RANCHO LOS AMIGOS NATIONAL REHABILITATION CENTER

IN-PATIENT CARDIAC REHABILITATION POLICY AND PROCEDURE

EFFECTIVE DATE: 01/17/2018 **APPROVED BY: Cesar Aranguri**

PURPOSE:

The purpose of In-Patient Cardiac Rehabilitation programs to provide a comprehensive quality of care approach for individuals (regardless of race, color, religion or creed) for healthcare services administered to patients with cardiovascular disease.

POLICY:

A. To provide quality inpatient and outpatient care to patients regardless of race, color, religion or creed.
B. To coordinate exercise programs and education/counseling to facilitate efficient, cost effective care.
C. To develop and implement individual treatment plans designed to meet patient and therapeutic goals.
D. To reduce risk factors, increase work capacity and earlier return to work or independent living for cardiac rehabilitation patients.
E. To provide patient and family education, to include lifestyle modification programs, so that the patient may reach optional levels of physiological, psychological, vocational and emotional functional capacity.
F. To acknowledge individual expertise and achievement while fostering a team approach in planning and decision making processes as it relates to patient care and the organizational structure of the facility.
G. To collaborate with multiple disciplines to develop and implement a comprehensive care plan.
H. To evaluate the effects of care through existing performance improvement activities.

PROCEDURE

I. Eligible patients for in-patient cardiac rehabilitation:

A. Post-acute myocardial infarctions who are medically stable
B. Coronary artery bypass graft surgery (CABG)
C. Percutaneous coronary intervention (PCI) with/without STENT Compensated heart failure
D. Post cardiac transplant surgery
E. Post valve replacement surgery

II. Clinical contraindications to in-patient cardiac rehabilitation:

A. Unstable angina, Shortness of breath (SOB) with ST-T changes
B. Decompensated congestive heart failure (CHF) i.e., pathological S3 heart sound, rales, increased BNP (> 1000 pg/mL)
C. Uncontrolled atrial arrhythmias, i.e. atrial fibrillation/flutter, multifocal atrial tachycardia >110 bpm consistently at rest or ventricular arrhythmias > 20% of the total burden beats or sustained ventricular tachycardia in the preceding 48 hrs.
D. SBP >200mmHg or resting DBP >110mmHg or 180/100 while on medications
E. Moderate to severe aortic stenosis (mean aortic valve pressure gradient > 30mmHg with aortic valve orifice area <1.2 cm2 in average-size adult). Moderate to severe mitral stenosis valve orifice area <1.2 cm2. Severe mitral regurgitation.
F. Orthostatic BP drop of > 20mmHg, with symptoms

G. Persistent sinus tachycardia (> 120 beats/min)
H. 3rd degree AV block (without pacemaker) or 2nd degree AV block with symptoms
I. Resting ST segment depression > 3-4 mm and no left ventricular hypertrophy of left bundle branch block. (Needs special consideration).
J. Acute pericarditis or myocarditis
K. SaO2 < 92%)
L. Recent embolic event. (< 4 weeks)
M. Deep vein thrombosis (DVT) during admission/inpatient period
N. Uncontrolled diabetes (fasting blood sugar greater than 400 mg/dL
O. Inability to Participate: Patients with severe orthopedic or neurologic problems that would prohibit exercise. Patient cannot tolerate 3 hours of therapy per day.
P. Severe behavioral disorders (unrelated to acute TBI): Verbally abusive, violent, inappropriate or disruptive to other patients.
Q. Unwillingness to participate: The patient does not wish to participate in PT/OT/speech therapies and/or shows no evidence of motivation in previous attempts to perform therapy
R. Poor rehabilitation potential: The patient's functional status is currently no different than their usual baseline. (Confirmed by previous history, medical records, or reliable source.)
S. Dementia: Not expected to improve and makes carryover of training unlikely or impossible.
T. Doesn't need help from at least 2 different rehab disciplines: The patient must demonstrate likely benefit from working with at least 2 of these: PT, OT
U. Acute illness or condition: The patient has an acute illness/condition requiring medical intervention prior to transfer to an acute rehab facility – these include:
i. septicemia (infection with fever and elevated white count)
ii. delirium (medication effect, dehydration, infectious, toxic-metabolic)
iii. unstable vital signs (severe hyper or hypotension, severe tachy or brady arrhythmia, hypoxia despite oxygen supplementation)
iv. acute psychotic episode (including active hallucinations or delusions)
v. uncontrolled pain (the patient's pain is not sufficiently controlled to allow participation in therapy)
vi. severe anemia
vii. extreme fatigue or lethargy due to medical condition
V. No Feasible Discharge Plan: The pre-admission assessment confirms that the patient will have absolutely no discharge options on completion of rehab AND the rehab prognosis is such that the patient will not achieve functional independence

III Patient Evaluation and Documentation prior initiating cardiac rehabilitation program

A. Medical Management Evaluation

1. Obtain current medical history-medical and surgical profile, including complications, comorbitities, and other pertinent medical history.
2. Perform a physical examination: cardiopulmonary systems assessment and musculoskeletal assessment.

3. Current medications , including dose and frequency
4. Identify any cardiac symptoms of chest discomfort, dyspnea, dizziness, arm/neck/shoulder pain including type, frequency, duration and cause of symptoms.
5. Cardiovascular disease risk factor profile
6. Resting 12 lead ECG
7. Assess left ventricular function as measured by echocardiogram, recent cardiac catheterization or nuclear imaging study

B. Nutritional Counseling Evaluation
1. Obtain estimates of total daily caloric intake and dietary content of saturated fat, trans fat, cholesterol, sodium, and nutrients.
2. Assess eating habits
3. Determine target areas for nutrition intervention

C. Weight Management Evaluation
1. Measure weight, height, and waist circumference.
2. Calculate body mass index (BMI).

D. Blood Pressure Management Evaluation
1. Measure seated resting blood pressure on ≥ 2 visits.
2. Measure blood pressure in both arms at program entry.
3. To rule out orthostatic hypotension, measure lying and standing blood pressure at program entry and after adjustments in antihypertensive drug therapy.
4. Assess current treatment and compliance.
5. Assess use of nonprescription drugs that may adversely affect blood pressure.

E. Lipid Management Evaluation
1. Obtain fasting measures of total cholesterol, high-density lipoprotein, low-density lipoprotein, and triglycerides. In those patients with abnormal levels, obtain a detailed history to determine whether diet, drug, and/or other conditions that may affect lipid levels can be altered.
2. Assess current treatment
3. Assess creatine kinase levels and liver function in patients taking lipid-lowering medications

F. Diabetes Management Evaluation
1. If a patient is known to be diabetic, identify history of complications such as findings related to heart disease; vascular disease; problems with eyes, kidneys, or feet; or autonomic or peripheral neuropathy.
2. Identify physician managing diabetic condition and prescribed treatment regimen,
3. Before starting exercise:

    a. Obtain latest fasting plasma glucose (FPG) and glycosylated hemoglobin (HbA1c).
    b. Consider stratifying patient to high-risk category because of the greater likelihood of exercise-induced complications.

G. Tobacco Cessation Evaluation
1. Ask the patient about smoking status and use of other tobacco products. Document status as never smoked, former smoker, current smoker (includes those who have quit in the last 12 months because of the high probability of relapse). Specify both amount of smoking (cigarettes per day) and duration of smoking (number of years). Quantify use and type of other tobacco products.

2. Determine readiness to change by asking every smoker/tobacco user if he or she is now ready to quit.
3. Assess for psychosocial factors that may impede success.

H. Psychosocial Management Evaluation
1. Identify psychological distress as indicated by clinically significant levels of depression, anxiety, anger or hostility, social isolation, marital/family distress, sexual dysfunction/adjustment, and substance abuse (alcohol or other psychotropic agents), using interview and/or standardized measurement tools.
4. Identify use of psychotropic medications

I. Physical Activity Counseling Evaluation
1. Assess domestic, occupational, and recreational needs.
2. Evaluate activities relevant to age, gender, and daily life, such as driving, sexual activity, sports, gardening, and household tasks.
3. Assess readiness to change behavior, self-confidence, barriers to increased physical activity, and social support in making positive changes.

J. Physical Therapy/Occupational Evaluation
1. Evaluate ROM, Muscle strength, neurological deficits, pain, weight
2. Sternal stability assessment if warranted **(**see Appendix A)
3. Monitor ADLS with telemetry
4. Perform 6 minute walk test (see Appendix B)

IV. Cardiac Rehabilitation Program Interventions/Plan of Care

A. Medical Management Intervention
1. Document the patient assessment information that reflects the patient's current status/risk stratification.
2. Generate and document a patient treatment plan (including an exercise prescription) that prioritizes goals and outlines intervention strategies for risk reduction.
3. Ensure that the patient is taking appropriate doses of aspirin, clopidogrel, beta-blockers, lipid-lowering agents, and ACE inhibitors or angiotensin receptor blockers as per the AHA/ACC, and that the patient has had an annual influenza vaccination.

B. Nutritional Counseling Intervention
1. Prescribe specific dietary modifications
2. Educate and counsel patient (and appropriate family members/domestic partners) on dietary goals and how to attain them. Incorporate behavior change models and compliance strategies into counseling sessions.

C. Weight Management Intervention
1. In patients with BMI 25 kg/m2 and/or waist 40 inches in men (102 cm) and 35 inches (88 cm) in women:
   a. Establish reasonable short-term and long-term weight goals individualized to the patient and his or her associated risk factors.
   b. Develop a combined diet, physical activity/exercise, and behavioral program designed to reduce total caloric intake, maintain appropriate intake of nutrients and fiber, and increase energy expenditure.

c. Aim for an energy deficit tailored to achieve weight goals

D. Blood Pressure Management Intervention
1. If blood pressure is 120-139 mm Hg systolic or 80-89 mm Hg diastolic:
   a. Provide lifestyle modifications, including regular physical activity/exercise; weight management; moderate sodium restriction and increased consumption of fresh fruits, vegetables, and low-fat dairy products; alcohol moderation; and smoking cessation.
   b. Provide drug therapy for patients with chronic kidney disease, heart failure, or diabetes if blood pressure is ≥130/≥80 mm Hg after lifestyle modification.
2. If blood pressure is ≥140 mm Hg systolic or ≥90 mm Hg diastolic:
   a. Provide lifestyle modification and drug therapy.

E. Lipid Management Intervention
1. Provide nutritional counseling consistent with the Therapeutic Lifestyle Change diet, such as the recommendation to add plant stanol/sterols and viscous fiber and the encouragement to consume more omega-3 fatty acids, as well as weight management counseling, as needed, in all patients. Add or intensify drug treatment in those with low-density lipoprotein >100 mg/dL; consider adding drug treatment in those with low-density lipoprotein >70 mg/dL.
2. Provide interventions directed toward management of triglycerides to attain non-high-density lipoprotein cholesterol <130 mg/dL.
3. Provide and/or monitor drug treatment

F. Diabetes Management Intervention
1. Educate patient and staff to be alert for signs/symptoms of hypoglycemia or hyperglycemia and provide appropriate assessment and interventions.
2. In those taking insulin or insulin secretogogues:
   a. Avoid exercise at peak insulin times.
   b. Advise that insulin be injected in abdomen, not muscle to be exercised.
   c. Test blood sugar levels pre- and post-exercise at each session: if blood sugar value is <100 mg/dL, delay exercise and provide patient 15 g of carbohydrate; retest in 15 minutes; proceed if blood sugar value >100 mg/dL; if blood sugar value is >300 mg/dL, patient may exercise if he or she feels well, is adequately hydrated, and blood and/or urine ketones are negative; otherwise, contact patient's physician for further treatment.
   d. Encourage adequate hydration to avoid effects of fluid shifts on blood sugar levels.
   e. Caution patient that blood sugar may continue to drop for 24-48 hours after exercise.
   f. In those treated with diet, metformin, alpha glucosidase inhibitors, and/or thiozolidinediones, without insulin or insulin secretogogues, test blood sugar levels prior to exercise for first 6-10 sessions to assess glycemic control; exercise is generally unlikely to cause hypoglycemia.
   g. Education: Teach and practice self-monitoring skills for use during unsupervised exercise. Refer to registered dietitian for medical nutrition therapy.

G. Tobacco Cessation Intervention
1. Provide individual education and counseling by program staff supplemented by self-teaching materials.
2. Promote social support by physician, program staff, family and/or domestic partner.
3. Promote relapse prevention: problem solving, anticipated threats, practice scenarios.

H. Psychosocial Management Intervention
1. Offer individual and/or small group education and counseling

2. Develop supportive rehabilitation environment and community resources
3. Teach and support self-help strategies.
4. Refer patients experiencing clinically significant psychosocial
5. distress to appropriate mental health specialists

I. Physical Activity Counseling Intervention
1. Provide advice, support, and counseling about physical activity needs on initial evaluation and in follow-up. Provide educational materials as part of counseling efforts.
2. Encourage patients to enroll in an out-patient cardiac rehabilitation program

J. Monitored Physical Activity Intervention

1. Monitor with telemetry activities of daily living (dressing, bathing, etc.) and low level exercise. Document activity HR, BP, rhythm strips and symptoms

2. Contraindications to begin activity session (Record rhythm strip in each case)
   a. Resting HR $\geq$ 100 bpm
   b. Resting HR $\leq$ 40 bpm
   c. Hypertension (SBP $\geq$ 170 mm Hg or DPB $\geq$ 100 mm
   d. Resting angina
   e. Frequent premature ventricular complexes (greater than 12/min), coupled PVCs, ventricular tachycardia (3 or more consecutive PVCs).
   f. New onset of uncontrolled atrial arrhythmias, i.e. atrial fibrillation/flutter, multifocal atrial tachycardia or HR of uncontrolled atrial arrhythmias >110 bpm consistently at rest
   g. 3rd degree AV block (without pacemaker)
   h. 2nd degree AV block Type II
   i. $SaO_2 < 92\%$
   j. Resting symptoms of dyspnea, wheezing, dizziness, etc

3. Criteria for terminating an activity session
   a. HR > 120 bpm.
   b. Onset of bradycardia
   c. Systolic hypotension $\geq$ 20 mm Hg drop in the BP from standing resting BP
   d. Hypertension (SBP > 180 mm Hg or DBP > 100 mm Hg
   e. Onset of angina. (If no relief within one to three minutes of rest, give one NTG 1./1.50 gr SL or 2x SL spray
   f. Net change of 2 or more mm of horizontal or downsloping ST segment depression or 1 mm ST segment elevation.
   g. Frequent premature ventricular complexes (greater than 12/min), coupled PVCs, ventricular tachycardia (3 or more consecutive PVCs).
   h. Onset of uncontrolled atrial arrhythmias, i.e. atrial fibrillation/flutter, multifocal atrial tachycardia
   i. 3rd degree AV block (without pacemaker)
   j. 2nd degree AV block Type II
   k. $SaO_2 < 92\%$
   l. Symptoms of dyspnea, wheezing, dizziness, etc

4. Low level exercise test prior to discharge

V. Cardiac Rehabilitation Program Expected Outcomes and Assessment

A. Medical Management Expected Outcome
   1. Outcome Report: Documented evidence of patient outcomes within the components of care that reflects progress toward goals, including whether the patient is taking appropriate doses of aspirin, clopidogrel, beta-blockers, and ACE inhibitors or angiotensin receptor blockers as per the AHA/ACC, and identifies specific areas that require further intervention and monitoring (Appendix E).

B. Nutritional Counseling Expected Outcome
   1. Patient understands basic principles of dietary content
   2. A plan has been provided to address eating behavior problems.

C. Weight Management Expected Outcome
   1. Short-term: Patient understands diet and physical activity/exercise program aimed toward attainment of established weight goal.
   2. Long-term: Patient enrolls in out-patient cardiac rehabilitation program aimed toward attainment of established weight goal.

D. Blood Pressure Management Expected Outcome
   1. Short-term: Continue to assess and modify intervention until normalization of blood pressure in prehypertensive patients; <140 mm Hg systolic and <90 mm Hg diastolic in hypertensive patients; <130 mm Hg systolic and <80 mm Hg diastolic in hypertensive patients with diabetes, heart failure, or chronic kidney disease.
   2. Long-term: Maintain blood pressure at goal levels.

E. Lipid Management Expected Outcome
   1. Short-term: Arrange follow-up to assess and modify intervention until low-density lipoprotein is <100 mg/dL and non-high-density lipoprotein cholesterol <130 mg/dL
   2. Long-term: Low-density lipoprotein cholesterol <100 mg/dL. Non-high-density lipoprotein cholesterol <130 mg/dL

F. Diabetes Management Expected Outcome
   1. Communicate with primary physician or endocrinologist about signs/symptoms and medication adjustments.
   2. Confirm patient's ability to recognize signs/symptoms, self-monitor blood sugar status, and self-manage activities.
   3. Arrange follow-up to attain FPG levels of 90-130 mg/dL and HbA1c <7%.
   4. Minimize complications and reduce episodes of hypoglycemia or hyperglycemia at rest and/or with exercise.
   5. Maintain blood pressure at <130/<80 mm Hg.

G. Tobacco Cessation Expected Outcome
   1. Short-term: Patient will demonstrate readiness to change by initially expressing decision to quit and selecting a quit date. Subsequently, patient will quit smoking and all tobacco use and adhere to pharmacological therapy (if prescribed) while practicing relapse prevention strategies; patient will resume cessation plan as quickly as possible when temporary relapse occurs.

2. Long-term: Complete abstinence from smoking and use of all tobacco products for at least 12 months (maintenance) from quit date. No exposure to environmental tobacco smoke at work and home.

H. Psychosocial Management Expected Outcome
1. Patient shows emotional well-being as indicated by the absence of clinically significant psychological distress, social isolation, or drug dependency.
2. Patient demonstrates responsibility for health-related behavior change, relaxation, and other stress management skills

I. Physical Activity Counseling and Training Expected Outcome
1. Patient should understand what activities are safe and which activities should be avoided
   i. Return to work
   ii. Driving
   iii. Household activity
   iv. Stair climbing
   v. Lifting
   vi. Sexual activity
   vii. Walking
   viii. Recreational and social activities

2. Patient enrolls in out-patient cardiac rehab program

VI. Staff Composition, Responsibilities and Qualifications.

An interdisciplinary team composed of a program director/medical director; supervising physician, physician assistant or nurse practitioner, physical therapists, mental health professional; dietician or nutritionist.

A. Medical Director:
1. A physician to serve as medical director. The medical director shall be responsible for establishing all medical protocols, policies and procedures, ensuring the achievement and maintenance of quality standards of medical care, for overall patient care including participation in patient treatment planning meetings and for consultation with program personnel and referring physicians. Policies and procedures will reviewed yearly by the medical director.
2. The medical director shall be a physician who is a board certified cardiologist or is board certified in internal medicine or family practice and shall have recent clinical experience in caring for cardiac patients and experience in exercise testing and cardiac rehabilitation.
3. The medical director shall be currently certified in advanced cardiac life support by the American Heart Association.

B. Program Director
1. Bachelor's degree in an allied health field, such as exercise physiology, or licensure in the jurisdiction, for example, as a registered nurse or physical therapist.
2. Advanced knowledge of exercise physiology, nutrition, risk-factor modification strategies, counseling techniques, and uses of education programs and technologies as applied to cardiovascular rehabilitation and secondary prevention services.
3. Experience in staff coordination and delivery of secondary prevention services to patients.

4. Successful completion of an AHA Basic Life Support (BLS) or ACLS (if eligible to provide such services) courses.
5. Certification, experience, and training equivalent to those specified for an Exercise Specialist by the ACSM, certification through the American Nurses Credentialing Center (ANCC), or the advanced specialty in cardiopulmonary rehabilitation of the American Physical Therapy Association.
6. Preferred qualification: Successful completion of ACLS course

C. Supervising physician, physician assistant or nurse practitioner
   1. Shall collaborate with the Medical Director and Program Director in the operational and clinical aspects of the program.
   2. Primary responsibilities shall include, but not be limited to: patient education, participation in establishing and monitoring exercise therapy, EKG telemetry monitoring, provision of emergency care and maintenance of, regular, ongoing communication with the patient's referring physician and the cardiac rehabilitation staff
   3. This individual shall have experience in cardiology, exercise prescription and exercise testing. He/she shall be currently certified in advanced cardiac life support by the American Heart Association

D. Physical Therapist.
   1. A registered physical therapist shall be responsible for providing consultation to program staff and advising and/or implementing the exercise training sessions of the program and participating in the patient/family education program services.
   2. The physical therapist shall be currently certified in basic life support by the American Heart Association or the American Red Cross.
   3. There must be no more than a 4:1 patient to physical therapist ratio at any exercise session

E. Dietitian/Nutritionist
   1. A dietitian shall provide or supervise nutritional counseling services to the patient/family and assist program staff in monitoring patient progress towards nutritional goals.
   2. A dietitian responsible for nutritional counseling services shall be registered or eligible for registration by the American Dietetic Association.

F. Psycho/social counselor
   1. Shall assist patients in adjusting to illness. Will provide or supervise psycho/social counseling services to the patient/family and assist program staff in monitoring patient progress towards psycho/social goals
   2. Counseling services shall be provided by qualified professional staff who are licensed and/or registered in accordance with California state law

VII. Staff Education and Performance Review

A. Each staff member must successfully complete both initial and annual competency checks. Should a staff member have difficulty passing any competency, a specific educational program will be developed for that person by the rehab manager with a subsequent date set for re-assessment. If the staff member cannot then demonstrate competency, he/she will not be retained in that rehab position (Appendix C).

   1. **New Employees:** Initial competencies will be based on the core expectations of staff job descriptions. An orientation checklist is available to document level of proficiency in meeting each of those expectations.

2. **Incumbent Employees:** Department- specific competencies – the Medical Director or Program Director will work with the staff to select at **least 4 rehab-related skills** to be developed or improved each year. Criteria for selection are based on JCAHO definitions of skills that are: high risk, problem-prone, infrequently used, or new. New includes demonstration of the correct use of any new piece of equipment used in patient care. Once identified, a quarterly schedule is set-up and a skills checklist is developed to guide & document performance of each selected skill.

3. **An outline plan/calendar will be created to address/practice one skill per quarter**

4. **A skills checklist for each selected competency will be developed; including references/resources to be utilized by staff to provide the knowledge background needed to perform the skill.**

VIII. Safety Precautions and Emergency Procedures

A. Monitoring During Exercise Therapy Sessions.
   1. Continuous electrocardiographic monitoring equipment shall be available for use with new participants and for periodic checks as deemed necessary by the supervising personnel.
   2. The medical director or his/her designated physician/physician assistant shall be present on the premises during exercise therapy sessions. The exercise training area must be in an area easily accessible to the hospital's medical emergency response team. The designated physician shall be qualified to respond to cardiac emergencies and be currently certified by the American Heart Association in Advanced Cardiac Life Support (ACLS).

B. Emergencies/Cardiopulmonary Resuscitation Preparedness.
   1. All health care personnel in attendance at the exercise sessions shall be certified in Basic Life Support by the American Heart Association and trained in the use of a defibrillator and/or AED).
   2. **Procedures to follow in the event of an emergency are contained in the STANDING ORDERS DURING EXERCISE SESSIONS**.
   3. There shall be periodic review and drill of this protocol by the staff frequently enough to maintain proficiency during emergencies and in all instances at least on a **quarterly basis**. **A written record of the drills shall be maintained.** The following are examples of medical emergency in-services: Mock codes, review of crash cart/defibrillator or critique of an actual code

Date	**Brief description of medical emergency in - service**
Date	**Brief description of medical emergency in - service**
Date	**Brief description of medical emergency in - service**
Date	**Brief description of medical emergency in - service**

4. Emergency instructions shall be posted in the exercise area (Standing Orders During Exercise Sessions).
5. Emergency drugs and equipment for initiation of Advanced Cardiac Life Support shall be located the exercise area during all exercise sessions. Such drugs shall be accessible only to authorized persons. Expired drugs and sterile supplies shall be removed from storage.
6. At a minimum emergency supplies shall include:
   a. Portable defibrillator with "quick" look capabilities
   b. Oxygen tank with regulator and mask
   c. Suction and intubation equipment
   d. Emergency drugs and intravenous equipment
   e. Blood pressure cuff and stethoscope
   f. Sublingual nitroglycerin
   g. Timing device which times to the second.

Appendix A

STERNAL STABILITY ASSESSMENT

Risk factors for sternal instability

Risk factors that are thought to contribute to the development of sternal instability and other sternal wound complications include:

- Obesity
- Macromastia (large breasts)
- Large chest circumference
- Smoking history
- Chronic obstructive pulmonary disease (COPD)
- Use of beta-adrenergic agonists
- Diabetes
- Osteoporosis
- Prolonged steroid use
- Inadvertent (off-center) or repeat sternotomy
- Bilateral internal mammary artery harvesting
- Prolonged mechanical ventilation (> 24 hours)
- Renal failure
- Chronic/persistent cough, secondary to use of type one ACE inhibitors
- Blood transfusions

Sternal assessment

Prior to undertaking a physical assessment, the following should be considered:

- **Pain** – intermittent/constant, dull/sharp, hot/cold, deep/superficial
- **Feeling of instability or excessive motion** – e.g., patient reports that their chest 'feels like it is going fall open'
- **Sounds** – 'clicking', 'clunking'
- **Activities that provoke 'unstable feeling'/pain/clicking/crepitus**
- **State of wound or scar** – including the colour, sensitivity to temperature, discharge (serous or coloured), hypersensitivity, and presence of keloid scarring or adhesions

Physical assessment

The Modified Sternal Instability Scale (see table below) has been shown to have high inter- and intra-rater reliability when used to determine whether the sternum is mechanically stable.

MOTION GRADE	DESCRIPTION
0	**Clinically stable sternum (no detectable motion) – normal**
1	**Minimally separated sternum (slight increase in motion upon special testing#)**
2	**Completely separated sternum – entire length (marked increase in motion upon special testing#)**
3	**Completely separated sternum – entire length (marked increase in motion upon special testing#)**

 # Special testing may include shoulder flexion (unilateral/bilateral), trunk rotation, lateral flexion, coughing and opposing movements of the upper limb (e.g., flexion, abduction and external rotation of one upper limb accompanied by extension, adduction and internal rotation of the other upper limb).

Assessment method

1. Palpate between the sternal halves using the 2nd, 3rd and 4th digits (as shown in the image below) during:

- Shoulder flexion (unilaterally and/or bilaterally)
- Trunk lateral flexion and/or rotation
- Coughing and deep inspiration/expiration

Manual sternal assessment during trunk lateral flexion

2. To further challenge the sternum, an additional optional movement is contrary shoulder movement (i.e., one shoulder flexing and externally rotating, while the other shoulder extends and internally rotates).

3. During movement, record grade of motion, bony gap (size) and tenderness.

Frequency of assessment

- **Day 5-7 post-cardiac surgery** – results should be documented in the medical record and the treating cardiac surgeon should be notified of the assessment outcome should an unstable sternum be detected

Appendix B

SIX MINUTE WALK TEST

Equipment Required:

- Stopwatch
- 60-100 ft. stretch of unimpeded walkway
- Telemetry unit

Set-Up:

- Place cones at either end of the 30 metre stretch as turning points
- Have chairs set up either side and halfway along the walking stretch

Patient Instructions:

- "The object of this test is to walk as far as possible for 6 minutes. You will walk back and forth in this hallway. Six minutes is a long time to walk, so you will be exerting yourself. You will probably get out of breath or become exhausted. You are permitted to slow down, to stop, and to rest as necessary. You may lean against the wall while resting, but resume walking as soon as you are able. You will be walking back and forth around the cones. You should pivot briskly around the cones and continue back the other way without hesitation. Now I'm going to show you. Please watch the way I turn without hesitation."

- **Read this standardised encouragement during the test:**

- After the 1st minute: "You are doing well. You have 5 minutes to go." When the timer shows 4 minutes remaining: "Keep up the good work. You have 4 minutes to go." When the timer shows 3 minutes remaining: "You are doing well. You are halfway done.
  When the timer shows 2 minutes remaining: "Keep up the good work. You have only 2 minutes left. When the timer shows 1 minute remaining: "You are doing well. You only have 1 minute to go. With 15 seconds to go: "In a moment I'm going to tell you to stop. When I do, just stop right where you are and I will come to you." At 6 minutes: "Stop"

- If the participant stops at any time prior, you can say: "You can lean against the wall if you would like; then continue walking whenever you feel able."

- Do not use other words of encouragement (or body language) to influence the patient's walking speed. Accompany the participant along the walking course, but keep just behind them. Do not lead them.

Contraindications for a six minute walk test

- Resting HR $\geq$ 100 bpm
- Hypertension (SBP $\geq$ 170 mm Hg or DPB $\geq$ 100 mm
- Resting angina
- Frequent premature ventricular complexes (greater than 12/min), coupled PVCs, ventricular tachycardia (3 or more consecutive PVCs).
- Resting symptoms of dyspnea, wheezing, dizziness, etc

Criteria for terminating a six minute walk test

- Achievement of a maximum heart rate of 120.

- Systolic hypotension - ≥ 20 mm Hg drop in the blood pressure from standing resting BP
- Hypertension (SBP greater n 180 mm Hg or DBP greater than 100 mm Hg, obtain if and when patient requires rest period)
- Onset of level 1 angina.
- Net change of 2 or more mm of horizontal or downsloping ST segment depression.
- Frequent premature ventricular complexes (greater than 12/min), coupled PVCs, ventricular tachycardia (3 or more consecutive PVCs).
- Patient request.
- Equipment failure or poor ECG recording preventing accurate ECG interpretation
- Any symptoms deemed by the tester to warrant termination, e.g. ataxia, dizziness, near-syncope, shortness of breath, wheezing, etc

Example of form to record 6 MWT results

6MWT 1						Date:	Time:
Supplemental Oxygen						**Mobility Aid**	
Time mins	**BP**	**SpO2**	**HR**	**RPE**	**Distance walked**	**Rests / comments**	
Rest							
1							
2							
3							
4							
5							
6							
Recovery 1							
2							
Total distance: _____ **Symptom recovery:** _____ **HR recovery:** _____ **Limiting factor:** _____ **Was test terminated?** ☐ No ☐ Yes If yes: when?							
6MWT Termination Criteria: ☐ Chest pain or angina-like symptoms ☐ Heart rate > Predicted HR max. ☐ Evolving mental confusion, light-headedness or incoordination ☐ Physical or verbal severe fatigue						☐ Intolerable dyspnoea, unrelieved by rest ☐ Persistent SpO2 <85% (Note: pending clinical presentation) ☐ Abnormal gait pattern (leg cramps, staggering, ataxia) ☐ Other clinically warranted reason	

APPENDIX C

RANCHO LOS AMIGOS NATIONAL REHABILITATION CENTER
CARDIAC REHABILITATION PROGRAM
INITIAL INDIVIDUAL COMPETENCY VALIDATION

EMPLOYEE: **TITLE:** **DATE:**

COMPETENCY	REVIEW VALIDATION		AGE GROUP SERVED	SELECTION CRITERIA	METHOD OF VALIDATION
	Initial	Date			
Arrhythmia Recognition			Young Adult Middle Adult Older Adult	High Risk	
Versacare Telemetry Monitor			Young Adult Middle Adult Older Adult	High Risk	
Defibrilator/AED			Young Adult Middle Adult Older Adult	High Risk	
Recognize signs and symptoms of exercise intolerance			Young Adult Middle Adult Older Adult	High Risk	
Patient assessment prior to exercise			Young Adult Middle Adult Older Adult	High Risk	
Basic heart and lung sounds			Young Adult Middle Adult Older Adult	High Risk	
Signs and symptoms of heart failure			Young Adult Middle Adult Older Adult	High Risk	
Signs and symptoms of myocardial ischemia			Young Adult Middle Adult Older Adult	High Risk	
Exercise equipment			Young Adult Middle Adult Older Adult	High Risk	

Physician:_____ Date:_____

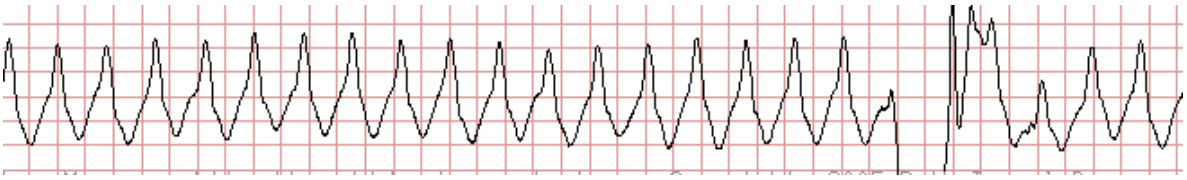
APPENDIX C

TELEMETRY MONITORING
Self Assessment Quiz Answers

1.

What is the rhythm? Normal Sinus Rhythm

2.



What is the rhythm? Ventricular Tachycardia

3.

What is the rhythm? Sinus Tachycardia

4.

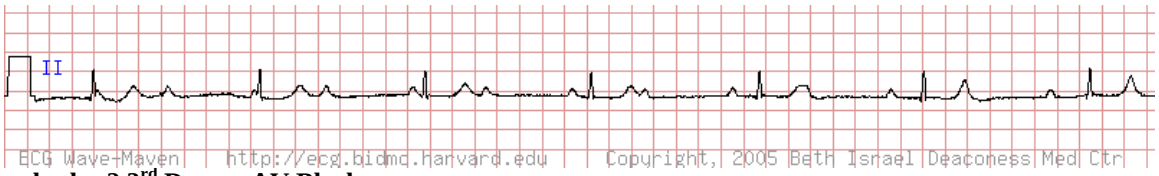
What is the rhythm? 2nd Degree AV Block Type I (Wenckebach)

5.

What is the rhythm? Junctional Rhythm

APPENDIX C

6.



What is the rhythm? 3rd Degree AV Block

7.

What  **is the rhythm? Atrial Flutter with variable block**

8.

What is the rhythm? Non-conducted Premature Atrial Contractions (PACs)

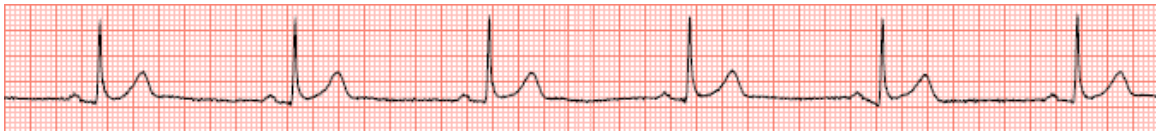
9.

What is the rhythm? Accelerated Idioventricular Rhythm

10.

What is the rhythm? 2nd Degree AV Block Type 2

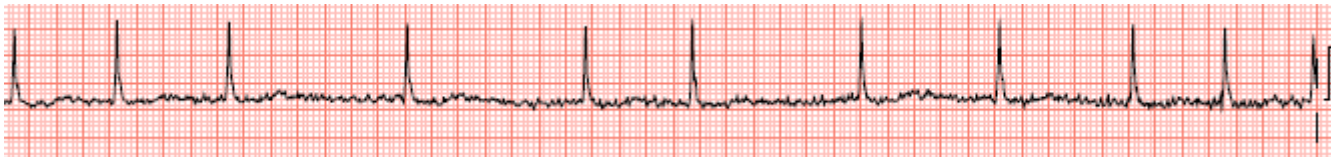
11.



What is the rhythm? Sinus Bradycardia

APPENDIX C

12.



What is the rhythm? Atrial Fibrillation

13.

What is the rhythm? Premature Atrial Contractions (PACs)

14.

What is the rhythm? Sinus Rhythm with 1st Degree AV Block

15.

What is the rhythm? Premature Ventricular Contractions (PVCs)

APPENDIX C

Rancho Los Amigos National Rehabilitation Center

SPECIFIC CLINICAL COMPETENCY: VERSACARE TELEMETRY MONITOR

Employee Name: _____

Job Title: _____

Employee has demonstrated "basic competence" for the management of the patient in the following areas:

Topic/Skill	Date	Instructor
USING THE VERSACARE TELEMETRY MONITOR		
1. Proper electrode placement		
2. Assigning patient to a channel		
3. Starting the ECG display		
4. Recording the ECG display		
5. Saving/printing ECG strips		
6. Marking additional ECG strips		
7. Editing report strip information		
8. Printing reports		
RHYTHM IDENTIFICATION: MUST BE ABLE TO ID THE FOLLOWING		
1. Sinus rhythms (normal, bradycardia and tachycardia)		
2. Atrial rhythms (PACs, atrial fibrillation and atrial flutter)		
3. Atrioventricular node blocks (1st degree, 2nd degree type I & 2 and 3rd degree		
4. Junctional rhythms (premature and escape)		
5. Ventricular rhythms (PVCs, escape/idioventricular and ventricular tachycardia		

"Basic competence" refers to the demonstration of basic skills required to safely and effectively complete assigned duties without immediate supervision. Additionally, the employee has demonstrated that they have identified areas where additional supervision and training are required and that they are appropriately able to address these areas by accessing resources (e.g. physician, mentor, senior staff, supervisor, scientific literature, peers).

Employee Signature:_____ Date:_____

Supervisor/Instructor Signature:_____ Date:_____

Submit Completed form to be filed in employee personnel and/or education file.

APPENDIX D
Low Level Exercise Test prior to Discharge Protocol

Contraindications for low level stress test

- Resting HR $\geq$ 100 bpm
- Hypertension (SBP $\geq$ 170 mm Hg or DPB $\geq$ 100 mm
- Resting angina
- Frequent premature ventricular complexes (greater than 12/min), coupled PVCs, ventricular tachycardia (3 or more consecutive PVCs).
- Resting symptoms of dyspnea, wheezing, dizziness, etc

Criteria for terminating a low level exercise test

- Achievement of a maximum heart rate of 120.
- Systolic hypotension - 20 mm Hg or more drop in the blood pressure.
- Hypertension (systolic blood pressure greater n 190 mm Hg or diastolic greater than 100 mm Hg).
- Onset of level 1 angina.
- Net change of 2 or more mm of horizontal or downsloping ST segment depression.
- Frequent multimodal premature ventricular complexes (greater than 12/min), coupled PVCs, ventricular tachycardia (3 or more consecutive PVCs).
- Patient request.
- Equipment failure or poor ECG recording preventing accurate ECG interpretation
- Any symptoms deemed by the tester to warrant termination, e.g. ataxia, dizziness, near-syncope, shortness of breath, wheezing, etc.