

What Healthcare Professionals Should Know About Exercise

Faculty

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Faculty Disclosure

Contributing faculty, John J. Whyte, MD, MPH, has disclosed no relevant financial relationship with any product manufacturer or service provider mentioned.

Audience

This course is designed for physicians and will be of interest to nurses and other healthcare professionals working with adult patients who are overweight or obese and should begin an exercise program.

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The purpose of CME Resource is to provide challenging curricula to assist healthcare professionals to raise their levels of expertise while fulfilling their continuing education requirements, thereby improving the quality of healthcare.

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Disclosure Statement

It is the policy of CME Resource not to accept commercial support.

Course Objective

The purpose of this course is to supply the information necessary for physicians and other healthcare professionals to provide practical advice for patients beginning an exercise program.

Learning Objectives

Upon completion of this course, you should be able to:

1. Discuss the current epidemic of obesity.
2. Identify reasons why patients do not wish to exercise, including the need for information in the patients' native languages.
3. Discuss the physiology of exercise.
4. Identify the benefits of exercise.
5. Define contraindications to exercise.
6. Describe each type of exercise.
7. Discuss the guidelines for devising an exercise program, including recommendations by national specialty societies and government agencies relating to exercise.
8. Identify effective exercise regimens for patients with certain diseases, such as diabetes, osteoporosis, and HIV.
9. Explain the current reimbursement climate for exercise programs and advisors.



Sections marked with this symbol include evidence-based practice recommendations. The level of evidence and/or strength of recommendation, as provided by the evidence-based source, are also included so you may determine the validity or relevance of the information. These sections may be used in conjunction with the course material for better application to your daily practice.

INTRODUCTION

Obesity is becoming an epidemic in the United States. Estimates show that about two-thirds of the adult population are either overweight or obese. This represents an increase of about 18% from just ten years ago [1]. Estimates of excess mortality due to obesity range from 100,000 to 300,000 premature deaths, and calculations suggest that obesity-related costs are as high as \$139 billion [2; 3; 4].

One of the biggest reasons for the growing obesity epidemic is the fact that few people exercise. According to data published by the Centers for Disease Control and Prevention (CDC), more than one-half of U.S. adults do not perform the minimum amount of exercise needed to prevent diseases, such as diabetes and high blood pressure [5]. About 25% of adults do not perform any type of exercise [6]. This is despite the fact that the benefits of exercise are well-documented, including reducing the risk of heart disease, improving glycemic control in diabetes, improving blood pressure, and alleviating depression.

Compounding this problem, a national study found that less than one-third of overweight patients reported receiving advice from their physicians to increase their physical activity [7]. Even when physicians do give advice, too often they simply admonish, "You need to exercise," which has been shown to have little, if any, effect. Of the individuals who did receive advice, only 38% received help in formulating a specific activity plan, and only 42% received follow-up support [7]. Much of this is due to the fact that most physicians have little knowledge about proper exercise techniques. Although there is discussion of exercise physiology in medical school, there is little information provided on how to give patients practical advice. One may learn how the muscle uses adenosine triphosphate (ATP), but not how to explain to patients what exercises they should do to lose weight and become more fit.

Patients do wish to receive information on exercise. In a study asking patients to respond to the statement, "If my doctor advised me to exercise, I would follow his/her advice," more than 90% of respondents agreed with the statement [8].



According to the American Heart Association, health professionals should personally engage in an active lifestyle to familiarize themselves with the issues involved in maintaining lifelong physical activity and to set a positive example for patients and the public. This may increase the likelihood that healthcare providers will recommend physical activity to their patients.

(http://www.guidelines.gov/summary/summary.aspx?doc_id=5360.

Last accessed November 27, 2007.)

Level of Evidence: Expert Opinion/Consensus Statement

This course will review the physiology and mechanics of exercise, but more importantly it will provide the information necessary for physicians and other clinicians to provide practical advice for patients on starting an exercise program. It will begin with exercise physiology and explain the different types of exercises with examples of the most important types. Using current national guidelines, the clinical management of patients will be discussed. Several disease states such as diabetes, osteoporosis and HIV will be discussed, and the effect of exercise on these conditions will be highlighted. Steps to address and treat patients with problems exercising will be explored. Finally, current reimbursement issues will be discussed. Although nutrition is an important component of weight management, it will not be addressed in this module.

The following case study will be referenced throughout the text to illustrate the challenges of developing an exercise program for patients.

Mr. S is a white male 33 years of age who presents for an annual physical examination. He has no major complaints, but he does report some intermittent right knee pain. He reports that his wife has expressed concern over his weight gain during the past two years. He thinks it is probably "around 10 pounds." He comments that he tries to watch his diet but does not do a good job. He is often in a rush and typically uses fast food restaurants as his source of meals. He also reports that he does not engage in any structured exercise program. He remarks that it is just "too boring" and he does not have any time to go to the gym, although he does have a membership at the local health club. He is not currently on any medications. There is no history of heart disease, hypertension, or cancer.

can be found at <http://www.cdc.gov/nccdphp/dnpa/bmi/index.htm>.)

In 1990, the number of obese adults was less than 15%. By 1995, the number had increased to 25%. By 2000, 34% of the adult population were overweight, and 27% were obese [10]. Estimates based on data collected in 2003–2004 show that approximately 66% of the adult population is either overweight or obese, with 32% meeting the definition of obesity [1]. That means that more than 6 out of 10 Americans have excess weight. Approximately 2.8% of men and 6.9% of women are morbidly obese [11]. Among persons who are 60 years of age or older, the prevalence of obesity is estimated to be 31% [11].

EPIDEMIOLOGY OF OBESITY/OVERWEIGHT

Within the past few decades, the prevalence of overweight and obesity has increased dramatically. The Body Mass Index (BMI), which uses weight adjusted for height, is used to define overweight and obesity. It is calculated by [weight in kg] divided by [height in meters]² OR [weight in pounds]/ [height in inches]² x 703. A value greater than 25.0 is defined as overweight and a BMI of 30.0 or more is called obesity (**Figure 1**) [9]. Roughly, a BMI >25 corresponds to about 10% more than one's ideal weight; a BMI >30 typically is an excess of 30 pounds for most people. These are only estimates. The term "morbid obesity" refers to obesity with a BMI equal to or greater than 40 kg/m²; many clinicians prefer the newer term "severe obesity" for patients at this BMI level. (A BMI calculator

The prevalence of overweight and obesity is generally higher for women than for men. Prevalence is greater in minority populations such as African Americans and Hispanics. Asian Americans are an exception, with prevalence lower than in the general population. There is also a correlation, greater in women than men, with lower socioeconomic status. More than 50% of adults with diabetes are obese, and more than 80% are overweight or obese; the link between obesity and Type 2 diabetes is well known [12]. Of particular concern is the increase in the number of children who are overweight. Presently, more than 17% of children between 12 to 19 years of age are overweight [11]. This prevalence has approximately tripled in the past three decades [13]. This is especially troubling because overweight adolescents are at risk for becoming overweight adults. Nearly one-third of overweight preschool children and 50% of overweight school-age children remain overweight as adults [14].

COST OF OBESITY AND RELATED ILLNESSES

The impact of obesity on general health is significant. It results in an estimated 100,000 to 300,000 preventable deaths a year [2; 3]. According to a 2004 study published in *JAMA*, deaths attributable to poor diet and inactivity are second only to deaths due to tobacco [15]. The economic costs are significant, as well. For the year 2000,

Body Mass Index		
$\frac{\text{Kilograms}}{(\text{Meters})^2}$	OR	$\frac{\text{Pounds}}{(\text{Inches})^2} \times 703$
25–29 = overweight		
30–39 = obese		
40 or more = morbid obesity		
Source: Author		Figure 1

the total costs of obesity were estimated to be \$117 billion; recent calculations, updated to 2003 dollars, suggest a figure as high as \$139 billion [4; 16]. Between 5% and 7% of the nation's health-care expenses are obesity-related [4].

Although the impact of obesity on general health has become highly publicized, most overweight Americans do not consider themselves at higher risk for medical problems or premature death. According to the results of a survey conducted by Shape Up America, 7 out of 10 overweight respondents said that their excess pounds were not a health concern. However, the survey results indicated that approximately 33% of the respondents had already developed a "weight-related medical condition" [17]. Despite the evidence linking obesity and ill-health, many Americans still consider excess weight to be only a cosmetic issue.

SURGEON GENERAL'S CALL TO ACTION (CTA) TO PREVENT AND DECREASE OVERWEIGHT AND OBESITY

The increase in obesity has become of such concern that in 2001, the U.S. Surgeon General developed a *Call to Action (CTA) to Prevent and Decrease Overweight and Obesity* [18]. It urges the community to help confront this issue by adopting a healthier lifestyle. The intent of CTA is to "create a multifaceted public health approach capable of delivering long-term reductions in the prevalence of overweight and obesity." The *Call to Action* identifies areas where collaborative work can address the national epidemic of overweight and obesity. In addition, the CTA serves as an impetus for the creation of partnerships that will improve the nation's health. Much of this call focuses on the need for people to become more physically active.

More information on the Surgeon General's report can be found at <http://www.surgeongeneral.gov/library>.

ADULT INACTIVITY

Data from the Behavioral Risk Factor Surveillance Survey (BRFSS) shows that the majority of adults do not exercise enough. About 52% of adults do not perform the minimum amount of exercise recommended to reduce the risk of diseases such as diabetes or high blood pressure [19]. This proportion is higher among women than men; it is also higher in minority populations. People are classified as meeting exercise recommendations if they report engaging in moderate-intensity activity at least 30 minutes per day, 5 or more days per week, or vigorous-intensity activity at least 20 minutes per day, 3 or more days per week.

In addition, the number of people who are not active at all during their leisure time is about 25%, according to BRFSS data from 2005 [19]. All of these numbers may actually be underestimates, because survey respondents often try to answer questions in a way that makes them appear healthy. Inactivity has significant consequences. For example, there is some data that suggests that obesity is the cause of a significant increase in the disability rates among adults in their 30s and 40s [20].

REASONS FOR LACK OF EXERCISE

Numerous reasons for failure to exercise exist, including lack of interest, competing demands for limited leisure time, fear of injury or pain, no facilities, and lack of knowledge of proper technique. Most of these reasons are misguided and, with proper education, can be resolved so that patients will be able to incorporate exercise into their daily lives.

Clearly, physicians and other clinicians must be more involved. The United States Preventive Services Task Force recommends that clinicians screen all adult patients for obesity and offer intensive counseling and behavioral interventions to promote sustained weight loss for obese adults. (Recommendations can be found at <http://www.ahrq.gov/clinic/3rduspstf/obesity/obesrr.htm>.) Clinicians should either offer obese patients intensive counseling and behavioral interventions or

refer obese patients to programs that provide such services. Intensive counseling is defined by the frequency of interventions: high-intensity is 2 or more person-to-person, individual, or group sessions per month for at least the first 3 months. A medium-intensity intervention is a monthly intervention. Anything less than once monthly is considered low-intensity. The Task Force found that the most effective therapies were of high intensity.

Healthy People 2010, a set of health objectives developed by the U.S. Department of Health and Human Services' Office of Disease Prevention and Health Promotion, specifically recommends that physicians routinely counsel their patients to be physically active as a way to combat the growing epidemic of obesity.

In a report in the *Archives of Internal Medicine*, Manson and others argued that physicians must counsel patients about the need for exercise, especially because the average person makes three office visits per year. They state that giving information about diet and exercise should not be left to health clubs and fad diets. They suggest that effective counseling can be provided within 5 minutes [21].

This type of information, however, must often be learned after graduation from medical school. In a survey of graduating medical students' competence in prescribing exercise to patients, only 10% of deans said their students were competent to prescribe exercise effectively [22]. In a survey of primary care physicians, Walsh found that only 14% of respondents prescribed exercise for more than half of their patients [23]. One of the most important barriers cited was lack of knowledge on effective counseling. It might be expected that, with growing awareness of obesity as a problem in the U.S., physicians would be counseling more of their patients about exercise. However, an analysis of data from the National Ambulatory Medical Care Survey reports that physicians' counseling about obesity has actually declined from 1995–1996 to 2003–2004 [24].

Interventions for Non-English Proficient Patients

As a result of the evolving racial and immigration demographics in the U.S., interaction with patients for whom English is not a native language is inevitable. Because patient education is such a vital aspect of the promotion of physical activity, it is each practitioners' responsibility to ensure that information and instructions are explained in such a way that allows for patient understanding. When there is an obvious disconnect in the communication process between the practitioner and patient due to the patient's lack of proficiency in the English language, an interpreter is required.

In this multicultural landscape, interpreters are a valuable resource to help bridge the communication and cultural gap between clients/patients and practitioners. Interpreters are more than passive agents who translate and transmit information back and forth from party to party. When they are enlisted and treated as part of the interdisciplinary clinical team, they serve as cultural brokers, who ultimately enhance the clinical encounter. In any case in which information regarding the benefits of physical activity and its necessity in health promotion are being provided, the use of an interpreter should be considered.



The Task Force on Community Preventive Services strongly recommends community-wide education on the basis of its effectiveness in increasing physical activity and improving physical fitness among adults and children. Other positive effects include increases in knowledge about exercise and physical activity and in intentions to be physically active.

(http://www.guidelines.gov/summary/summary.aspx?doc_id=3177.)

Last accessed November 27, 2007.)

Strength of Recommendation: Strongly recommended based on strong evidence of effectiveness.

EXERCISE PHYSIOLOGY

MUSCLE FIBERS

There are two types of motor units in skeletal muscle, Type 1 and Type 2. Type 1 has a small cell diameter with a high excitability and fast conduction velocity. It has an oxidative profile with moderate contraction velocity and low fatigability. There are few muscle fibers of this type. In contrast, Type 2 has a large cell diameter, with low excitability, but a very fast conduction velocity. Type 2 fibers are numerous in quantity, with a glycolytic profile and high fatigability.

The small motor units, with Type 1 (also known as “slow-twitch”) fibers, are recruited first and are frequently active, while the large motor units, with Type 2 (“fast-twitch”) fibers, are used infrequently, in forceful contractions.

Maximal efforts, in which fast motor units are recruited, cannot be sustained because of the rapid depletion of glycogen.

When exercising, the “size principle” should be considered in developing muscle mass. This refers to the fact that slow-twitch muscle fibers are the first fibers recruited to do an activity, while fast-twitch fibers are recruited after the majority of slow-twitch fibers have been recruited. Therefore, if a small or moderate amount of force is needed to perform an activity, slow-twitch fibers will primarily be used. Fast-twitch fibers will only be recruited if the slow-twitch fibers cannot generate enough force to fully perform the exercise. In order to make continued progress, both slow-twitch and fast-twitch fibers must be recruited. If a muscle fiber is not recruited, it will make no adaptation, such as an increase in size. In general, these two types of fibers are not different in the amount of force they produce, but rather differ in rate of force production. The “overload principle” refers to the idea that one must increase the resistance, frequency, or duration of an activity beyond that which would normally be expected. Overload will result in strength development.

During physical activity, the amount of blood pumped out by the heart is increased. The cardiac output (stroke volume x heart rate) increases in accordance with the degree of exercise. At rest, the stroke volume of an average-sized man is approximately 70 ml. With a heart rate of 72 beats/min, the cardiac output (CO) is about 5 l/min. The term “cardiac index” refers to CO per square meter of body surface.

With exercise, the initial increase in cardiac output is due to an elevation in both stroke volume and heart rate. With maximal exercise, the increase is accomplished by a more rapid heart rate. To help produce a greater blood flow to the muscles, there is a corresponding decrease in perfusion of the kidneys, liver, and other internal organs.

Exercise training can also lead to reduced heart rate at rest. This occurs as a result of an increased left ventricular end diastolic volume. In this scenario, the heart pumps more blood each time it beats, and therefore it can beat at a slower rate while maintaining the same degree of perfusion.

The effects of exercise on the body’s cells are significant. Physical activity increases the size and number of mitochondria, increases muscle’s ability to use fat as a source of energy, increases the size of muscle fibers, and increases the content of myoglobin in muscle fibers. Exercise also results in increased fat oxidation. All of these increases lead to hypertrophy of the muscle, which leads to an increase in strength of the muscle.

OXYGEN CONSUMPTION (VO₂ MAX)

VO₂ max is the maximum volume of oxygen consumed by the body each minute during exercise. Oxygen consumption = cardiac output x arterial-venous oxygen difference. It often is used as a measure of a person’s maximal capacity to do aerobic exercise because oxygen consumption is linearly related to expenditure of energy. In general, exercise increases heart rate, which will then increase oxygen consumption. A rough correlation shows 65% of maximal heart rate correlates to 50% VO₂ max.

BENEFITS OF EXERCISE

The benefits of exercise are extensive and well-known. These include cardiovascular, endocrine, psychological, and possible immunogenic benefits.

CARDIOVASCULAR

Numerous studies have documented the benefits of exercise as an effective strategy for both primary and secondary prevention of heart disease. In a review of the literature, Gassner et al. demonstrated that regular exercise reduces the risk of both overall mortality and cardiovascular mortality. Moreover, patients with established heart disease showed improved activity tolerance and quality of life after beginning an exercise program. Although approximately 4% to 15% of heart attacks occur during or soon after exertion, it is actually the least active patients who are at greatest risk. The benefits of exercise are far greater than the cardiac risks, and sudden cardiac death from exercise is extremely rare [25].

Exercise has also been shown to improve lipid profiles. Savage et al. demonstrated reduction in triglyceride levels and total cholesterol/high-density lipoprotein cholesterol (HDL-C) ratio for patients completing a 4-month exercise training program [26]. Brochu et al. demonstrated that both younger and older men showed improvements in lipid profile after an exercise program, although younger patients typically experienced greater improvements [27]. A meta-analysis of more than 50 trials involving exercise showed an average increase of nearly 5% in HDL, a 5% decrease in low-density lipoprotein (LDL), and a 3.7% decrease in triglycerides [28]. Another meta-analysis looked at studies of exercise in people diagnosed with cardiovascular disease. Among a total of 580 subjects and 680 controls, the researchers found statistically significant reductions in triglycerides and elevations in HDL-C [29]. For overweight and obese patients, a meta-analysis of 13 studies with a total of 613 subjects (348 exercise, 265 control) found a significant reduction in triglycerides [30].

ENDOCRINE

There is little doubt that exercise improves glycemic control in patients with diabetes and those with impaired glucose tolerance, i.e., persons who are at risk for diabetes. Exercise has been shown to reduce baroreflex sensitivity and heart rate variability in patients with Type 2 diabetes [31]. It has also been shown to reduce hemoglobin A1C approximately 1% [32]. A 2006 Cochrane Review concluded that exercise significantly improves glycemic control, lowers plasma triglycerides, and reduces visceral adipose tissue in people with type 2 diabetes. These improvements appear to occur independently of weight loss [33]. In addition, because nearly 75% of the risk of Type 2 diabetes is attributable to overweight/obesity, the reduction in body weight and body fat through exercise also improves glycemic control and reduces the complications of diabetes.

Exercise is also well-known to ameliorate osteoporosis. Exercise can place physical stress on the body, causing the bones to become stronger. Brief, high-intensity periods of loading that generate a diversity of strain patterns on the bones provide the maximal osteogenic response, which can delay the onset of osteoporosis.

PSYCHOLOGICAL

Anecdotal reports and well-designed clinical trials support the conclusion that exercise reduces stress, improves depression, and helps with overall, general well-being [34; 35]. Although the precise mechanism is unknown, the improvements may be the result of endorphin release. Interestingly, the word endorphin is abbreviated from “endogenous morphine,” which refers to morphine being created naturally in the body. This endorphin release may help with stress, pain relief, and mood. All of these can have an impact on morbidity. Daviglus et al. studied nearly 7000 middle-aged men and women and demonstrated that a higher BMI in middle age is associated with a poorer quality of life in older age. The authors suggested that preventive measures, such as exercise, to reduce BMI are important in lessening the burden of disease [36].

POSSIBLE IMMUNOGENIC AND OTHER BENEFITS OF EXERCISE

Studies suggest a possible link between excess body weight and cancer, including colon, breast, endometrial, and possibly other cancers. For example, Calle et al. enrolled nearly a million patients (405,000 men and 495,000 women) in a 16-year prospective study known as the Cancer Prevention Study III [37]. The results showed that there were positive linear trends in death with increasing BMI values for esophageal, stomach, colon, rectal, liver, gallbladder, pancreas, prostate and kidney cancer, and non-Hodgkin's lymphoma, multiple myeloma, and leukemia. There was no significant association with cancer of the brain or bladder, or melanoma. Weight gain in adulthood is considered a risk factor for breast cancer. This is supported by research including the Nurses Health Study, which found that women who gained 25 kgs or more after age 18 had a relative risk of 1.45 (95% CI 1.27-1.66) [38]. More studies are being conducted to further analyze the association between obesity and certain cancers.

Educating patients about the benefits of exercise is an important task. Although many patients may be aware of these benefits, it is important for them to hear it directly from their healthcare providers. When patients appreciate the potential benefits of exercise, they are more likely to engage in activity that produces those benefits. It is also important for patients to realize that it is not necessary to begin an extensive exercise regimen to reap any benefits. Even small increases in physical activity are associated with measurable health benefits. For example, weight reduction of 5% body weight is associated with lower incidence of diabetes, improved lipid profile, and reduced blood pressure.

ASSESSMENT PRIOR TO EXERCISE

Most people can participate in some type of exercise. Recommendations for evaluating patients who wish to begin exercising vary, and there is no clear data to support an age cutoff for physical evaluation. The President's Council on Physical Fitness and Sports suggests that people who are older than 35 years of age and have been inactive for several years see their doctors before beginning an exercise program [39]. Most people who are in good health will not need an extensive medical workup before starting an exercise program; a physical exam should be sufficient. Although all parts of the physical exam are important, it is necessary to carefully auscultate the lungs for any rales or wheezes and assess the heart for any murmurs. Measuring blood pressure and pulse in resting, supine, and standing positions is standard as is the assessment of carotid, abdominal, and femoral pulses. One should not omit a thorough neurological exam, including assessment of motor strength, deep tendon reflexes, and cerebellar function.

Patients who have medical conditions such as hypertension, heart disease, arthritis, or diabetes may require a more extensive workup or an exercise tolerance test. The American College of Sports Medicine (ACSM) recommends symptom-limited exercise testing before vigorous exercise for men 45 years of age and older and women 55 years of age and older, although the evidence for this recommendation is limited. ACSM also advises testing in people with more than one major cardiac risk factor, signs or symptoms of coronary artery disease, or known pulmonary, metabolic, or cardiac disease [40].

CONTRAINDICATIONS TO EXERCISE

There are a few contraindications to exercise that clinicians should recognize; several are listed in **Table 1**. These patients should wait to begin an exercise program until they are medically cleared. Many people believe they cannot exercise due to certain health conditions, but the reality is that many of those persons are the ones most likely to benefit. Their health risks are actually greater for habitual inactivity and obesity than they are for initiating an exercise program.

On exam, Mr. S's height is 6'1" and his current weight is 240 pounds. His blood pressure is 135/85 mm Hg and his heart rate is 84 beats per minute (bpm). A review of the medical chart from last year shows a 22 pound weight gain. His BMI is 31.7. Physical exam is largely unremarkable. There is full range of motion and normal strength of his knees, with no anterior/posterior drawer sign or fluid collection.

His lab work is as follows:

- Sodium (Na) 140 mEq/L
- Potassium (K+) 4.2 mEq/L
- Chloride (Cl) 109 mmol/L
- Carbon dioxide (CO₂) 22 mmol/L
- Creatine (Crt) 1.1 mg/dl

- Glucose 120 mg/dl
- Total cholesterol 220 mg/dl
- High-density lipoprotein (HDL) 30 mg/dl
- Low-density lipoprotein (LDL) 150 mg/dl
- Triglycerides 200 mg/dl

Mr. S is obese, as demonstrated by a BMI >30. In addition, he has hyperlipidemia. With a fasting blood glucose of 120, he also has prediabetes. He should clearly be started on an exercise program. Given his age and general medical health, he does not need to undergo any further diagnostic testing. His right knee pain is likely due to early arthritis, a result of his excess weight. Discussion of exercise should be initiated.

EXERCISE MOTIVATION

In addressing the issue of exercise with patients, there are two fundamental issues:

1. How to Get People Motivated
2. How to Organize a Routine

One of the most important steps in getting people motivated is to set both short-term and long-term goals. Goals must be specific, clear, and moderately difficult to achieve but attainable with effort. Too often, patients either set no specific goals (simply just "lose weight") or they set highly unrealistic ones ("lose 30 pounds in a month"). Healthcare professionals should encourage patients to first set short-term goals for 2, 4, and 6 months. Anything earlier than 2 months does not give enough time to see significant change. A realistic goal regarding weight loss from an exercise program is for patients to lose one pound every 2 weeks; so at 2 months, patients should strive for a 4 pound weight loss, and at 6 months, a 10 to 12-pound weight loss would be realistic. In terms of strength improvement, patients should see a 5% improvement in 2 months and a 10% improvement in 6 months. A realistic goal regarding length of exercise could be to start with 20 minutes 3 times a week, increasing to 40 to 60 minutes 3 to 4 times a week at 6 months.

CONTRAINDICATIONS TO BEGINNING AN EXERCISE PROGRAM	
<ul style="list-style-type: none"> • Recent myocardial infarction (2 weeks) • Unstable angina • Severe aortic stenosis • Decompensated congestive heart failure (low ejection fraction) • Left ventricular outflow obstruction • Uncontrolled dysrhythmias • Uncontrolled diabetes or diabetic complications • Uncontrolled hypertension 	
Source: Compiled by Author	Table 1

The long-term goal must be to maintain the program, with incremental improvements. However, healthcare professionals should keep patients focused on short-term accomplishments—this will minimize frustration and provide the encouragement to sustain the routine. Patients should remember that this is a lifestyle change, and they must change behavior for the long term by making small changes over time.



The Task Force on Community Preventive Services strongly recommends individually-adapted health behavior change programs that are tailored to the individual's specific interests, preferences, and readiness for change. These programs

teach participants the behavioral skills needed to incorporate moderate-intensity physical activity into daily routines.

(http://www.guidelines.gov/summary/summary.aspx?doc_id=3177.)

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Strength of Recommendation: Strongly recommended based on strong evidence of effectiveness.

In helping patients set exercise goals, it is critical to determine a patient's current fitness level. Some information will be obtained by body weight, percent body fat, body mass index, and resting heart rate. However, more information can be obtained by asking patients specific questions about their activity levels, recognizing that many patients will overestimate their activity. It may be useful to have patients fill out a questionnaire relating to physical activity prior to the visit. Questions could include:

- What types of physical activities do you enjoy?
- What exercises do you perform regularly? How often and for how long?
- How much do you walk a day?
- Do you own any exercise equipment?

- What gets in the way of consistently exercising?
- Have you thought about increasing the amount of your activity?

For those patients who are currently active, it is important to review their routine and make refinements. For those patients who are primarily sedentary, the key is to get them to start with some type of exercise.

In motivating patients, it is helpful to acknowledge and address impediments to fitness. As discussed earlier, there are many reasons why people do not exercise, including lack of time, fear of injury, belief that exercise is too boring, and a feeling of being too old. It is important for the healthcare provider not to ignore these concerns, but rather address them and offer alternatives. For example, lack of time can be addressed by explaining to patients that they can simply exercise 10 to 20 minutes, 2 to 3 times a day, a few times a week. "Too boring" can be addressed by choosing an enjoyable activity. As for being "too old" to exercise, the healthcare provider should share with them the significant data that shows elderly patients improve strength and balance and decrease morbidity with exercise programs.

It is also useful for patients to develop support systems. Several studies show patients to be more successful with long-term exercise programs if they involve family, friends or a training partner. One is less inclined to avoid going to a gym or fitness facility if other people are waiting there for them.

It may be useful for some patients to create a journal of their activity. There are also numerous computer programs that help track progress. For some people, a journal can be a great motivator, keeping them "on track" in reaching their goals. A journal will not be for everyone, but it is certainly worth suggesting to patients. This is also a way for physicians to monitor a patient's progress.

In assessing a patient's ability and interest in changing his or her lifestyle, one can also refer to the Stages of Motivational Readiness for Change [41]. This model consists of the following stages:

1. Precontemplation
2. Contemplation
3. Preparation
4. Action
5. Maintenance

Those in the "precontemplation stage" are not physically active and have not given much thought to becoming active. Patients who are in the "contemplation stage" are currently inactive but are thinking about becoming physically active. Those patients who are in the "preparation stage" may be physically active but not at the recommended level; these patients are ready to make a plan to increase activity. Those in the "action stage" are physically active at the recommended levels but typically have been doing so for only a short time. Finally, those in the "maintenance stage" have typically been at the recommended level for at least 6 months.

These stages can be used as a framework to assess people's readiness for change, recognizing that these are not truly linear stages, but more likely iterative. Most people make multiple attempts before they are able to achieve significant change.

For example, when examining patients who seem to be in the "precontemplation stage," it is important for healthcare providers to discuss the benefits of exercise and address any concerns patients have about initiating an exercise program. The goal is to convince patients to start thinking about change. For "contemplators," it is useful to give more encouragement. The goal is to move them toward preparing for change. Healthcare providers can provide specific information about becoming more physically active, perhaps through information about a structured program or a "how to" book. When seeing patients in the "preparation

stage," the goal should be to increase their physical activity level. This may be done by discussing any barriers and helping the patient develop strategies to overcome them. For those in the "action" and "maintenance" stages, the goal is to maintain changes; one should praise efforts, help with any obstacles, and aim to minimize setbacks. Again, this model serves as a general framework in helping motivate patients to adopt healthy behavior.

Discussion with Mr. S reveals that he is in the contemplation stage. He is currently inactive but is thinking about becoming active. His reasons for not going to the gym, although he has a membership, should be explored. For example, he says he does not have time and exercise is too boring. One should point out that he could simply start with 10 minutes of exercise, two days a week, and then slowly build up to the recommended levels. He should realize that exercise does not have to take place at the gym. He should focus on activities that he might enjoy, such as swimming or brisk walking, and possibly "go partners" with his wife or friends to make it more interesting.

TYPES OF EXERCISE

Healthcare providers must understand some basic exercise principles to properly advise their patients. These principles will allow them to guide patients to an exercise program. Remember, patients often need specific instructions with examples of exercises.

In organizing a routine, one must keep in mind that there are essentially three types of exercises:

1. Stretching
2. Aerobic
3. Anaerobic

Patients should try to incorporate all three types into a routine. Not all exercises affect the same muscle groups, and each type of exercise does not provide the same benefit.

STRETCHING

Stretching involves the ability to move joints and muscles through their full range of motion. It is a neglected area of most fitness routines. Stretching must be an integral part of a workout because it keeps the muscles and joints loose. In addition, it protects against injury, improves blood flow, and increases tendon flexibility. Stretching can be performed at any time of the day and practically anywhere. All one needs is a padded surface or exercise mat.

Stretching should be done for about 10 to 12 minutes and should cover all the muscle groups [39]. Patients should be encouraged to stretch to the point that they can feel some minor discomfort, hold the stretch for 15 to 20 seconds, and repeat 2 to 3 times. Stretching should be done at least 2 to 3 times per week. The following are some basic stretches targeting the major muscle groups.

- **Pike Stretch (hamstrings, lower back):** Sit on the floor with your legs outstretched in front of you and your feet together. Bend forward at the waist and reach toward your toes with your hands.
- **Straddle Stretch (groin, upper back, obliques):** Sit on the floor and spread your legs apart. Reach your right hand toward your left foot. Hold for 15 to 20 seconds. Reach your left hand toward your right foot.
- **Cat Stretch (back, triceps, laterals):** Kneel on the floor with your forearms and hands outstretched on the floor in front of you. Slide your forearms forward as far as possible while trying to keep your thighs perpendicular to the floor. Maintaining this position, while supporting yourself with your arms and shoulders, attempt to lower and press your abdomen to the floor. Try to hold this position for 15 to 20 seconds.
- **Door Push (chest):** Stand in front of a doorway, step slightly in and press both hands and arms against the door frame. Lean forward.

- **Shoulder Stretch:** In a seated position with your back upright, grab your elbow with the opposite hand. Gently pull across your body. Hold for 15 to 20 seconds. Repeat with the other arm.

AEROBIC

Aerobic activity is typically known as “cardio” because it strengthens the heart and improves overall fitness by increasing the body’s ability to use oxygen. Aerobic activities are any activities that use large muscle groups, are maintained continuously, and are rhythmic in nature. They use muscles at a lower intensity for a more prolonged period of time. These activities require the muscles to consume a considerable amount of oxygen.

There is a wide range of aerobic activities from which patients can choose. These include swimming, brisk walking, stair climbing, running, cycling, skiing, tennis, and racquetball.

ANAEROBIC

Anaerobic activities focus on muscular strength and muscular endurance. These activities, which involve major muscle groups, are typically known as “resistance training.” Muscular strength relates to exerting maximum force for a brief time period with repeated contractions until the muscle becomes fatigued. Weightlifting is a good example. Muscular endurance involves sustaining repeated contractions or applying force against a fixed object for an extended period of time. Push-ups are an example of a muscular endurance exercise. Oxygen is not used and the muscles produce lactic acid as a by-product.

Before beginning resistance training, patients should become familiar with two important concepts: (1) Correct Form, and (2) Breathing Technique. Form is broken down into repetition rhythm, range of motion (ROM) and proper angle. The rhythm should be controlled and consistent, throughout the entire set of repetitions. One must resist the temptation to jerk the weight up or use momentum to move the weight. ROM simply means to fully extend or flex the muscle being

worked. One must allow the muscle targeted to fully stretch at the bottom of the movement. Each exercise has two phases: the eccentric and concentric motion. The concentric is the pushing part of the motion and the eccentric is the resistance portion. Contrary to popular opinion, muscles get stronger from the eccentric part of the movement, or the stretch, not the push. Therefore, patients must go through the full range of motion to benefit.

With respect to breathing, patients should inhale during the resistance phase and exhale during the push phase of each exercise. For example, one would inhale while lowering the weight to one's chest and exhale as one pushes it back up. Doing this allows the best possible flow of oxygen-rich blood to the working muscles. Patients should be cautioned not to hold their breath during any exercise because Valsalva's maneuver, which increases intra-abdominal pressure, may occur. This happens when patients close the glottis and activate abdominal muscles. This increase in abdominal pressure causes an increase in blood pressure and should be avoided. One trick to encourage patients to breathe is to ask them to count the number of repetitions out loud.

EXERCISE EXAMPLES

An adequate resistance training program could include the following types of exercise, focusing on the major muscle groups. One can use 5 to 10 pound dumbbells for those exercises that require the use of weight. Even this light weight can make a significant difference. At home, one can use a household item that provides a comfortable weight, such as a milk carton or beverage container. These exercises can also be performed without weights.

- **Chest (Bench Press):** Hold the weights with your hands. Place them on your thighs, and sit down on a flat surface. From this position, lean back and slowly bring the weights to the chest area. Begin to exhale and press the weights up—fully extending the arms, keeping them above your eyes. Inhale as you lower them to the starting position and repeat the movement.
- **Back (Bent-Over Row):** Start by placing your feet a foot or so apart. Grip a weight with your hands just outside the knees. Keeping the back straight and the knees flexed, slightly bend forward at the waist. Let the arms hang naturally while holding the weights. From this starting position, pull the weights to the lower abdomen, keeping the elbows close to the body. Exhale as you pull. Return to the starting position, inhaling as you do.
- **Arms (Bicep Curls):** Hold a weight in each hand, arms hanging naturally, with your elbows at your sides, palms facing the sides of your thighs. The back should be straight, the chest flared outward. Begin to bend your right arm up first while exhaling, keeping the elbow totally stationary. Wait until the right arm goes completely down to the fully extended position, and then begin to curl the left arm. Each arm curled completes one full repetition.
- **Shoulders (Lateral Raises):** Place the feet a few inches apart with the knees bent slightly. Keep the back erect as you lean forward slightly. With the weights in front of your thighs, begin to slowly raise them up to the side until parallel with the floor.

- **Legs (Stiff Leg Dead Lift):** Start by holding the weights close to your thighs, nearly touching them. Keep the weights close to the body—this protects the back. The back must stay straight. Squat as far as you comfortably can, as you will begin to feel the pull in your hamstrings as you lower the weights toward the ground. Slowly return to the starting position.
- **Legs (Dumbbell Lunge):** Hold a weight in each hand, arms hanging at your sides. Step out with one leg, keeping the back straight. You must step out far enough so that the knee does not pass over the toe. This puts too much stress on the knee. Go down far enough so that the opposite knee nearly touches the ground. Keep this stance and repeat this for your repetitions.
- **Abdominals:** Do not perform standard sit-ups as these could hurt the lower back. Rather, focus on the following 2 exercises:
(1) Obliques — Lie on your back with the knees flexed in the bent sit-up position. From this position, bring both knees down to the ground. With the back remaining flat, begin to flex your body toward your toes (“crunch”). Bring your shoulders up off the ground, but go slowly, controlling your momentum. Repeat this for 10 to 15 times.
(2) Seated bench kicks/jack knives — Sit on the end of a bench or chair with the hands placed behind the buttocks. Begin to kick the legs outward with the knees bent slightly—at the same time, lean back to extend the torso. Come back to the beginning position and repeat this motion 10 to 15 times.

Although these exercise examples are useful, just encouraging patients to walk more can achieve some health benefits.

DEVELOPMENT OF AN EXERCISE PROGRAM

Any workout program or schedule should address the length of the workout, the frequency of the workout, and its intensity. Each is discussed below.

LENGTH/FREQUENCY

The current recommendation by the Institute of Medicine is for adults to set a long-term goal of at least 60 minutes of moderate-intensity physical activity (e.g., brisk walking) or shorter periods of more intense activity daily [42].

The President’s Council on Physical Fitness and Sports sets a goal of 30 minutes a day, at least five days a week, or 60 minutes a day/five days a week for children younger than 18 years of age.

For many patients, these goals may seem unattainable and, as a result, they may be discouraged. Therefore, explain that if a patient cannot be active for 60 minutes at a time, he/she can divide it into three 20-minute sessions or six 10-minute sessions, gradually building up to the total of 60 minutes. In addition, patients can start with simply exercising two days a week and gradually build up to the recommended level.

INTENSITY

Intensity refers to relative load or resistance against which the muscle works. In general, intensity reflects the energy requirements of the activity, the amount of oxygen consumed, and the calories of energy expended. It is a critical factor in the development of the maximal oxygen intake (VO_2 max).

The key criterion is for patients to elevate their heart rate. Patients should calculate their maximal heart rate (MHR): $MHR = 220 - \text{age}$. For example, a patient 45 years of age has a maximal heart rate of 175 bpm. For patients having difficulty finding their pulse, a pulse monitor, which is available at most gyms and health stores, can be used.

Low-intensity exercise is defined as exercising at a heart rate <50% maximal heart rate; moderate-intensity is defined as exercising at a heart rate of 50% to 70% of maximal heart rate. Vigorous exercise generally involves a heart rate about 70% to 85% of a person's maximum [43; 44].

For those patients not wishing to measure heart rate, there are other indicators of activity. One is a subjective report of psychological strain associated with exercise, based on rate of perceived exertion as measured by the Borg scale. This numerical scale goes from 6 to 20, with a value of 6/7 correlated with very, very light exertion, 8/9 very light, 10–12 fairly light, 13/14 somewhat hard, 15/16 hard, 17/18 very hard, and 19/20 very, very hard [45]. A score of 12–16 correlates to moderate intensity.

The American Heart Association's (AHA) current guidelines attempt to simplify the descriptions of exercise intensity. AHA describes "moderate-intensity" aerobic exercise as raising the heart rate noticeably, with exertion equivalent to a brisk walk. "Vigorous" exercise causes a substantial heart rate increase with rapid breathing and for many people is equivalent to jogging [40].

For patients who want to "add up" different types of exercise to meet the daily goal, metabolic equivalents (METs) are useful. METs are simply a shorthand measure of the effort involved in any activity. Moderate activity uses 3 to 6 METs and burns 3.5 to 7 kcals per minute. Vigorous activity uses greater than 6 METs and burns more than 7 kcals per minute [43]. To meet a goal of 30 minutes of moderate intensity activity five days a week, a person would need to accumulate at least $30 \times 3 \times 5 = 450$ METs. A list of moderate and vigorous activities, classified by METs, is available at the American Heart Association web site.

With resistance training, one can alter the desired result while employing varying intensity levels. For example, those patients who aspire to obtain larger muscles should utilize heavy, more intense lifts in the range of 6 to 8 repetitions. For those patients who desire a slight increase in muscle mass, a lighter, less intense level in the 12 to 15 repetition range is appropriate.

Some patients will be fearful of lifting weights, although this is a generally safe activity. Interestingly, weight training has been in practice in some form for eons, with its evolution as an ancient tradition of stone lifting to its implementation into the fitness programs of today.

Many people have been misinformed about the benefits that a resistance training program can offer. Some of the more common misconceptions include:

If you stop lifting weights, the muscle turns to fat.

Patients should understand that muscle does not turn directly into fat and fat does not turn directly into muscle. Fat is used to store energy that can be used to build muscle. When people do decide to stop training with weights, their muscles will usually decrease in size. This accounts for the concept of the muscles turning to fat.

I'm too old to start weight training.

The truth is that it is never too late to start lifting weights. Studies have shown that regular mild resistance training helps prevent osteoporosis and maintain functional status. In addition, resistance training improves strength. This is especially helpful for older, inactive patients who typically have difficulties with endurance, balance, strength, and flexibility. Weight training can help to reduce these deficits.

Women get big, bulky muscles lifting weights.

In general, women have smaller muscle groups and also lack significant testosterone production. This prevents them from developing large muscles. In addition, muscle size is a function of exercise intensity. Current recommendations do not suggest an intensity that would be required to develop large, bulky muscles.

Lifting weights makes one very stiff and hinders flexibility.

Studies have shown that strength training can increase flexibility by as much as two hundred percent when performed correctly. When a joint is being moved from beginning flexion to complete extension, the muscles used are being stretched. This stretching leads to improved flexibility.

Although it may seem obvious, it is important to discuss with patients the normal responses to exercise. They should expect to have an elevated heart rate, increased breathing, perspiration and mild muscle aches. Typically, patients will experience muscle soreness 48 hours after exercising, which is known as delayed onset muscle soreness (DOMS). This is an expected process as cells deteriorate and regenerate, eventually leading to increased strength.

At the same time, patients should be aware of the warning signs of excessive intensity, too frequent, or improper exercise. These include severe dyspnea, chronic coughing, chest discomfort, dizziness, prolonged muscle ache (exceeding 72 hours), and intense joint pain. If patients experience these symptoms, they should consult a healthcare provider to review why these symptoms occurred.

As noted earlier, patients should understand that even moderate amounts of exercise can make a significant difference in their health status. Numerous trials have demonstrated that even low amounts of moderate exercise, lasting thirty minutes, can be sufficient to prevent weight gain. In the Studies of Targeted Risk Reduction Interventions through Defined Exercise (STRRIDE), 182 patients who were overweight with mild to moderate dyslipidemia were randomized to: (1) no exercise, (2) supervised low-dose/moderate-intensity exercise (at 40% to 55% peak oxygen consumption) equivalent to walking 12 miles per week, (3) low-dose/vigorous-intensity exercise (at 65% to 80% peak oxygen consumption) equivalent to jogging 12 miles per week, or (4) high-dose/vigorous-intensity exercise (at 65% to 80% peak oxygen consumption) equivalent to jogging 20 miles per week. The exercise was conducted on treadmills, elliptical

trainers, and stationary bikes. The study lasted 8 months, and patients were instructed not to alter their diet during this time period. Therefore, this study looked only at the effect of exercise. At the conclusion of the study, the high-dose/vigorous-intensity group had the greatest weight loss; the control group actually gained weight. All the exercise groups demonstrated decreased abdominal, hip, and waist circumference. More importantly, there was a dose-response relationship between amount of exercise and amount of weight and fat loss. The authors concluded that significant benefit can be achieved with 30 minutes of walking daily [46].

Mr. S should be started on an exercise program that includes elements of stretching, aerobic, and anaerobic exercises.

**EXERCISE MAINTENANCE/
ADHERENCE/FAILURE**

It is estimated that approximately 50% of people who start an exercise program will have quit within six months. The people who are most successful demonstrate some of the following characteristics:

- They have chosen a convenient, economical activity that is pleasurable.
- They have set realistic goals, both short-term and long-term, that they track over time.
- They structure exercise within their schedule.
- They receive encouragement from family, friends, and healthcare providers.

It is important to emphasize to patients who are beginning and maintaining an exercise program that doing so is very difficult, and they should expect to experience setbacks. These setbacks should not be viewed as failure, which for many people will serve as more discouragement. Rather, healthcare providers should explore why the patient could not maintain the program and determine methods to achieve success. For instance, if the patient could not find time to exercise, one

could emphasize the need to schedule it, with the understanding that exercise can be broken into 10-minute intervals.

It is important for the physician to review exercise advice and/or prescriptions with the patient. Giving such advice should not be viewed as a single event but rather one that must be discussed at each office visit, just as current medications would be reviewed.

SPECIALTY SOCIETY POSITION STATEMENTS

Numerous specialty societies support the need for exercise and the role of physicians and other healthcare providers in encouraging physical activity:

AMERICAN HEART ASSOCIATION (AHA)

The AHA strongly recommends physical activity counseling as an important strategy for implementing primary and secondary prevention guidelines. The AHA believes that healthcare providers should deliver counseling systematically, including asking specific questions about the kinds of activity and how much activity each patient is getting [47].

The AHA specifically advises that in the patient-visit setting, physicians and their staff should discuss physical activity and provide exercise prescriptions for patients and their families. At times, implementing physical activity at the workplace should be discussed. The AHA recommends at least 30 minutes of moderate-intensity physical activity five days a week, or 20 minutes of vigorous exercise at least three days a week. Moderate and vigorous activities can be combined to meet the goal, and moderate-intensity activities can be performed in 10-minute segments if necessary. They also suggest that resistance training using free weights or gym equipment be done at least twice a week, with 8 to 10 different exercises repeated on non-consecutive days. For older adults, AHA also advises stretching for flexibility, about ten minutes at least twice a week [40; 48].

AMERICAN MEDICAL ASSOCIATION (AMA)

The AMA supports educating physicians about exercise, including instruction on the role of exercise prescription in medical practice and in medical student instruction. Physicians are encouraged to prescribe exercise to their patients and to shape programs to meet each patient's capabilities and level of interest [49].

AMERICAN CANCER SOCIETY (ACS)

The ACS currently recommends that patients maintain a healthy body weight, avoid weight gain, exercise for at least 30 minutes of moderate to vigorous activity five or more days a week, and eat a variety of healthy foods [50]. Forty-five to 60 minutes of exercise at least 5 days a week is preferable, for increased health benefits.

AMERICAN DIABETES ASSOCIATION (ADA)

The ADA has published guidelines for patients regarding exercise. The ADA recommends that patients with diabetes undergo a detailed medical exam prior to beginning an exercise program. Specifically, they recommend screening for macrovascular and microvascular diabetic complications that could be exacerbated by exercise. They also suggest considering an exercise test for patients at high risk of underlying cardiovascular disease. In general, however, the ADA recognizes that both Type 1 and Type 2 diabetics can and should participate in physical activity [51]. The ADA recommends at least 150 minutes per week of moderate-intensity activity and/or at least 90 minutes per week of vigorous activity, with exercise on at least three days each week and without going more than two consecutive days without aerobic exercise. The timing is intended to maximize benefits for insulin sensitivity. Resistance exercise is recommended three days per week, aiming for three sets of 8 to 10 repetitions for each muscle group targeted. People with diabetes need to check blood glucose before, after, and several hours following exercise, at least in the beginning of an exercise program.

SPECIFIC DISEASE CONDITIONS

As noted earlier, exercise provides numerous health benefits. Because the different types of exercises have a different impact on the body, patients with some disease conditions are likely to benefit more from one type of exercise than another. It is important to be familiar with the latest data, especially with respect to three diseases: (1) diabetes, (2) osteoporosis, and (3) human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS).

DIABETES

About 20.8 million people in the United States have diabetes. Of those, 14.6 million are diagnosed and 6.2 million are undiagnosed. Ninety to ninety-five percent of people with diabetes have Type 2 diabetes. The majority of diabetic patients are overweight or obese [52].

Until recently, many medical professionals believed that patients with diabetes should not engage in exercise programs. This was due to a belief that exercise increases the risk of hypoglycemia, especially in Type 1 diabetics. Although there is a risk of hypoglycemia, for most patients the benefits of physical activity exceed this risk. Patients taking insulin or insulin secretagogues may need to take extra carbohydrate before physical activity if blood glucose is low; adjustments may also be needed for patients taking exenatide or pramlintide.

In diabetics, exercise can improve peripheral insulin sensitivity and enhance insulin binding. Poirier et al. studied 13 patients with Type 2 diabetes who underwent a moderate aerobic exercise training program for 12 weeks (60% VO_2 max, one hour, three times a week). At the end of the study, nonobese patients showed enhanced insulin sensitivity [53].

Most patients with diabetes can safely exercise. Certainly, patients with uncontrolled diabetes should not begin an exercise program until glucose levels are stabilized. Patients with proliferative or severe nonproliferative retinopathy are advised to avoid vigorous exercise, because there is a poten-

tial risk of vitreous hemorrhage or retinal detachment. Patients with nephropathy or peripheral neuropathy have traditionally been told to avoid vigorous exercise. However, current ADA recommendations state that both aerobic exercise and resistance training may actually be beneficial in patients with nephropathy. These patients do, however, need careful workup for cardiovascular risks, including a stress test. For patients with peripheral neuropathy, non-weight-bearing exercise is advised as a common-sense precaution, since limited sensation could increase the risk of injury. Autonomic neuropathy in diabetes is closely tied to cardiovascular disease and carries a risk of postural hypotension, impaired thermoregulation, and other serious problems; for these patients, a thorough cardiac investigation is recommended before starting an exercise program [51].

Although all types of exercises should be discussed with diabetic patients, it is important to emphasize aerobic activities for this population. Numerous studies have documented the benefit of such exercise. In a meta-analysis of 12 aerobic training studies and 2 resistance training studies, Boule et al. showed that exercise training reduced glycosylated hemoglobin by an amount that should decrease the risk of diabetic complications. This effect appeared to be independent of weight loss [54]. Hu et al. examined the relationship of total physical activity and incidence of Type 2 diabetes in women as part of the Nurses' Health Study, a large prospective cohort study [55]. Study subjects were asked about levels of aerobic activity, such as walking, and vigorous activities, such as jogging, bicycling, swimming, or squash. At the end of the study time, aerobic exercise decreased the risk of Type 2 diabetes, with greater physical activity level associated with a substantial reduction in diabetes risk. In a study published in 2003, mortality for all causes was reduced by 39% in diabetics who walked at least 2 hours each week [56]. In a cohort study, Church et al. observed mortality rates in 2,196 diabetic men across quartiles of fitness and BMI levels. Cardiovascular fitness, as measured by an exercise test, predicted mortality to a greater degree than could be explained by differences in A1C.

An association was seen within BMI categories as well as across the entire study population. Men's self-reports of exercise habits correlated well with the fitness measurements [57].

The ADA, in a 2006 consensus statement, reiterates the benefits of exercise to improve both glycemic control and insulin sensitivity. The statement also notes the increasing evidence that lifestyle changes, including exercise, can slow or prevent the onset of diabetes in patients with impaired glucose tolerance [51].



The American Diabetes Association recommends that, for patients with type 2 diabetes, initial physical activity recommendations should be modest, based on the patient's willingness and ability, gradually increasing the duration and frequency to 30 to 45 minutes of moderate aerobic activity, 3 to 5 days per week, when possible. Greater activity levels of at least 1 hour per day of moderate (walking) or 30 minutes per day of vigorous (jogging) activity may be needed to achieve successful long-term weight loss.

(http://www.guidelines.gov/summary/summary.aspx?doc_id=6824. Last accessed November 27, 2007.)

Level of Evidence: Expert Opinion/Consensus Statement

OSTEOPOROSIS

Osteoporosis is quickly becoming a major health problem. 10 million patients have osteoporosis and nearly 34 million more have osteopenia (low bone mass). One out of every two adults older than 50 years of age has one of these two conditions [58].

The conditions result in more than 300,000 hip fractures and 700,000 spinal fractures each year. The morbidity is significant, with about 1 in 5 hip fracture patients who were ambulatory prior to the injury requiring long-term care [58].

It is critical that clinicians focus on prevention of these conditions. Although there has been significant discussion about discontinuing the use of hormone replacement therapies (HRT) in women,

there is considerable data demonstrating the effectiveness of exercise in preventing and treating osteoporosis for both men and women.

Although patients should include all types of exercises in a program, as discussed earlier, it is important for them to perform resistance training to prevent and treat osteoporosis. This is because it is weight-bearing exercises—not aerobic or stretching—that increase bone mineral density. The increase in bone mineral density subsequently reduces fracture risk. In order to increase bone mineral density, there should be a physical stress on the muscles/bones. Brief, high-intensity periods of loading that generate a diversity of strain patterns on the bones provide an osteogenic response. Low-impact exercises do not create enough stress to increase muscle mass or bone mineral density.

Nelson et al. showed that after one year of resistance training, postmenopausal women demonstrated an increase in both femoral neck and lumbar spine bone mineral density (BMD), while the control group showed a decrease in BMD [59]. In a small study of premenopausal women, Ulrich et al. demonstrated that total weight-bearing physical activity, including resistance exercises, weight-bearing household and occupational activity was strongly associated with higher BMD [60]. Milliken et al. studied the effects of a year's length of weight-bearing and resistance exercises on bone mineral density in 2 groups of postmenopausal women with and without hormone replacement therapy [61]. Although the combination of exercise and HRT produced the greatest increase in BMD, exercise alone resulted in modest site-specific increases in BMD. Kerr et al. studied the impact of a resistance training program and calcium supplementation on BMD in postmenopausal women over a two-year period [62]. Patients completed 3 sets of 9 resistance-type exercises, 3 times a week. At the end of the study period, the exercise group showed a significant increase in bone density at the hip measuring site.

Currently, the National Osteoporosis Foundation recommends regular weight-bearing, muscle-strengthening exercise to reduce the risk of fractures and falls. People who already have osteoporosis need a physician's evaluation before beginning a vigorous exercise program. Motions like twisting the spine or bending at the waist and high-impact exercises like aerobics can be harmful in people at high risk of fracture [63; 64].

HIV/AIDS

HIV/AIDS is a significant public health problem. For many years, patients with HIV/AIDS were counseled not to engage in exercise. This was due to the belief that intense or prolonged exercise could lead to decreased immune function in a population that was already immunocompromised and/or immunodepressed. This belief has not been supported in the literature. Physical activity may in fact offer substantial health benefits for persons with HIV disease. Data suggests that exercise can improve HIV patients' quality of life and improve overall strength.

Stringer et al. studied the effects of an exercise training program on aerobic fitness, immune indices, and quality of life in HIV-infected adults [65]. Thirty-four HIV positive patients (in the intermediate stage of disease) participated in a 6-week aerobic exercise training program and were randomly assigned to one of three groups: (1) control (no regular aerobic exercise), (2) moderate intensity exercise (one hour of exercise training three times per week at 80% of lactic acid threshold), or (3) heavy intensity exercise training (approximately 30 to 40 minutes of exercise at 50% of difference between lactic acid threshold and VO_2 max). Aerobic function with a symptom limited cardiopulmonary exercise test, immune indices with CD4 counts and Candida skin tests, viral replication with plasma HIV viral load measurements, and quality of life with an HIV-positive population validated questionnaire were measured pre- and post-study. At the conclusion of the study, aerobic fitness and quality of life indices increased

significantly in both exercise groups relative to the control group. Aerobic fitness improved more in the high intensity group than the moderate intensity group. Immune indices changed very little among all three groups.

Neidig et al. studied whether aerobic exercise training would improve depression symptoms in patients with HIV [66]. Sixty HIV-infected adults participated in a randomized, controlled trial of a supervised 12-week aerobic exercise training program versus usual activity. Exercise consisted of three supervised one-hour training sessions per week. Trainer personnel encouraged patients to reach target heart rates corresponding to 60% to 80% of maximum oxygen uptake. Aerobic activity consisted of stationary bike riding, walking, or treadmill exercise. At the end of the study, as compared to study controls, patients who exercised showed reductions in depressive symptoms on all indices. Cochrane reviews addressing exercise and HIV, published in 2004 and 2005, addressed resistance exercises and aerobic exercise, respectively. Both reviews noted that although sample sizes tended to be small and dropout rates high, the sum of the evidence supported exercise as both safe and beneficial for people with HIV [67; 68].

INSURANCE COVERAGE/ REIMBURSEMENT

In general, exercise counseling is not a specific service billed separately. However, it may be part of an evaluation/management service. In addition, some services may be billable as "incident to physician services." Insurance plans vary widely, so patients should check with their plans to learn the latest policies. Of note, some plans, especially the managed care plans, offer incentives to join and attend a fitness center. For example, Independence Blue Cross currently offers a plan that allows up to \$150 reimbursement of annual fitness center fees if the enrollee completes 120 workouts within a 365-day enrollment period [69].

Exercise programs for cardiac patients, commonly referred to as cardiac rehabilitation programs, are generally covered by insurance. Medicare coverage considers cardiac rehabilitation programs reasonable and necessary only for patients with a clear medical need who are referred by their attending physician and (1) have a documented diagnosis of acute myocardial infarction within the preceding 12 months; or (2) have had coronary bypass surgery; or (3) have stable angina pectoris; or (4) have had heart valve repair/replacement; or (5) have had percutaneous transluminal coronary angioplasty (PTCA) or coronary stenting; or (6) have had a heart or heart-lung transplant [70].

In 1999, the Centers for Medicare & Medicaid Services (CMS) implemented the Medicare Lifestyle Modification Program Demonstration to determine if a comprehensive lifestyle program might be a cost effective alternative to more traditional medical treatments for selected Medicare patients. The program was designed to study two groups of up to 1,800 selected Medicare patients with severe coronary artery disease who elected to follow one of two lifestyle modification programs: Dr. Dean Ornish's Program for Reversing Heart Disease and the Cardiac Wellness Extended Program [71]. Unfortunately, the program had low participation, with only 401 subjects (11% of the target) as the enrollment period was ending. An evaluation by researchers at Brandeis University found multiple barriers at the patient, provider, and organizational levels and pointed out the need for stronger political and managerial buy-in, as well as a role for social marketing to patients [72].

CONCLUSION

Obesity is a significant health problem, and data indicates that the majority of adults are overweight. Physical inactivity is one of the major causes leading to obesity. Although exercise is an effective therapeutic intervention for most patients, most people do not engage in any significant exercise. Various reasons exist including the fact that healthcare professionals, in general, do not discuss the need to exercise. Healthcare professionals must learn more about exercise physiology and provide patients with counseling on the different types of exercises, including stretching, aerobic and anaerobic activity. Workout length, frequency, and intensity are also important to discuss, with a general recommendation of at least moderate activity for 30 to 60 minutes most days of the week. The majority of patients will experience difficulty in initiating and sustaining exercise. Therefore, careful follow-up at subsequent office visits is necessary to reinforce the information. Patients should understand that incorporating exercise is a lifestyle change. Clinicians should provide the guidance to make these changes.

RESOURCES

**President's Council on
Physical Fitness and Sports**
www.fitness.gov

Healthier US
www.healthierus.gov

Overweight and Obesity Resources
[www.cdc.gov/nccdphp/dnpa/obesity/
resources.htm](http://www.cdc.gov/nccdphp/dnpa/obesity/resources.htm)

**Exercise: A Guide from the
National Institute on Aging**
[http://www.nia.nih.gov/HealthInformation/
Publications/ExerciseGuide](http://www.nia.nih.gov/HealthInformation/Publications/ExerciseGuide)

**Exercise: A Video from the
National Institute on Aging**
[http://www.niapublications.org/exercisevideo/
exercisevhs.asp](http://www.niapublications.org/exercisevideo/exercisevhs.asp)

Discovery Health
www.discoveryhealth.com

**National Association for
Sport and Physical Education**
www.aahperd.org/naspe

American Heart Association
www.americanheart.org/start
www.choosetomove.org

FACULTY BIOGRAPHY

John J. Whyte, MD, MPH, is vice president for continuing medical education at Discovery Health Channel. In this role, Dr. Whyte develops, designs and delivers medical education programming for Discovery Health Channel, the leading health channel in more than 64 million homes. Dr. Whyte creates courses, products and services on important clinical topics that appeal to both a medical and lay audience. This includes television shows, online content and DVDs.

Dr. Whyte is a board-certified internist, having completed an internal medicine residency at Duke University Medical Center and a health services research fellowship at Stanford University. His research focused on the management of hyperlipidemia in patients with coronary disease. He remains clinically active, performing as a locum tenens in underserved areas.

Prior to joining Discovery, Dr. Whyte was in the immediate office of the director at the Agency for Healthcare Research Quality. He served as medical adviser and director of the Council on Private Sector Initiatives to Improve the Safety, Security, and Quality of Healthcare (CPSI) — a council created by former Health and Human Services Secretary Tommy Thompson.

Dr. Whyte has also served as Medical Officer/Senior Advisor in the Coverage and Analysis Group as well as the Acting Director, Division of Items and Devices at the Centers for Medicare & Medicaid Services (CMS) (formerly the Health Care Financing Administration). In those roles, Dr. Whyte made recommendations as to whether or not the Medicare program should pay for certain procedures, equipment, or services and was responsible for more national coverage decisions than any other CMS staff.

Dr. Whyte has written extensively in the medical and lay press on health policy issues.

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