HTS Cardiac Care Rehab Protocol

1. Identify patients with a cardiac disorder:
   - Coronary Artery Disease
     - A disease process with thickening of the inner walls of blood vessels – Arteriosclerosis.
   - Congestive Heart Failure
     - Failure of either the right or left side of the heart to adequately pump blood.
   - Chronic Obstructive Pulmonary Disorder (COPD)
     - Airway obstruction and alterations in lung function

2. Complete a screen to determine if there has been a significant change in function.

3. Complete the regular evaluation and at least 2 relevant formal tests. (Some examples)
   - BORG Scale of Perceived Exertion
   - Karvonen Method of Target Heart Rate
   - Six-Minute Walk Test
   - Vital Signs – blood pressure, heart rate, oxygenation, respiration
   - Dyspnea Levels

4. Consider the following treatment interventions in your plan of care:
   - Energy Conservation Techniques
   - Adaptive Equipment Biletul Zilei Fotbal Training
   - Stress Management/Relaxation Strategies
   - Breathing Techniques
   - Activity Tolerance Training at Target Heart Rate – include a warm-up and cool-down activity prior to aerobic exercise (stretching, active ROM, slow walking)
   - Diet Education- emphasis on sodium and fluid intake
   - Education about heart failure
   - Sternal Precautions – if applicable
   - Home Exercise Program – Taking own vital signs, knowing warning signs, balancing rest and activity
   - Restorative Exercise Program – Caregivers monitoring vital signs
Cardiac Care Report Tool

Name:__________________________ Age:_______________  Date:_____________________

**Blood Pressure** at rest: ____________, during activity___________, after activity____________

<table>
<thead>
<tr>
<th>Blood Pressure Category</th>
<th>Systolic (upper #) mm Hg (millimeters of mercury)</th>
<th>Diastolic (lower #) mm Hg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>Less than 120</td>
<td>Less than 80</td>
</tr>
<tr>
<td>Prehypertension</td>
<td>120-139</td>
<td>80-89</td>
</tr>
<tr>
<td>High Blood Pressure (Hypertension) Stage 1</td>
<td>140-159</td>
<td>90-99</td>
</tr>
<tr>
<td>High Blood Pressure (Hypertension) Stage 2</td>
<td>160 or higher</td>
<td>100 or higher</td>
</tr>
<tr>
<td>Hypertensive Crisis (Emergency care)</td>
<td>Higher than 180</td>
<td>Higher than 110</td>
</tr>
</tbody>
</table>

**Resting Heart Rate/RHR**: (take pulse for 10 seconds X 6) = ________________ (Norm 60-80 bpm)

**Maximum Heart Rate/MHR**: (220 – age) =_________ beats /one minute

**Target Heart Rate/THR**: (Karvonen method)

\[
\text{MHR} - \text{RHR} = \text{Target Heart Rate} = \text{MHR} - \text{RHR} = \text{Intensity (50-85%)} + \text{MHR} = \text{RHR}
\]

**Lower limit Intensity % = .50 - .60 / Upper limit Intensity % = .70 - .85**

**Heart rate during activity**: (10 sec. pulse X 6) = ________________

**Heart rate after activity**: (10 sec. pulse X 6) = ________________

**Borg Scale of Perceived Exertion:**

<table>
<thead>
<tr>
<th>Borg Scale Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>No Exertion at all</td>
</tr>
<tr>
<td>7</td>
<td>Extremely light</td>
</tr>
<tr>
<td>8</td>
<td>Very light</td>
</tr>
<tr>
<td>9</td>
<td>Light</td>
</tr>
<tr>
<td>10</td>
<td>Somewhat hard</td>
</tr>
<tr>
<td>11</td>
<td>“Training Range”</td>
</tr>
<tr>
<td>12</td>
<td>Hard</td>
</tr>
<tr>
<td>13</td>
<td>Very hard</td>
</tr>
<tr>
<td>14</td>
<td>Extremely hard</td>
</tr>
<tr>
<td>15</td>
<td>Maximal exertion</td>
</tr>
</tbody>
</table>

**Activity description:**

- □ light seated exercise
- □ light exercise in standing
- □ self care activity
- □ ambulation ___ ft. ___ mins
- □ other ________________________________________

**Borg Scale Score_______ during activity**

(goal during activity= moderate 12-14 range)

**Edema Measurements**: Pitting or Non-pitting (Circumferential)

<table>
<thead>
<tr>
<th>Location</th>
<th>Measurement</th>
<th>Location</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper body</td>
<td></td>
<td>Lower body</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Measurement</td>
<td>Location</td>
<td>Measurement</td>
</tr>
<tr>
<td>Location</td>
<td>Measurement</td>
<td>Location</td>
<td>Measurement</td>
</tr>
<tr>
<td>Location</td>
<td>Measurement</td>
<td>Location</td>
<td>Measurement</td>
</tr>
</tbody>
</table>

**Depth and Duration - Pitting**

- \(+1=\text{Mild edema (0-1/4" indentation), disappears rapidly}\)
- \(+2=\text{Moderate Pitting (1/4-1/2"), disappears 10-15 sec.}\)
- \(+3=\text{Severe Pitting (1/2-1"), disappears in 1-2 minutes}\)
- \(+4=\text{Severe Pitting (>1"), may be present after 5 minutes}\)

**Distance Measure - Pitting**

- From medial malleolus, palpate proximally until there is no more pitting.
- Measure distance from medial malleolus to the spot where pitting stops.

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Dyspnea – labored or difficult breathing

Dyspnea Intensity – Method 1

1. = mild, noticeable to patient but not to observer
2. = some difficulty, noticeable to observer
3. = moderate difficulty, but can continue
4. = severe, patient cannot continue

Dyspnea Intensity – Method 2

0. = able to count to 15 easily
1. = able to count to 15 but must take one breath
2. = must take 2 additional breaths
3. = must take 3 additional breaths
4. = unable to count
THE BORG SCALE

0 Nothing at all
0.5 Very, very slight (just noticeable)
1 Very slight
2 Slight (light)
3 Moderate
4 Somewhat severe
5 Severe (heavy)
6
7 Very severe
8
9
10 Very, very severe (maximal)

At the beginning of the 6-minute exercise, show the scale to the patient and ask the patient this: “Please grade your level of shortness of breath using this scale.” Then ask this: “Please grade your level of fatigue using this scale.” At the end of the exercise, remind the patient of the breathing number that they chose before the exercise and ask the patient to grade their breathing level again. Then ask the patient to grade their level of fatigue, after reminding them of their grade before the exercise.
CONTENTS
Purpose and Scope
Background
Indications and Limitations
Contraindications
Safety Issues
Technical Aspects of the 6-Minute Walk Test
Required Equipment
Patient Preparation
Measurements
Quality Assurance
Interpretation
References

PURPOSE AND SCOPE
This statement provides practical guidelines for the 6-minute walk test (6MWT). Specifically, it reviews indications, details factors that influence results, presents a brief step-by-step protocol, outlines safety measures, describes proper patient preparation and procedures, and offers guidelines for clinical interpretation of results. These recommendations are not intended to limit the use of alternative protocols for research studies. We do not discuss the general topic of clinical exercise testing.

As with other American Thoracic Society statements on pulmonary function testing, these guidelines come out of a consensus conference. Drafts were prepared by two members (P.L.E. and R.J.Z.) and were based on a comprehensive Medline literature search from 1970 through 2001, augmented by suggestions from other committee members. Each draft responded to comments from the working committee. The guidelines follow previously published methods as closely as possible and provide a rationale for each specific recommendation. The final recommendations represent a consensus of the committee. The committee recommends that these guidelines be reviewed in five years and in the meantime encourages further research in areas of controversy.

BACKGROUND
There are several modalities available for the objective evaluation of functional exercise capacity. Some provide a very complete assessment of all systems involved in exercise performance (high tech), whereas others provide basic information but are low tech and are simpler to perform. The modality used should be chosen based on the clinical question to be addressed and on available resources. The most popular clinical exercise tests in order of increasing complexity are stair climbing, a 6MWT, a shuttle-walk test, detection of exercise-induced asthma, a cardiac stress test (e.g., Bruce protocol), and a cardio-pulmonary exercise test (1, 2). Other professional organizations have published standards for cardiac stress testing (3, 4).

Assessment of functional capacity has traditionally been done by merely asking patients the following: “How many flights of stairs can you climb or how many blocks can you walk?” However, patients vary in their recollection and may report overestimations or underestimations of their true functional capacity. Objective measurements are usually better than self-reports. In the early 1960s, Balke developed a simple test to evaluate the functional capacity by measuring the distance walked during a defined period of time (5). A 12-minute field performance test was then developed to evaluate the level of physical fitness of healthy individuals (6). The walking test was also adapted to assess disability in patients with chronic bronchitis (7). In an attempt to accommodate patients with respiratory disease for whom walking 12 minutes was too exhausting, a 6-minute walk was found to perform as well as the 12-minute walk (8). A recent review of functional walking tests concluded that “the 6 MWT is easy to administer, better tolerated, and more reflective of activities of daily living than the other walk tests” (9).

The 6MWT is a practical simple test that requires a 100-ft hallway but no exercise equipment or advanced training for technicians. Walking is an activity performed daily by all but the most severely impaired patients. This test measures the distance that a patient can quickly walk on a flat, hard surface in a period of 6 minutes (the 6MWD). It evaluates the global and integrated responses of all the systems involved during exercise, including the pulmonary and cardiovascular systems, systemic circulation, peripheral circulation, blood, neuromuscular units, and muscle metabolism. It does not provide specific information on the function of each of the different organs and systems involved in exercise or the mechanism of exercise limitation, as is possible with maximal cardiopulmonary exercise testing. The self-paced 6MWT assesses the submaximal level of functional capacity. Most patients do not achieve maximal exercise capacity during the 6MWT; instead, they choose their own intensity of exercise and are allowed to stop and rest during the test. However, because most activities of daily living are performed at submaximal levels of exertion, the 6MWD may better reflect the functional exercise level for daily physical activities.

INDICATIONS AND LIMITATIONS
The strongest indication for the 6MWT is for measuring the response to medical interventions in patients with moderate to severe heart or lung disease. The 6MWT has also been used as a one-time measure of functional status of patients, as well as a predictor of morbidity and mortality (see Table 1 for a list of these indications). The fact that investigators have used the 6MWT in these settings does not prove that the test is clinically useful (or the best test) for determining functional capacity or changes in functional capacity due to an intervention in patients with these diseases. Further studies are necessary to determine the utility of the 6MWT in various clinical situations.
Formal cardiopulmonary exercise testing provides a global assessment of the exercise response, an objective determination of functional capacity and impairment, determination of the appropriate intensity needed to perform prolonged exercise, quantification of factors limiting exercise, and a definition of the underlying pathophysiologic mechanisms such as the contribution of different organ systems involved in exercise. The 6MWT does not determine peak oxygen uptake, diagnose the cause of dyspnea on exertion, or evaluate the causes or mechanisms of exercise limitation (1, 2). The information provided by a 6MWT should be considered complementary to cardiopulmonary exercise testing, not a replacement for it. Despite the difference between these two functional tests, some good correlations between them have been reported. For example, a significant correlation (r = 0.73) between 6MWD and peak oxygen uptake has been reported for patients with end-stage lung diseases (36, 37).

In some clinical situations, the 6MWT provides information that may be a better index of the patient’s ability to perform daily activities than is peak oxygen uptake; for example, 6MWD correlates better with formal measures of quality of life (38). Changes in 6MWD after therapeutic interventions correlate with subjective improvement in dyspnea (39, 40). The reproducibility of the 6MWD (with a coefficient of variation of approximately 8%) appears to be better than the reproducibility of 1-second forced expiratory volume in patients with chronic obstructive pulmonary disease (COPD) (8, 41–43). Questionnaire indices of functional status have a larger short-term variability (22–33%) than does the 6MWD (37).

The shuttle-walking test is similar to the 6MWT, but it uses an audio signal from a tape cassette to direct the walking pace of the patient back and forth on a 10-m course (44–47). The walking speed increases every minute, and the test ends when the patient cannot reach the turnaround point within the required time. The exercise performed is similar to a symptom-limited, maximal, incremental treadmill test. An advantage of the shuttle walking test is that it has a better correlation with peak oxygen uptake than the 6MWD. Disadvantages include less validation, less widespread use, and more potential for cardiovascular problems.

CONTRAINDICATIONS

Absolute contraindications for the 6MWT include the following: unstable angina during the previous month and myocardial infarction during the previous month. Relative contraindications include a resting heart rate of more than 120, a systolic blood pressure of more than 180 mm Hg, and a diastolic blood pressure of more than 100 mm Hg.

Patients with any of these findings should be referred to the physician ordering or supervising the test for individual clinical assessment and a decision about the conduct of the test. The results from a resting electrocardiogram done during the previous 6 months should also be reviewed before testing. Stable exertional angina is not an absolute contraindication for a 6MWT, but patients with these symptoms should perform the test after using their antiangina medication, and rescue nitrate medication should be readily available.

Rationale

Patients with the previously mentioned risk factors may be at increased risk for arrhythmias or cardiovascular collapse during testing. However, each patient determines the intensity of their exercise, and the test (without electrocardiogram monitoring) has been performed in thousands of older persons (31, 48–50) and thousands of patients with heart failure or cardiomyopathy (32, 51, 52) without serious adverse events. The contraindications listed previously were used by study investigators based on their impressions of the general safety of the 6MWT and their desire to be prudent, but it is unknown whether adverse events would occur if such patients performed a 6MWT; they are, therefore, listed as relative contraindications.

SAFETY ISSUES

1. Testing should be performed in a location where a rapid, appropriate response to an emergency is possible. The appropriate location of a crash cart should be determined by the physician supervising the facility.
2. Supplies that must be available include oxygen, sublingual nitroglycerine, aspirin, and albuterol (metered dose inhaler or nebulizer). A telephone or other means should be in place to enable a call for help.
3. The technician should be certified in cardiopulmonary resuscitation with a minimum of Basic Life Support by an American Health Association–approved cardiopulmonary resuscitation course. Advanced cardiac life support certification is desirable. Training, experience, and certification in related health care fields (registered nurse, registered respiratory therapist, certified pulmonary function technician, etc.) are also desirable. A certified individual should be readily available to respond if needed.
4. Physicians are not required to be present during all tests. The physician ordering the test or a supervising laboratory physician may decide whether physician attendance at a specific test is required.
5. If a patient is on chronic oxygen therapy, oxygen should be given at their standard rate or as directed by a physician or a protocol.

Reasons for immediately stopping a 6MWT include the following: (1) chest pain, (2) intolerable dyspnea, (3) leg cramps, (4) staggering, (5) diaphoresis, and (6) pale or ashen appearance.

Technicians must be trained to recognize these problems and the appropriate responses. If a test is stopped for any of these reasons, the patient should sit or lie supine as appropriate depending on the severity of the event and the technician’s assessment of the severity of the event and the risk of syncope. The following should be obtained based on the judgment of the technician: blood pressure, pulse rate, oxygen saturation, and a physician evaluation. Oxygen should be administered as appropriate.

### TABLE 1. INDICATIONS FOR THE SIX-MINUTE WALK TEST

<table>
<thead>
<tr>
<th>Pretreatment and posttreatment comparisons</th>
<th>Lung transplantation (9, 10)</th>
<th>Lung resection (11)</th>
<th>Lung volume reduction surgery (12, 13)</th>
<th>Pulmonary rehabilitation (14, 15)</th>
<th>COPD (16–18)</th>
<th>Pulmonary hypertension</th>
<th>Heart failure (19, 20)</th>
<th>Functional status (single measurement)</th>
<th>COPD (21, 22)</th>
<th>Cystic fibrosis (23, 24)</th>
<th>Heart failure (25–27)</th>
<th>Peripheral vascular disease (28, 29)</th>
<th>Fibromyalgia (30)</th>
<th>Older patients (31)</th>
<th>Predictor of morbidity and mortality</th>
<th>Heart failure (32, 33)</th>
<th>COPD (34, 35)</th>
<th>Primary pulmonary hypertension (10, 36)</th>
</tr>
</thead>
</table>

*Definition of abbreviation: COPD = chronic obstructive pulmonary disease.*
TECHNICAL ASPECTS OF THE 6MWT

Location

The 6MWT should be performed indoors, along a long, flat, straight, enclosed corridor with a hard surface that is seldom traveled. If the weather is comfortable, the test may be performed outdoors. The walking course must be 30 m in length. A 100-ft hallway is, therefore, required. The length of the corridor should be marked every 3 m. The turnaround points should be marked with a cone (such as an orange traffic cone). A starting line, which marks the beginning and end of each 60-m lap, should be marked on the floor using brightly colored tape.

Rationale. A shorter corridor requires patients to take more time to reverse directions more often, reducing the 6MWD. Most studies have used a 30-m corridor, but some have used 20- or 50-m corridors (52–55). A recent multicenter study found no significant effect of the length of straight courses ranging from 50 to 164 ft, but patients walked farther on continuous (oval) tracks (mean 92 ft farther) (54).

The use of a treadmill to determine the 6MWD might save space and allow constant monitoring during the exercise, but the use of a treadmill for 6-minute walk testing is not recommended. Patients are unable to pace themselves on a treadmill. In one study of patients with severe lung disease, the mean distance walked on the treadmill during 6 minutes (with the speed adjusted by the patients) was shorter by a mean of 14% when compared with the standard 6MWD using a 100-ft hallway (57). The range of differences was wide, with patients walking between 400–1,300 ft on the treadmill who walked 1,200 ft in the hallway. Treadmill test results, therefore, are not interchangeable with corridor tests.

REQUIRED EQUIPMENT

1. Countdown timer (or stopwatch)
2. Mechanical lap counter
3. Two small cones to mark the turnaround points
4. A chair that can be easily moved along the walking course
5. Worksheets on a clipboard
6. A source of oxygen
7. Sphygmomanometer
8. Telephone
9. Automated electronic defibrillator

PATIENT PREPARATION

1. Comfortable clothing should be worn.
2. Appropriate shoes for walking should be worn.
3. Patients should use their usual walking aids during the test (cane, walker, etc.).
4. The patient’s usual medical regimen should be continued.
5. A light meal is acceptable before early morning or early afternoon tests.
6. Patients should not have exercised vigorously within 2 hours of beginning the test.

MEASUREMENTS

1. Repeat testing should be performed about the same time of day to minimize intraday variability.
2. A “warm-up” period before the test should not be performed.
3. The patient should sit at rest in a chair, located near the starting position, for at least 10 minutes before the test starts. During this time, check for contraindications, measure pulse and blood pressure, and make sure that clothing and shoes are appropriate. Compete the first portion of the worksheet (see the APPENDIX).
4. Pulse oximetry is optional. If it is performed, measure and record baseline heart rate and oxygen saturation (SpO₂) and follow manufacturer’s instructions to maximize the signal and to minimize motion artifact (56, 57). Make sure the readings are stable before recording. Note pulse regularity and whether the oximeter signal quality is acceptable.

The rationale for measuring oxygen saturation is that although the distance is the primary outcome measure, improvement during serial evaluations may be manifest either by an increased distance or by reduced symptoms with the same distance walked (39). The SpO₂ should not be used for constant monitoring during the exercise. The technician must not walk with the patient to observe the SpO₂. If worn during the walk, the pulse oximeter must be lightweight (less than 2 pounds), battery powered, and held in place (perhaps by a “fanny pack”) so that the patient does not have to hold or stabilize it and so that stride is not affected. Many pulse oximeters have considerable motion artifact that prevents accurate readings during the walk. (57)

5. Have the patient stand and rate their baseline dyspnea and overall fatigue using the Borg scale (see Table 2 for the Borg scale and instructions [58]).
6. Set the lap counter to zero and the timer to 6 minutes. Assemble all necessary equipment (lap counter, timer, clipboard, Borg Scale, worksheet) and move to the starting point.
7. Instruct the patient as follows:

   “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 exhausting 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.”

   Demonstrate by walking one lap yourself. Walk and pivot around a cone briskly.

   “Are you ready to do that? I am going to use this counter to keep track of the number of laps you complete. I will click it each time you turn around at this starting line. Remember that the object is to walk AS FAR AS POSSIBLE for 6 minutes, but don’t run or jog.

   Start now, or whenever you are ready.”

<table>
<thead>
<tr>
<th>TABLE 2. THE BORG SCALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
<tr>
<td>0.5</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
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<td>7</td>
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<td>8</td>
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<tr>
<td>9</td>
</tr>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

This Borg scale should be printed on heavy paper (11 inches high and perhaps laminated) in 20-point type size. At the beginning of the 6-minute exercise, show the scale to the patient and ask the patient this: “Please grade your level of shortness of breath using this scale.” Then ask this: “Please grade your level of fatigue using this scale.”

At the end of the exercise, remind the patient of the breathing number that they chose before the exercise and ask the patient to grade their breathing level again. Then ask the patient to grade their level of fatigue, after reminding them of their grade before the exercise.
8. Position the patient at the starting line. You should also stand near the starting line during the test. Do not walk with the patient. As soon as the patient starts to walk, start the timer.
9. Do not talk to anyone during the walk. Use an even tone of voice when using the standard phrases of encouragement. Watch the patient. Do not get distracted and lose count of the laps. Each time the participant returns to the starting line, click the lap counter once (or mark the lap on the worksheet). Let the participant see you do it. Exaggerate the click using body language, like using a stopwatch at a race.

   After the first minute, tell the patient the following (in even tones): “You are doing well. You have 5 minutes to go.”

   When the timer shows 4 minutes remaining, tell the patient the following: “Keep up the good work. You have 4 minutes to go.”

   When the timer shows 3 minutes remaining, tell the patient the following: “You are doing well. You are halfway done.”

   When the timer shows 2 minutes remaining, tell the patient the following: “Keep up the good work. You have only 2 minutes left.”

   When the timer shows only 1 minute remaining, tell the patient: “You are doing well. You have only 1 minute to go.”

   Do not use other words of encouragement (or body language to speed up).

   If the patient stops walking during the test and needs a rest, say this: “You can lean against the wall if you would like; then continue walking whenever you feel able.” Do not stop the timer. If the patient stops before the 6 minutes are up and refuses to continue (or you decide that they should not continue), wheel the chair over for the patient to sit on, discontinue the walk, and note on the worksheet the distance walked, the time stopped, and the reason for stopping prematurely.

   When the timer is 15 seconds from completion, say this: “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.”

   When the timer rings (or buzzes), say this: “Stop!” Walk over to the patient. Consider taking the chair if they look exhausted. Mark the spot where they stopped by placing a bean bag or a piece of tape on the floor.

10. Post-test: Record the postwalk Borg dyspnea and fatigue levels and ask this: “What, if anything, kept you from walking farther?”
11. If using a pulse oximeter, measure SpO₂ and pulse rate from the oximeter and then remove the sensor.
12. Record the number of laps from the counter (or tick marks on the worksheet).
13. Record the additional distance covered (the number of meters in the final partial lap) using the markers on the wall as distance guides. Calculate the total distance walked, rounding to the nearest meter, and record it on the worksheet.
14. Congratulate the patient on good effort and offer a drink of water.

QUALITY ASSURANCE
Sources of Variability
There are many sources of 6MWD variability (see Table 3). The sources of variability caused by the test procedure itself should be controlled as much as possible. This is done by following the standards found in this document and by using a quality-assurance program.

Practice Tests
A practice test is not needed in most clinical settings but should be considered. If a practice test is done, wait for at least 1 hour before the second test and report the highest 6MWD as the patient’s 6MWD baseline.

Rationale. The 6MWD is only slightly higher for a second 6MWT performed a day later. The mean reported increase ranges from 0 to 17% (23, 27, 40, 51, 54, 59). A multicenter study of 470 highly motivated patients with severe COPD performed two 6MWTs 1 day apart, and on average, the 6MWD was only 66 ft (5.8%) higher on the second day (54).

Performance (without an intervention) usually reaches a plateau after two tests done within a week (8, 60). The training effect may be due to improved coordination, finding optimal stride length, and overcoming anxiety. The possibility of a practice or training effect from tests repeated after more than a month has not been studied or reported; however, it is likely that the effect of training wears off (does not persist) after a few weeks.

Technician Training and Experience
Technicians who perform 6MWTs should be trained using the standard protocol and then supervised for several tests before performing them alone. They should also have completed cardiopulmonary resuscitation training.

Rationale. One multicenter study of older people found that after correction for many other factors, two of the technicians had mean 6MWDs that were approximately 7% lower than the other two sites (31).

Encouragement
Only the standardized phrases for encouragement (as specified previously here) must be used during the test.

Rationale. Encouragement significantly increases the distance walked (42). Reproducibility for tests with and without encouragement is similar. Some studies have used encouragement every 30 seconds, every minute, or every 2 minutes. We have chosen every minute and standard phrases. Some studies (53) have instructed patients to walk as fast as possible. Although larger mean 6MWDs may be obtained thereby, we recommend that such phrases not be used, as they emphasize initial speed at the expense of earlier fatigue and possible excessive cardiac stress in some patients with heart disease.

<table>
<thead>
<tr>
<th>TABLE 3. 6MWD SOURCES OF VARIABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factors reducing the 6MWD</strong></td>
</tr>
<tr>
<td>Shorter height</td>
</tr>
<tr>
<td>Older age</td>
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<tr>
<td>Higher body weight</td>
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<tr>
<td>Female sex</td>
</tr>
<tr>
<td>Impaired cognition</td>
</tr>
<tr>
<td>A shorter corridor (more turns)</td>
</tr>
<tr>
<td>Pulmonary disease (COPD, asthma, cystic fibrosis, interstitial lung disease)</td>
</tr>
<tr>
<td>Cardiovascular disease (angina, MI, CHF, stroke, TIA, PVD, AAI)</td>
</tr>
<tr>
<td>Musculoskeletal disorders (arthritis, ankle, knee, or hip injuries, muscle wasting, etc.)</td>
</tr>
<tr>
<td><strong>Factors increasing the 6MWD</strong></td>
</tr>
<tr>
<td>Taller height (longer legs)</td>
</tr>
<tr>
<td>Male sex</td>
</tr>
<tr>
<td>High motivation</td>
</tr>
<tr>
<td>A patient who has previously performed the test</td>
</tr>
<tr>
<td>Medication for a disabling disease taken just before the test</td>
</tr>
<tr>
<td>Oxygen supplementation in patients with exercise-induced hypoxemia</td>
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Definition of abbreviations: COPD = chronic obstructive pulmonary disease; 6MWD = 6-minute walking distance.
Supplemental Oxygen

If oxygen supplementation is needed during the walks and serial tests are planned (after an intervention other than oxygen therapy), then during all walks by that patient oxygen should be delivered in the same way with the same flow. If the flow must be increased during subsequent visits due to worsening gas exchange, this should be noted on the worksheet and considered during interpretation of the change noted in 6MWD. The type of oxygen delivery device should also be noted on the report: for instance, the patient carried liquid oxygen or pushed or pulled an oxygen tank, the delivery was pulsed or continuous, or a technician walked behind the patient with the oxygen source (not recommended). Measurements of pulse and SpO₂ should be made after waiting at least 10 minutes after any change in oxygen delivery.

Rationale. For patients with COPD or interstitial lung disease, oxygen supplementation increases the 6MWD (17, 59, 61, 63). Carrying a portable gas container (but not using it for supplemental oxygen) reduced the mean 6MWD by 14% in one study of patients with severe respiratory disability, but using the container to deliver supplemental oxygen during the exercise increased the mean 6MWD by 20–35% (59).

Medications

The type of medication, dose, and number of hours taken before the test should be noted.

Rationale. Significant improvement in the distance walked, or the dyspnea scale, after administration of bronchodilators has been demonstrated in patients with COPD (62, 63), as well as cardiovascular medications in patients with heart failure (19).

INTERPRETATION

Most 6MWTs will be done before and after intervention, and the primary question to be answered after both tests have been completed is whether the patient has experienced a clinically significant improvement. With a good quality-assurance program, with patients tested by the same technician, and after one or two practice tests, short-term reproducibility of the 6MWD is excellent (37). It is not known whether it is best for clinical purposes to express change in 6MWD as (1) an absolute value, (2) a percentage change, or (3) a change in the percentage of predicted value. Until further research is available, we recommend that change in 6MWD be expressed as an absolute value (e.g., the patient walked 50 m farther).

A statistically significant mean increase in 6MWD in a group of study participants is often much less than a clinically significant increase in an individual patient. In one study of 112 patients (half of them women) with stable, severe COPD, the smallest difference in 6MWD that was associated with a noticeable clinical difference in the patients’ perception of exercise performance was a mean of 54 m (95% confidence interval, 37–71 m) (64). This study suggests that for individual patients with COPD, an improvement of more than 70 m in the 6MWD after an intervention is necessary to be 95% confident that the improvement was significant. In an observational study of 45 older patients with heart failure, the smallest difference in 6MWD that was associated with a noticeable difference in their global rating of worsening was a mean of 43 m (20). The 6MWD was more responsive to deterioration than to improvement in heart failure symptoms.

Reported Mean Changes in 6MWD After Interventions

Supplemental oxygen (4 L/min) during exercise in patients with COPD or interstitial lung disease increased mean 6MWD by approximately 95 m (36%) in one study (59). Patients taking an inhaled corticosteroid experienced a mean 33 m (8%) increase in 6MWD in an international COPD study (16). Patients with COPD in a study of the effects of exercise and diaphragmatic strength training experienced a mean increase in 6MWD of 50 m (20%) (65). Lung volume reduction surgery in patients with very severe COPD has been reported to increase 6MWD by a mean of 55 m (20%) (13).

Cardiac rehabilitation in patients referred with various heart diseases increased 6MWD by a mean of 170 m (15%) in a recent study (66). In 25 older patients with heart failure, an angiotensin-converting enzyme inhibitor medication (50 mg captopril per day) improved 6MWD a mean of 64 m (39%) compared with a mean increase of only 8% in those receiving a placebo (19).

Interpreting Single Measurements of Functional Status

Optimal reference equations from healthy population-based samples using standardized 6MWT methods are not yet available. In one study, the median 6MWD was approximately 580 m for 117 healthy men and 500 m for 173 healthy women (50). A mean 6MWD of 630 m was reported by another study of 51 healthy older adults (55). Differences in the population sampled, type and frequency of encouragement, corridor length, and number of practice tests may account for reported differences in mean 6MWD in healthy persons. Age, height, weight, and sex independently affect the 6MWD; therefore, these factors should be taken into consideration when interpreting the results of single measurements made to determine functional status. We encourage investigators to publish reference equations for healthy persons using the previously mentioned standardized procedures.

A low 6MWD is nonspecific and nondiagnostic. When the 6MWD is reduced, a thorough search for the cause of the impairment is warranted. The following tests may then be helpful: pulmonary function, cardiac function, ankle–arm index, muscle strength, nutritional status, orthopedic function, and cognitive function.

Conclusions

The 6MWT is a useful measure of functional capacity targeted at people with at least moderately severe impairment. The test has been widely used for preoperative and postoperative evaluation and for measuring the response to therapeutic interventions for pulmonary and cardiac disease. These guidelines provide a standardized approach to performing the 6MWT. The committee hopes that these guidelines will encourage further research into the 6MWT and allow direct comparisons among different studies.

This statement was developed by the ATS Committee on Proficiency Standards for Clinical Pulmonary Function Laboratories.

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References


Cooper KH. A means of assessing maximal oxygen intake: correlation between field and treadmill testing. *JAMA* 1968;203:201–204.


Hector DA, Rice TW, Stelmach K, Meeker DP. Exercise testing, 6 min, walk, and stair climb in the evaluation of patients at high risk for pulmonary resection. *Chest* 1992;102:1774–1779.


Cote CG, Celli BR. In patients with COPD, the 6 minute walking distance is a better predictor of health care utilization than FEV1, blood gases, and dyspnea [abstract]. *Eur Respir J* 1998;363.


### APPENDIX

The following elements should be present on the 6MWT worksheet and report:

- **Lap counter:** __ __ __ __ __ __ __ __ __ __ __ __ __ __ __
- **Patient name:** ____________________ **Patient ID#** ___________
- **Walk #** ______ **Tech ID:** _______ **Date:** __________
- **Gender:** M F **Age:** ____ **Race:** ____ **Height:** __ft __in, ____ meters
- **Weight:** _____ lbs, _____ kg **Blood pressure:** _____ / _____
- **Medications taken before the test (dose and time):** __________________
- **Supplemental oxygen during the test:** No Yes, flow _____ L/min, type _____

#### Baseline

- **Time:** ___:___
- **Heart Rate:** ___
- **Dyspnea:** ___ (Borg scale)
- **Fatigue:** ___ (Borg scale)
- **SpO₂:** ___ %

#### End of Test

- **SpO₂:** ___ %

- **Stopped or paused before 6 minutes?** No Yes, reason: ________________

- **Other symptoms at end of exercise:** angina dizziness hip, leg, or calf pain

- **Number of laps:** ____ (×60 meters) + final partial lap: _____ meters =

- **Total distance walked in 6 minutes:** _____ meters

- **Predicted distance:** _____ meters **Percent predicted:** _____%

#### Tech comments:

Interpretation (including comparison with a preintervention 6MWD):
**Sternal Precautions:** Follow for 4-6 weeks
1. Do not raise arms past shoulder height in front and on the side
2. Do not push or pull especially when standing up or sitting down
3. Do not bend hips more than 45 degrees so your organs won’t be pushing up into the chest cavity
4. Do not cross legs especially if your legs have been grafted
5. Do not carry items that weigh more than 10 pounds

**Sternal Precautions and Activities of Daily Living:**
(You should keep frequently used items in bathroom, kitchen, bedroom, within reach at or below shoulder height.)

**Grooming:**
- Comb or dry hair by keeping both arms and shoulders close to the body or turn head side to side with elbows rested on table
- Tie or pin hair by tucking chin under or have someone else do it
- Raise arm to shoulder height to apply roll-on or spray deodorant
- Extend handle on hair brush or comb/bend head forward

**Bathing/Showering:**
- Dry off back of body by flipping towel overhead and draping over back, keep elbow at side of body and move towel side to side.
- Use long-handled sponge for back and legs

**Toilet Hygiene:**
- Wipe from front to back or reach to the side

**Dressing:**
- Use reacher to obtain or return light weight items from high compartments
- Put on shirt by placing arms through sleeves keeping elbows close to body. Gather collar and put head through by tucking chin under. Pull shirt down by reaching across chest and under arm.
- Take shirt off by reaching behind bent head for collar and pulling shirt over head
- Put on bra by fastening hook in front at waist level and turn hook to back. Put arms through straps. Reverse steps to take off.
How Can I Live With Heart Failure?

About 5 million Americans are living with congestive heart failure today. In fact, it’s one of the most common reasons people 65 and older go into the hospital.

Fortunately, heart failure can be treated. Getting good medical care, following doctor’s orders and learning about heart failure will help you lead a comfortable life.

You can help by taking your medicine as your doctor tells you, and by following your eating and exercise plans.

What medicine might I take?

Here are some examples:

1. Angiotensin Converting Enzyme (ACE) Inhibitor — lowers blood pressure and decreases the heart’s workload.
2. Angiotensin Receptor Blocker (ARB) — lowers blood pressure.
3. Diuretic — helps your body get rid of extra water and sodium.
4. Beta-blocker — lowers blood pressure and slows heart rate.
5. Digoxin — helps your heart pump better.
6. Vasodilator — lowers blood pressure by relaxing blood vessels and allowing them to open (dilate).

What will help me get better?

- Visit the doctor and follow his or her advice.
- Read food labels and avoid foods high in salt or sodium.
- Start an aerobic exercise plan as your doctor advises.
- Keep up your interests and be upbeat!

My doctor’s advice

Ask your doctor to fill in the blanks with recommendations that will help you recover.

Medicine Notes: ________________________________

Diet Notes: Example: No salt allowed

Exercise Notes: ________________________________
What should I watch out for?

Tell your doctor right away if...
• You gain 3 or more pounds in a day or so.
• You see that your feet, ankles or other parts of your body are puffy.
• It’s hard to breathe.
• You can’t do what you could do the day before.
• You have “the flu.”
• You get a fever.
• You have chest pain.

How can I learn more?

1. Talk to your doctor, nurse or other health-care professionals. If you have heart disease or have had a stroke, members of your family also may be at higher risk. It’s very important for them to make changes now to lower their risk.
2. Call 1-800-AHA-USA1 (1-800-242-8721) or visit americanheart.org to learn more about heart disease.
3. For information on stroke, call 1-888-4-STROKE (1-888-478-7653) or visit StrokeAssociation.org.

We have many other fact sheets and educational booklets to help you make healthier choices to reduce your risk, manage disease or care for a loved one.

Knowledge is power, so Learn and Live!

What are the warning signs of heart attack and stroke?

Warning Signs of Heart Attack
Some heart attacks are sudden and intense, but most of them start slowly with mild pain or discomfort with one or more of these symptoms:
• Chest discomfort
• Discomfort in other areas of the upper body
• Shortness of breath with or without chest discomfort
• Other signs including breaking out in a cold sweat, nausea or lightheadedness

Warning Signs of Stroke
• Sudden weakness or numbness of the face, arm or leg, especially on one side of the body
• Sudden confusion, trouble speaking or understanding
• Sudden trouble seeing in one or both eyes
• Sudden trouble walking, dizziness, loss of balance or coordination
• Sudden, severe headache with no known cause

Learn to recognize a stroke. Time lost is brain lost.

Call 9-1-1 … Get to a hospital immediately if you experience signs of a heart attack or stroke!

Do you have questions or comments for your doctor?

Take a few minutes to write your own questions for the next time you see your healthcare provider. For example:

How can my family help me?

Should I stay in bed?
How to Be Heart Healthy

The heart – it is perhaps the organ you are most conscious of, as it is the one you can feel beating every day. As such, you know that its health is directly related to your own. But are you aware of what can go wrong with the heart, as well as how to maintain its strength and stability? If not, you should be. Heart disease is the number-one cause of death in the United States today, meaning it is vital that you take the steps necessary to protect yourself and your heart. Below is a brief overview of how to become and remain heart healthy. For further information, speak with a medical practitioner or check out the American Heart Association’s website (www.heart.org).

HEART CONDITIONS
Without proper care and attention, you can develop a number of heart conditions varying severity, and/or conditions that put you at a higher risk for heart disease. These conditions include:

- Arrhythmia (irregular heartbeat)
- Cardiac arrest
- High blood pressure
- High cholesterol

The best protection against these conditions is heart-healthy prevention—a multi-faceted process, outlined below:

NUTRITION
The first step in the process is also the most publicly discussed: nutrition. A healthy weight and a well-nourished body are keys to maintaining heart health. As each person is unique, each person’s diet and nutritional needs will vary. To find out exactly what and how much you should eat, speak with your doctor or nutritionist. Until then, here are a few general guidelines:

- Saturated fats – avoid them. Saturated fats should make up less than seven percent of your daily caloric intake.
- Fruits and vegetables – have at least 4.5 cups of fruits and vegetables per day.
- Meat and fish – limit your processed meat intake to no more than 2 servings per week. As a replacement, consider fish. It is advised that you have at least two 3.5-ounce servings per week.
- Fiber – include fiber in your daily diet. Have at least 3 one-ounce servings per day, preferably in the form of whole grains.
- Sodium – limit your intake to no more than 1,500 mg per day. And remember, sodium and salt are not synonyms. Read your labels carefully.
- Labels – check them. Know what you’re putting in your body. One of the best ways to know if you have a heart-healthy food in your hands is to look for the American Heart Association’s seal of approval. However, in the absence of that, get used to reading nutrition labels and learn how to tell what’s healthy and what’s not.
- Portions – anything in excess is a bad thing. Eat in moderation and when you’re not hungry, don’t eat.

EXERCISE
Hand in hand with a proper diet is exercise. Exercise can take many forms, from walking and running to aerobics and weight lifting. What you are able and/or advised to do will differ depending on your current health, fitness level, ability, age and weight. All that matters is that you move.

STRESS
You know that stress affects your daily functioning. On the days that you are most stressed, everything seems a little more harried and a little less manageable. But did you know that stress can also affect your heart?

The effects take different forms and, in fact, doctors are still trying to figure out exactly what links stress and heart disease. However, it is known that when you are constantly stressed, your body, and thus your heart, are in a constant, heightened (and unhealthy in the long-term) state. So here are a few tips on how to keep the stress levels down:

- Stay positive – instead of using “I can’t” and similar negative statements, think about what you can do. Affirming yourself and your abilities goes a long way.
- Take time for yourself.
- Do things that bring you pleasure.
- Employ emergency stress busters – count to ten, or take a few deep breaths or a quick walk. Figure out what takes you from boiling to calm and cool (or at least down to a simmer).
- Meditate.
- Exercise – for some exercise is one of the great stress relievers.
- Eliminate unhealthy habits.

You can eat well, exercise regularly and be stress-free as often as humanly possible, but you can still be at risk for heart disease, thanks to your unhealthy habits. The number one unhealthy habit is smoking. As hard as it may be to stop, it is also vital to your heart and your health. Excessive drinking and other habits can put you at risk, as well. Check with your doctor to find out what needs to be cut and what needs to be added for your optimal heart health. 

Information for this patient handout was gathered from the American Heart Association (www.heart.org).
Test Your Sodium Smarts Quiz

You may be surprised to learn how much sodium is in many foods. Sodium, including sodium chloride or salt, can come from natural sources or be added to foods. High-sodium diets are linked to increased blood pressure and a higher risk for heart disease and stroke. The American Heart Association recommends that you aim to eat less than 1,500 mg of sodium per day.

When you buy prepared and packaged foods, you can read the amount of sodium in the product per serving, in milligrams (mg), by looking at the Nutrition Facts panel. Read the Nutrition Facts panel for the overall nutrition information — including calorie, fat and sodium content — before you make food choices. Select and prepare foods with little or no salt.

Test your sodium smarts by answering the questions below about which food products are higher in sodium. Most examples use the USDA National Nutrient Database for Standard Reference, which shows the average nutrient values of multiple commercially prepared food products of the same type. Sodium amounts can vary depending on the brand, which is why we are showing averages. We've chosen “regular” or “traditional” varieties of foods as examples to illustrate their high sodium content. When you shop, we recommend that you select sodium-free, low-sodium, or reduced-sodium foods whenever they are available to reduce your sodium consumption.

Q1. Which food has more sodium? Check the item you believe has more sodium.

☐ A.) Raisin bread (enriched)
     1 large slice (32g)

☐ B.) French or Vienna bread (including sourdough)
     1 small slice (32g)

Q2. Which food has more sodium? Check the item you believe has more sodium.

☐ A.) American cheese (pasteurized process, low-fat)
     1 slice (21g)

☐ B.) Swiss cheese (low-fat)
     1 slice (28g)

Q3. Which food has more sodium? Check the item you believe has more sodium.

☐ A.) Potato salad
     1/3 cup (95g)

☐ B.) Mashed potatoes (fast-foods)
     1/3 cup (80g)

Q4. Which food has more sodium? Check the item you believe has more sodium.

☐ A.) Raisin bran flake cereal
     1 cup (59g)

☐ B.) Raisin-cinnamon English muffin
     1 (57g)
Test Your Sodium Smarts Quiz

Q5. Which food has more sodium? Check the item you believe has more sodium.

☐ A.) Potato chips
    (plain, salted)
    1 ounce (28g)

☐ B.) Pretzels
    (hard, plain, salted)
    1 ounce (28g)

Q6. Which food has more sodium? Check the item you believe has more sodium.

☐ A.) Reduced-fat
    Italian dressing
    2 tbsp (30g)

☐ B.) Reduced-fat
    ranch dressing
    2 tbsp (30g)

Q7. Which food has more sodium? Check the item you believe has more sodium.

☐ A.) Ham
    (sliced, regular)
    2 slices (56g)

☐ B.) Turkey breast
    (oven roasted)
    2 sliced (56g)

Q8. Which food has more sodium? Check the item you believe has more sodium.

☐ A.) Pasta sauce
    (spaghetti/marinara)
    ½ cup (128g)

☐ B.) Pasta sauce
    (Alfredo)
    ½ cup (124g)

Q9. Which food has more sodium? Check the item you believe has more sodium.

☐ A.) Tomato soup
    (ready-to-serve)
    1 cup (245g)

☐ B.) Chicken noodle soup
    (ready-to-serve)
    1 cup (245g)

Q10. Which food has more sodium? Check the item you believe has more sodium.

☐ A.) Soy sauce
    1 tbsp (18g)

☐ B.) Teriyaki sauce
    1 tbsp (18g)
Test Your Sodium Smarts Quiz (Answer Key)

Q1. The correct answer is: B.) 1 small slice of French bread has more sodium.
No matter how you slice it, bread is one of the most common sources of sodium. Sodium is added to bread to help with the texture and rising action of the dough. The amount of sodium differs by bread type and can add up quickly when you eat more than one slice.

A.) Raisin bread (enriched)
1 large slice (32g); Sodium – 125 mg

B.) French or Vienna bread (including sourdough)
1 small slice (32g); Sodium – 208 mg

Q2. The correct answer is: A.) 1 slice of American cheese has more sodium.
American cheese is a highly processed “cheese-like” product. Highly processed foods tend to be high in sodium because food manufacturers use salt or other sodium-containing compounds to preserve food and to improve their taste and texture.

A.) American cheese (pasteurized process, low-fat)
1 slice (21g); Sodium – 300 mg

B.) Swiss cheese (low-fat)
1 slice (28g); Sodium – 73 mg

Q3. The correct answer is: A.) 1/3 cup of potato salad has more sodium.
Salt is often added to commercially prepared (e.g., store-bought) potato salad for taste. You can make potato salad with a low-sodium recipe that uses herbs and spices.

A.) Potato salad
1/3 cup (59g); Sodium – 312 mg

B.) Mashed potatoes (fast-foods)
1/3 cup (80g); Sodium – 182 mg

Q4. The correct answer is: A.) 1 cup of raisin bran cereal has more sodium.
Since raisin bran tastes “sweet,” it may come as a surprise as to how much sodium can be in commercial breakfast cereals. Salt is added to sweet foods in processing to enhance their flavor, so even sweet-tasting cereals like raisin bran can have lots of sodium.

A.) Raisin bran flake cereal
1 cup (59g); Sodium – 342 mg

B.) Raisin-cinnamon English muffin
1 (57g); Sodium – 189 mg

Q5. The correct answer is: B.) 1 ounce (28g) of hard pretzels has more sodium.
Don’t get the facts twisted — Hard pretzels can have more sodium for the same total weight than potato chips, because salt is added to hard pretzels for texture, not just for taste. For potato chips, salt is added at the end of food processing and applied on the surface to enhance the flavor. To limit your sodium consumption, buy unsalted potato chips and pretzels. But remember that unsalted potato chips have virtually no sodium, while unsalted pretzels can pack 82 mg per ounce.

A.) Potato chips (plain, salted)
1 ounce (28g); Sodium – 149 mg

B.) Pretzels (hard, plain, salted)
1 ounce (28g); Sodium – 385 mg

Q6. The correct answer is: A.) 2 tablespoons of Italian salad dressing has more sodium.
Prepared salad dressings can be high in sodium, depending on the dressing type, other ingredients and taste preference. Be sure to select low-sodium salad dressings or use a low-sodium recipe to whip up a salad dressing at home.

A.) Reduced-fat Italian salad dressing
2 tbsp (30g); Sodium – 410 mg

B.) Reduced-fat ranch salad dressing
2 tbsp (30g); Sodium – 273 mg

Q7. The correct answer is: A.) 2 slices of regular ham has more sodium.
Sodium in processed meats like ham, bacon and hot dogs can come from salt added for taste and sodium-containing ingredients used as preservatives to enhance the color or retain moisture. The American Heart Association recommends that you limit the consumption of processed meats to no more than two servings a week.

A.) Ham (sliced, regular)
2 slices (56g); Sodium – 730 mg

B.) Turkey breast (oven roasted)
2 slices (56g); Sodium – 540 mg

Q8. The correct answer is: B.) ½ cup of Alfredo pasta sauce has more sodium.
Alfredo sauce has more sodium, calories and fats than spaghetti/marinara sauce. Prepared pasta sauces are traditionally very high in sodium, although the sodium content can vary greatly depending on the brand and flavor. Several food manufacturers have offered products with less sodium.

A.) Pasta sauce (spaghetti/marinara)
½ cup (128g); Sodium – 525 mg

B.) Pasta sauce (Alfredo)
½ cup (124g); Sodium – 760 mg

Q9. The correct answer is: B.) 1 cup of chicken noodle soup has more sodium.
Salt may be more necessary to provide taste for traditional canned chicken noodle soup than tomato soup, but here is the scoop on soup: All canned varieties can have high amounts of sodium. In recent years, tasty soups with less sodium have become available — pick these whenever you can.

A.) Tomato soup (ready-to-serve)
1 cup (245g); Sodium – 789 mg

B.) Chicken noodle soup (ready-to-serve)
1 cup (245g); Sodium – 840 mg

Q10. The correct answer is: A.) 1 tbsp of soy sauce has more sodium.
Not surprised? The big surprise may be how high in sodium both soy sauce and teriyaki sauce can be. The 1,006 mg of sodium per 1 tablespoon (tbsp) of soy sauce is almost equivalent to that contained in ½ teaspoon (tsp) of salt (1,150 mg). Choose low-sodium or light soy sauce at grocery stores and restaurants.

A.) Soy sauce
1 tbsp (18g); Sodium – 1006 mg

B.) Teriyaki sauce
1 tbsp (18g); Sodium – 690 mg

www.heart.org/nutrition 3