

How I Do It

PRESCRIBING EXERCISE TO SENIORS: A STEP-BY-STEP GUIDE TO IMPROVING MEDICAL CONDITIONS

A. S. Abdulla, BSc, MD, CCFP, DipSportMed

Medical Director, Kingsway Health Centre and Family Sports Medicine Consultants, Toronto, ON



A.S. ABDULLA

Exercise prescription has been the cornerstone of the author's medical practice because of its pluripotential health improvements. It has been used as an adjunct to quitting cigarette smoking, reversing Type 2 diabetes into milder glucose intolerance that is diet-controlled, and minimizing destabilizing mood disorders of patients suffering from somatiform disorders. The properly-prescribed exercise regimen incorporates patients' interests, needs and goals, and overcomes their perceived barriers. The properly-prescribed exercise regimen will motivate a patient's innate sensibilities to facilitate lifelong compliance, and will improve various medical conditions.

Key words: Exercise, elderly, aging, wellness

INTRODUCTION

The author has spent many years counselling patients on the merits of dietary modifications in diabetes, hypercholesterolemia, and obesity, the avoidance of salt and caffeine for hypertensives, adequate calcium and vitamin D intake for the prevention of osteoporosis, cessation of smoking for the improvement of cardiac and pulmonary risk factors, and cognitive therapy for depression and anxiety disorders. However, we have never found a more profound impact on all of the above medical conditions as well as the patient's general well-being than a properly prescribed and facilitated exercise regimen. This article briefly reviews the epidemiology of sedentarianism, the general benefits and risks of exercise, a short primer on the types of exercise, and then a step-by-step approach to exercise prescription. The intent of this article is to increase the level of activity in the geriatric population safely and work through the basics of exercise prescription. The medical approach to dealing with more advanced levels of physical activity falls beyond the scope of this article.

Correspondence to: Dr. A. S. Abdulla, 945 Royal York Rd., Toronto, ON M8X 2E6. Fax: (416) 239-6492. Ottawa Office: 99 Kakulu Road, Kanata, ON K2L 3C8.
E-mail: drabdulla@doctor.com

EPIDEMIOLOGY

The "baby boom" generation is entering the age of seniority and over the next 20 years will comprise nearly 25% of the entire population. At the turn of the last century only 4% of the population reached this age.¹ The over 65 geriatric population uses healthcare resources at a higher per capita level than any other group. As well, there has been a reduction in the level of physical activity and an increase in obesity in the general population over the last decade.^{3,4} This leads one to extrapolate a pessimistic future prospect of obese, sedentary seniors with multiple medical concerns swallowing almost the entire healthcare budget.

BENEFITS OF EXERCISE

The benefits of exercise are multiple, but medical research in this area was essentially nonexistent before 1980.⁵ Increasing fitness levels have had the empiric effect of reducing the effects of aging.^{6,7} Increasing fitness levels have been associated with longer lives and decrease in certain cancers and cardiovascular deaths.⁵⁻¹⁰ Exercise has been found to improve both physical and mental well-being through the following categories: improved body physique (including increased muscle mass, strength, flexibility, bone density, and reduction in body fat),^{5,7,11-13} reduced disability associated with arthritis,^{14,15} improved balance and reduced falls,^{7,16} and improved psychological health.^{17,18} Specifically, exercise has been shown to improve glucose tolerance and reduce insulin resistance, improve abnormal lipoprotein profiles, reduce hypertension and left ventricular hypertrophy, improve resting metabolic rate, and reduce abdominal obesity.⁵

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RISKS OF EXERCISE AND OF EXERCISE TESTING

The risks associated with physical activity of light to moderate intensity are highest for those individuals with established cardiac disease or poorly managed condition(s), less so for those individuals with coronary artery disease risk factors of undetermined significance, and the lowest for those in the healthy non-smoking category up to and including stable well-managed medical conditions.¹⁹ An annual physical examination usually is able to differentiate between these categories. There is, however, a more objective evaluation of exercise-associated risk that I include in my annual examination. The Canadian Society for Exercise Physiology (CSEP-www.csep.ca) through Health Canada has developed the Physical Activity Readiness Questionnaire (PAR-Q) (Table 1), which can readily identify those adults for whom physical activity might be inappropriate or those who should have a more thorough medical work-up.^{20,21} These individuals can be further evaluated using a (sub)maximal graded exercise testing (GXT), commonly call a “stress test”. The risk of exercise testing by maximal GXT is death <0.01% and myocardial infarction <0.04%.¹⁹ The risks for submaximal GXT are lower and thus it is the preferred choice given our intention to improve these patients activity levels and not to get them to compete in marathons. There are contraindications for exercise testing that must be noted (Table 2).¹⁹

Table 1. Physical Activity Readiness Questionnaire PAR-Q

| | YES | NO | |
|----|--------------------------|--------------------------|---|
| 1. | <input type="checkbox"/> | <input type="checkbox"/> | Has your doctor ever said you have heart trouble? |
| 2. | <input type="checkbox"/> | <input type="checkbox"/> | Do you frequently have pains in your heart and chest? |
| 3. | <input type="checkbox"/> | <input type="checkbox"/> | Do you often feel faint or have spells of severe dizziness? |
| 4. | <input type="checkbox"/> | <input type="checkbox"/> | Has a doctor ever said your blood pressure was too high? |
| 5. | <input type="checkbox"/> | <input type="checkbox"/> | Has your doctor ever told you that you have a bone or joint problem such as arthritis that has been aggravated by exercise, or might be made worse with exercise? |
| 6. | <input type="checkbox"/> | <input type="checkbox"/> | Is there a good physical reason not mentioned here why you should not follow an activity program even if you wanted to? |
| 7. | <input type="checkbox"/> | <input type="checkbox"/> | Are you over age 65 and not accustomed to vigorous exercise? |

Table 2. Contraindications to exercise testing

Absolute Contraindications

1. A recent significant change in the resting ECG suggesting infarction or other acute cardiac event.
2. Recent complicated myocardial infarction (unless patient is stable and pain free).
3. Unstable angina.
4. Uncontrolled ventricular arrhythmia.
5. Uncontrolled atrial arrhythmia that compromises cardiac function.
6. Third degree AV heart block without pacemaker.
7. Acute congestive heart failure.
8. Severe aortic stenosis.
9. Suspected or known dissecting aneurysm.
10. Active or suspected myocarditis or pericarditis.
11. Thrombophlebitis or intracardiac thrombi.
12. Recent systemic or pulmonary embolus.
13. Acute infections.
14. Significant emotional distress (psychosis).

Relative Contraindications

1. Resting diastolic blood pressure >115 mm Hg or resting systolic blood pressure >200 mg Hg.
2. Moderate valvular heart disease.
3. Known electrolyte abnormalities (hypokalemia, hypomagnesemia).
4. Fixed-rate pacemaker (rarely used).
5. Frequent or complex ventricular ectopy.
6. Ventricular aneurysm.
7. Uncontrolled metabolic disease (e.g., diabetes, thyrotoxicosis, or myxedema).
8. Chronic infectious disease (e.g., mononucleosis, hepatitis, AIDS).
9. Neuromuscular, musculoskeletal, or rheumatoid disorders that are exacerbated by exercise.
10. Advanced or complicated pregnancy.

TYPES OF EXERCISE

The two most common types of exercise training are aerobic/cardiovascular endurance training and muscular strength/resistance training. Other types of exercise training include flexibility, balance and coordination.

Cardiovascular endurance training deals with the improvement in the body's ability to utilize oxygen efficiently while the body moves. It is training to prevent one from getting winded or tired after walking up a flight of stairs. This type of exercise is best carried out when the individual utilizes his/her large muscle groups over an extended period of time in a rhythmic fashion. Examples include walking, cycling, swimming, skating, dancing, skipping, etc. It is important to define the intensity, duration, and frequency as one moves from the conditioning to improvement to maintenance stages (see Constituents of the Exercise Regimen). This type of

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exercise training is an excellent starting point for increasing the level of activity. While aerobic training is helpful for stamina and cardiopulmonary fitness, it has little influence on muscle strength or mass, especially in the upper body.

Resistance training or weight training is the use of a gradually increasing resistance over time to develop muscle strength. It is the ability to hold, lift or carry a bigger bag of groceries for a longer time without having to ask for help.

Flexibility is an area of exercise training that is often neglected, most likely because it can be perceived as both boring and ambiguous in its goals. Simply put, no one boasts about their ability to do a hamstring stretch. However, stretching and flexibility are tantamount to maintaining and improving joint range of motion. Lack of flexibility is rampant in the elderly and integral to the reduced ability to perform activities of daily living. Accordingly, any exercise prescription for the elderly should include a stretching program focusing on the upper and lower trunk, neck, and hip/posterior thigh.^{6,19}

Balance and coordination are best incorporated into sport, because development of certain skills intuitively incorporates these faculties. Examples include tennis, golf, and cross-country skiing.

APPROACH TO EXERCISE PRESCRIPTION

During a patient's annual physical examination, we have the opportunity to review the patients' physical health and have the following laboratory results; fasting blood work, ECG, chest x-ray, and pulmonary function tests. It is routine to ask about their physical fitness. For those patients who are regularly active, I review their activities, intensity, duration, and frequency (see Constituents of the Exercise Regimen) and develop the next goal. For those who are minimally active and have needs for further testing, they are appropriately counselled. For those who are minimally active and have no contraindications to exercise, the following is my step-by-step approach. Christmas and Andersen have developed an approach to exercise prescription which also has merits.²²

QUESTIONING

Typically, I inquire about the patient's knowledge of the benefits of exercise. More often these days patients are well-educated but perhaps a bit "stuck

in their ways". I ask about their interest in regular physical fitness. This is when I hear the "Yes, but..." diatribe of perceived barriers. It is important at this juncture to listen and list the patient's concerns, so that they can be successfully challenged. These concerns usually fall into the following categories: unsure of the program to follow, concern about personal safety or health, laziness, tiredness, aggravation of a present condition (like an arthritic knee), and finally lack of time.²² It is best to review their previous physical activity level to ensure that we appropriately challenge an ex-hockey player and not frighten a couch potato. This often lets the physician assess the appropriate starting point, the pace of progress, and the expectations. Then, I usually say "Wouldn't you like to improve so-and-so?" and that I would be willing to assist the patient in this endeavour. Sometimes patients literally jump at this opportunity, while others are a bit hesitant. For the hesitant ones, we have started a new dialogue. For those who are willing, our job has just begun.

PRELIMINARY PROGRAM

It is at this stage that the art of exercise prescription is successfully ingrained. This requires a fine balance of exercise science and behavioral techniques to create long-term compliance and attainment of the individual's goals.¹⁹ All attempts are commended, and any indiscretions are calmly redirected to the goals without guilt. I ask the patient to choose an aerobic activity and to commit to a frequency of 3 to 4 times a week on non-consecutive days. This is recorded in the chart as a tacit contract. There are no limits to the minimum duration at this stage because our interest is to increase physical activity.

I usually include a stretching program after the aerobic activity at this stage as a matter of habit and prevention. A series of easy-to-understand stretches are published in the American College of Sports Medicine Fitness Book.^{19,23} I include a calf stretch, a hamstring stretch, a quadricep stretch, a few back stretches, and if motivated a groin stretch, a shoulder stretch and neck stretches. Each stretch should last about 15 seconds up to a position of mild discomfort, three times for each, in a slow, controlled motion (non-ballistic) with a gradual progression to greater ranges of motion (ROM).^{19,23,24} I always include the proviso that if anything hurts, take the next time off or do not progress the next time in duration of program or extent of stretch.

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Finally, I ask each patient to record their heart-rate upon waking and their post-exercise heart-rate. This serves two purposes: 1) it helps to familiarize the patient with his or her level of exertion; 2) it helps in the true exercise regimen for target intensity levels. The appropriate stage of promotion to the next stage is based on dialogue between the patient and his/her physician-coach. Sometimes the first stage of the exercise regimen is assiduously expounded upon from this preliminary program.

CONSTITUENTS OF THE EXERCISE REGIMEN

Stage I: Initial Conditioning

This stage can be distinctly approached or more often extends almost imperceptively from the preliminary program. Each of these stages will include a warm-up, a stretching program, resistance training, and a cardiovascular endurance component. This stage can last 4 to 8 weeks, based on the individual's interest and adaptation to the progression of challenge. The expectation is to follow the exercise prescription 3 to 4 days per week on non-consecutive days. The exercise program's duration should begin at about 12 minutes and progress to 20-30 minutes (it is possible to divide this into 10 minute aliquots). This stage should start with a 5-minute walk, a 5-minute stretching program, and light resistance exercises using whatever appliances are available (e.g. various sizes of canned goods, condominium facilities) involving squats, sloppy push-ups, leg raises, arm raises, abdomen tightening and back exercises for the remainder of the time. As the regimen progresses, the walk can be lengthened or exchanged for another low level aerobic activity (like stationary-bike riding, swimming, walking stairs), or split before and after the resistance training.

The aerobic component involves a target heart-rate of between 40 to 60% of maximum heart-rate*, which is compatible with mildly laboured ability to talk during exercise. The resistance training involves 6 to 8 repetitions of each exercise, with proper form, through a full ROM, and with a normal breathing pattern. Individual goals should guide progression. They should be realistic and generously rewarded.^{19,25,26}

*Maximum heart-rate (HR max) = (220-age) (simplified calculation).²⁰

Stage II: Improvement

This stage has the same pattern of warm-up, stretching, resistance and aerobic training. This stage typically lasts 4 to 6 months. The exercise regimen continues at the same frequency of 3 to 4 times per week, but can alternate exercise days between an aerobic and a weight-training focus. The resistance training should attempt to train all major muscle groups (e.g. gluteals, quadriceps, abdominals, hamstrings, deltoids, pectorals, and latissimus dorsi) and to increase the number of repetitions up to 10. The goal for the end of this stage is to reach: 1) 70 to 75% of maximal heart-rate, 2) resistance training with known weights causing minimal muscle soreness, discomfort, or injury; and 3) duration up to 40-45 minutes. The rate of progression is, as always, commensurate with the individual's adaptation response. Commonly, progression in duration of exercise, and then intensity of both resistance and cardiovascular endurance, occurs every 2-3 weeks.^{19,25,26} The most important caveat is to not progress if pain, discomfort, or interposed illness is encountered. Sometimes a hold pattern or regression is required, which is why the preliminary stages of education and training were so important.

Stage III: Maintenance

This stage is usually achieved after 6 months of training. The key for this stage is to: 1) provide alternatives to ensure that exercise is enjoyable; 2) find a comfortable intensity, duration, and frequency (at least 3 times and not more than 5 times per week); and 3) set new goals based on the patient's new awareness and health.^{19,25,26} Patients at this stage are very proactive, because they feel the impact of their training and tend to want to exercise even during illness or disability. It is important to maintain realistic goals for each individual. One of my post-angioplasty patients went on to complete a marathon, but he was an exceptional individual.

REFERENCES

1. Kane RL, Duslander JG, Abrass IB et al. *Essentials of Clinical Geriatrics*, 2nd Ed. Minnesota: McGraw-Hill 1989: 20-1.
2. Brock D, Guralnick J, Brody KJ. *Demography and epidemiology of aging in the US*. Schneider E, Rowe J, eds. *Handbook of the Biology of Aging*. San Diego: Academic Press 1990: 2-23.
3. Centers for Disease Control and Prevention. 1994 BRFSS Summary Prevalence Report. Atlanta: US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion 1994.
4. Crespo CJ, Smit E, Anderson R et al. Race/ethnicity, social class and their relation to no leisure-time physical activity: Results from the Third National

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- Health and Nutrition Examination Survey 1988-94. *Am J Prev Med* 1999;3: 20-5.
5. Evans WJ. Exercise training guidelines for the elderly. *Med Sci Sports Exer* 1999; 31: 12-7.
 6. Exercise and physical activity for older adults. American College of Sports Medicine Position Stand. *Med Sci Sports Exer* 1998;30:992-1008.
 7. Hurley BF, Hagberg JM. Optimizing health in older persons: aerobic or strength training? In: Holloszy JO, ed. *Exercise and Sport Sciences Reviews*. Baltimore: Williams & Wilkins 1998: 61-89.
 8. Blair SN et al. Physical fitness and all-cause mortality: A prospective study of healthy men and women. *JAMA* 1989;262:2395-401.
 9. Shephard RJ. Exercise and cancer: linkages with obesity? *Crit Rev Food Sci Nutr* 1996;36:321-9.
 10. Powell KE, Blair SN. The public health burdens of sedentary living habits: theoretical but realistic estimates. *Med Sci Sports Exer* 1994; 26: 851-6.
 11. Ryan AS, Niclas BJ. Aerobic exercise maintains regional bone mineral density during weight loss in postmenopausal women. *J Appl Physiol* 1998; 84: 1305-10.
 12. Judge JO, Whipple RH, Wolfson LB. Effects of resistive training and balance exercises on isokinetic strength in older persons. *J Am Geriatr Soc* 1994;42:937-46.
 13. Morey MP, Cowper P, Fuessner I et al. Evaluation of a supervised exercise program in a geriatric population. *J Am Geriatr Soc* 1989; 37: 348-54.
 14. Ettinger WH Jr., Burns R, Messler SP et al. A randomized trial comparing aerobic exercise and resistance training with a health education program in older adults with knee osteoarthritis. The Fitness Arthritis and Seniors Trial (FAST). *JAMA* 1997; 277: 25-31.
 15. Hochberg MC, Allman RD, Brandt KD et al. Guidelines for the medical management of osteoarthritis, Part II: osteoarthritis of the knee. *Arthritis Rheum* 1995; 38: 1541-6.
 16. Province MA, Hadley EC, Hornbrook MC et al. The effects of exercise on the falls in elderly patients: a pre-planned meta-analysis of the FICSIT Trials, Frailty and Injuries: Cooperative Studies of Intervention Techniques. *JAMA* 1995; 273: 1341-7.
 17. O'Conner PJ, Aenchenbacher CE, Dishman RK. Physical activity and depression in the elderly. *J Aging Physiol Activ* 1993; 1: 34-58.
 18. Camacho TC, Roberts RE, Lazarus NB et al. Physical activity and depression: Evidence from the Alameda county study. *Am J Epidemiol* 1991; 134: 220-31.
 19. Kenney WL. ACSM's Guidelines for Exercise Testing and Prescription, 5th ed. Philadelphia: Williams & Wilkins 1995.
 20. Thomas S, Meredith CW, O'Sullivan P. Revision of the physical activity readiness questionnaire. *Can J Sport Sci* 1992; 17: 338-45.
 21. Shephard RJ, McCartney NR. The Canadian home fitness test. *Sport Med* 1991; 11: 358.
 22. Christmas C, Andersen RA. Exercise and older patients: guidelines for the clinician. *J Am Geriatr Soc* 2000; 48: 318-24.
 23. The recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness in healthy adults. Position stand of the American College of Sports Medicine. *Med Sci Sports Exer* 1990; 22: 265-74.
 24. Pollock ML, Wilmore JH. *Exercise in Health and Disease: Evaluation and Prescription for Prevention and Rehabilitation*, 2nd ed. Philadelphia: WB Saunders 1990.
 25. Hass CJ. Single versus multiple sets in long-term recreational weightlifters. *Med Sci Sport Exer* 2000; 32: 235-42.
 26. Skinner J. *Exercise Testing and Exercise Prescription for Special Cases*, 2nd ed. Philadelphia: Lea & Febiger 1993.
 27. Fiatarone MA, O'Neill EF, Ryan ND et al. Exercise training and nutritional supplementation for physical frailty in very elderly people. *N Engl J Med* 1994; 330: 1769-75.

CALENDAR OF MEETINGS

"Care Management, Who Needs it?", American Society on Aging, Vancouver, BC, **JUNE 28-JULY 1, 2001**. Fax: (415) 974-0300; e-mail: info@asaging.org

"3rd Annual U.S. Geriatrics & Long-term Care Congress" New Orleans, LA, USA, **June 28-July 1, 2001**. Tel: (949) 250-1008; fax: (949) 250-0445; website: www.gericongress.com

"One World, Diverse Approaches to Housing and Care", 4th International Conference of the International Association of Homes and Services for the Ageing, PanPacific Hotel, Vancouver, BC, **JUNE 29-JULY 1, 2001**. Contact Virginia Nuessles (Washington, DC). Fax 1(201) 220-0041; e-mail: sfrisbie@aahsa.org

"Global Aging", 17th Congress of the International Association of Gerontology, Vancouver, BC, **JULY 1-6, 2001**. Contact Gloria Gutman, Gerontology Research Centre, SFU, 515 W. Hastings St., Vancouver, BC. Fax: (604) 291-5066; e-mail: iag_congress@sfu.ca or iaf@sfu.ca website: www.harbour.sfu.ca/iag/

"Diseases of the Cardiovascular System & Immunity: Interactions and Therapeutics", International Society for Heart Research, Montreal, QC. **JULY 12-15, 2001**. Contact Dr. Ghassan Bkaily, fax: (819) 820-6807 or (819)

564-5320; e-mail: gbkael01@courrier.usherb.ca

"New Directions in Alzheimer Care", 10th National Alzheimer's Disease Education Conference, Hyatt Regency, Chicago, IL, USA, **JULY 15-18, 2001**. Tel: (312) 335-5790; website: www.alz.org

"Bridging the Gap Between Brain and Mind", 10th Congress of the International Psychogeriatric Association, Nice, France, **SEPT. 9-14, 2001**. Contact: Prof. Philippe Robert, Centre Mémorial, Clinique de Psychiatrie et de Psychologie Médicale, Hôpital Pasteur, 30 av de la voie Romaine, 06002 Nice, France. Fax: +33-4-9392-8338; e-mail: ipa2001@nice-acropolis.com

"2nd International Congress on Vascular Dementia", Paphos, Cyprus, **OCTOBER 4-7, 2001**. Fax: + 973-3-514-0077; e-mail: vascular@kenes.com

"17th International Conference, Alzheimer's Disease International", Christchurch, New Zealand, **October 25-27, 2001**. Cultures, Research, Caregiving, Delivery of Care, Workshops, Posters. Contact University of Canterbury, Private Bag 4800, Fax: 64 3 364 2057; e-mail: alz@cont.canterbury.ac.nz; website: www.conference.canterbury.ac.nz/alzheimer2001/index.html