

# Cardiac Rehabilitation and Peripheral Artery Disease Supervised Exercise Therapy Protocol

Chest Pain or Angina
1. Patient complains of chest pain or angina, <b>or</b> exhibits at least 1 sign or symptom of angina: pain, pressure, or squeezing discomfort in chest, back, neck, jaw, or upper extremity; indigestion-like discomfort; nausea or vomiting; diaphoresis at rest.
2. Assess symptoms, pulse, electrocardiogram (ECG), blood pressure (BP), respiratory rate (RR), oxygen saturation (O2 sat).
<p>a. For Raleigh CCN, activate emergency response per WakeMed policy. For off-campus outpatient rehab sites, notify supervising provider and activate emergency response if indicated per WakeMed policy.</p> <ul style="list-style-type: none"> <li>i. Monitor ECG, RR, O2 sat continuously. Reassess symptoms, BP at least every 5 minutes, or with changes in patient condition.</li> <li>ii. Do NOT administer <b>Nitroglycerin</b> if:               <ul style="list-style-type: none"> <li>1. HR &lt;50 or &gt;100 bpm.</li> <li>2. SBP &lt;90 mmHg.</li> </ul> </li> <li>iii. Otherwise, administer <b>Nitroglycerin 0.4 mg sublingual x1</b>.               <ul style="list-style-type: none"> <li>1. After 5 minutes, reassess symptoms, ECG, BP, RR, O2 sat.</li> <li>2. If angina continues, administer second dose of <b>Nitroglycerin 0.4 mg sublingual x1</b>.</li> <li>3. After 5 minutes, reassess symptoms, ECG, BP, RR, O2 sat.</li> <li>4. If angina continues, administer third dose of <b>Nitroglycerin 0.4 mg sublingual x1</b>.</li> <li>5. Do NOT administer any more <b>Nitroglycerin</b> this session.</li> </ul> </li> <li>iv. Follow provider orders upon arrival. If emergency response activated, hand off care to emergency response team upon arrival.</li> <li>v. Notify patient's provider.</li> </ul>
<p>b. EXCEPTION: if the patient has diagnosis of stable angina with <b>Nitroglycerin</b> as part of their exercise regimen.</p> <ul style="list-style-type: none"> <li>i. Do NOT administer <b>Nitroglycerin</b> if:               <ul style="list-style-type: none"> <li>1. HR &lt;50 or &gt;100 bpm.</li> <li>2. SBP &lt;90 mmHg.</li> </ul> </li> <li>ii. Otherwise, administer <b>Nitroglycerin 0.4 mg sublingual x1</b>.               <ul style="list-style-type: none"> <li>1. After 5 minutes, reassess symptoms, ECG, BP, O2 sat.</li> <li>2. If angina continues, administer second dose of <b>Nitroglycerin 0.4 mg sublingual x1</b>.</li> <li>3. After 5 minutes, reassess symptoms, ECG, BP, O2 sat.</li> <li>4. If angina continues, administer third dose of <b>Nitroglycerin 0.4 mg sublingual x1</b>.</li> <li>5. Do NOT administer any more <b>Nitroglycerin</b> this session.</li> <li>6. After 5 minutes, reassess symptoms, ECG, BP, O2 sat.</li> </ul> </li> <li>iii. If angina resolves, patient may exercise at low intensity.</li> <li>iv. Reassess symptoms, ECG, BP, O2 sat at least once during exercise; at completion of exercise; and with changes in patient condition.</li> </ul>
<p>c. At end of initial assessment, if angina self-resolves, patient may exercise at low intensity.</p> <ul style="list-style-type: none"> <li>i. Reassess symptoms, ECG, BP, O2 sat at least once during exercise; at completion of exercise; and with changes in patient condition.</li> <li>ii. Notify patient's provider.</li> </ul>
Decreased Oxygen Saturation, Shortness of Breath, or Respiratory Distress
1. O2 sat <90%, <b>or</b> patient complains of shortness of breath <b>or</b> exhibits at least 1 sign or symptom of respiratory distress: increased respiratory effort (e.g., tachypnea, nasal flaring, retractions, use of accessory muscles to assist in breathing); inadequate respiratory effort (e.g., bradypnea or hypoventilation); abnormal airway sounds (e.g., stridor, wheezing, grunting); pale, cool skin tone or in some cases warm, red, and diaphoretic; changes in level of consciousness or agitation
2. Assess symptoms, pulse, electrocardiogram (ECG), blood pressure (BP), respiratory rate (RR), oxygen saturation (O2 sat).
<p>a. For Raleigh CCN, activate emergency response per WakeMed policy. For off-campus outpatient rehab sites, notify supervising provider and activate emergency response if indicated per WakeMed policy.</p> <ul style="list-style-type: none"> <li>i. If O2 sat &lt;90%, administer <b>oxygen starting at 4 L/min via nasal cannula</b>, increasing by 1 L/min up to 6 L/min to maintain O2 sat &gt;=90%.</li> <li>ii. If O2 sat &gt;=90%, encourage deep breaths.</li> <li>iii. Monitor ECG, RR, O2 sat continuously. Reassess symptoms, BP at least every 5 minutes, or with changes in patient condition.</li> <li>iv. Follow provider orders upon arrival. If emergency response activated, hand off care to emergency response team upon arrival.</li> <li>v. Notify patient's provider.</li> </ul>

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- b. At end of initial assessment, if O2 sat  $\geq 90\%$  **and** shortness of breath or signs and symptoms of respiratory distress self-resolve, patient may exercise at low intensity.
  - i. Reassess symptoms, ECG, BP, O2 sat at least once during exercise; at completion of exercise; and with changes in patient condition.
  - ii. Notify patient's provider.

### Hypoglycemia or Hyperglycemia

1. Patient complains of or exhibits 1 or more signs or symptoms of:
  - a. **Hypoglycemia** (altered mental status; shakiness; nervousness, irritability, or anxiety; lightheadedness or dizziness; headache; tingling or numbness of tongue or lips; tachycardia; diaphoresis, chills, and clamminess; hunger)
  - b. **Hyperglycemia** (fatigue, shortness of breath, tachycardia, increased thirst, very dry mouth, fruity breath odor, nausea or vomiting, stomach pain, frequent urination)
2. Perform point of care (POC) glucose test.
  - a. **Blood glucose (BG)  $< 50$  mg/dL or  $\geq 500$  mg/dL is a critical result.** For Raleigh CCN, activate emergency response per WakeMed policy. For off-campus outpatient rehab sites, notify supervising provider and activate emergency response if indicated per WakeMed policy.
    - b. If **BG  $< 70$  mg/dL** and patient is **unable** to consume carbohydrates orally
      - i. For Raleigh CCN, activate emergency response per WakeMed policy. For off-campus outpatient rehab sites, notify supervising provider and activate emergency response if indicated per WakeMed policy.
        - ii. Administer **Glucagon 1mg IM STAT**. If patient has insulin infusing via insulin pump, disconnect pump until BG  $\geq 120$  mg/dL. Perform POC glucose test every 15 minutes.
      - iii. Assess symptoms, pulse, electrocardiogram (ECG), blood pressure (BP), respiratory rate (RR), oxygen saturation (O2 sat).
      - iv. Monitor ECG, RR, O2 sat continuously. Reassess symptoms, BP at least every 5 minutes, or with changes in patient condition.
      - v. Follow provider orders upon arrival. If emergency response activated, hand off care to emergency response team upon arrival.
    - c. If **BG  $< 70$  mg/dL** and patient is **able** to consume carbohydrates
      - i. Treat with **15-30 grams fast-acting oral carbohydrate** (4-8 oz. juice). Perform POC glucose test in 15 minutes.
      - ii. If repeat BG  $< 70$  mg/dL, treat with **15 grams fast-acting oral carbohydrate** (4 oz. juice). Perform POC glucose test in 15 minutes.
      - iii. If BG remains  $< 70$  mg/dL **or** signs and symptoms of hypoglycemia persist after 2 treatments
        1. For Raleigh CCN, activate emergency response per WakeMed policy. For off-campus outpatient rehab sites, notify supervising provider and activate emergency response if indicated per WakeMed policy.
        2. Treat with **15 grams fast-acting oral carbohydrate** (4 oz. juice). Perform POC glucose test every 15 minutes.
        3. Assess symptoms, pulse, electrocardiogram (ECG), blood pressure (BP), respiratory rate (RR), oxygen saturation (O2 sat).
        4. Monitor ECG, RR, O2 sat continuously. Reassess symptoms, BP at least every 5 minutes, or with changes in patient condition.
        5. Follow provider orders upon arrival. If emergency response activated, hand off care to emergency response team upon arrival.
      - ii. Once BG  $\geq 70$  mg/dL, patient should consume a meal or snack (e.g., 2 graham cracker squares and 1 oz. peanut butter and/or snack bar). If signs and symptoms of hypoglycemia have resolved **and** emergency response was not activated, patient may exercise at low intensity.
    - d. If **BG  $\geq 250$  mg/dL** for patients with Type 1 Diabetes (DM) **or**  **$\geq 350$  mg/dL** for patients with Type 2 DM
      - i. Implement orders to correct hyperglycemia per home medication orders. Provide 8 oz. water within prescribed fluid restrictions.
      - ii. Perform POC glucose test in 15 minutes.
      - iii. If BG  $< 250$  mg/dL for patients with Type 1 DM or  $< 350$  mg/dL for patients with Type 2 DM, **and** signs and symptoms of hyperglycemia have resolved, **and** emergency response was not activated; patient may exercise at low intensity.
      - iv. If BG remains  $\geq 250$  mg/dL for patients with Type 1 DM or  $\geq 350$  mg/dL for patients with Type 2 DM, patient may **not** exercise. Notify patient's provider.

### Exercise Blood Glucose Testing

1. For patients with a history of pre-diabetes or diabetes (DM) currently taking any form of medication that may affect blood glucose (BG) levels (e.g., DM medications, corticosteroids, fluoroquinolone antibiotics, cyclosporine, tacrolimus, sirolimus); **or** patients who have had a change in medication that may affect BG levels; **or** patients with HgA1C  $> 8\%$
2. Perform point of care (POC) glucose test, or check BG value using continuous glucose monitor (CGM), **pre-exercise**.
  - a. To begin exercise, BG must be  $\geq 100$  mg/dL or 70-99 mg/dL with ordered treatment below, **and**  $< 250$  mg/dL for patients with Type 1 DM or  $< 350$  mg/dL for patients with Type 2 DM.

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- b. If **BG <70** mg/dL and patient is **unable** to consume carbohydrates orally
- For Raleigh CCN, activate emergency response per WakeMed policy. For off-campus outpatient rehab sites, notify supervising provider and activate emergency response if indicated per WakeMed policy.
  - If BG was obtained from CGM, perform POC glucose test to confirm BG value.
  - Administer **Glucagon 1mg IM STAT**. If patient has insulin infusing via insulin pump, disconnect pump until BG  $\geq$  120 mg/dL. Perform POC glucose test every 15 minutes.
  - Assess symptoms, pulse, electrocardiogram (ECG), blood pressure (BP), respiratory rate (RR), oxygen saturation (O2 sat).
  - Monitor ECG, RR, O2 sat continuously. Reassess symptoms, BP at least every 5 minutes, or with changes in patient condition.
  - Follow provider orders upon arrival. If emergency response activated, hand off care to emergency response team upon arrival.

- c. If **BG <70** mg/dL and patient is **able** to consume carbohydrates
- If BG was obtained from CGM, perform POC glucose test to confirm BG value.
  - Treat with **15-30 grams fast-acting oral carbohydrate** (4-8 oz. juice). Perform POC glucose test in 15 minutes.
  - If repeat BG  $<70$  mg/dL, treat with **15 grams fast-acting oral carbohydrate** (4 oz. juice). Perform POC glucose test in 15 minutes.
  - If BG remains  $<70$  mg/dL **or** signs and symptoms of hypoglycemia persist after 2 treatments
    - For Raleigh CCN, activate emergency response per WakeMed policy. For off-campus outpatient rehab sites, notify supervising provider and activate emergency response if indicated per WakeMed policy.
    - Treat with **15 grams fast-acting oral carbohydrate** (4 oz. juice). Perform POC glucose test every 15 minutes.
    - Assess symptoms, pulse, electrocardiogram (ECG), blood pressure (BP), respiratory rate (RR), oxygen saturation (O2 sat).
    - Monitor ECG, RR, O2 sat continuously. Reassess symptoms, BP at least every 5 minutes, or with changes in patient condition.
    - Follow provider orders upon arrival. If emergency response activated, hand off care to emergency response team upon arrival.
  - Once BG  $\geq 70$  mg/dL, patient should consume a meal or snack (e.g., 2 graham cracker squares and 1 oz. peanut butter and/or snack bar). If signs and symptoms of hypoglycemia have resolved **and** emergency response was not activated, patient may exercise at low intensity.

- d. If **BG = 70-99** mg/dL,
- If BG was obtained from CGM, perform POC glucose test to confirm BG value.
  - Provide **15-30 grams oral carbohydrate** (4-8 oz. juice and/or 2 graham cracker squares and 1 oz. peanut butter and/or snack bar).
  - Patient may proceed with exercise.

- e. If **BG = 100-150** mg/dL prior to exercise and patient took full dose of rapid or short-acting insulin **or** hypoglycemic oral agent with most recent meal (e.g., Insulin Lispro, Aspart, Glulisine, Regular; Glyburide, Glipizide, Glimepiride, Chlorpropamide, Tolazamide, Tolbutamide, Nateglinide, Repaglinide, Pramlintide, Exenatide), perform POC glucose test after 15-25 minutes of exercise. Depending on BG value, provide treatment as indicated in sections 2b-d.

- f. If **BG  $\geq$ 250** mg/dL for patients with Type 1 DM **or**  **$\geq$ 350** mg/dL for patients with Type 2 DM
- If BG was obtained from CGM, perform POC glucose test to confirm BG value.
  - Implement orders to correct hyperglycemia per home medication orders. Provide 8 oz. water within prescribed fluid restrictions.
  - Perform POC glucose test in 15 minutes.
  - If BG  $<250$  mg/dL for patients with Type 1 DM or  $<350$  mg/dL for patients with Type 2 DM, **and** signs and symptoms of hyperglycemia have resolved, **and** emergency response was not activated; patient may exercise at low intensity.
  - If BG remains  $\geq 250$  mg/dL for patients with Type 1 DM or  $\geq 350$  mg/dL for patients with Type 2 DM, patient may **not** exercise. Notify patient's provider.

### 3. Perform POC glucose test **post-exercise**.

- a. If **BG <70** mg/dL and patient is **unable** to consume carbohydrates orally
- For Raleigh CCN, activate emergency response per WakeMed policy. For off-campus outpatient rehab sites, notify supervising provider and activate emergency response if indicated per WakeMed policy.
  - Administer **Glucagon 1mg IM STAT**. If patient has insulin infusing via insulin pump, disconnect pump until BG  $\geq$  120 mg/dL. Perform POC glucose test every 15 minutes.
  - Assess symptoms, pulse, electrocardiogram (ECG), blood pressure (BP), respiratory rate (RR), oxygen saturation (O2 sat).
  - Monitor ECG, RR, O2 sat continuously. Reassess symptoms, BP at least every 5 minutes, or with changes in patient condition.
  - Follow provider orders upon arrival. If emergency response activated, hand off care to emergency response team upon arrival.

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- b. If **BG <70** mg/dL and patient is **able** to consume carbohydrates
    - i. Treat with **15-30 grams fast-acting oral carbohydrate** (4-8 oz. juice). Perform POC glucose test in 15 minutes.
    - ii. If repeat BG <70 mg/dL, treat with **15 grams fast-acting oral carbohydrate** (4 oz. juice). Perform POC glucose test in 15 minutes.
    - iii. If BG remains <70 mg/dL **or** signs and symptoms of hypoglycemia persist after 2 treatments
      - 1. For Raleigh CCN, activate emergency response per WakeMed policy. For off-campus outpatient rehab sites, notify supervising provider and activate emergency response if indicated per WakeMed policy.
      - 2. Treat with **15 grams fast-acting oral carbohydrate** (4 oz. juice). Perform POC glucose test every 15 minutes.
      - 3. Assess symptoms, pulse, electrocardiogram (ECG), blood pressure (BP), respiratory rate (RR), oxygen saturation (O2 sat).
      - 4. Monitor ECG, RR, O2 sat continuously. Reassess symptoms, BP at least every 5 minutes, or with changes in patient condition.
      - 5. Follow provider orders upon arrival. If emergency response activated, hand off care to emergency response team upon arrival.
    - iv. Once BG  $\geq$ 70 mg/dL, patient should consume a meal or snack (e.g., 2 graham cracker squares and 1 oz. peanut butter and/or snack bar).
  - c. If **BG = 70-89** mg/dL, provide **15-30 grams oral carbohydrate** (4-8 oz. juice and/or 2 graham cracker squares and 1 oz. peanut butter and/or snack bar) and encourage patient to eat a snack or meal within the hour.
  - d. If **BG  $\geq$ 90** mg/dL, no treatment required.
- 4. Discontinue pre and post-exercise BG monitoring when the following conditions are met for 4 consecutive sessions:**
- a. **Pre-exercise** BG  $\geq$ 100 mg/dL, **and** <250 mg/dL for patients with Type 1 DM or <350 mg/dL for patients with Type 2 DM
  - b. **Post-exercise** BG  $\geq$ 90 mg/dL.
  - c. **Exceptions**
    - i. If patient taking Metformin only, discontinue pre and post-exercise BG monitoring when pre-exercise BG  $\geq$ 90 mg/dL and post-exercise BG  $\geq$  80 mg/dL for 4 consecutive sessions.
    - ii. Patients with Type 1 DM should continue to monitor their **pre and post-exercise** BG each session, or be monitored by staff, even after these conditions have been met.