

Exercise and Older Patients: Prescribing Guidelines

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A combination of aerobic activity, strength training, and flexibility exercises, plus increased general daily activity can reduce medication dependence and health care costs while maintaining functional independence and improving quality of life in older adults. However, patients often do not benefit fully from exercise prescriptions because they receive vague or inappropriate instructions. Effective exercise prescriptions include recommendations on frequency, intensity, type, time, and progression of exercise that follow disease-specific guidelines. Changes in physical activity require multiple motivational strategies including exercise instruction as well as goal-setting, self-monitoring, and problem-solving education. Helping patients identify emotionally rewarding and physically appropriate activities, contingencies, and social support will increase exercise continuation rates and facilitate desirable health outcomes. Through patient contact and community advocacy, physicians can promote lifestyle patterns that are essential for healthy aging. (*Am Fam Physician* 2006;74:437-44. Copyright © 2006 American Academy of Family Physicians.)

Evidence suggests that regular physical activity provides substantial health benefits, reducing the risk of many chronic diseases.¹ Physical activity is associated with reduced medical costs, especially for women, and these cost reductions become more significant with increasing age.² Current recommendations encourage activity on most or all days of the week, but only 31 percent of persons 65 to 74 years of age report regularly engaging

Aerobic exercise, resistance and flexibility training, and lifestyle modification can improve physical fitness in older adults.

in moderate physical activity for 20 minutes or more three days a week; this rate drops to 20 percent by 75 years of age.¹ Women are more likely than men to report engaging in no physical activity. These trends have not improved over the past decade.¹ In addition, less than 50 percent of older adults report that their physicians have recommended exercise.³

Research has consistently shown that older adults who remain or become active have a significantly decreased risk of all-cause and cardiovascular mortality compared with their sedentary counterparts.⁴⁻⁶ Starting an exercise program later in life can significantly reduce risk factors even if a person was sedentary when he or she was younger. By understanding the specifics of disease

prevention and treatment through exercise, physicians can play a significant role in offering patients effective and inexpensive primary or adjunct therapies, encouraging appropriate physical activity, and eliminating barriers that prevent older adults from exercising regularly.⁷ *Table 1* defines common exercise terminology.

STRUCTURED PHYSICAL ACTIVITY AND LIFESTYLE MODIFICATION

There are four ways for patients to improve physical fitness: aerobics, resistance training, flexibility training, and lifestyle modification. Repetitive aerobic exercise that uses large muscle groups (e.g., walking, dancing, cycling, swimming) increases the heart rate (*Table 2*⁸) for an extended period.

Progressive resistance training requires muscles to generate the force to move or resist a given weight. Weight resistance can be created using elastic bands, weight cuffs, free weights, weight machines, or the patient's body weight. Progressive resistance training maintains or improves muscle mass, strength, and endurance. It improves balance, allowing the patient to exercise and perform daily activities (e.g., rising from a seated position, carrying groceries, preparing meals) more safely. Although data⁹ on tai chi are emerging, the strongest data¹⁰ on

SORT: KEY RECOMMENDATIONS FOR PRACTICE

<i>Clinical recommendation</i>	<i>Evidence rating</i>	<i>References</i>
Tailor exercise prescriptions to include FITT-PRO (Frequency, Intensity, Type, Time, and Progression of exercise) and cross-training guidelines to promote desired outcomes.	C	13-15, 18, 19
Exercise prescriptions should be considered a valuable adjunct therapy for patients regardless of their age, health, or frailty status.	C	25, 26
Exercise prescriptions and associated health benefits should be communicated in a way that is meaningful to patients including keeping the language simple and checking for understanding and agreement.	C	22, 24, 30, 31
Physicians should provide patients with the tools necessary to safely initiate a health-specific program (e.g., communicating a consistent message and providing ongoing patient support through partnerships with hospital- and community-based resources).	C	22, 23

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, see page 363 or <http://www.aafp.org/afpsort.xml>.

TABLE 1
Exercise Terminology

<i>Term</i>	<i>Definition</i>
Aerobic exercise	Exercise that involves repetitive motions, uses large muscle groups, increases heart rate for an extended period, and raises core body temperature (e.g., walking, dancing, swimming)
Balance training	Exercise that helps maintain stability during daily activities and other exercises, preventing falls. It can be static (e.g., stand on one leg) or dynamic (e.g., walk a tightrope), with hand support as needed
Exercise	Structured, planned, and repetitive physical activity with the intent of improving physical fitness
Flexibility or stretching exercise	Exercise that lengthens muscles to increase a joint's capacity to move through a full range of motion. Stretches can be static (assume position, hold stretch, then relax); dynamic (fluid motion [e.g., tai chi]); active (balance while holding stretch, then moving [e.g., yoga]); or a combination (proprioceptive neuromuscular facilitation).
Lifestyle modification	Use opportunities in a person's daily routine to increase energy expenditure (e.g., manually open doors, carry groceries, use stairs) and substitute active for sedentary leisure time
Physical fitness	The summation of four factors: cardiorespiratory endurance, muscle power, flexibility, and body composition
Power	How quickly a muscle contracts (e.g., quickly hoisting a grocery bag versus slowly lifting the bag)
Progressive resistance training	Exercise that requires muscles to generate force to move or resist weight, with the intensity increasing as physical capacity improves (e.g., strength training)

effective balance training methods support combination programs that include progressive resistance training. Emphasis on muscle power (how fast the muscle contracts) rather than strength alone may help patients retain the greatest amount of functional capacity as they age.^{11,12} Regardless of age or health status, continual improvement requires a progressively increasing resistance as the patient becomes stronger.^{13,14}

Flexibility is the ability to move a joint through a complete range of motion.¹⁵ Flexibility facilitates movement and can help prevent injury throughout life. Poor lower back and hip flexibility may contribute to pain in the lower back muscles.¹⁵ Limited range of motion in the hip, knee, and ankle joints may increase the risk of falls and contribute to age-related gait changes.^{16,17}

Lifestyle modifications include finding opportunities

TABLE 2
American Heart Association Target Heart Rate Ranges

<i>Age (years)</i>	<i>Target HR (bpm)*</i>	<i>Average maximum HR (bpm)</i>
60	80 to 120	160
65	78 to 116	155
70	75 to 113	150
75	73 to 109	145

HR = heart rate; bpm = beats per minute.

**—50 to 75 percent of maximum HR.*

Information from reference 8.

TABLE 3
Guidelines for the FITT-PRO Approach to Exercise Prescriptions*

<i>Frequency and time</i>	<i>Intensity</i>	<i>Progression</i>
General exercise		
30 minutes or more of continuous or accumulated physical activity, seven days per week	Moderate intensity assessed by one of the following criteria: Able to speak but not sing comfortably during exercise Somewhat difficult (Borg RPE† at 12 to 14) Maximum heart rate of 65 to 75 percent (or 55 to 64 percent for patients who are unfit)	Increase intensity over time to maintain moderate intensity criteria.
Aerobics training		
20 to 60 minutes of continuous or intermittent exercise (minimum of 10 minutes per episode), three to seven days per week Frequency depends on intensity; seven days per week is preferred	Moderate intensity (see above criteria)	Increase the length of the exercise session every few weeks without altering intensity. Next, maintain session length but increase intensity intermittently for a brief time (e.g., increase the pace for 20 steps, then return to a comfortable pace for three minutes, repeat).
Resistance training‡		
The following regimen should be performed two or three days per week: One set of 10 to 15 repetitions of low-intensity weight One set of eight to 10 repetitions of moderate-intensity weight One set of six to eight repetitions of high-intensity weight	Weight intensity: Low: 40 percent of 1-RM§ Moderate: 41 to 60 percent of 1-RM§ High: greater than 60 percent of 1-RM§	When 15 low-intensity repetitions are perceived as somewhat difficult for the patient (Borg RPE† at 12 to 14), increase the weight for the next session. Gradually work back up to 15 repetitions per session at the new weight.
Flexibility training 		
The following regimen should be performed two or three times per week: Three or four repetitions for each stretch; rest briefly between stretches (30 to 60 seconds). Hold static stretches 10 to 30 seconds.	Include static and dynamic techniques to stretch all major muscle groups. Hold stretch in a position of mild discomfort.	Add new stretches to the routine, progress from static poses to dynamic moves, or reduce reliance on balance support.

FITT-PRO = Frequency, Intensity, Type, Time, and Progression; RPE = rate of perceived exertion; 1-RM = one repetition maximum.

*—Emphasize endurance training supplemented by resistance training. More activity may be necessary to reach specific goals. See Table 4 for disease-specific guidelines.

†—The Borg RPE scale is available at http://www.cdc.gov/nccdphp/dnpa/physical/measuring/perceived_exertion.htm.

‡—Multiple-set regimens may provide greater benefits, if time allows. For frail or previously sedentary patients, low-intensity training with 10 to 15 repetitions may be a prudent starting point. Patient should maintain normal breathing patterns and proper technique.

§—Repetition maximum is the most weight that can be lifted through a full range of motion, in good form, for one repetition.

||—Few researchers have tested whether flexibility programs can prevent or reverse the decline in range of motion with age.

Information from references 13 through 15, 18, and 19.

within patients' existing daily routines to increase activity (e.g., manually opening doors, taking stairs rather than elevators, parking further from entrances).

COMPONENTS OF AN EXERCISE PRESCRIPTION

A successful exercise prescription is succinct, measurable, patient-appropriate, and in a form that allows the physician to address compliance expectations and barriers. Exercise prescriptions will vary depending on the desired

outcomes; however, they should include cross-training (combinations of activities) to optimize health outcomes, reduce injury risk, and encourage program continuance. Cross-training programs emphasizing core muscle groups (i.e., back, thighs, abdomen, and other weight-bearing muscles) are preferred. An exercise prescription should include the following components: Frequency, Intensity, Type, Time, and Progression (FITT-PRO) of exercise. Table 3^{13-15,18,19} provides recommendations for

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prescribing aerobic, resistance, and flexibility training for older adults. The activities and intensity levels should depend on the patient's daily health and energy needs, and the training routine should vary to maintain interest and promote optimal gains. Chair- and bed-based exercise should be considered as a starting point and used by frail patients.

Effective exercise prescriptions should consider comorbidities and be reevaluated and adjusted periodically to maintain the desired therapeutic effect. Physicians can evaluate patients' physical activity levels during health maintenance examinations and chronic disease visits. Prescriptions should encourage patients to limit sedentary activities such as television watching and computer use. *Table 4* is a sample patient-based exercise prescription

that addresses lifestyle modification and aerobic, strength, and flexibility training. Many activity selections (e.g., circuit training, yoga) can fulfill multiple requirements.

COMMUNICATION BARRIERS

Quality physician-patient communication, including shared decision making, improves patient satisfaction and clinical outcomes associated with exercise prescriptions. More than 33 percent of patients 65 years or older and up to 80 percent of patients in public hospitals have poor health literacy.²⁰ Written, disease-specific handouts containing simple language and diagrams can reduce misinterpretation. Physicians should keep directions explicit and measurable and clearly define activity intensity and variety. For example, a physician can tell the patient, "Take a 10-minute walk, three times a day, every day of the week. Choose a speed that allows you to talk but that is moderately hard work. The distance is not important, but make sure to walk for the entire 10 minutes."

EXERCISE AND COMORBIDITIES

In older adults, medical clearance and appropriate follow-up are important parts of exercise programs.¹⁵ By following the American College of Sports Medicine's assessment guideline, medical and trained exercise professionals can determine the appropriate components for the patient's individual exercise program. Exercise testing protocols specific to the patient's age, health status, current activity level, and desired exercise intensity are available.¹⁵ Maximal exercise testing (a stress test) is recommended for older adults (men 45 years or older, women 55 years or older) who are starting vigorous training programs.¹⁵

Risk factors also should be identified using a screening tool; however, some patients require a more thorough examination.¹⁵ Screening tools from the American College of Cardiology and the American Heart Association are available at http://www.acc.org/clinical/guidelines/exercise/exercise_clean.pdf.^{15,21} *Table 5*¹⁵ lists disease-specific exercise considerations.

THE FIVE A'S

To support behavior change, physicians should use the five A's model (i.e., Assess, Advise, Agree, Assist, and Arrange) when

TABLE 4

Exercise Prescription

Lifestyle modification

Brisk dog walk: 15 minutes each morning and evening, regardless of weather, seven days per week with wife; Borg RPE* at 13 to 14

Take the stairs: One flight up, two flights down

Park at perimeter of parking lots: Walk to entrances

Yard work: One day per week, weather permitting

Aerobic exercise

Brisk dog walk: See above

Group circuit training class: 50 minutes, two mornings per week of bicycle or elliptical training at the local senior center

Flexibility training

Balance ball: Stretch back, chest, hamstrings, gastrocnemius, and Achilles tendon for five minutes each morning and 10 minutes each evening, seven days per week using physician-provided, illustrated handouts with stretch variations

Introductory yoga video: 60 minutes each Sunday morning for one month, then reassess with physician

Progressive resistance training

Group circuit training class: 50 minutes, two mornings per week of total body strength and range-of-motion training at the local senior center; Borg RPE* at 12 to 15

Balance ball: Core muscle training (abdominal curls and back extensions) every other day while watching television: one set of 10 repetitions for each exercise

RPE = rate of perceived exertion.

*—The Borg RPE scale is available at http://www.cdc.gov/nccdphp/dnnpa/physical/measuring/perceived_exertion.htm.

NOTE: A sample of a patient-based exercise prescription. Prescription includes exercise goals for a 70-year-old retired man presenting with sleep complaints, lack of energy, back stiffness, and knee pain. He has weak quadriceps and abdominal muscles and tight hip flexor and hamstring muscles.

TABLE 5
Disease-Specific Exercise Considerations*

Arthritis

Special considerations

Focus on improving functionality through cross-training; functional exercises include sitting and standing and stair climbing.

Start with repeated short bouts of low-intensity exercise every day, progressively increasing the duration.

Exercise affected joints using a pain-free range of motion for flexibility training.

PRT should begin using the patient's pain threshold as an intensity guide; begin with as little as two or three repetitions and work up to 10 to 12 repetitions, two or three days per week.

Cardiovascular exercise initially should be brief (10 minutes), adding five minutes per session until 30 minutes is reached; cardiovascular exercises may be weight bearing (walking) or nonweight bearing (cycling, hydrotherapy).

Contraindications

Avoid vigorous, repetitive exercises that use unstable joints; overstretching; and morning exercise if rheumatoid arthritis-related stiffness is present.

Avoid exercising joints during flare-ups.

Discontinue exercise if patient has unusual or persistent fatigue, increased weakness, or decreased range of motion, or if joint swelling or pain lasts for more than one hour after exercise.

Diabetes

Special considerations

Aim to expend at least 1,000 kcal per week (equivalent to walking 10 miles). If weight loss is a goal, aim for more than 2,000 kcal per week.

PRT should include lower resistance (40 to 60 percent of 1-RM†) and lower intensity; use major muscle groups; repetition goal should be 15 to 20, focusing on proper form and breathing to prevent Valsalva maneuver.

Before beginning an exercise program, patients should undergo a medical evaluation to assess cardiovascular, nervous, renal, and visual systems and the risk of diabetic complications.

Contraindications

Intense PRT may cause an acute hyperglycemic effect; basic PRT may cause postexercise hypoglycemia, especially in patients taking insulin or oral hypoglycemic agents.

Patients with diabetes and concomitant retinopathy and overt nephropathy may have reduced exercise capacity.

Peripheral neuropathy may be associated with gait and balance abnormalities; consider limiting weight-bearing exercises and addressing patient foot care.

With autonomic neuropathy, emphasize the Borg RPE‡; monitor patient for heart rate and blood pressure response to exercise, thermoregulation, signs of silent ischemia, and postexercise plasma glucose levels.

Polyuria may contribute to dehydration and compromised thermoregulation.

Hypertension

Special considerations

Focus on aerobic activities that use large muscle groups.

Patients should exercise 30 to 60 minutes, three to seven days per week to effectively lower blood pressure; daily exercise may be most effective.

Intensities of 40 to 70 percent 1-RM† appear to be as effective as higher intensities in lowering blood pressure.

PRT should be combined with aerobic activity using lower resistance and more repetition; patients should follow proper form and breathing to prevent Valsalva maneuver.

Beta blockers may attenuate heart rate response and reduce exercise capacity, and other medications may impair thermoregulation; therefore, patients should cool down gradually after exercise to prevent hypotension.

Obesity

Special considerations

Focus on daily activities that use large muscle groups and increase total energy expenditure.

Patients should exercise 45 to 60 minutes, five to seven days per week.

Initial intensity should be 40 to 60 percent VO_2 reserve with an emphasis on increased duration and frequency; progression to 50 to 75 percent VO_2 reserve will help the patient expend calories faster; a vigorous program may not be necessary if moderate activities such as walking are preferred and will promote compliance.

Contraindications

To prevent orthopedic injury, aerobic intensity and duration may be maintained at or below usual recommendations and modified as needed; nonweight-bearing aerobic activities or frequent rotation of modalities may be required.

Equipment modifications may be required, because treadmills have weight limits and cycle or rowing seats may be too small; free weights may be used instead of weight machines, if needed.

Because risk of hyperthermia during exercise is increased in patients who are obese, hydration and proper attire should be emphasized.

PRT = progressive resistance training; 1-RM = one repetition maximum; RPE = rate of perceived exertion; VO_2 = volume of oxygen utilization.

*—Considerations should accompany guidelines from Table 3.

†—Repetition maximum is the most weight that can be lifted through a full range of motion, in good form, for one repetition.

‡—The Borg RPE scale is available at http://www.cdc.gov/nccdphp/dnpa/physical/measuring/perceived_exertion.htm.

Table 5 continues

TABLE 5 (continued)
Disease-Specific Exercise Considerations*

Osteoporosis

Special considerations

Focus should be on improving balance and functionality.
Frequency should include weight-bearing aerobic activities four days per week; PRT two or three days per week; flexibility five to seven days per week; and functional exercise (e.g., chair stand, stair-climbing, vigorous walking).
Intensity should be 40 to 70 percent VO_2 reserve for aerobic activities; PRT (Borg RPE \ddagger at 13 to 15) should include one or two sets of eight to 10 repetitions.
Pain status will dictate the exercise plan; patients severely limited by pain should consult a physician before initiating an exercise program.

Contraindications

Avoid explosive movements and high-impact loading (e.g., jumping, jogging) and dynamic abdominal exercise with excessive trunk flexion and twisting (e.g., sit-ups, golf swing, bending while picking up objects).

Peripheral arterial disease

Special considerations

Because patients with peripheral arterial disease are at a high risk of cardiovascular disease, an exercise stress test should be performed before the physician creates an exercise prescription; many patients are extremely deconditioned.

Pulmonary disease

Special considerations

The minimum frequency goal should be three to five days per week; those with impaired functional capacity may benefit most from daily exercise; patients should initially exercise intermittently for 10 to 30 minutes per session until they progress to 20 to 30 minutes of continuous exercise.
An exercise subspecialist should monitor initial training sessions, and modifications should be made in response to symptoms; patients may be taught to use a heart rate or a dyspnea scale to assess intensity.
Walking is strongly recommended; stationary bicycling may be an alternative.
PRT with emphasis on shoulder girdle and inspiratory and upper extremity muscles is important.

PRT = progressive resistance training; 1-RM = one repetition maximum; RPE = rate of perceived exertion; VO_2 = volume of oxygen utilization.

*—Considerations should accompany guidelines from Table 3.

†—Repetition maximum is the most weight that can be lifted through a full range of motion, in good form, for one repetition.

‡—The Borg RPE scale is available at http://www.cdc.gov/nccdphp/dnpa/physical/measuring/perceived_exertion.htm.

Information from reference 15.

helping a patient with an exercise regimen. Physicians should begin by assessing the patient's current fitness level and willingness to begin an exercise program. Activity readiness questionnaires from the Canadian Society for Exercise Physiology are available at <http://www.csep.ca/forms.asp>.¹⁵ These questionnaires can be given to patients in the waiting room before their appointments.

During the office visit, the physician should stress the importance of physical activity and introduce exercise options and guidelines. Support networks within the family and community are key to long-term exercise compliance and should be discussed. Physicians can improve compliance by making exercise programs social activities. Physicians may provide a take-home information packet including handouts on exercise-associated health benefits; resistance, aerobic, and flexibility training; and lifestyle modification, plus illustrations and guidelines for balance balls or other specialized exercise equipment.^{22,23}

The patient and physician should collaboratively select long- and short-term fitness goals, including how the patient will meet the goals (e.g., social support, time management, behavior changes).²⁴ Physicians should counsel patients on performing some form of activity every day, problem solving, and gradual incorporation of additional exercise to meet patient-specific goals. The patient can keep a log, including questions and barriers to exercise, that can be discussed at follow-up visits. For example, if the patient does not exercise because of inclement weather, the physician can discuss appropriate clothing, moving exercise indoors, or changing activities. Short-term support can include a brief phone call one week after the program begins. Finally, the physician should provide referrals for physical therapy or special assistance, if needed.

Age should not limit exercise training^{25,26}; however, experts recommend a more gradual approach in older

TABLE 6

Resources for Information on Exercise for Older Patients

ACSM Fit Society Page (click publications and other media)
Web site: <http://www.acsm.org>

ACSM Position Papers
Web site: <http://www.acsm-msse.org/pt/re/msse/positionstandards.htm>

CDC Physical Activity for Everyone
Web site: <http://www.cdc.gov/nccdphp/dnpa/physical/index.htm>

CDC Report of the Surgeon General
Web site: <http://www.cdc.gov/nccdphp/sgr/fact.htm>

ICAA: Common Questions and Answers About Exercise
Web site: <http://www.icaa.cc/FacilityLocator/Doctors/physiciantools.htm>

Shape Up America!
Web site: <http://www.shapeup.org/>

ACSM = American College of Sports Medicine; CDC = Centers for Disease Control and Prevention; ICAA = International Council on Active Aging.

patients.¹⁸ Before arranging for an exercise program, physicians should consider social preferences (e.g., solitude or socialization), cultural norms, exercise history, instructional needs, readiness, motivation, self-discipline, short- and long-term goals, and logistics. For example, home-based exercise can be effective for physically or financially limited patients,^{27,28} whereas patients who are frail or who have balance and agility problems may benefit more from supervised activities. Patients who usually do not exercise may enjoy moderately vigorous activities such as dancing or walking.

PRACTICAL TIPS

A Scandinavian study²⁹ suggests that older patients whose physicians had advised them to exercise were five to six times more likely to participate in supervised exercise classes, and men were more than 12 times more likely to perform calisthenics at home.²⁹ Incorporating activity counseling into routine patient care involves the following:

- Confirm that the patient understands the exercise prescription and its expected health benefits (e.g., ask what activity the patient is doing, how often and how intensely he or she is active, and what health benefits are expected).
- Translate new exercise-related information that is presented in the media.

- Recommend credible resources from which patients can get information about exercise.
- Encourage affordable community-based exercise and support programs.
- Foster a continued exercise and health message.
- Serve as a resource for the nonmedical personnel who implement community and home-based exercise programs (e.g., offer annual question-and-answer or medical update sessions).

Successful exercise prescriptions require collaboration between the physician and the patient.^{30,31} Physicians should consider offering group visits and workshops to address the whys and hows of exercise. Collaboration with hospital-sponsored or hospital-approved exercise programs and physical therapy and community-based programs increases exercise accessibility and provides patient support while cutting costs. Physicians also should support personal, local, and federal initiatives that encourage increased physical activity. *Table 6* includes resources for more information on creating exercise programs; many of these Web sites offer downloadable handouts.

This material is based on work supported by the U.S. Department of Agriculture, under agreement No. 58-1950-4-401. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the view of the U.S. Department of Agriculture.

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Author disclosure: Financial support for Dr. McDermott was provided by the National Institute of Diabetes and Digestive and Kidney Diseases (F32-DK064512-03).

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