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Recommendations for Cardiovascular Screening, Staffing, and Emergency Policies at Health/Fitness Facilities

Writing Group

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The message from the nation's scientists is clear, unequivocal, and unified: physical inactivity is a risk factor for cardiovascular disease,^{1,2} and its prevalence is an important public health issue. New scientific knowledge based on epidemiological observational studies, cohort studies, controlled trials, and basic research has led to an unprecedented focus on physical activity and exercise. The promotion of physical activity is at the top of our national public health agenda, as seen in the publication of the 1996 report of the US Surgeon General on physical activity and health.³

The attention now being given to physical activity supports the goals of Healthy People 2000⁴ and should lead to increased levels of regular physical activity throughout the US population, including the nearly one fourth of adult Americans who have some form of cardiovascular disease.⁵ Although regular exercise reduces subsequent cardiovascular morbidity and mortality,^{1,2,6} the incidence of a cardiovascular event during exercise in patients with cardiac disease is estimated to be 10 times that of otherwise healthy persons.⁷ Adequate screening and evaluation are important to identify and counsel persons with underlying cardiovascular disease before they begin exercising at moderate to vigorous levels.

Moderate (or higher) levels of physical activity and exercise are achieved in a number of settings, including >15 000 health/fitness facilities across the country. A recent survey of 110 health/fitness facilities in Massachusetts found that efforts to screen new members at enrollment were limited and inconsistent.⁸ Nearly 40% of responding facilities stated that they do not routinely use a screening interview or questionnaire to evaluate new members for symptoms or history of cardiovascular disease, and 10% stated that they conducted no initial cardiovascular health history screening at all.

This statement provides recommendations for *cardiovascular screening* of all persons (children, adolescents, and

adults) before enrollment or participation in activities at health/fitness facilities. Staff qualifications and emergency policies related to cardiovascular safety are also discussed. Health/fitness facilities are defined here as organizations that offer health and fitness programs as their primary or secondary service or that promote high-intensity recreational physical activity (eg, basketball, tennis, racquetball, and swim clubs). Ideally such facilities have a professional staff, but those that provide space and equipment only (eg, unsupervised hotel exercise rooms) are also included. A health/fitness facility user is defined as a dues-paying member or a guest paying a regular daily fee to use the facility specifically to exercise. These recommendations are intended to assist health/fitness facility staff, healthcare providers, and consumers in the promotion and performance of safe and effective physical activity/exercise.

The writing group based these recommendations on a review of the literature and the consensus of the group. Earlier statements from the American Heart Association (AHA) and the American College of Sports Medicine (ACSM) are highlighted and supplemented. These recommendations were peer reviewed by selected authorities in the field representing the AHA, the ACSM, the American College of Cardiology, the International Health Racquet and Sports Clubs Association (IHRSA), and the Young Men's Christian Association. The recommendations are not mandatory or all-encompassing, nor do they limit provision of individualized care by practitioners exercising independent judgment. With this statement the AHA and the ACSM assume no responsibility toward any individual for whom this statement may be applied in the provision of individualized care. Specific details about exercise testing and training of persons with and without cardiovascular disease and those with other health problems are provided elsewhere.^{7,9-11} The ACSM has published comprehensive guidelines for operating health/fitness facilities.¹² Although issues in competitive sports are beyond the scope of this statement, the 26th Bethesda Conference¹³ on sudden cardiac death in competitive athletes and the AHA¹⁴ provide specific recommendations for the screening and evaluation of athletes for congenital heart disease, systemic hypertension, and other cardiovascular diseases before participation in competitive sports.

Cardiovascular Screening

Rationale

Regular exercise results in increased exercise capacity and physical fitness, which can lead to many health benefits. Persons who are physically active appear to have lower rates of all-cause mortality, probably because of a decrease in

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occurrence of chronic illnesses, including coronary heart disease. This benefit may be the result of an improvement in cardiovascular risk factors in addition to enhanced fibrinolysis, improved endothelial function, decreased sympathetic tone, and other as yet undetermined factors.¹ Regular endurance exercise leads to favorable alterations in the cardiovascular, musculoskeletal, and neurohumoral systems. The result is a training effect, which allows an individual to do increasing amounts of work while lowering the heart rate and blood pressure response to submaximal exercise. Such an effect is particularly desirable in patients with coronary artery disease because it allows increased activity with less ischemia.¹

The Centers for Disease Control and Prevention,² the ACSM,² and the AHA¹¹ recommend that every American participate in at least moderate-intensity physical activity for ≥ 30 minutes on most, if not all, days of the week. Unfortunately, many Americans are sedentary or perform too little physical activity; only 22% of adult Americans engage in regular exercise ≥ 5 times a week.³ The prevalence of physical inactivity is higher among culturally diverse segments of the US population, low-income groups, the elderly, and women.³ It is important for healthcare providers to educate the public about the benefits of physical activity and to encourage more leisure-time exercise, particularly for those who are underactive. Consumers should seek information about safe and effective ways to increase physical activity and initiate and maintain a regular program of exercise.

Efforts to promote physical activity will result in an increasing number of persons with and without heart disease joining the >20 million persons who already exercise at health/fitness facilities.¹⁵ Current market research indicates that 50% of health/fitness facility members are older than 35 years, and the fastest-growing segments of users are those older than 55 and those aged 35 to 54.¹⁵ With increased physical activity, more people with symptoms of or known cardiovascular disease will face the cardiovascular stress of physical activity and possible risk of a cardiac event. More than one fourth of all Americans have some form of cardiovascular disease.⁵ The prevalence of coronary heart disease for American adults aged 20 years and older is 7.2% in the general population, 7.5% for non-Hispanic whites, 6.9% for non-Hispanic blacks, and 5.6% for Mexican Americans.⁵ The prevalence of myocardial infarction in older Americans aged 65 to 69 is 18.0% and 9.7% for men and women, respectively.⁵

Moderately strenuous physical exertion may trigger ischemic cardiac events, particularly among persons not accustomed to regular physical activity and exercise. Siscovick et al¹⁶ examined the incidence of primary cardiac arrest in men aged 25 to 75 years after excluding those with a history of clinically recognized heart disease. Although the risk was significantly increased during high-intensity exercise, the likelihood for primary cardiac arrest during such activity in a clinically healthy population was estimated at 0.55 events/10 000 men per year. Maron et al¹⁷ studied causes of sudden death in competitive athletes. In persons younger than 35 years, 48% of deaths were due to hypertrophic cardiomyopathy. Coronary artery anomalies, idiopathic left ventricular

hypertrophy, and coronary heart disease each accounted for 10% to 20% of deaths. In those over 35, coronary artery disease accounted for approximately 80% of all deaths. *Overall, the absolute incidence of death during exercise in the general population is low.*¹⁸⁻²⁰ *Each year approximately 0.75 and 0.13/100 000 young male and female athletes²⁰ and 6/100 000 middle-aged men die during exertion.*¹⁹ No estimates are available for middle-aged women or the elderly.

Cardiovascular events other than death during exercise have also been studied. Data from the Framingham Heart Study indicate that the baseline risk of myocardial infarction in a 50-year-old man who is a nonsmoker and does not have diabetes is approximately 1% per year, or approximately 1 chance per million per hour.²¹ Heavy exertion (≥ 6 METs [metabolic equivalents]) within 1 hour of symptomatic onset of acute myocardial infarction has been reported in 4.4% to 7.1% of patients.^{22,23} The adjusted relative risk is significantly greater in persons who do not participate in regular physical activity, with an approximate 3-fold increase in risk during the morning hours. The relation of physical activity to acute myocardial infarction in the thrombolytic era was examined among 3339 patients in the TIMI II trial,²⁴ where moderate or marked physical activity preceded myocardial infarction in 18.7% of patients.

Van Camp et al²⁵ reported the incidence of major cardiovascular complications in 167 randomly selected cardiac rehabilitation programs that provided supervised exercise training to 51 000 patients with known cardiovascular disease. The incidence of myocardial infarction was 1/294 000 person-hours; the incidence of death was 1/784 000 person-hours.

Screening Prospective Members/Users

All facilities offering exercise equipment or services should conduct cardiovascular screening of all new members and/or prospective users. The primary purpose of preparticipation screening is to identify both those not known to be at risk and those known to be at risk for a cardiovascular event during exercise. Recent evidence suggests that screening by health/fitness facilities is done only sporadically.⁸ In Canada, evidence from the Canadian Home Fitness Test and its screening instrument, the Physical Activity Readiness Questionnaire (PAR-Q), suggests that even simple screening questionnaires can effectively identify many persons at high risk and increase the safety of nonsupervised exercise.²⁶ Current knowledge of the relation between identifiable risk factors, the incidence of cardiovascular disease, and the triggering factors for acute myocardial infarction suggests that screening is both reasonable and prudent.

The cost-effectiveness of preparticipation screening is an important consideration. Exercise testing is comparatively expensive. The incidence of false-positive findings when testing asymptomatic persons²⁷ and the need to follow up abnormal results can lead to subsequent and more costly procedures. A thorough and mandatory screening process that might prove optimally sensitive in detecting occult cardiovascular disease might be so prohibitive to participation that fewer persons would engage in a fitness program. Such a result would be counterproductive to the goal of maximizing

TABLE 1. Revised Physical Activity Readiness Questionnaire (PAR-Q)

Yes	No	
_____	_____	1. Has a doctor ever said that you have a heart condition and recommended only medically supervised activity?
_____	_____	2. Do you have chest pain brought on by physical activity?
_____	_____	3. Have you developed chest pain in the past month?
_____	_____	4. Have you on 1 or more occasions lost consciousness or fallen over as a result of dizziness?
_____	_____	5. Do you have a bone or joint problem that could be aggravated by the proposed physical activity?
_____	_____	6. Has a doctor ever recommended medication for your blood pressure or a heart condition?
_____	_____	7. Are you aware, through your own experience or a doctor's advice, of any other physical reason that would prohibit you from exercising without medical supervision?

If you answered "yes" to any of these questions, call your personal physician or healthcare provider before increasing your physical activity.

Adapted from Shephard et al²⁶ and Thomas et al.²⁸

physical activity. Because most of the health benefits of exercise accrue at moderate levels of intensity,² where the risks are probably low, recommendations that would inhibit large numbers of persons from participating in exercise programs are not justified. Preparticipation screening should identify persons at high risk and should be simple and easy to perform. Public health efforts should focus on increasing the use of preparticipation screening.

Two practical tools for preparticipation screening are likely to have an effect on identifying high-risk individuals without inhibiting their participation in exercise programs. The PAR-Q²⁸ (Table 1) is a self-administered questionnaire that focuses primarily on symptoms that might suggest angina pectoris. Participants are directed to contact their personal physician if they answer "yes" to 1 or more questions. The PAR-Q also identifies musculoskeletal problems that should be evaluated before participation since these might involve modification of the exercise program. The questionnaire is designed to be completed when the participant registers at a health/fitness facility. In unsupervised fitness facilities (eg, hotel fitness centers), the PAR-Q can be self-administered by means of signs prominently displayed at the main entry into the facility. Although less satisfactory than documenting the results of screening, use of signs and similar visual methods are a minimal recommendation for encouraging prospective users to assess their health risks while exercising at any facility.

Another simple, self-administered device that aims to identify high-risk individuals without negatively impacting participation is a questionnaire patterned after one developed by the Wisconsin Affiliate of the American Heart Association²⁹ (Table 2). The 1-page form is slightly more complex than the PAR-Q and uses history, symptoms, and risk factors (including age) to direct prospective members to either

participate in an exercise program or contact their physician (or appropriate healthcare provider) before participation. Persons at higher risk are directed to seek facilities providing appropriate levels of staff supervision. The questionnaire can be administered within a few minutes on the same form participants use to join or register at the facility. It identifies potentially high-risk participants, documents the results of screening, educates the consumer, and encourages and fosters appropriate use of the healthcare system. In addition, it can guide staff qualifications and requirements. This instrument is also simple enough to be adapted for use as self-screening signs posted in nonstaffed facilities.

Health appraisal questionnaires should preferably be interpreted by qualified staff (see next section for criteria) who can limit the number of unnecessary referrals for preparticipation medical evaluation, avoiding undue expense and barriers to participation.

In view of the potential legal risk assumed by operators of health/fitness facilities, it is recommended that all facilities providing staff supervision document the results of screening. Screening, particularly for participants for whom a medical evaluation is recommended, requires time, personnel, and financial resources. Individual facilities can determine the most cost-effective way to conduct and document preparticipation screening.

Every effort should be made to educate all prospective new members about the importance of obtaining a health appraisal and—if indicated—medical evaluation/recommendation before beginning exercise testing/training. The potential risks inherent in not obtaining an appraisal should also be emphasized. Without an appraisal, it is impossible to determine whether a person may be at significant risk of severe bodily harm or death by participating in an exercise program. The same is true of persons who undergo a health appraisal, are identified as having symptoms of or known cardiovascular disease, and refuse or neglect to obtain the recommended medical evaluation yet seek admission to a health/fitness facility program. *Because of safety concerns, persons with known cardiovascular disease who do not obtain recommended medical evaluations and those who fail to complete the health appraisal questionnaire upon request may be excluded from participation in a health/fitness facility exercise program to the extent permitted by law.*

Persons without symptoms or a known history of cardiovascular disease who do not obtain the recommended medical evaluation after completing a health appraisal should be required to sign an assumption of risk or release/waiver. Both of these forms may be legally recognized in the jurisdiction where the facility is located. When appropriate guidelines are followed, it is likely that the potential benefits of physical activity will outweigh the risks. *Persons without symptoms or a known history of cardiovascular disease who do not obtain recommended medical evaluations or sign a release/waiver upon request may be excluded from participation in a health/fitness facility exercise program to the extent permitted by law. Persons who do not obtain an evaluation but who sign a release/waiver may be permitted to participate.* However, they should be encouraged to participate in only moderate-

TABLE 2. 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

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

Symptoms

- You experience chest discomfort with exertion.
- You experience unreasonable breathlessness.
- You experience dizziness, fainting, blackouts.
- You take heart medications.

Other health issues:

- You have musculoskeletal problems.
- You have concerns about the safety of exercise.
- You take prescription medication(s).
- You are pregnant.

Cardiovascular risk factors

- You are a man older than 45 years.
- You are a woman older than 55 years or you have had a hysterectomy or you are postmenopausal.
- You smoke.
- Your blood pressure is >140/90.
- You don't know your blood pressure.
- You take blood pressure medication.
- Your blood cholesterol level is >240 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 diabetic or take medicine to control your blood sugar.
- You are physically inactive (ie, you get <30 minutes of physical activity on at least 3 days per week).
- You are >20 pounds overweight.

If you marked 2 or more of the statements in this section, consult your healthcare provider before engaging in exercise. You might benefit by using a facility with a professionally qualified exercise staff to guide your exercise program.

None of the above is true.

You should be able to exercise safely without consulting your healthcare provider in almost any facility that meets your exercise program needs.

AHA/ACSM indicates American Heart Association/American College of Sports Medicine.

or lower-intensity physical activities and counseled about warning symptoms and signs of an impending cardiovascular event.

The major objectives of preparticipation cardiovascular screening are to identify persons with known cardiovascular disease, symptoms of cardiovascular disease, and/or risk factors for disease development who should receive a medical evaluation/recommendation before starting an exercise program or undergoing exercise testing. Screening also identifies persons with known cardiovascular disease who should not participate in an exercise program or who should participate at least initially in a medically supervised program, as well as persons with other special needs.^{7,12}

Screening also serves another purpose. One of the trends in cardiac rehabilitation is to “mainstream” low-risk, clinically stable patients to community facilities rather than specialized, often costly cardiac programs. Facility directors should expect that an increasing percentage of their participants will have health histories that warrant supervision of exercise programs by professional staff.

When a medical evaluation/recommendation is advised or required, written and active communication with the individual’s personal physician (or healthcare provider) is strongly recommended. The sample letter and medical release form in Tables 3A and 3B can be used or modified for such purposes.

TABLE 3A. Sample Physician Referral Form*

Dear Dr. _____:

Your patient (name of patient) would like to begin a program of exercise and/or sports activity at (name of health/fitness facility). After reviewing his/her responses to our cardiovascular screening questionnaire, we would appreciate your medical opinion and recommendations concerning his/her participation in exercise/sports activity. Please provide the following information and return this form to (name, address, telephone, fax of health/fitness facility contact):

- Are there specific concerns or conditions our staff should be aware of before this individual engages in exercise/sports activity at our facility? Yes/No
If yes, please specify: _____

- If this individual has completed an exercise test, please provide the following:
 - Date of test _____
 - A copy of the final exercise test report and interpretation
 - Your specific recommendations for exercise training, including heart rate limits during exercise: _____

- Please provide the following information so that we may contact you if we have any further questions:
 _____ I AGREE to the participation of this individual in exercise/sports activity at your health/fitness facility.
 _____ I DO NOT AGREE that this individual is a candidate to exercise at your health/fitness facility because _____

Physician's signature _____
 Physician's name _____
 Address _____

 Telephone _____ Fax _____

Thank you for your help.

*Must be accompanied by a medical release form.

Characteristics of Participants

Intensity of physical activity is measured through endurance- or strength-type exercise as defined in Table 4. Health appraisal questionnaires should be used before exercise test-

ing and/or training to initially classify participants by risk for triage and preliminary decision making (Table 5), namely, apparently healthy persons (Class A-1); persons at increased risk (Classes A-2 and A-3); and persons with known cardio-

TABLE 3B. Sample Authorization for Release of Medical Information

- I hereby authorize _____ to release the following information from the medical record of
 Patient's name _____
 Address _____

 Telephone _____
 Date of birth _____
- Information to be released:
 (If specific treatment dates are not indicated, information from the most recent visit will be released.)
 _____ Exercise test _____ Most recent history and physical exam
 _____ Most recent clinic visit _____ Consultations
 _____ Laboratory results (specify) _____
 _____ Other (specify) _____
- Information to be released to:
 Name of person/organization _____
 Address _____

 Telephone _____
- Purpose of disclosure information _____
- I do not give permission for disclosure or redisclosure of this information other than that specified above.
- I request that this consent become invalid 90 days from the date I sign it or _____ .
 I understand that this consent can be revoked at any time except to the extent that disclosure made in good faith has already occurred in reliance of this consent.
- Patient's signature _____
 Date _____
 Witness _____
 (Please print)
 Signature _____

TABLE 4. Classification of Physical Activity Intensity³

Intensity	Endurance-Type Activity								Strength-Type Exercise
	Relative Intensity			Absolute Intensity (METs) in Healthy Adults (age in years)					Relative Intensity*
	VO ₂ max (%) Heart Rate Reserve (%)	Maximum Heart Rate (%)	RPE†	Young (20–39)	Middle-aged (40–64)	Old (65–79)	Very old (80+)	RPE	Maximum Voluntary Contraction (%)
Very light	<25	<30	<9	<3.0	<2.5	<2.0	≤1.25	<10	<30
Light	25–44	30–49	9–10	3.0–4.7	2.5–4.4	2.0–3.5	1.26–2.2	10–11	30–49
Moderate	45–59	50–69	11–12	4.8–7.1	4.5–5.9	3.6–4.7	2.3–2.95	12–13	50–69
Hard	60–84	70–89	13–16	7.2–10.1	6.0–8.4	4.8–6.7	3.0–4.25	14–16	70–84
Very hard	≥85	≥90	>16	≥10.2	≥8.5	≥6.8	≥4.25	17–19	>85
Maximum‡	100	100	20	12.0	10.0	8.0	5.0	20	100

*Based on 8–12 repetitions for persons <50 and 10–15 repetitions for persons ≥50.

†Borg rating of Relative Perceived Exertion (RPE), 6–20 scale.³⁰

‡Maximum values are mean values achieved during maximum exercise by healthy adults.

Absolute intensity (metabolic equivalents [METs]) values are approximate mean values for men. Mean values for women are approximately 1–2 METs lower than those for men.

vascular disease (Classes B, C, and D). Apparently healthy persons of all ages and asymptomatic persons at increased risk (Classes A-1 through A-3) may participate in *moderate-intensity* exercise without first undergoing a medical examination or a medically supervised, symptom-limited exercise test. Apparently healthy younger persons (Class A-1) may also participate in *vigorous* exercise without first undergoing a medical examination and a medically supervised exercise test. It is suggested that persons classified as Class A-2 and particularly Class A-3 undergo a medical examination and possibly a maximal exercise test before engaging in vigorous exercise. All other persons (Classes B and C) should undergo a medical examination and perform a maximal exercise test before participation in moderate or vigorous exercise unless exercise is contraindicated (ie, Class D). Data from a medical evaluation performed within 1 year are acceptable unless clinical status has changed. Medically supervised exercise tests should be conducted in accordance with previously published guidelines.⁷

Using Screening Results for Risk Stratification

With completion of the initial health appraisal and, if indicated, medical consultation and supervised exercise test, participants can be further classified for exercise training on the basis of individual characteristics detailed below. The following classifications have been modified using existing AHA⁷ and ACSM¹⁰ guidelines and are recommended (Table 5):

Class A: Apparently healthy. There is no evidence of increased cardiovascular risk for exercise. This classification includes (1) “apparently healthy” younger persons (Class A-1) and (2) irrespective of age, persons who are “apparently healthy” or at “increased risk” (Classes A-2 and A-3) and who have a normal diagnostic maximal exercise test. Submaximal exercise tests are sometimes performed at health/fitness facilities where permitted by law for nondiagnostic purposes, including physical fitness assessment, exercise

prescription, and monitoring of progress.¹⁰ Such testing is also useful for educating participants about exercise and for motivating them. Nondiagnostic exercise testing should be conducted only for persons in Class A and only by appropriately qualified, well-trained personnel (see section on staffing below) who are knowledgeable about indications and contraindications for exercise testing, indications for test termination, and test interpretation. All health/fitness facilities, including those where exercise testing is performed, should have an emergency plan (see section on emergency policies and procedures below) to ensure that emergencies are handled safely, efficiently, and effectively. No restrictions other than provision of basic guidelines are required for exercise training. No special supervision is required during exercise training.

Class B: Presence of known, stable cardiovascular disease with low risk for vigorous exercise but slightly greater than for apparently healthy persons. This classification includes clinically stable persons with (1) coronary artery disease (myocardial infarction, coronary artery bypass surgery, percutaneous transluminal coronary angioplasty, angina pectoris, abnormal exercise test, or abnormal coronary angiogram), (2) valvular heart disease; (3) congenital heart disease (risk stratification for patients with congenital heart disease should be guided by the 26th Bethesda Conference recommendations¹³); (4) cardiomyopathy (includes stable patients with heart failure with characteristics as outlined below but not recent myocarditis or hypertrophic cardiomyopathy); and (5) exercise test abnormalities that do not meet the criteria outlined in Class C below. The clinical characteristics of such persons are (1) New York Heart Association (NYHA) Class I or II (Table 6); (2) exercise capacity >6 METs; (3) no evidence of heart failure; (4) free of ischemia or angina at rest or on the exercise test ≤6 METs; (5) appropriate rise in systolic blood pressure during exercise; (6) absence of non-sustained or sustained ventricular tachycardia; and (7) ability to satisfactorily self-monitor intensity of activity. For these

TABLE 5. Participant/Health-Fitness Facility Selection Chart

Participant Characteristics	Risk Class A-1	Risk Class A-2	Risk Class A-3	Risk Class B	Risk Class C	Risk Class D
Age/gender	Children	Men >45 y	Men >45 y	Children*	Children*	Children*
	Adolescents	Women >55 y	Women >55 y	Adolescents*	Adolescents*	Adolescents*
	Men ≤45 y			Men	Men	Men
	Women ≤55 y			Women	Women	Women
Cardiovascular risk factors	None	None	≥2	May be present	May be present	May be present
Known CVD	None	None	None	Yes	Yes	Yes
CVD features (see text for details)	Class A apparently healthy	Class A apparently healthy	Class A apparently healthy	Class B known CVD: low risk	Class C known CVD: moderate risk	Class D known CVD: high risk
Low intensity	Facility 1–4	Facility 1–4	Facility 1–4	Facility 1–5	Facility 4–5	Not recommended
Moderate intensity	Facility 1–4	Facility 1–4	Facility 1–4	Facility 4–5	Facility 5	Not recommended
Vigorous intensity	Facility 1–4	Facility 1–4	Facility 1–4	Facility 4–5	Facility 5	Not recommended
Facility Characteristics						
	Level 1	Level 2	Level 3	Level 4	Level 5	
Type of facility	Unsupervised exercise room	Single exercise leader	Fitness center for healthy clients	Fitness center serving clinical populations	Medically supervised clinical exercise program	
Personnel	None	Exercise leader Recommended: medical liaison	General manager Health/fitness instructor Exercise leader Recommended: medical liaison	General manager Exercise specialist Health/fitness instructor Medical liaison	General manager Exercise specialist Health/fitness instructor Medical liaison	
Emergency plan	Present	Present	Present	Present	Present	
Emergency equipment	Telephone in room Signs	Telephone Signs Recommended: blood pressure kit Stethoscope	Telephone Signs Recommended: blood pressure kit Stethoscope	Telephone Signs Blood pressure kit Stethoscope	Telephone Signs Blood pressure kit Stethoscope Oxygen Crash cart Defibrillator	

*Risk stratification for patients with congenital heart disease should be guided by recommendations of the 26th Bethesda Conference.¹³
CVD indicates cardiovascular disease.

persons, activity should be individualized with exercise prescription by qualified personnel. Medical supervision is recommended during prescription sessions and nonmedical supervision by appropriately qualified staff for other exercise sessions until the participant understands how to monitor his or her own activity. Subsequent exercise training may be performed without special supervision.

Class C: Those at moderate to high risk for cardiac complications during exercise and/or who are unable to self-regulate activity or understand the recommended activity level. This classification includes persons with (1) coronary artery disease with the clinical characteristics outlined below; (2) acquired valvular heart disease; (3) congenital heart disease (risk stratification for patients with congenital heart disease should be guided by the 26th Bethesda Conference recommendations¹³); (4) cardiomy-

opathy (includes stable patients with heart failure with characteristics as outlined below but not recent myocarditis or hypertrophic cardiomyopathy); (5) exercise test abnormalities not directly related to ischemia; (6) a previous episode of ventricular fibrillation or cardiac arrest that did not occur in the presence of an acute ischemic event or cardiac procedure; (7) complex ventricular arrhythmias that are uncontrolled at mild to moderate work intensity with medication; (8) 3-vessel or left main coronary artery disease; and (9) ejection fraction <30%. One or more of the following clinical characteristics are also present: (1) ≥2 previous myocardial infarctions; (2) NYHA Class III or greater; (3) exercise capacity <6 METs; (4) ischemic horizontal or down-sloping ST depression ≥1 mm or angina at a workload ≤6 METs; (5) a fall in systolic blood pressure with exercise; (6) a medical problem that the physician believes may be potentially life-threatening; (7) a previous episode of primary cardiac arrest; and (8) ventricular tachycardia at a workload <6 METs. Physical activity should be individualized, and exercise should be prescribed by appropriately qualified medical personnel. Medical supervision, monitoring for adverse signs and symptoms, electrocardiographic monitoring of heart rate

TABLE 6. New York Heart Association Classification⁷

Class I	Heart disease without symptoms
Class II	Heart disease with symptoms during ordinary activity
Class III	Heart disease with symptoms during less than ordinary activity
Class IV	Heart disease with symptoms at rest

and rhythm, and blood pressure monitoring are recommended during exercise sessions until safety is established. Subsequent exercise training should be supervised by appropriately qualified personnel.

Class D: Unstable conditions with activity restriction. This classification includes those with (1) unstable ischemia; (2) heart failure that is not compensated; (3) uncontrolled arrhythmias; (4) severe and symptomatic aortic stenosis; (5) hypertrophic cardiomyopathy or cardiomyopathy from recent myocarditis; (6) severe pulmonary hypertension; or (7) other conditions that could be aggravated by exercise (for example, resting systolic blood pressure >200 mm Hg or resting diastolic blood pressure >110 mm Hg; active or suspected myocarditis or pericarditis; suspected or known dissecting aneurysm; thrombophlebitis and recent systemic or pulmonary embolus). In this population no physical activity is recommended for conditioning purposes. Risk stratification for patients with congenital heart disease should be guided by the 26th Bethesda Conference recommendations.¹³

These classifications are presented as a means of beginning exercise with the lowest possible risk. They do not consider accompanying morbidities (for example, insulin-dependent diabetes mellitus, morbid obesity, severe pulmonary disease, complicated pregnancy, or debilitating neurological or orthopedic conditions) that may constitute a contraindication to exercise or necessitate closer supervision during exercise training.

Using Screening Results for Exercise Prescription

For individuals considered to be in Class A, exercise training intensity (Table 4) may be prescribed using the rating of perceived exertion alone and/or specific target heart rates. A suggested rating of perceived exertion for such persons is 12 to 16 (moderate to hard) on the Borg scale of 6 to 20 and/or an intensity level that corresponds to 50% to 90% of maximum heart rate or 45% to 85% of maximum oxygen uptake or heart rate reserve. Heart rate reserve is defined as maximum heart rate minus resting heart rate. For persons taking medications that affect heart rate (eg, β -adrenergic blockers), these heart rate methods do not apply unless guided by an exercise tolerance test.

In the absence of atrial fibrillation, frequent atrial or ventricular ectopy, a fixed-rate pacemaker, or similar conditions, exercise intensity should be prescribed for persons with cardiovascular disease (Class B or C) using target heart rates and perceived exertion ratings in accordance with previously published guidelines.^{7,10} For these persons, target heart rates should be prescribed using data obtained during exercise testing performed while the participant is taking his or her usual cardioactive medications. In the absence of myocardial ischemia or other significant exercise test abnormalities, a target range of 50% to 90% of peak heart rate or 45% to 85% of peak measured oxygen uptake or heart rate reserve is recommended. This intensity level corresponds to 12 to 16 (moderate to hard) on the Borg scale. In the presence of myocardial ischemia (ie, ischemic ST-segment depression >1 mm, chest discomfort believed to be angina pectoris, or

other symptoms believed to be an anginal equivalent), significant arrhythmia, or other significant exercise test abnormalities (eg, a fall in systolic blood pressure from baseline, systolic blood pressure >240 mm Hg, or diastolic blood pressure >110 mm Hg), the target training intensity is derived from the heart rate associated with the abnormality. If this occurs at a high level of exercise, the above target heart rate recommendations are applicable, provided that the upper limit of the range is ≥ 10 beats per minute (bpm) below the level at which the abnormality appears. Otherwise, the recommended upper limit of training heart rate is 10 bpm less than that associated with the abnormality.

Staffing

Health/fitness facility personnel involved in management or delivery of exercise programs must meet academic and professional standards and have the required experience as established by the ACSM.^{10,12} Such personnel include the general manager/executive director, medical liaison, fitness director, and exercise leader. In general, health/fitness facility personnel should have the formal training and experience needed to ensure that clients are provided with safe, effective programs and services. The levels of education and experience needed to ensure effectiveness and safety vary with the health status of the client population. The kinds of personnel who should be employed at health/fitness facilities serving various types of clients are summarized in Table 5.

The general manager/executive director is responsible for the overall management of the facility and should have competencies in business as well as design and delivery of exercise programs.

The medical liaison reviews medical emergency plans, witnesses and critiques medical emergency drills, and reviews medical incident reports. In Level 2 and 3 facilities (Table 5), the medical liaison may be a licensed physician, a registered nurse trained in advanced cardiac life support, or an emergency medical technician. In Level 4 and 5 facilities (Table 5), the medical liaison must be a licensed physician.

The fitness director manages the facility's exercise and activity programs and is responsible for program design and the training and supervision of staff. He or she must have a degree in exercise science, another health-related field, or equivalent experience, and knowledge of exercise physiology, exercise programming, and operation of exercise facilities. The fitness director must hold professional certification at an advanced level by a nationally recognized health/fitness organization. In Level 3 facilities this certification should be comparable to ACSM health fitness instructor certification. In Level 4 and 5 facilities the fitness director should be certified at a level that correlates with ACSM exercise specialist certification. The exercise specialist typically holds a master's degree in exercise science or a related field and has extensive experience in exercise testing and leadership in clinical populations. He or she must be trained in cardiopulmonary resuscitation (CPR) and should have ≥ 1 year of supervisory experience in the fitness industry.

The exercise leader works directly with program participants and provides instruction and leadership in specific modes of exercise. He or she also helps program participants master the behavioral skills needed to adhere to exercise programs. In Level 1, 2, and 3 facilities the exercise leader as a minimum must have a high school diploma or equivalent and entry-level or higher professional certification from a nationally recognized health/fitness organization (comparable to ACSM exercise leader certification). In Level 4 facilities the exercise leader should have education and experience corresponding to that required by ACSM health fitness instructor certification. In Level 5 facilities the exercise leader should be either an exercise specialist or a health fitness instructor directly supervised by an exercise specialist. *In all cases the exercise leader must be trained in CPR and should have prior supervised internship or work experience in the health/fitness industry.*

Some health/fitness facilities provide services in allied health fields such as nutrition, stress management, and physical therapy. Personnel providing such services should meet current accepted professional standards in those fields and should be certified as recommended by relevant professional organizations and licensed by or registered with the state as required by law.

Emergency Policies and Procedures

All health/fitness facilities must have written emergency policies and procedures that are reviewed and practiced regularly. Such plans will correspond to the type of facility and risk level of its membership outlined in Table 5. All fitness center staff who directly supervise program participants should be trained in basic life support. Health/fitness facilities must develop appropriate emergency response plans and must train their staff in appropriate procedures to provide during a life-threatening emergency. When an incident occurs, each staff member must perform the necessary emergency support steps in accordance with established procedures. It is important for everyone to know the emergency plan. Emergency drills should be practiced once every 3 months or more often with changes in staff; retraining and rehearsal are especially important. When new staff are hired, new team arrangements may be necessary. Because life-threatening cardiovascular emergencies are rare, constant vigilance by staff and familiarity with the plan and how to follow it are important.

It is essential to acknowledge that emergency equipment alone does not save lives. Equipment alone may offer a false sense of security if it is not backed up with appropriate staffing. The training and preparedness of an astute professional staff who can readily handle emergencies is paramount. This issue is particularly important if persons with certain medical conditions are recruited and encouraged to exercise in a specific health/fitness facility. Such a facility has the responsibility to offer appropriate coverage by personnel as outlined above and in Table 5. Acquisition of equipment for evaluation and resuscitation will depend on the risk level of participants, personnel, and medical coverage. All facilities must have a telephone that is

readily accessible and available when emergency assistance is needed. It would be useful for all supervised facilities to have a sphygmomanometer and stethoscope readily available. Level 4 and 5 facilities that recruit members with known cardiovascular disease must have such equipment available, and Level 5 facilities (supervised cardiac rehabilitation) should be fully equipped according to the recommendations of the AHA⁹ and the American Association of Cardiovascular and Pulmonary Rehabilitation.³¹ Such equipment includes a defibrillator, oxygen, and fully stocked crash cart. Delineation of specific equipment standards in such facilities is beyond the scope of these guidelines; such information is detailed in the documents above.^{9,31} Appropriately trained staff who are medically and legally empowered must be available to operate such devices during a facility's operational hours.

The emergency plan must address transportation of victims to a hospital emergency room and must include telephone access to 911 or the local emergency unit access system. Health/fitness facility personnel should be familiar with emergency transport teams in the area so that access and location of the center are clearly identified. Staff should greet the emergency response team at the entrance of the facility so that they can be promptly guided to the site of the emergency. A staff member should remain with the victim at all times. Prompt emergency transport is optimized by free and ready access to the victim within the health/fitness facility and assistance by designated staff.

General Considerations in Selecting a Health/Fitness Facility

In selecting a health/fitness facility, an individual should first consider his or her health status. Persons with a history of cardiovascular disease should seek facilities that provide or require a thorough medical evaluation of prospective members/users. Personnel should include nurses, exercise specialists, health/fitness instructors, and/or exercise leaders licensed or certified by the appropriate agencies, organizations, or authorities. They should be trained to recommend and supervise exercise in patients with cardiovascular and other chronic diseases. Persons at high risk for development of cardiovascular disease should seek facilities that require appropriate medical evaluation of clients and employ exercise leaders who are certified as competent to design and deliver exercise programs for high-risk persons. Table 5 summarizes personnel and safety recommendations for health/fitness facilities (Levels 1 through 5) serving clients in various health categories (Classes A through C).

Persons seeking health/fitness facilities should select one that meets professional and industry standards. Facilities should be clean, well-maintained, and spacious enough to ensure the comfort and safety of program participants. Indoor facilities should be climate controlled, and changing rooms and showers should be provided. Flooring in areas where exercise is to be carried out should be designed to minimize risk of injury. Exercise equipment should be well-maintained. The variety, amount, and availability of exercise equipment should match individual needs and preferences, including time of day and preferred

mode of exercise. For example, if aerobic dance is the preferred mode of exercise, individuals should seek a fitness center that offers this program at a convenient time and that provides an exercise leader who is competent in this activity and able to teach men and women of various age and fitness levels.

The programs and services of a health/fitness center should optimize participation. The location of the center should minimize time spent traveling to it. The social environment should be attractive and the staff competent in helping members/users master the behavioral skills needed to adopt and maintain a physically active lifestyle.

Summary of Key Points

- Physical inactivity is a risk factor for cardiovascular disease; it is very prevalent and an important health issue.
- Regular exercise reduces subsequent cardiovascular morbidity and mortality.^{1,2,6}
- Efforts to promote physical activity will impact everyone, including persons with cardiovascular disease.
- The incidence of a cardiovascular event during exercise among patients with cardiac disease is greater than that among otherwise healthy persons.⁷
- Overall, in the general population the absolute incidence of death during exercise is relatively low.⁷
- *All facilities offering exercise equipment or services should conduct a cardiovascular screening of all new members and/or prospective users.* Preparticipation screening should identify persons at high risk, and public health efforts should focus on increasing the use of screening. In view of the potential legal risk assumed by operators of fitness facilities, it is recommended that those facilities providing staff supervision document the results of screening.
- When a medical evaluation/recommendation is advised or required, written and active communication by facility staff with the individual's personal physician (or healthcare provider) is strongly recommended.
- Health appraisal questionnaires should be used before exercise testing and/or training to initially classify participants by risk for triage and preliminary decision making. Following the initial health appraisal and, if indicated, medical consultation and supervised exercise test, participants can be further classified for exercise training on the basis of individual characteristics.
- Every effort should be made to educate participants about the importance of obtaining a preparticipation health appraisal and, if indicated, a medical evaluation/recommendation. The potential risks incurred without obtaining an appraisal and/or evaluation should also be emphasized.
- *The AHA, the IHRSA, and the ACSM recommend that all health/fitness facilities have written emergency policies and procedures that are reviewed and practiced regularly.*^{12,15} It is essential to acknowledge that emergency equipment alone does not save lives: training and preparedness by astute professional staff who can readily handle emergencies is paramount.
- Whatever their health status, persons seeking a health/fitness facility should choose one that provides equipment,

programs, staff, services, and membership contracts appropriate for their needs and that meets accepted professional and industry standards.

References

1. Fletcher GF, Balady GJ, Blair SN, Blumenthal J, Casperson C, Chaitman B, Epstein S, Froelicher ES, Froelicher V, Pina I, Pollock M. Statement on exercise: benefits and recommendations for physical activity programs for all Americans. *Circulation*. 1996;94:857–862.
2. Pate RR, Pratt M, Blair SN, Haskell WL, Macera CA, Bouchard C, Buchner D, Ettinger W, Heath GW, King AC, Kriska A, Leon AS, Marcus BH, Morris J, Paffenbarger RS, Patrick K, Pollock ML, Rippe JM, Sallis J, Wilmore JH. Physical activity and public health: a recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA*. 1995;273:402–407.
3. *Physical Activity and Health: A Report of the Surgeon General*. Atlanta, Ga: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion; 1996.
4. *Healthy People 2000: National Health Promotion and Disease Prevention Objectives*. US Dept of Health and Human Services/Public Health Service. Publication no. (PHS) 91–50213.
5. American Heart Association. *Heart and Stroke Facts: 1997 Statistical Supplement*. Dallas, Tex; 1996.
6. Paffenbarger RS, Hyde RT, Wing AL, Hsieh CC. Physical activity, all-cause mortality, and longevity of college alumni. *N Engl J Med*. 1986;314:605–613.
7. Fletcher GF, Balady G, Froelicher VF, Hartley LH, Haskell WL, Pollock ML. Exercise standards: a statement from the American Heart Association. *Circulation*. 1995;91:580–615.
8. McInnis KJ, Hayakawa S, Balady GJ. Cardiovascular screening and emergency procedures at health clubs and fitness centers. *Am J Cardiol*. 1997;80:380–383.
9. Pina IL, Balady GJ, Hanson P, Labovitz AJ, Madonna DW, Myers J. Guidelines for clinical exercise testing laboratories: a statement for healthcare professionals from the American Heart Association. *Circulation*. 1995;91:912–921.
10. American College of Sports Medicine. Kenney WL, ed. *Guidelines for Exercise Testing and Prescription*. 5th ed. Baltimore, Md: Williams & Wilkins; 1995:269–287.
11. Fletcher G. How to implement physical activity in primary and secondary prevention: a statement for healthcare professionals from the American Heart Association. *Circulation*. 1997;96:355–357.
12. Peterson JA, Tharrett SJ, eds. *American College of Sports Medicine Health/Fitness Facility Standards and Guidelines*. 2nd ed. Champaign, Ill: Human Kinetics Publishers; 1997.
13. 26th Bethesda Conference. Recommendations for determining eligibility for competition in athletes with cardiovascular abnormalities. *J Am Coll Cardiol*. 1994;24:845–899.
14. Maron BJ, Thompson PD, Puffer JC, McGrew CA, Strong WB, Douglas PS, Clark LT, Mitten MJ, Crawford MH, Atkins DL, Driscoll DJ, Epstein AE. Cardiovascular preparticipation screening of competitive athletes: a statement for health professionals from the American Heart Association. *Circulation*. 1996;94:850–856.
15. *1997 IHRSA/American Sports Data Health Club Trend Report*. Hartsdale, NY: American Sports Data; 1997.
16. Siscovick DS, Weiss NS, Fletcher RH, Lasky T. The incidence of primary cardiac arrest during vigorous exercise. *N Engl J Med*. 1984;311:874–877.
17. Maron BJ, Shirani J, Poliac LC, Mathenge R, Roberts WC, Mueller FO. Sudden death in young competitive athletes: clinical, demographic, and pathological profiles. *JAMA*. 1996;276:199–204.
18. Thompson PD, Funk EJ, Carleton RA, Sturner WQ. Incidence of death during jogging in Rhode Island from 1975 through 1980. *JAMA*. 1982;247:2535–2538.
19. Thompson PD. The cardiovascular complications of vigorous physical activity. *Arch Intern Med*. 1996;156:2297–2302.
20. Van Camp SP, Bloor CM, Mueller FO, Cantu RC, Olson HG. Non-traumatic sports death in high school and college athletes. *Med Sci Sports Exerc*. 1995;27:641–647.
21. Anderson KM, Wilson PW, Odell PM, Kannel WB. An updated coronary risk profile: a statement for health professionals. *Circulation*. 1991;83:356–362.

22. Mittleman MA, Maclure M, Tofler GH, Sherwood JB, Goldberg RJ, Muller JE. Triggering of acute myocardial infarction by heavy physical exertion: protection against triggering by regular exertion. *N Engl J Med.* 1993;329:1677–1683.
23. Willich SN, Lewis M, Lowel H, Arntz HR, Schubert F, Schroder R. Physical exertion as a trigger of acute myocardial infarction. *N Engl J Med.* 1993;329:1684–1690.
24. Tofler GH, Muller JE, Stone PH, Forman S, Solomon RE, Knatterud GL, Braunwald E. Modifiers of timing and possible triggers of acute myocardial infarction in the Thrombolysis in Myocardial Infarction Phase II (TIMI II) study group. *J Am Coll Cardiol.* 1992;20:1049–1055.
25. Van Camp SP, Peterson RA. Cardiovascular complications of outpatient cardiac rehabilitation programs. *JAMA.* 1986;256:1160–1163.
26. Shephard RJ, Thomas S, Weller I. The Canadian home fitness test: 1991 update. *Sports Med.* 1991;11:358–366.
27. Gibbons RJ, Balady GJ, Beasley JW, Bricker JT, Duvernoy WF, Froelicher VF, Mark DB, Marwick TH, McCallister BD, Thompson PD Jr, Winters WL, Yanowitz FG, Ritchie JL, Cheitlin MD, Eagle KA, Gardner TJ, Garson A Jr, Lewis RP, O'Rourke RA, Ryan TJ. ACC/AHA guidelines for exercise testing: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol.* 1997;30:260–311.
28. Thomas S, Reading J, Shephard RJ. Revision of the Physical Activity Readiness Questionnaire (PAR-Q). *Can J Sports Sci.* 1992;17:338–345.
29. *How to Choose a Health Club.* Milwaukee, Wisc: Wisconsin Affiliate, American Heart Association; 1989.
30. Borg GA. Psychophysical basis of perceived exertion. *Med Sci Sports Exerc.* 1982;14:377–381.
31. American Association of Cardiovascular and Pulmonary Rehabilitation. *Guidelines for Cardiac Rehabilitation Programs.* 2nd ed. Champaign, Ill: Human Kinetics Publishers; 1995.

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