CARDIAC REHABILITATION

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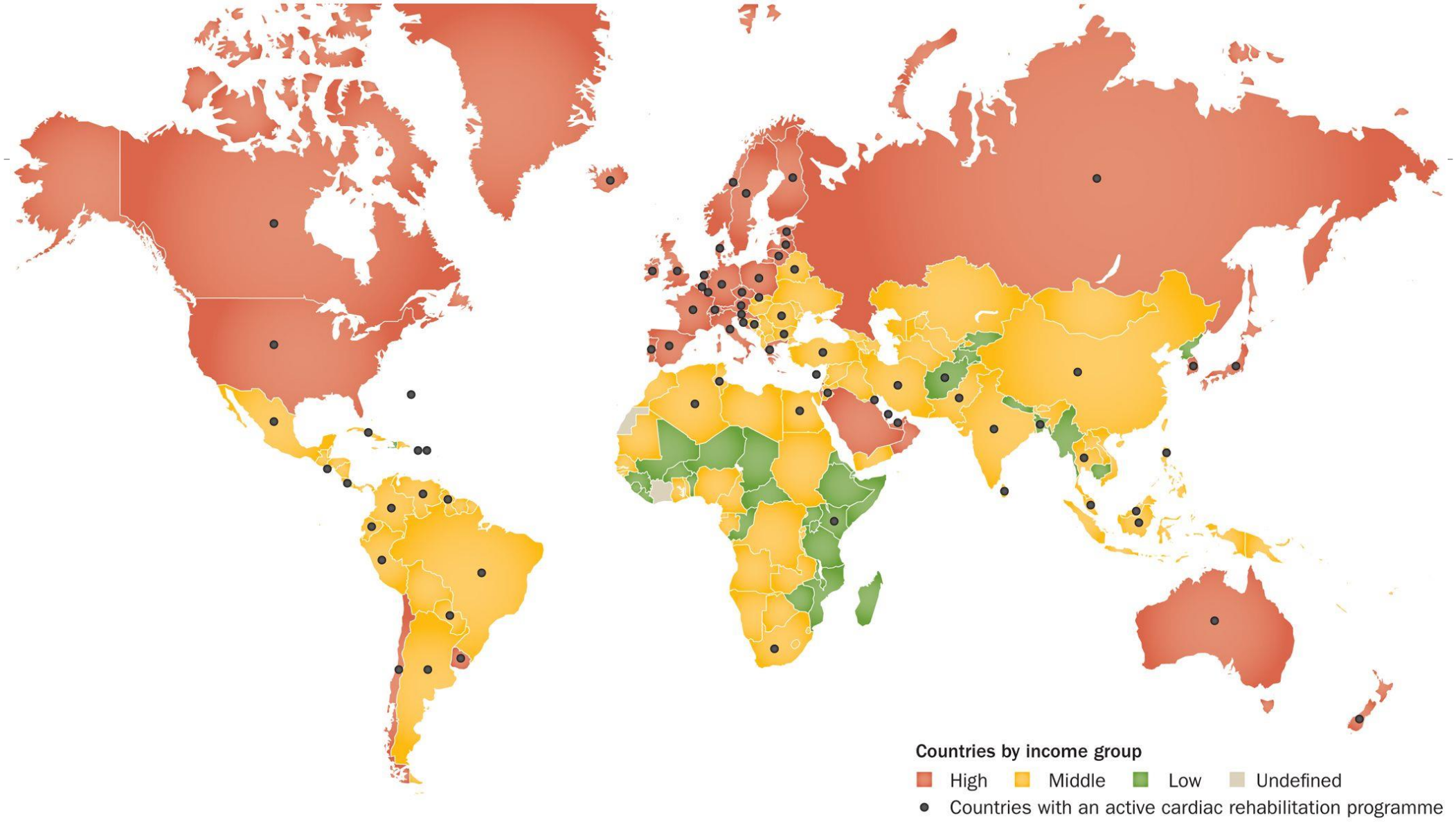
Definition

Cardiac Rehabilitation is the sum of activities by which patients with cardiac disease, in partnership with a multidisciplinary team of health professionals are encouraged to support and achieve and maintain optimal physical and psychosocial health.

- Initially, rehabilitation was offered mainly to people recovering from a myocardial infarction (MI), but now encompasses a wide range of cardiac problems.
- CR begins as soon as possible in intensive care units, only if the patient is in stable medical condition. Intensity of rehabilitation depends on the patient's condition and complications in the acute phase of disease.

Cardiac rehab programs worldwide



Goals of Cardiac Rehabilitation

!The main goal of cardiac rehabilitation is to promote secondary prevention and to enhance quality of life among cardiac patients

Medical Goals	Social Goals	Psychological Goals	Behavioural Goals	Health Service Goals
Improve Cardiac Function	Return to work if appropriate and/or previous level of functional capacity	To restore self confidence	To quit all forms of smoking	To directly reduce medical costs
Reduce the risk of sudden death and re-infarction	To promote independence in ADLs for those who are compromised	Relieve anxiety and depression in pt.s and their careers	To make heart healthy dietary decisions	To promote early mobilisation and discharge from hospital
Relieve symptoms such as breathlessness and angina		To relieve or manage stress	To be physically active	To reduce cardiac related hospital admission
Increase Work Capacity		To restore good sexual health	To adhere to medication regimes	

Prevent progression of underlying atherosclerotic process

Individual Risk Assessment

- Cardiac Rehabilitation can be adapted to meet individual needs, thus a careful assessment and evaluation of the CV risk factor profile of the patient should be undertaken at the beginning of the programme.
- Risk factors should be evaluated using validated measures which take into account other comorbidities

RISK FACTORS	
Non Modifiable	**Modifiable**
Age	Excessive alcohol intake
Gender	Dyslipedemia
Personal Cardiac History	Hypertension
Family History of CVD	Obesity
Diabetes (unless prediabetes)	Smoking
	Physical Inactivity
	Anxiety/Depression
	Hostility
	Stress

Before exercise training

- Clinical risk stratification is suitable for low to moderate risk patients undergoing low to moderate intensity exercise
- Exercise testing and echocardiography are recommended for high risk patients and/or high intensity exercise
- Functional exercise capacity should be evaluated before and on completion of exercise training.

On examination:

- Vitals: PR (pulse rate), RR (respiratory rate), BP (blood presure), SpO2, ECG findings
- Respiratory examination
- Circulatory Examination
- Neurological examination

Measurements

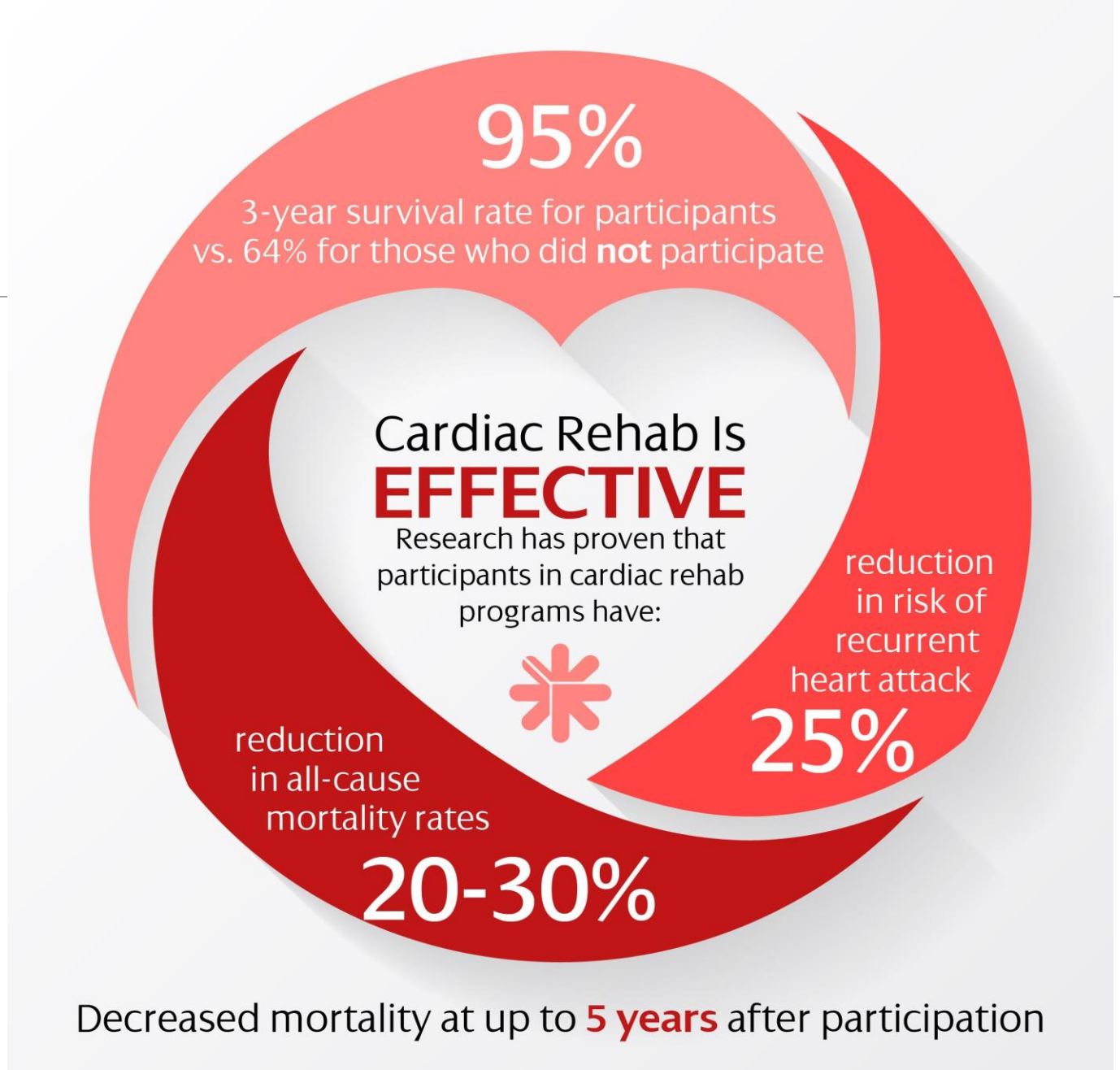
- Exercise capacity
- Quality of life surveys
- Weight
- Waist circumference
- Lipids
- Glucose/HbA1C
- Telemetry monitoring occurs during exercise sessions
- Nutritional survey tool
- Stress level

Benefits of Cardiac Rehabilitation

- Offset deleterious pyschologic and physiologic effects of bed rest during hospitalization
- Provide additional medical surveillance of patients
- Enable patients to return to activities of daily living within the limits imposed by their disease
- Prepare the patient and the support system at home to optimize recovery followed by hospital discharge

- Reduces cardiovascular and total mortality
- Does not increase non-fatal reinfarction rate
- Improves myocardial perfusion
- May reduce progression of atherosclerosis when combined with aggressive diet
- No consistent effects on hemodynamics, LV function or visible collaterals
- No consistent effects on cardiac arrhythmias
- Improves exercise tolerance without significant CV complications
- Improves skeletal muscle strength and endurance in clinically stable patients
- Promotes favorable exercise habits
- Decreases angina and CHF symptoms

Participation in cardiac rehabilitation programs should be available to all cardiac patients who require it. Age is not and should not be a barrier to cardiac rehabilitation participation. However, consideration of patient safety results in the following specific inclusion/exclusion criteria applying to participation.


95%
3-year survival rate for participants
vs. 64% for those who did not participate
Cardiac Rehab Is
EFFECTIVE
Research has proven that
participants in cardiac rehab
programs have:
reduction
in risk of
recurrent
heart attack
25%
reduction
in all-cause
mortality rates
20-30%
Decreased mortality at up to 5 years after participation

Indication for Cardiac Rehabilitation

- ❑ **Medically stable post MI**
- ❑ **Coronary Artery Bypass Surgery**
- ❑ **Percutaneous Coronary Intervention**
- ❑ **Stable Angina**
- ❑ **Stable heart failure (NYHA I-III)**
- ❑ **Cardiomyopathy**
- ❑ **Cardiac Transplantation**
- ❑ **Implantable Cardioverter Defibrillator**
- ❑ **Valve Repair/Replacement**
- ❑ **Insertion of Cardiac Pacemaker (with one or more other inclusion criteria)**
- ❑ **Peripheral Arterial Disease**
- ❑ **Post Cerebral Vascular Disease**
- ❑ **At risk of coronary artery disease with diagnosis of diabetes, dyslipedemia, hypertension**

Contraindications for Cardiac Rehabilitation

ABSOLUTE Contraindications

1. A recent significant change in the resting ECG suggesting infarction or other acute cardiac events
2. Recent complicated myocardial infarction
3. Unstable angina
4. Uncontrolled ventricular dysarhythmia
5. Uncontrolled atrial dysarhythmia that compromises cardiac function
6. 3rd degree A-V block

7. Acute congestive heart failure
8. Severe aortic stenosis

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9. Suspected or known dissecting aneurysm
10. Active or suspected myocarditis or pericarditis
11. Thrombophlebitis or intracardiac thrombi
12. Recent systemic or pulmonary embolus
13. Acute infection
14. Significant emotional distress (psychosis)

Relative Contraindications

1. Resting diastolic blood pressure > 120 mmHg or resting systolic blood pressure >200 mmHg
2. Moderate valvular heart disease
3. Known electrolyte abnormalities (hypokalemia, hypomagnesemia)
4. Fixed-rate pacemaker (rarely used)
5. Frequent or complex ventricular ectopy
6. Ventricular aneurysm

7. Cardiomyopathy, including hypertrophic cardiomyopathy

8. Uncontrolled metabolic disease (e.g. diabetes, thyrotoxicosis, or myxedema)

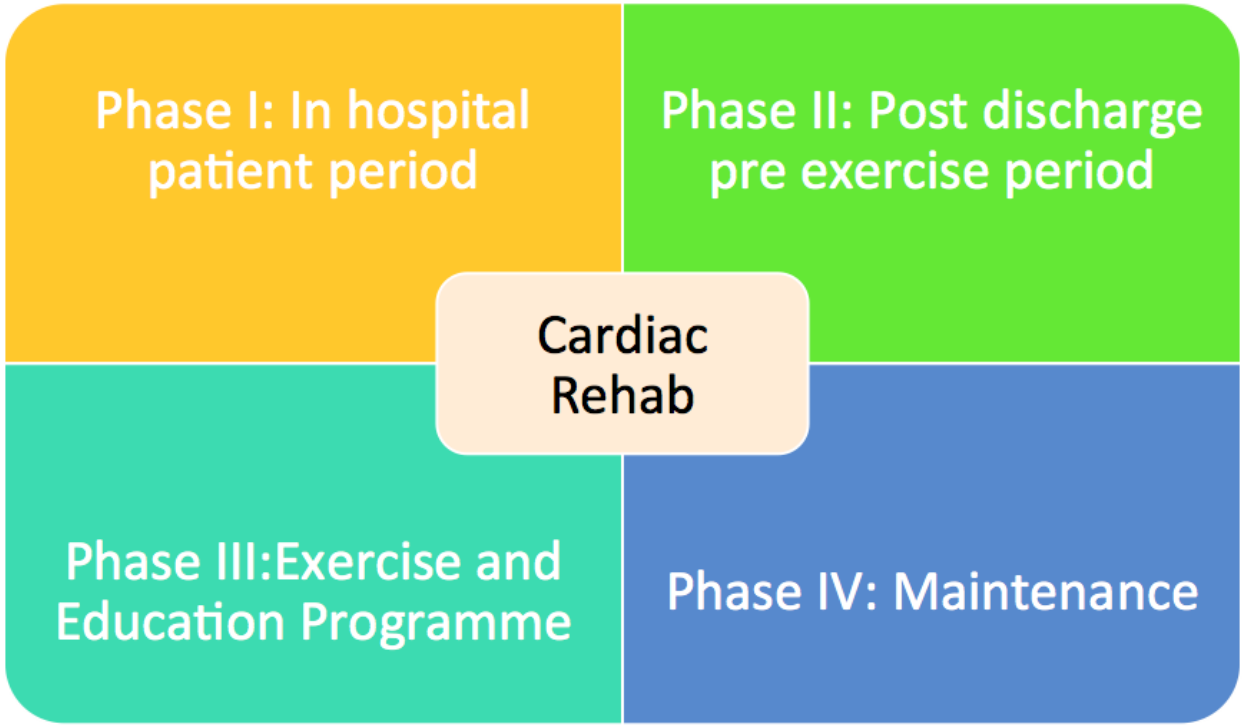
9. Chronic infectious disease (e.g. mononucleosis, hepatitis, AIDS)

10. Neuromuscular, musculoskeletal, or rheumatoid disorders that are exacerbated by exercise

11. Advanced or complicated pregnancy

Cardiac Rehabilitation Phases

Cardiac rehabilitation typically comprises of four phases. The term phase is used to describe the varying time frames following a cardiac event. The secondary prevention component of CR requires delivery of exercise training, education, and counselling, risk factor intervention and follow up.



Phase I: In-hospital patient period

Objectives:

- Conditioning from acute event/ post-coronary artery bypass graft
- To make patient functionally independent
- To adjust with discharge from the hospital
- Psychological counselling
- Nutritional counselling
- Secondary prevention targetting

Phase I relates to the period of hospitalization following an acute cardiac event.

The duration of this phase may vary depending on the initial diagnosis, the severity of the event and individual institutions, usually one week acute event/post-operative.

<u>During this phase:</u>

- Individuals typically undergo a risk factor assessment and risk stratification
- Receiving information regarding their diagnosis, risk factors, medications and work/ social issues.
- Involvement and support of the partner and family is facilitated and encouraged.
- Early mobilization and adequate discharge planning.

Acute Period—CCU (Coronary Care Unit):

- Activities of very low intensity (1–2 mets)

- Passive ROM *(Passive Range of Motion)* (1.5 mets)
- Upper extremity ROM (1.7 mets) Lower extremity ROM (2.0 mets)
- ***Avoid:*** isometrics (increases heart rate), valsalva (promotes arrhythmia), raising the legs above the heart (can increase preload)
- Use protective chair posture—can reduce the cardiac output by 10%
- Bedside commode (3.6 mets) versus bedpan (4.7 mets)

!N.B. The metabolic equivalent of task **(MET)** is the objective measure of the ratio of the rate at which a person expends energy, relative to the mass of that person, while performing some specific physical activity compared to a reference, set by convention at 3.5 mL of oxygen per kilogram per minute, which is roughly equivalent to the energy expended when sitting quietly.

Subacute Period

- Transfer from the CCU (Coronary Care Unit) to either a telemetry unit or to the medical ward.
- Activities or exercises of intensity (3–4 mets)
- ROM exercise: intensity can be gradually increased by increasing the speed and/or duration;
- Early ambulation: starting in the room and then corridors of the ward, treadmill walking starting from a slow stroll to a regular slow walk and gradually increasing as tolerated

Phase II: Post-discharge period

Objectives:

❖Functional goals

- Exercise training under supervision/ at home
- Nutritional Counseling:
- Dietitian Appointment /Weight Management:
  - Mediterranean style diet
  - Goal: BMI 18.5-24.9. Waist circumference <102 cm men; <89 cm women

❖ Psychosocial goals

- Anxiety/depression management
- Assessment of Nicotine use/Counseling on smoking cessation

Phase II: This phase will define the stage of cardiac rehabilitation that occurs immediately after discharge, in which higher levels of surveillance, monitoring of ECGs, and intensive risk factor modification occurs

- This phase is typically a period of ***four to six weeks***.
- It focuses on:
  - health education and resumption of physical activity, however the structure of this phase may vary dramatically from centre to centre.
- It may take the format of:
  - telephone follow up, home visits, or individual or group education sessions.
- Either way, some form of contact is maintained with the patient, facilitating ongoing education and exchange of information.

Tests Lipid Management. Goals:

- LDL <70 mg/dL
- Non-HDL cholesterol < 100 mg/dL
- Total LDL particle concentration < 800 nmol/L
- Glucose: Goals < 100 for non-diabetic patients
- Hemoglobin A1c < 7.0% for diabetic patients

- Cardiovascular conditioning exercise a minimum of 40 minutes/day, 7 days/week
- Target heart rate or perceived exertion recommendation should be maintained for at least 20 minutes per session
- Exercise Training: aerobic, stretching, strengthening, balance exercises

Aerobic Exercise Prescription

- Each aerobic exercise program should begin with a warm-up phase of 5 minutes at lower intensity
- The conditioning phase should be maintained for at least 20 minutes
- Then, a cool down phase a low intensity for at least 5 minutes is performed.
- Goal 30-40 minutes aerobic exercise everyday

- Stretching/Flexibility Exercises
- Balance Exercises

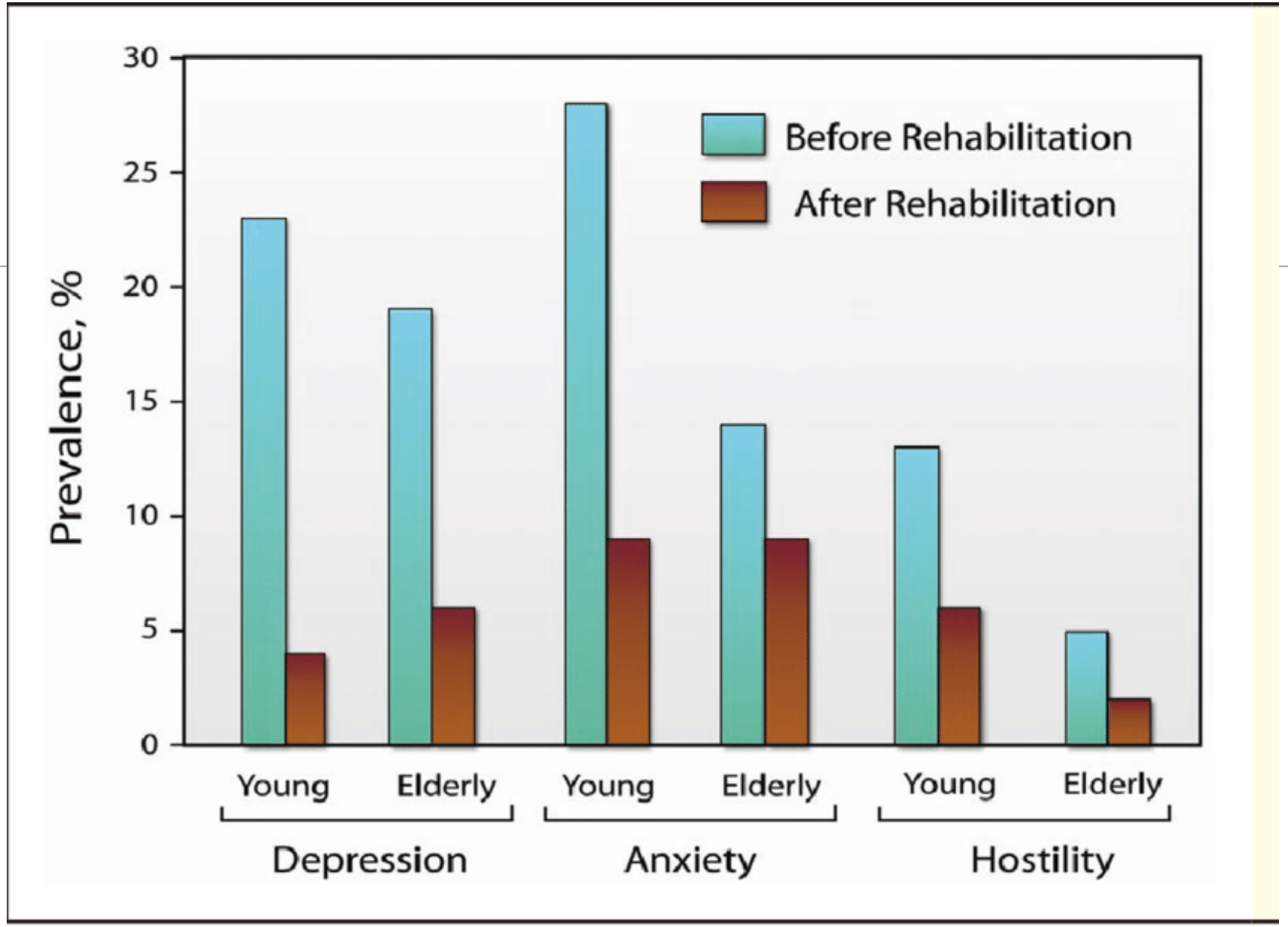
Single stance

Forward left lift

Phase III: Cardiac Rehabilitation and secondary prevention

Objectives:

- Functional goals
  - Exercise training under supervision
- Psychosocial goals
  - Return to work
  - Return to hobbies and lifestyle
  - Anxiety/depression management
- Secondary preventive targets


Prevalence, %
30
25
20
15
10
5
0
Before Rehabilitation
After Rehabilitation
Young
Elderly
Young
Elderly
Young
Elderly
Depression
Anxiety
Hostility

Structured exercise training with continual educational and psychological support and advice on risk factors. We should take a menu-based approach and be individually tailored.

Typically lasts ***at least 6 weeks*** with patients exercising 2/7 minimum. Exercise class will consist of warm-up, exercise class, cool down – may also include resistance training with active recovery stations where appropriate

Exercise prescription based on:

- Clinical status
- Risk Stratification
- Previous activity
- Future needs

Phase IV: Maintenance

Objectives:

- Maintenance of achieved functional status
- Return to work
  - Return to hobbies and lifestyle modifications
- Secondary preventive targets

Phase IV: This phase constitutes the components of long-term maintenance of lifestyle changes and professional monitoring of clinical status.

- It is when patients leave the structured Phase 3 programme and continue exercise and other lifestyle modifications indefinitely.
- This may be facilitated in the CR unit itself or in a local leisure centre.
- Alternatively, individuals may prefer to exercise independently and Phase 4 may involve helping them set a safe and realistic maintenance programme.

Home Based Exercise Program

Follow up evaluation performed by a physician at 3-6-9 and12 months. Then every 6 or 12 months.

Evaluation include:

- Physical exam
- Review exercise program
- Laboratory test: lipid profile, glucose, liver function tests, creatinine
- Review nutrition plan
- Adjust medications as needed
- Control of weight

CARDIAC REHABILITATION OF SPECIAL GROUPS

Heart Transplantation

The heart is denervated (loss of vagal inhibition to the SA node), therefore, physiologic response is somewhat different then the one seen in a post-CABG (Coronary artery bypass surgery) patient.

1. High resting heart rate
2. Lower peak exercise heart rate
3. Post exercise recovery rate—slow return to resting level

- At maximum effort—the work capacity, cardiac output, systolic BP, and the total O2 consumption (VO2) are lower
- Pre transplantation, rehabilitative strength training may enhance preoperative and operative recovery
- Five- and ten-year survival is about 82% to 74% respectively
- Accelerated arthrosclerosis occurs following transplantation

Exercise Prescription

Intensity of exercise is based on the following:

- Percentage of maximum oxygen consumption or maximum workload performed on stress test
- Anaerobic threshold
- Duration frequency and types of exercise follow the same principles as those with other types of cardiac problems
- During exercise testing, ischemia is not presented as angina, therefore, ECG changes and other symptoms should be followed

Stroke

- Acute MI and acute stroke
- CABG (Coronary artery bypass surgery) and acute stroke
- According to the studies, as much as 77% of stroke patients have some form of co-existing cardiac disease, these complications include:

- Hypertension
- Angina
- Myocardial infarction
- Congestive Heart Failure
- Rhythm disturbances

Stroke Exercise Testing Modality

- Treadmill ambulation, if tolerated

- Stationary bicycle/ergometer modified for involved leg (ace wrap)
- Portable leg ergometers that allow for seating in a wheelchair or arm chair
- Arm ergometer modified for involved hand or using one-handed arm ergometer
- Telemetry monitoring of level surface ambulation or general conditioning classes

Hemiplegic Ambulation Compared to Normal Ambulation

- Speed—40% to 45% slower
- Energy cost—50% to 65% higher

AMERICAN HEART ASSOCIATION DIET

Step 1 Diet

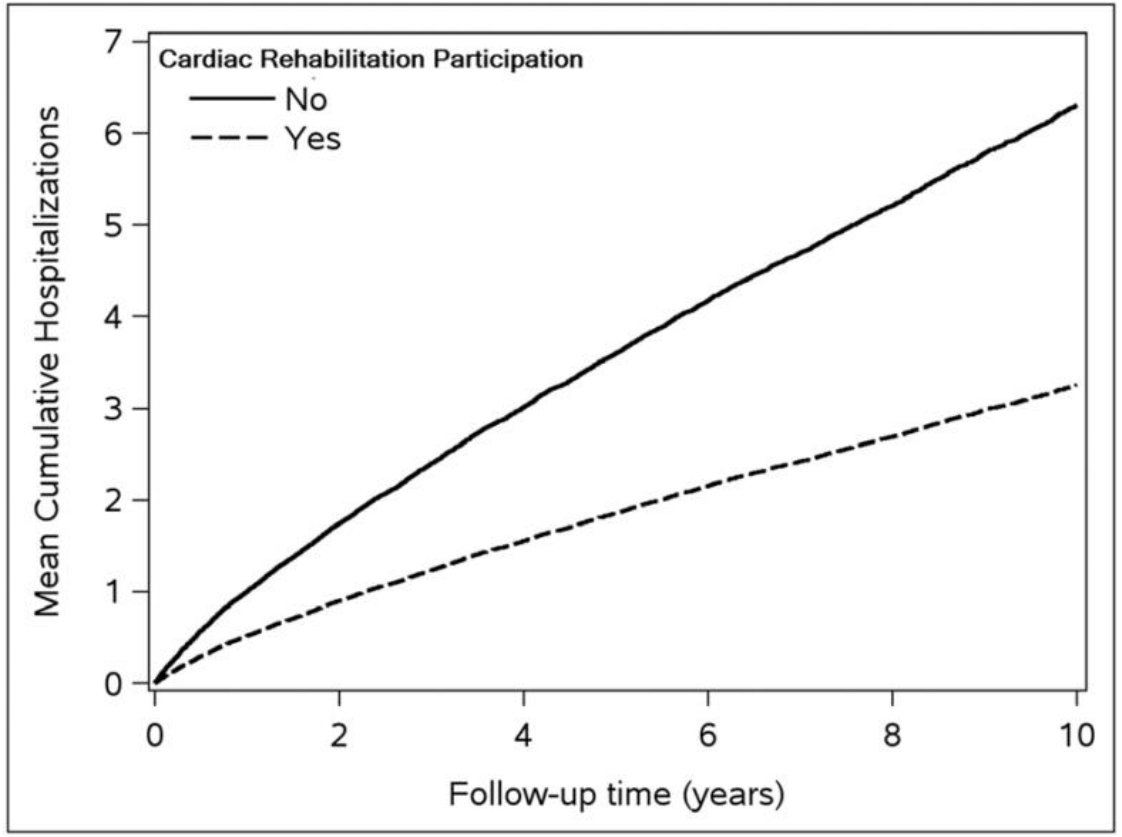
- 8% to 10% of the day's total calories form saturated fat
- 30% or less of the day's total calories from fat
- Less than 300 mg of dietary cholesterol a day
- Just enough calories to achieve and maintain a healthy weight

Step 2 Diet

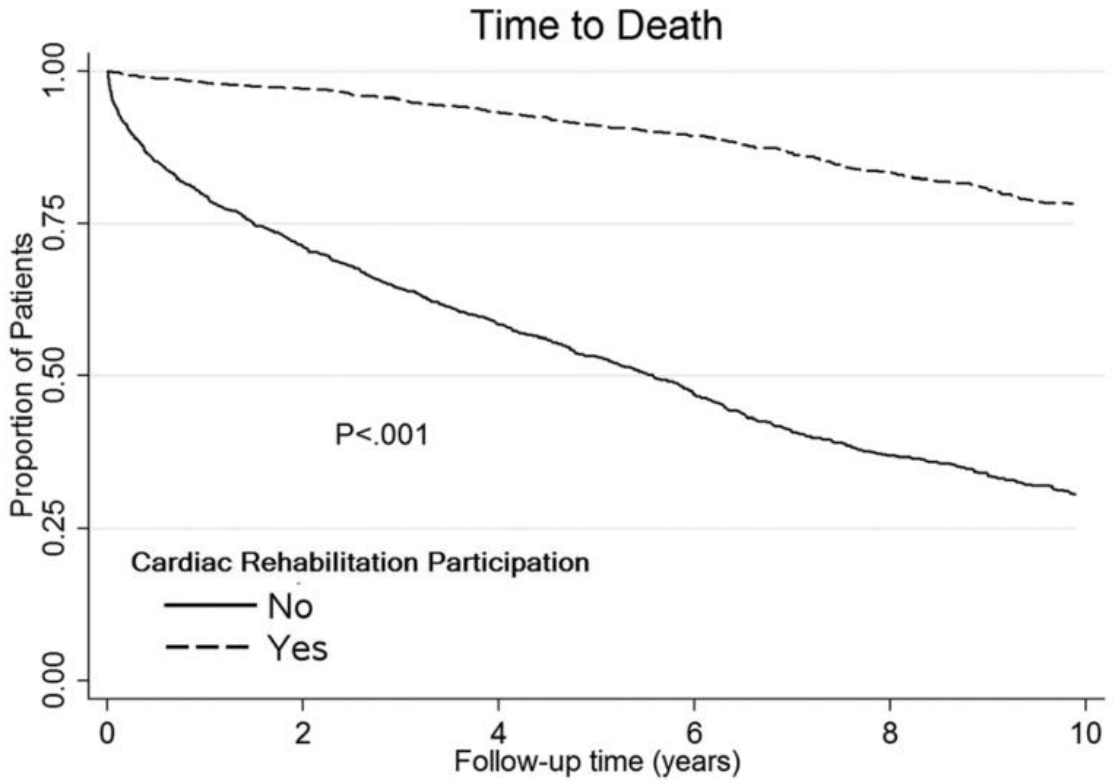
If do not lower cholesterol enough on Step 1 diet or if patient are at a high risk for heart disease or already have heart disease:

- Less than 7% of the day's total calories from saturated fat
- 30% or less of the day's total calories from fat
- Less than 200 mg of dietary cholesterol a day
- Just enough calories to achieve and maintain a healthy weight

Readmission/Mortality After Myocardial Infarction for Cardiac Rehabilitation Participants and Non-Participants



Non-Participant	980	739	529	346
Participant	1491	1282	1078	877



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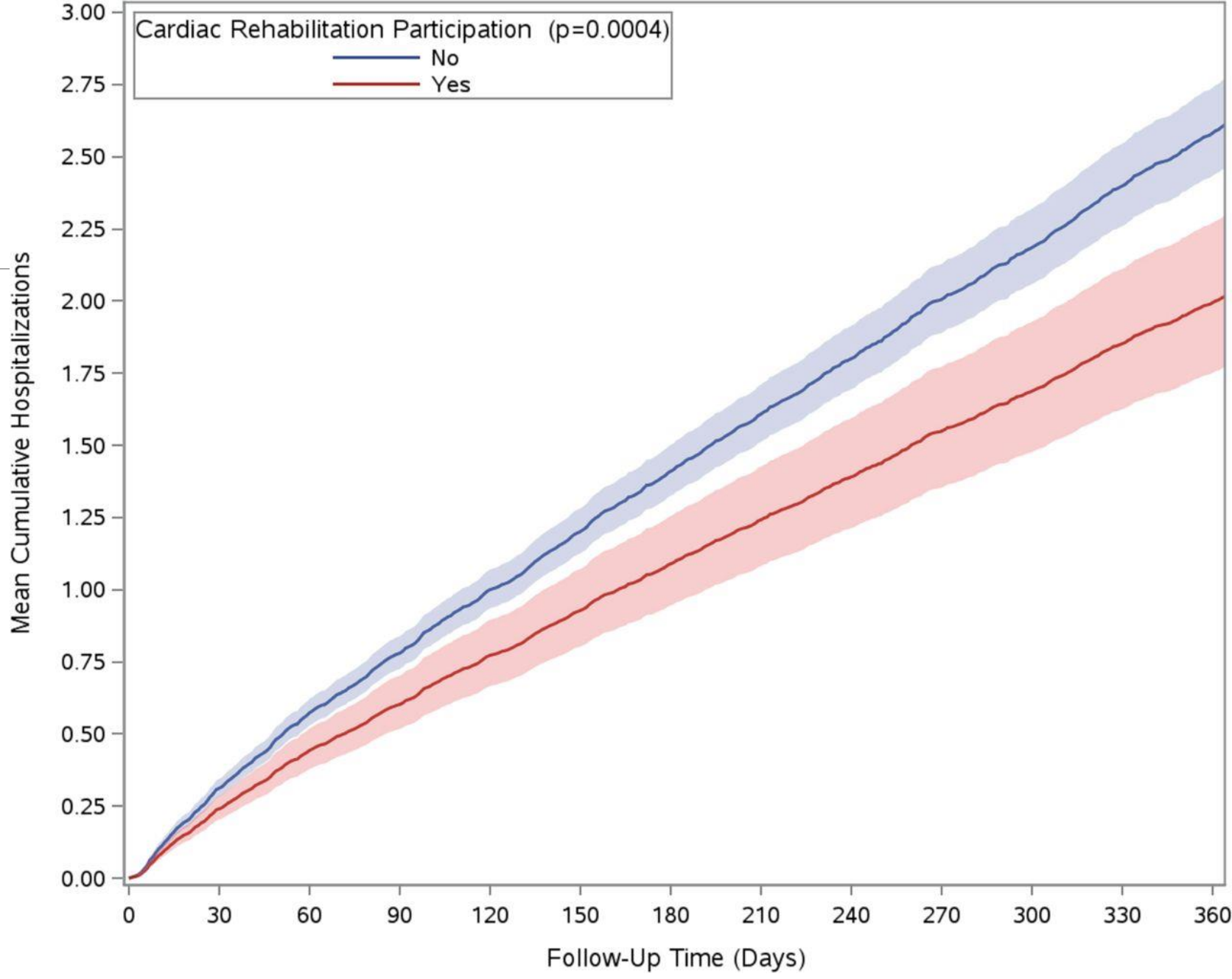
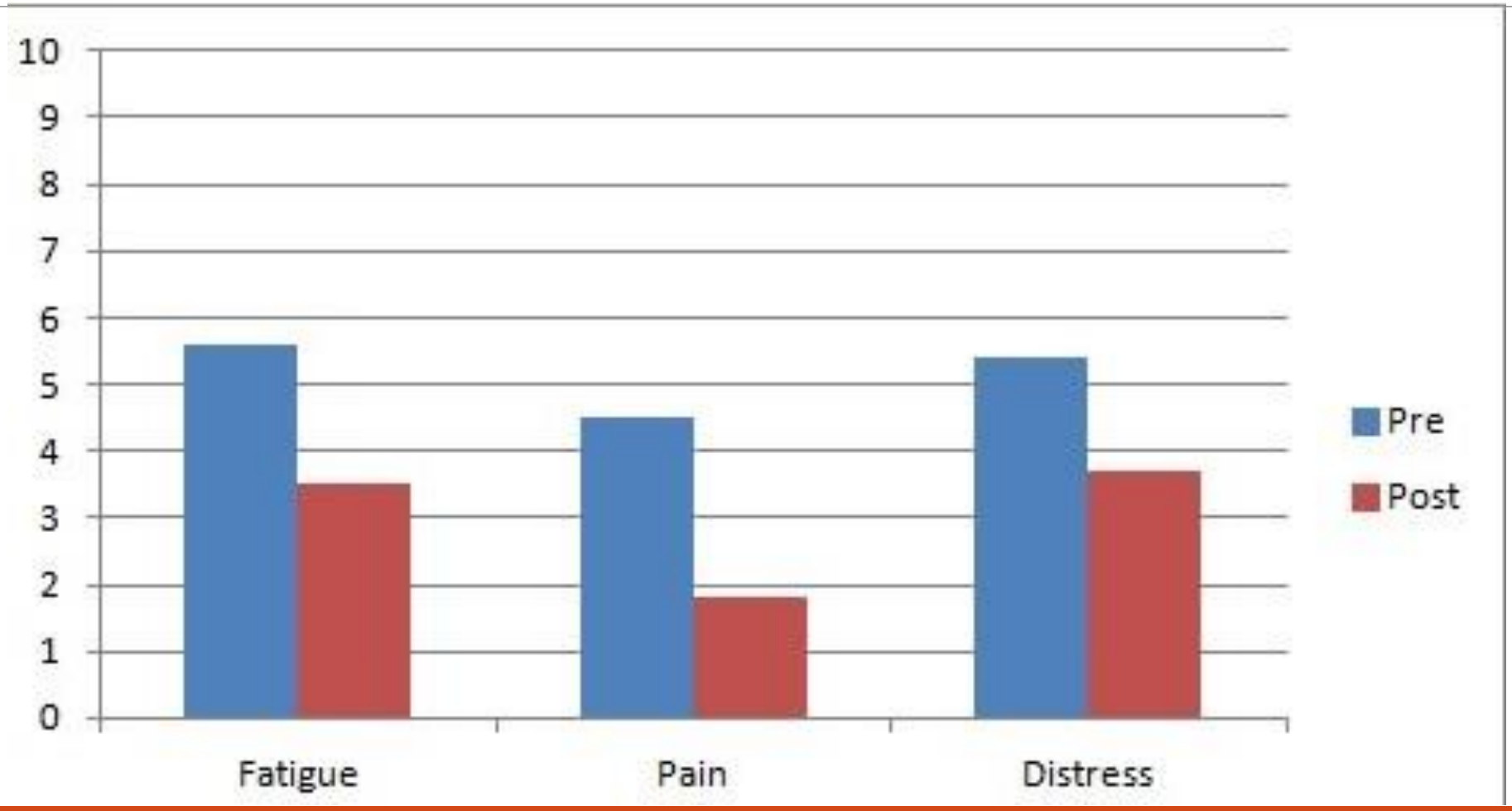
Cumulative Hospitalizations Over Time for Medicare Beneficiaries Receiving *Ventricular Assist Devices* in 2014,
Stratified by Participation in Cardiac Rehabilitation Cumulative hospitalizations were calculated adjusted for age, sex, race, census region, comorbidities, discharge to an inpatient rehabilitation facility or skilled nursing facility, and length of stay.

Shaded areas represent 95% confidence intervals.



Patient complaints pre- and post Cardiac Rehab



Why is Cardiac Rehabilitation Important??

Cardiac Rehabilitation will give to the patients the tools, knowledge, and motivation needed to fight the progression of cardiovascular disease with their “heart and soul”!

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Thank you

CARDIAC REHABILITATION

NEW START

BETTER HEART