (220-age)

C. Cardiac rehabilitation

D. Exercise of some sort but I don’t really know what kind or how much
What do you recommend?

A. Nothing- she is already on maximal therapy. She should move to assisted living

B. Aerobic exercise 30 minutes 5 days a week at 60-70% maximal HR (220-age)

C. Cardiac rehabilitation

D. Exercise of some sort but I don’t really know what kind or how much
New York Heart Association Classes

- Class I — No limitation during ordinary activity
- Class II — Slight limitation by shortness of breath and/or fatigue during moderate exertion or stress
- Class III — Symptoms with minimal exertion that interfere with normal daily activity
- Class IV — Inability to carry out any physical activity; these patients typically have marked neurohumoral activation and muscle wasting

JAMA 2009;301(14):1439-1450.
Systolic Heart Failure and Exercise (HF-ACTION)

2231 sedentary adults, EF<35%, NYHA class II-IV, randomized to usual care or exercise for 3 years

- 11% reduction: all-cause mortality/ hospitalization
- 13% reduction: cardiovascular mortality or heart failure hospitalization
- Improvement on 6-minute walk distance

No Safety Concerns

JAMA. 2009;301(14):1439-1450
Long-term Outcomes
CHF Exercise

123 patients, NYHA class II-III HF, randomized to exercise 2X/week for 10 years or usual care

Significant benefits in:
- %VO2 max
- Resting HR
- LVEF %
- Quality of Life
- Hospitalizations (HR 0.64)
- Cardiac Mortality (HR 0.68)

JACC 2012;60:1521-1528
Event Free Survival

- Graph showing Event Free Survival over months for Untrained and Trained groups.
- The red line represents Untrained, and the yellow line represents Trained.
- The x-axis represents months from entry to 120, while the y-axis represents Event Free Survival from 1 to 0.
Heart failure with preserved EF (HFpEF) and Exercise

3 small RCTs:

- Improved exercise capacity and endurance
- Improved health related quality of life
- No major clinical outcomes measured

No Safety Concerns

Int J of Cardiology. 2012;162:6-13
Barriers to exercise prescriptions in heart failure patients

- Physician Factors
- Exercise Intolerance
- Heart rate invalid measure of intensity
- Perception of health status
Barrier: Physician Factors

Lack of: Knowledge, Confidence, Success, Time, Resources
Barrier: Exercise Intolerance

ACC/AHA Heart Failure Guidelines:

Class IIa: Maximal exercise testing with or without measurement of respiratory gas exchange is reasonable to facilitate prescription of an appropriate exercise program for patients presenting with HF.

Level of Evidence: C

Barrier: Exercise Amount

All-Cause Mortality or Hospitalization

CV Mortality Heart Failure Hospitalization

Met-h per week (3 METS for 1.5 hours = 4.5 MET-h)

Hazard Ratio

Adapted from JACC 2012; 60:1899-905
Heart rate reserve (HRR) is the difference between measured or predicted maximum heart rate and resting heart rate.

Example:

\[
\text{Peak heart rate} - \text{resting heart rate} = \text{HRR} \\
120 - 80 = 40
\]

Exercise heart rate goal:

Resting heart rate + 0.60 HRR

\[
80 + 24 = 104
\]
Borg Rating of Perceived Exertion Scale

<table>
<thead>
<tr>
<th>Échelle de Borg</th>
<th>Borg’s Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>très très facile</td>
<td>very, very light</td>
</tr>
<tr>
<td>très facile</td>
<td>very light</td>
</tr>
<tr>
<td>assez facile</td>
<td>fairly light</td>
</tr>
<tr>
<td>un peu difficile</td>
<td>somewhat hard</td>
</tr>
<tr>
<td>difficile</td>
<td>hard</td>
</tr>
<tr>
<td>très difficile</td>
<td>very hard</td>
</tr>
<tr>
<td>très très difficile</td>
<td>very, very hard</td>
</tr>
</tbody>
</table>
Barrier: Perception of Health Status

“My heart’s not strong enough for exercise”
Heart Failure, Exercise and Patient-reported Health Status

- Overall health status
- Symptoms
- Physical limitations
- Quality of life
- Social limitations

NNT=4
So what do you recommend?

ACC/AHA Heart Failure Guidelines and Exercise

Class 1: Exercise training is beneficial as an adjunctive approach to improve clinical status in ambulatory patients with current or prior symptoms of HF and reduced LVEF.

Level of Evidence: B

Exercise Prescription

F: 5 days/wk
I: Resting heart rate + 60-70% HRR or Borg perceived rating scale 12- 14
T: 5 minutes
T: Walking, exercise bike, group exercise class
P: Start low- go slow. Increase 1 minute/day per week to reach minimal goal of 60 min per week
CHF/Exercise Pearls

- Begin a gradual home or group program exploring patient specific barriers

- Even patients with NYHA class III symptoms can exercise

- Use Borg scale or calculate HRR when recommending intensity of exercise

- 60 – 120 minutes a week provides benefit
A 35 year old man seeks help for symptoms of depression:

- PHQ-9 is 14 = moderate severity
- Insurance does not cover CBT
- Would like to avoid medications
What do you recommend?

A. Resistance exercise
B. Aerobic exercise
C. CBT- Cognitive Behavioral Therapy
D. SSRI
What do you recommend?

A. Resistance exercise
B. Aerobic exercise
C. CBT- Cognitive Behavioral Therapy
D. SSRI
Depression

- Depression: widespread impact on health

- Medications and/or therapy provide benefit in some patients.

- Obstacles to CBT or medications include cost, stigma, side effects, drug interactions
Exercise and Depression

- Physical inactivity associated with higher risk for depression
- Regular exercise is associated with a heightened sense of well being and lower rate of depression

Prev Med Feb 2013;PMID: 23480972
Exercise as First-line Treatment for Depression

- Exercise improves depressive symptoms more than placebo. Benefit is small-moderate

- Exercise improves depressive symptoms to a similar degree as cognitive behavior therapy

Cochrane Library. 2012, Issue 7
Exercise vs. Pharmacologic Therapy

- Randomized to medication or exercise
- No difference in depression scores

Cochrane Library 2012, Issue 7
202 sedentary, depressed adults randomized

Remission of depression at 16 weeks:
- Home-based exercise  40%
- Group, supervised exercise  45%
- Sertraline  47%
- Placebo  31%

Psychosomatic Medicine 2007;69:587-596
SMILE-II Study
Probability of at least partial remission at 1 year

Adapted from Psychosomatic Medicine 2011;73:127-133

Minutes of self-reported exercise per week
Exercise, Depressive Symptoms and Chronic Illness

Meta-analysis included 90 studies on the effect of exercise on depressive symptoms in chronically ill patients:

NNT 6

Arch Intern Med 2012;172(2):101-111
Exercise as Adjunct Therapy for Treatment of Depression

82 patients with moderate depression were randomized to fluoxetine 20 mg daily or fluoxetine 20 mg plus exercise for 8 weeks:

<table>
<thead>
<tr>
<th>Medication/Exercise</th>
<th>Medication</th>
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</thead>
<tbody>
<tr>
<td>Minimal or no depression</td>
<td>58.5</td>
</tr>
<tr>
<td>Mild depression</td>
<td>34</td>
</tr>
<tr>
<td>Moderate depression</td>
<td>7.5</td>
</tr>
</tbody>
</table>

Perceptual and Motor Skills 2011;112:761-769
### Barriers to Exercise in Depression

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fatigue</td>
<td>“I am just too tired to do anything active”</td>
</tr>
<tr>
<td>Vulnerability</td>
<td>“I feel unsafe away from home”</td>
</tr>
<tr>
<td>Motivation</td>
<td>“I know that I should exercise. I just can’t seem to get started”</td>
</tr>
<tr>
<td>Confidence</td>
<td>“I’ve never been good at sports. They make me feel inadequate”</td>
</tr>
</tbody>
</table>
Overcoming Barriers to Exercise in Depression

- Some patients may need anti-depressant prior to exercise to improve motivation
- Some patients may benefit from group exercise to reduce social isolation
- Electronic-based physical activity program for goal setting and monitoring

www.healthfinder.gov

Psychology, Health & Medicine 2010;15:646-659
Exercise Prescription

F: 3-5 days/wk
I: Moderate intensity- 60-70% MHR
T: 30 minutes
T: Aerobic exercise monitoring progress with smart phone app.

P: Increase weekly to 150 minutes per week.
Depression Pearls

- Exercise can be a first-line therapy for patients with mild-moderate depression
- Exercise can be a useful adjunct to CBT or medications
- Enlist help: structured or group programs, internet or mobile phone resources
Can we make a difference?

- Meta-analysis of 22,527 adults with diverse chronic illnesses
- Effect size equivalent to an additional 48 minutes of physical activity a week
- Behavioral strategies and those recommending self-monitoring were most effective

Physically-active physicians are up to five times more likely to counsel their patients about exercise and provide more frequent reminders.