

Section 02: Health Appraisal / Risk Stratification

**ACSM Guidelines: Chapter 2 – Pre-Participation Health
Screening and Risk Stratification**

ACSM Manual: Chapter 2 – Pre-Assessment Screening

**HPER 4450
Dr. Cheatham**



Purpose

To aid in the development of a safe and effective exercise prescription and optimize safety during exercise testing, it is important to screen potential participants for risk factors and/or symptoms of various cardiovascular, pulmonary, and metabolic diseases, as well as conditions that may be aggravated by exercise.



Purpose

- The purpose of preparticipation health screening include the following:
 - Identification of individuals with medical contraindications for exclusion from exercise programs until those conditions have been abated or are under control
 - Recognition of persons with clinically significant disease(s) or conditions who should participate in a medically supervised exercise program
 - Detection of individuals at increased risk for disease because of age, symptoms, and/or risk factors who should undergo a medical evaluation and exercise testing before initiating an exercise program or increasing the frequency, intensity, or duration of their current program
 - Recognition of special needs of individuals that may affect exercise testing and programming



Pre-Participation Screening

- **Self-Guided Screening for Physical Activity**
 - Little or no input from health-related professionals.
 - Need for an easy to use screening tool.
 - Surgeon General's Statement:
 - “previously inactive men over age 40 and women over age 50, and people at high risk for cardiovascular disease (CVD) should first consult a physician before embarking on a program of vigorous physical activity to which they are unaccustomed.”



Pre-Participation Screening

- Initial or minimal step:
 - Complete a self-administered questionnaire that serves to alert those with elevated risk to consult their physician prior to participation
 - Examples of questionnaires:
 - AHA/ACSM Health/Fitness Facility Preparticipation Screening Questionnaire
 - Physical Activity Readiness Questionnaire (PAR-Q)

PAR-Q & YOU

Physical Activity Readiness Questionnaire

1. Do you have any of the following conditions?
 a. Heart disease
 b. High blood pressure
 c. Diabetes
 d. Asthma
 e. Other chronic disease

2. Do you have any of the following symptoms?
 a. Chest pain or discomfort
 b. Dizziness or lightheadedness
 c. Shortness of breath
 d. Excessive fatigue
 e. Other symptoms

3. Do you have any of the following risk factors?
 a. Family history of heart disease
 b. High cholesterol
 c. Obesity
 d. Smoking
 e. Other risk factors

4. Do you have any of the following medications?
 a. Blood thinners
 b. Blood pressure medications
 c. Diabetes medications
 d. Other medications

5. Do you have any of the following other conditions?
 a. Pregnancy
 b. Recent surgery
 c. Recent injury
 d. Other conditions

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5. Do you have any of the following other conditions?
 a. Pregnancy
 b. Recent surgery
 c. Recent injury
 d. Other conditions



Pre-Participation Screening

- The initial screening step is designed to yield information regarding risk stratification and the need for medical clearance (MC) prior to beginning or significantly increasing physical activity
- This process requires identification of the presence of:
 - Coronary artery disease (CAD) risk factors
 - Signs or symptoms of cardiovascular, pulmonary, and/or metabolic disease
 - Known cardiovascular, pulmonary, and/or metabolic disease



Pre-Participation Screening

PAR-Q & YOU

Physical Activity Readiness Questionnaire - PAR-Q (revised 2003)

(A Questionnaire for People Aged 15 to 69)

Regular physical activity is fun and healthy, and increasingly more people are starting to become more active every day. Being more active is very safe for most people. However, some people should check with their doctor before they start becoming much more physically active.

If you are planning to become much more physically active than you are now, start by answering the seven questions in the box below. If you are between the ages of 15 and 69, the PAR-Q will tell you if you should check with your doctor before you start. If you are over 69 years of age, and you are not used to being very active, check with your doctor.

Common sense is your best guide when you answer these questions. Please read the questions carefully and answer each one honestly: check YES or NO.

YES	NO	
<input type="checkbox"/>	<input type="checkbox"/>	1. Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?
<input type="checkbox"/>	<input type="checkbox"/>	2. Do you feel pain in your chest when you do physical activity?
<input type="checkbox"/>	<input type="checkbox"/>	3. In the past month, have you had chest pain when you were not doing physical activity?
<input type="checkbox"/>	<input type="checkbox"/>	4. Do you lose your balance because of dizziness or do you ever lose consciousness?
<input type="checkbox"/>	<input type="checkbox"/>	5. Do you have a bone or joint problem (for example, back, knee or hip) that could be made worse by a change in your physical activity?
<input type="checkbox"/>	<input type="checkbox"/>	6. Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?
<input type="checkbox"/>	<input type="checkbox"/>	7. Do you know of any other reason why you should not do physical activity?

If you answered YES to one or more questions

Talk with your doctor by phone or in person BEFORE you start becoming much more physically active or BEFORE you have a fitness appraisal. Tell your doctor about the PAR-Q and which questions you answered YES.

- You may be able to do any activity you want — as long as you start slowly and build up gradually. Or, you may need to restrict your activities to those which are safe for you. Talk with your doctor about the kinds of activities you wish to participate in and follow his/her advice.
- Find out which community programs are safe and helpful for you.

NO to all questions


If you answered NO honestly to all PAR-Q questions, you can be reasonably sure that you can:

- start becoming much more physically active — begin slowly and build up gradually. This is the safest and easiest way to go.
- take part in a fitness appraisal — this is an excellent way to determine your basic fitness so that you can plan the best way for you to live actively. It is also highly recommended that you have your blood pressure evaluated. If your reading is over 144/94, talk with your doctor before you start becoming much more physically active.

DELAY BECOMING MUCH MORE ACTIVE:

- if you are not feeling well because of a temporary illness such as a cold or a fever — wait until you feel better; or
- if you are or may be pregnant — talk to your doctor before you start becoming more active.

PLEASE NOTE: If your health changes so that you then answer YES to any of the above questions, tell your fitness or health professional. Ask whether you should change your physical activity plan.



Pre-Participation Screening

AHA/ACSM Health/Fitness Facility Preparticipation Screening Questionnaire

Assess your health needs by marking all *true* statements.

History

You have had:

A heart attack

Heart surgery

Cardiac catheterization

Coronary angioplasty (PTCA)

Pacemaker/implantable cardiac defibrillator/rhythm disturbance

Heart valve disease

Heart failure

Heart transplantation

Congenital heart disease

Symptoms

You experience chest discomfort with exertion.

You experience unreasonable breathlessness.

You experience dizziness, fainting, blackouts.

You take heart medications.

If you marked any of the statements in this section, consult your physician or other appropriate healthcare provider before engaging in exercise. You may need to use a facility with a medically qualified staff.

Other health issues

You have diabetes

You have or asthma other lung disease.

You have burning or cramping in your lower legs when walking short distances.

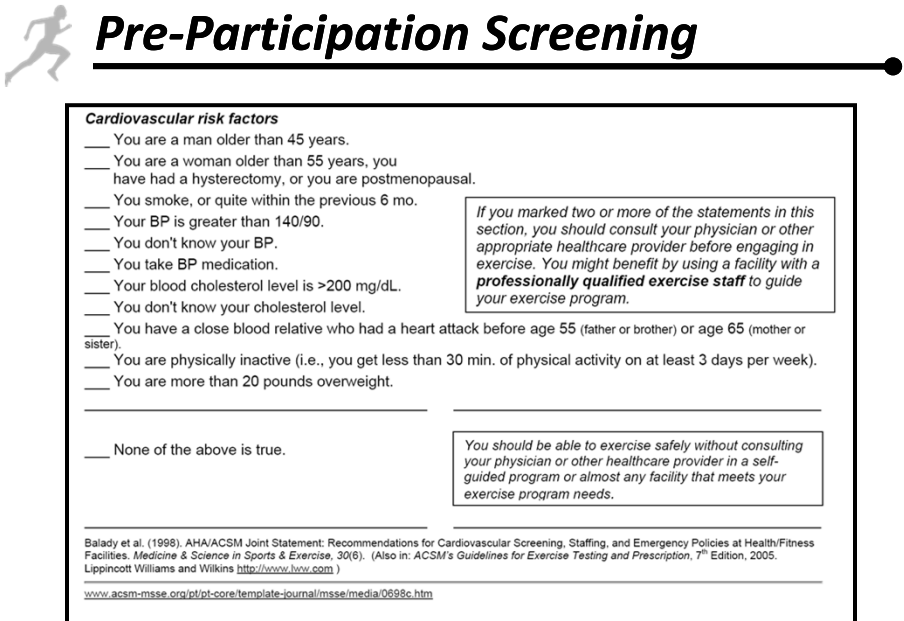
You have musculoskeletal problems that limit your physical activity.

You have concerns about the safety of exercise.

You take prescription medication(s).

You are pregnant.

Figure 2.2, ACSM Guidelines, P. 21



Pre-Participation Screening

Cardiovascular risk factors

You are a man older than 45 years.

You are a woman older than 55 years, you have had a hysterectomy, or you are postmenopausal.

You smoke, or quite within the previous 6 mo.

Your BP is greater than 140/90.

You don't know your BP.

You take BP medication.

Your blood cholesterol level is >200 mg/dL.

You don't know your cholesterol level.

You have a close blood relative who had a heart attack before age 55 (father or brother) or age 65 (mother or sister).

You are physically inactive (i.e., you get less than 30 min. of physical activity on at least 3 days per week).

You are more than 20 pounds overweight.

None of the above is true.

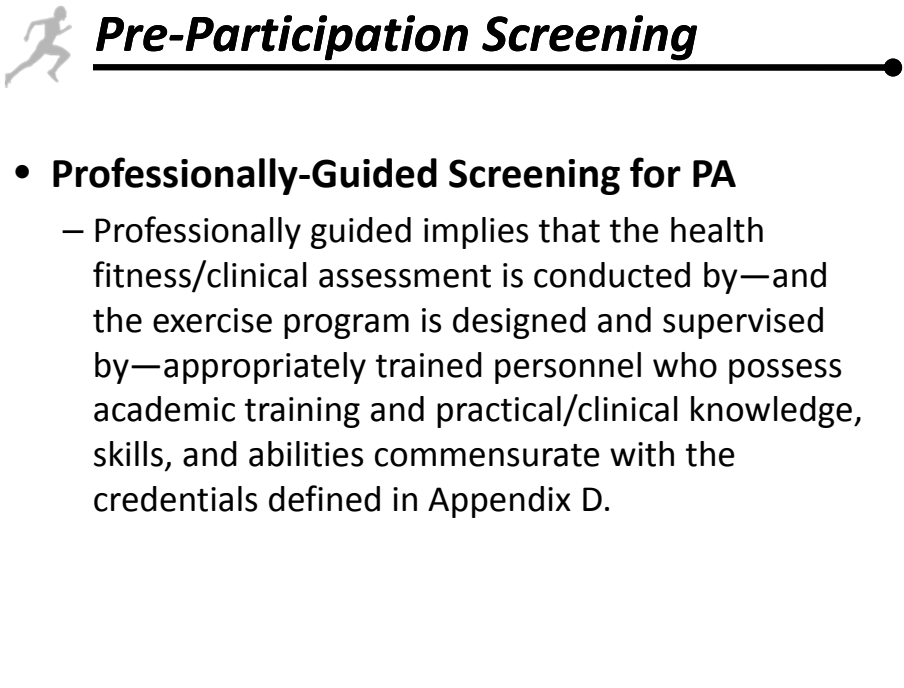
If you marked two or more of the statements in this section, you should consult your physician or other appropriate healthcare provider before engaging in exercise. You might benefit by using a facility with a professionally qualified exercise staff to guide your exercise program.

You should be able to exercise safely without consulting your physician or other healthcare provider in a self-guided program or almost any facility that meets your exercise program needs.

Balady et al. (1998). AHA/ACSM Joint Statement: Recommendations for Cardiovascular Screening, Staffing, and Emergency Policies at Health/Fitness Facilities. *Medicine & Science in Sports & Exercise*, 30(8). (Also in: *ACSM's Guidelines for Exercise Testing and Prescription*, 7th Edition, 2005. Lippincott Williams and Wilkins <http://www.lww.com>)

www.acsm-msse.org/pl/pl-core/template-journal/msse/media/0698c.htm

Figure 2.2, ACSM Guidelines, P. 21



Pre-Participation Screening

- **Professionally-Guided Screening for PA**
 - Professionally guided implies that the health fitness/clinical assessment is conducted by—and the exercise program is designed and supervised by—appropriately trained personnel who possess academic training and practical/clinical knowledge, skills, and abilities commensurate with the credentials defined in Appendix D.



Pre-Participation Screening

- A more advanced process administered by professionally trained personnel provides greater detail regarding CVD risk factors and signs/symptoms and identifies a broader scope of chronic diseases and/or conditions that need special consideration before engaging in an exercise program.
- The professionally guided preparticipation screening process involves (a) the review of more detailed health/medical history information and specific risk stratification, and (b) detailed recommendations for physical activity/exercise, medical examination, exercise testing, and physician supervision.



Risk Stratification

- **ACSM Risk Stratification**
 - Purpose: To decide appropriate course of action regarding exercise testing before entering an exercise program
 - Based on:
 - The presence or absence of known cardiovascular, pulmonary, and/or metabolic disease
 - The presence or absence of signs or symptoms suggestive of cardiovascular, pulmonary, and/or metabolic disease
 - The presence or absence of CVD risk factors
 - Answers two questions:
 - Should the client have a medical examination before starting the exercise program?
 - Does the client need a physician present to supervise the GXT?



Risk Stratification

TABLE 2.1. ACSM RISK STRATIFICATION CATEGORIES FOR ATHEROSCLEROTIC CARDIOVASCULAR DISEASE

Low risk	Asymptomatic men and women who have ≤ 1 CVD risk factor from Table 2.3
Moderate risk	Asymptomatic men and women who have ≥ 2 risk factors from Table 2.3
High risk	Individuals who have known cardiovascular, ^a pulmonary, ^b or metabolic ^c disease or one or more signs and symptoms listed in Table 2.2

ACSM, American College of Sports Medicine; CVD, cardiovascular disease.

^aCardiac, peripheral vascular, or cerebrovascular disease.

^bChronic obstructive pulmonary disease, asthma, interstitial lung disease, or cystic fibrosis.

^cDiabetes mellitus (type 1, type 2), thyroid disorders, renal, or liver disease.

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Table 2.1, ACSM Guidelines, P. 23



Risk Stratification

TABLE 2.3. ATHEROSCLEROTIC CARDIOVASCULAR DISEASE (CVD) RISK FACTOR THRESHOLDS FOR USE WITH ACSM RISK STRATIFICATION

POSITIVE RISK FACTORS	DEFINING CRITERIA
Age	Men ≥ 45 yr; Women ≥ 55 yr
Family history	Myocardial infarction, coronary revascularization, or sudden death before 55 yr of age in father or other male first-degree relative, or before 65 yr of age in mother or other female first-degree relative
Cigarette smoking	Current cigarette smoker or those who quit within the previous 6 months or exposure to environmental tobacco smoke
Sedentary lifestyle	Not participating in at least 30 min of moderate intensity (40%–60% $\dot{V}O_2R$) physical activity on at least three days of the week for at least three months (20,23)
Obesity ^a	Body mass index ≥ 30 $\text{kg} \cdot \text{m}^2$ or waist girth >102 cm (40 inches) for men and >88 cm (35 inches) for women (2)
Hypertension	Systolic blood pressure ≥ 140 mm Hg and/or diastolic ≥ 90 mm Hg, confirmed by measurements on at least two separate occasions, or on antihypertensive medication (10)

Table 2.3, ACSM Guidelines, P. 28 or Table 2.2, ACSM Manual, P. 22.



Risk Stratification

Dyslipidemia	Low-density lipoprotein (LDL-C) cholesterol $\geq 130 \text{ mg} \cdot \text{dL}^{-1}$ ($3.37 \text{ mmol} \cdot \text{L}^{-1}$) or high-density lipoprotein (HDL-C) cholesterol $< 40 \text{ mg} \cdot \text{dL}^{-1}$ ($1.04 \text{ mmol} \cdot \text{L}^{-1}$) or on lipid-lowering medication. If total serum cholesterol is all that is available use $\geq 200 \text{ mg} \cdot \text{dL}^{-1}$ ($5.18 \text{ mmol} \cdot \text{L}^{-1}$) (3)
Prediabetes	Impaired fasting glucose (IFG) = fasting plasma glucose $\geq 100 \text{ mg} \cdot \text{dL}^{-1}$ ($5.50 \text{ mmol} \cdot \text{L}^{-1}$) but $< 126 \text{ mg} \cdot \text{dL}^{-1}$ ($6.93 \text{ mmol} \cdot \text{L}^{-1}$) or impaired glucose tolerance (IGT) = 2-hour values in oral glucose tolerance test (OGTT) $\geq 140 \text{ mg} \cdot \text{dL}^{-1}$ ($7.70 \text{ mmol} \cdot \text{L}^{-1}$) but $< 200 \text{ mg} \cdot \text{dL}^{-1}$ ($11.00 \text{ mmol} \cdot \text{L}^{-1}$) confirmed by measurements on at least two separate occasions (8)
NEGATIVE RISK FACTOR	DEFINING CRITERIA
High-serum HDL cholesterol [†]	$\geq 60 \text{ mg} \cdot \text{dL}^{-1}$ ($1.55 \text{ mmol} \cdot \text{L}^{-1}$)
<p>Note: It is common to sum risk factors in making clinical judgments. If HDL is high, subtract one risk factor from the sum of positive risk factors, because high HDL decreases CVD risk.</p> <p>[†]Professional opinions vary regarding the most appropriate markers and thresholds for obesity; therefore, allied health professionals should use clinical judgment when evaluating this risk factor.</p> <p>Copyright © 2010 American College of Sports Medicine</p>	

Table 2.3, ACSM Guidelines, P. 28 or Table 2.2, ACSM Manual, P. 22.



Risk Stratification

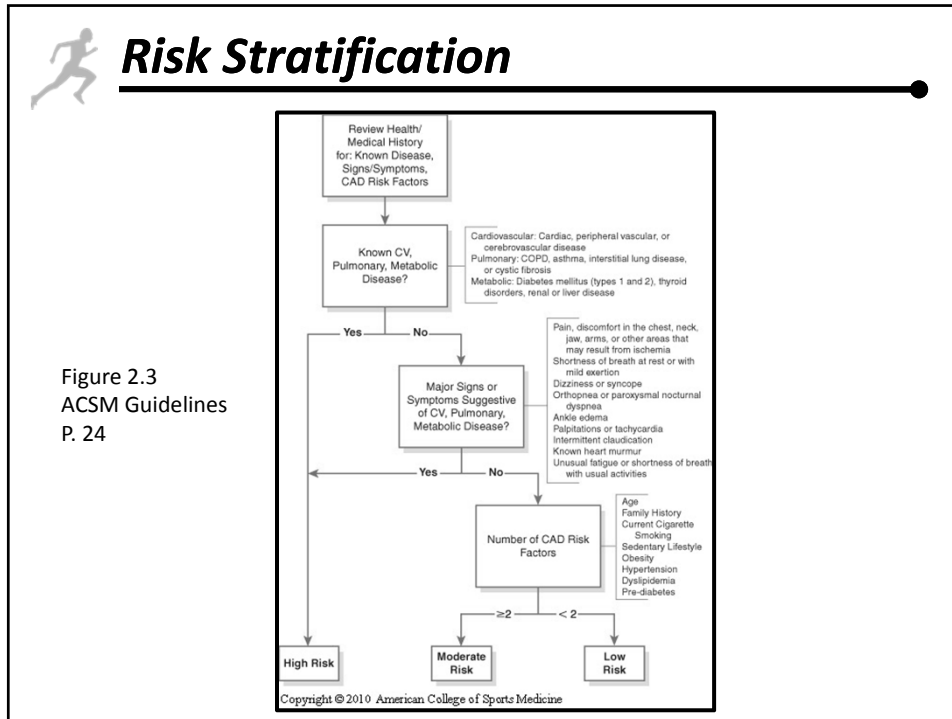
TABLE 2.2. MAJOR SIGNS OR SYMPTOMS SUGGESTIVE OF CARDIOVASCULAR, PULMONARY, OR METABOLIC DISEASE*	
SIGN OR SYMPTOM	CLARIFICATION/SIGNIFICANCE
Pain, discomfort (or other angular equivalent) in the chest, neck, jaw, arms, or other areas that may result from ischemia	<p>One of the cardinal manifestations of cardiac disease, in particular coronary artery disease</p> <p>Key features favoring an ischemic origin include:</p> <ul style="list-style-type: none"> • Character: Constricting, squeezing, burning, "heaviness" or "heavy feeling" • Location: Substernal, across midthorax, anteriorly, in one or both arms, shoulders; in neck, cheeks, teeth; in forearms, fingers in interscapular region • Provoking factors: Exercise or exertion, excitement, other forms of stress, cold weather, occurrence after meals <p>Key features against an ischemic origin include:</p> <ul style="list-style-type: none"> • Character: Dull ache, "knife-like," sharp, stabbing; "jabs" aggravated by respiration • Location: In left submammary area; in left hemithorax • Provoking factors: After completion of exercise, provoked by a specific body motion
Shortness of breath at rest or with mild exertion	<p>Dyspnea (defined as an abnormally uncomfortable awareness of breathing) is one of the principal symptoms of cardiac and pulmonary disease. It commonly occurs during strenuous exertion in healthy, well-trained persons and during moderate exertion in healthy, untrained persons. However, it should be regarded as abnormal when it occurs at a level of exertion that is not expected to evoke this symptom in a given individual. Abnormal exertional dyspnea suggests the presence of cardiopulmonary disorders, in particular left ventricular dysfunction or chronic obstructive pulmonary disease.</p>
Dizziness or syncope	<p>Syncope (defined as a loss of consciousness) is most commonly caused by a reduced perfusion of the brain. Dizziness and, in particular, syncope during exercise may result from cardiac disorders that prevent the normal rise (or an actual fall) in cardiac output. Such cardiac disorders are potentially life-threatening and include severe coronary artery disease, hypertrophic cardiomyopathy, aortic stenosis, and malignant ventricular dysrhythmias. Although dizziness or syncope shortly after cessation of exercise should not be ignored, these symptoms may occur even in healthy persons as a result of a reduction in venous return to the heart.</p>
Ankle edema	<p>Unusually early or severe</p> <p>Bilateral ankle edema that is most evident at night is a characteristic sign of heart failure or bilateral chronic venous insufficiency. Unilateral edema of a limb often results from venous thrombosis or lymphatic blockage in the limb. Generalized edema (known as anasarca) occurs in persons with the nephrotic syndrome, severe heart failure, or hepatic cirrhosis.</p>
Palpitations or tachycardia	<p>Palpitations (defined as an unpleasant awareness of the forceful or rapid beating of the heart) may be induced by various disorders of cardiac rhythm. These include tachycardia, bradycardia of sudden onset, ectopic beats, compensatory pauses, and accentuated stroke volume resulting from valvular regurgitation. Palpitations also often result from anxiety states and high cardiac output (or hyperkinetic) states, such as anemia, fever, thyrotoxicosis, arteriovenous fistula, and the so-called idiopathic hyperkinetic heart syndrome.</p>
Intermittent claudication	<p>Intermittent claudication refers to the pain that occurs in a muscle with an inadequate blood supply (usually as a result of atherosclerosis) that is stressed by exercise. The pain does not occur with standing or sitting, is reproducible from day to day, is more severe when walking upstairs or up a hill, and is often described as a cramp, which disappears within 1-2 min after stopping exercise. Coronary artery disease is more prevalent in persons with intermittent claudication. Patients with diabetes are at increased risk for this condition.</p>
Known heart murmur	<p>Although some may be innocent, heart murmurs may indicate valvular or other cardiovascular disease. From an exercise safety standpoint, it is especially important to exclude hypertrophic cardiomyopathy and aortic stenosis as underlying causes because these are among the more common causes of exertion-related sudden cardiac death.</p>
Unusual fatigue or shortness of breath with usual activities	<p>Although there may be benign origins for these symptoms, they also may signal the onset of, or change in the status of cardiovascular, pulmonary, or metabolic disease.</p>


*These signs or symptoms must be interpreted within the clinical context in which they appear because they are not all specific for cardiovascular, pulmonary, or metabolic disease.

Modified from Gordon SMBS. Health appraisal in the non-medical setting. In: Durstine JL, King AC, Painter PL, ACSM's exercise manual for guidelines for exercise testing and prescription. Philadelphia (PA): Lea & Febiger, 1993. p. 219-28.

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Table 2.2, ACSM Guidelines, P. 26-27 or Table 2.3, ACSM Manual, P. 23-24.



 **Exercise Test Considerations**

- Once the risk category has been established for an individual as low, medium, or high, appropriate recommendations may be made regarding:
 - The necessity for medical examination and clearance before initiating a physical activity/exercise program or substantially changing the FITT framework of an existing physical activity/exercise program
 - The necessity for an exercise test before initiating a physical activity/exercise program or substantially changing the FITT framework of an existing activity program
 - The necessity for physician supervision when participating in a maximal or submaximal exercise test

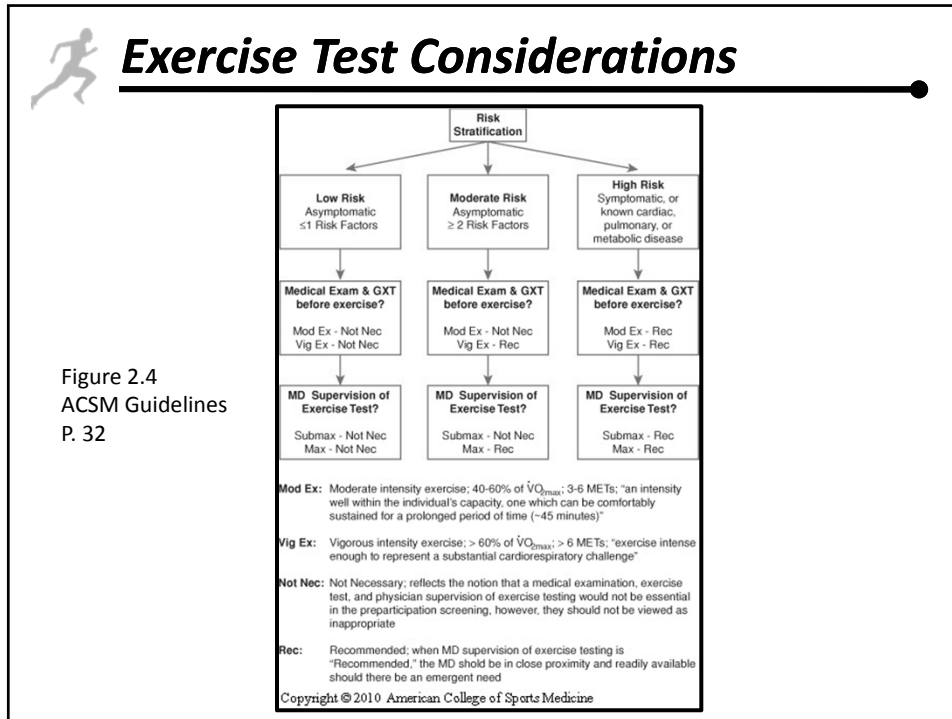


Figure 2.4
ACSM Guidelines
P. 32

ACSM Risk Stratification Case Study

- Read the case study example on P. 28 of the ACSM Manual.
- Do the following:
 - Go through each ACSM Risk factor for CAD and decide if the person does or does not have each risk factor.
 - Decide if the person exhibits any "Major Signs or Symptoms Suggestive of CPM Disease".
 - Risk stratify the person (low, moderate, high).
 - Decide if the person needs a medical exam and exercise test prior to moderate or vigorous exercise.
 - Decide if the person needs physician supervision of a submaximal or maximal exercise test.



ACSM Risk Stratification Case Study

>>> CASE STUDY

Todd is a 44-year-old electrical engineer who works 50–60 hours per week. He is 5'9", 233 pounds, with total cholesterol of 192 mg · dL⁻¹, low-density lipoprotein (LDL) of 138 mg · dL⁻¹, high-density lipoprotein (HDL) of 41 mg · dL⁻¹, triglycerides of 200 mg · dL⁻¹, and blood glucose of 120 mg · dL⁻¹. Todd's resting heart rate is 81 bpm and blood pressure is 144/86 mmHg. His waist and hip circumference measures are 42 inches and 40 inches, respectively. Todd has never smoked, but usually has one to two glasses of wine with dinner. He reports no leisure-time physical activity and does not exercise on a regular basis (less than two sessions per month). Todd denies all complaints of chest discomfort and shortness of breath at rest or with exertion; however, he has gained 20 pounds over the last 2 years. Todd's wife reports he snores frequently and has difficulty waking up in the mornings. Further testing reveals that Todd has obstructive sleep apnea and is being treated with continuous positive airway pressure (CPAP). A review of his family history reveals that Todd's father had double-bypass surgery at age 53 and suffered a fatal myocardial infarction at age 62. Todd's brother (42 years old) also is hypertensive and was recently diagnosed with type 2 diabetes, which is being treated with diet and physical activity recommendations. Todd has been referred to your facility for coronary artery disease risk factor reduction and physical activity counseling.

Determine the presence or absence of each CVD risk factor, any signs or symptoms, the ACSM risk stratification, the recommendations for a medical exam and exercise test, and the recommendation for physician supervision of the exercise test.



ACSM Risk Stratification Case Study

- Answers:
 - Risk Factors:
 - Positive Risk Factors
 - Family History: YES (Father had CABG at 53 yrs (< 55 yrs))
 - Smoking: NO
 - Sedentary Lifestyle: YES
 - Obesity: YES; BMI = 34.5 (≥ 30)
 - Hypertension = YES (SBP = 144 (≥ 140))
 - Dyslipidemia = YES (LDL = 138 (≥ 130))
 - Pre-Diabetes = YES (Blood glucose = 120 (≥ 100))
 - Negative Risk Factors
 - HDL: No; 41 < 60
 - “Major Signs or Symptoms Suggestive of CPM Disease”: None Noted
 - ACSM Risk Level: Moderate Risk (More than 1 RF)
 - Positive RF = 5, Negative RF = 0, Total = 5



ACSM Risk Stratification Case Study

- Answers (cont'd):
 - Need for Medical Exam and Exercise Test
 - Moderate Exercise: Not necessary
 - Vigorous Exercise: Recommended
 - Physician Supervision of Exercise Tests
 - Submaximal: Not necessary
 - Maximal: Recommended



ACSM Risk Stratification Assignment

