Start Exercising Already!
A Physician's Step-by-step Guide to Prescribing Exercise for All Patients

ABSTRACT

Sedentarianism raises multiple health concerns. In an effort to provide safe options this article will include a short primer on types of exercises along with a step-by-step approach to exercise prescription in the adult population.

KEYWORDS: exercise, sedentarianism, exercise prescription

Introduction

This article will briefly review the epidemiology of sedentarianism and the general benefits and risks of exercise, and will include a short primer on types of exercises along with a step-by-step approach to exercise prescription. The aim of this article is to help you increase the level of activity among your adult patients safely and to work through the basics of exercise prescription. The medical approach to dealing with more advanced levels of physical activity is beyond the scope of this article.

Epidemiology

There has been a reduction in the level of physical activity and a converse increase in obesity and weight gain in the general population over the last decade.[1-3,10] This raises concerns about the prospect of obese, sedentary, adults with multiple medical concerns.

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Benefits

The benefits of exercise are multiple and there is an abundance of clinical research devoted to this topic. Interestingly enough, this field of medical research was essentially nonexistent prior to 1980.[4] My intention is to provide a brief review of the literature. Firstly, increasing fitness levels has empirically been shown to reduce the effects of aging associated with declining health and function.[5,6,29] Secondly, increasing fitness levels has been associated with longer lives and a decrease in all types of mortality including deaths due to certain cancers and cardiovascular events.[4-9] Thirdly, exercise has been shown to improve both physical and mental well-being through the following mechanisms: improved body physique (including increased muscle mass, strength, flexibility, bone density, and reduction in body fat),[4,6,11,12,18] reduced disability associated with arthritis,[13,14] improved balance and a reduction in falls,[6,15] and improved psychological health.[16,17] Fourthly, in more specific terms, 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.[4]

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Risks

This section is to be further subdivided into risks associated with physical activity and risks associated with exercise testing. The risks associated with light to moderate intensity physical activity can be categorized as follows: The risks are highest for those individuals with established cardiac disease or poorly managed condition(s) like "brittle" diabetes or high ventolin-use asthma. They are lower for those individuals with coronary artery disease (CAD) and risk factors of undetermined significance like smoking or hypercholesterolemia. They are lowest for those in the healthy non-smoking category, up to and including, stable well-managed medical conditions like controlled atrial fibrillation or stable chronic obstructive pulmonary disease.[19] A history and physical examination can be used to differentiate between these categories. There is, however, a more objective evaluation of exercise-associated risk. The Canadian Society for Exercise Physiology (CSEP)* through Health Canada has developed the Physical Activity Readiness Questionnaire (PAR-Q) which can easily identify adults for whom physical activity might be inappropriate or those

who should have a more thorough medical work-up prior to starting an exercise programme.[20-21] The PAR-Q is specifically designed for use on those individuals aged 15 to 69. Patients can be further evaluated with the use of (sub)maximal graded exercise testing (GXT). Exercise testing by maximal GXT carries a risk of death of less than 0.01% and a risk of myocardial infarction (MI) of less than 0.04%.[19] The risks from submaximal GXT are lower. Finally, there are contraindications for exercise testing that must be noted.[19]

Cardiovascular endurance training aims to improve the body's ability to utilize oxygen efficiently while the body is in motion.

Types of Exercise

Most physicians are aware of the two most common types of exercise training; aerobic/cardiovascular endurance training and muscular strength/resistance training. Other types of exercise are performed to improve flexibility, balance and coordination. Cardiovascular endurance training aims to improve the body's ability to utilize oxygen efficiently while the body is in motion. Examples include walking, cycling, swimming, skating, dancing, skipping, etc. The prescribing physician should define the intensity, duration, and frequency as his patient goes from the initial stage of conditioning to actual improvement in fitness to the maintenance stage (see constituents of the exercise regimen). This type of exercise training is an excellent starting point for increasing the level of activity and should be the main objective for the adult (see preliminary programme). Resistance training or weight training involves the use of a device or devices, which provide gradually increasing resistance for the purpose of developing muscle strength over time. Flexibility is an area of exercise training that is often neglected. However, stretching and flexibility are tantamount to maintaining and improving joint range of motion. Lack of flexibility is extremely common in the elderly and is primarily responsible for their inability to perform activities of daily living (ADL). Accordingly, any exercise prescription should include a stretching programme focusing on the upper and lower trunk, neck, and hip/posterior thigh.[5,19] Work on balance and coordination is best incorporated into sport activities because the development of certain skills will rely on the exercise of balance and coordination. Examples of such sports include tennis, golf, Tai Chi and lawn-bowling.

Approach to Exercise Prescription

During a patient's annual physi-

cal examination, it has become my routine to ask about their level of physical fitness. If a patient is active on a regular basis, I usually review their activities, assessing the intensity, duration, and frequency (to be described fully in constituents of the exercise regimen) and then develop a fitness goal. If a patient is minimally active, an assessment must be done to determine if there are any contraindications to exercising and if investigations should be done prior to starting an exercise programme.

With those who are minimally active but have no contraindications to exercise, I use my step-by-step approach. It is based on years of clinical experience in integrating exercise science methodologies from various sources with behavioural techniques. Christmas and Andersen have developed an approach to exercise prescription, which also has some merits.[22] Theirs is a review article that focuses on providing an approach to motivating the sedentary older patient, rather than on describ-

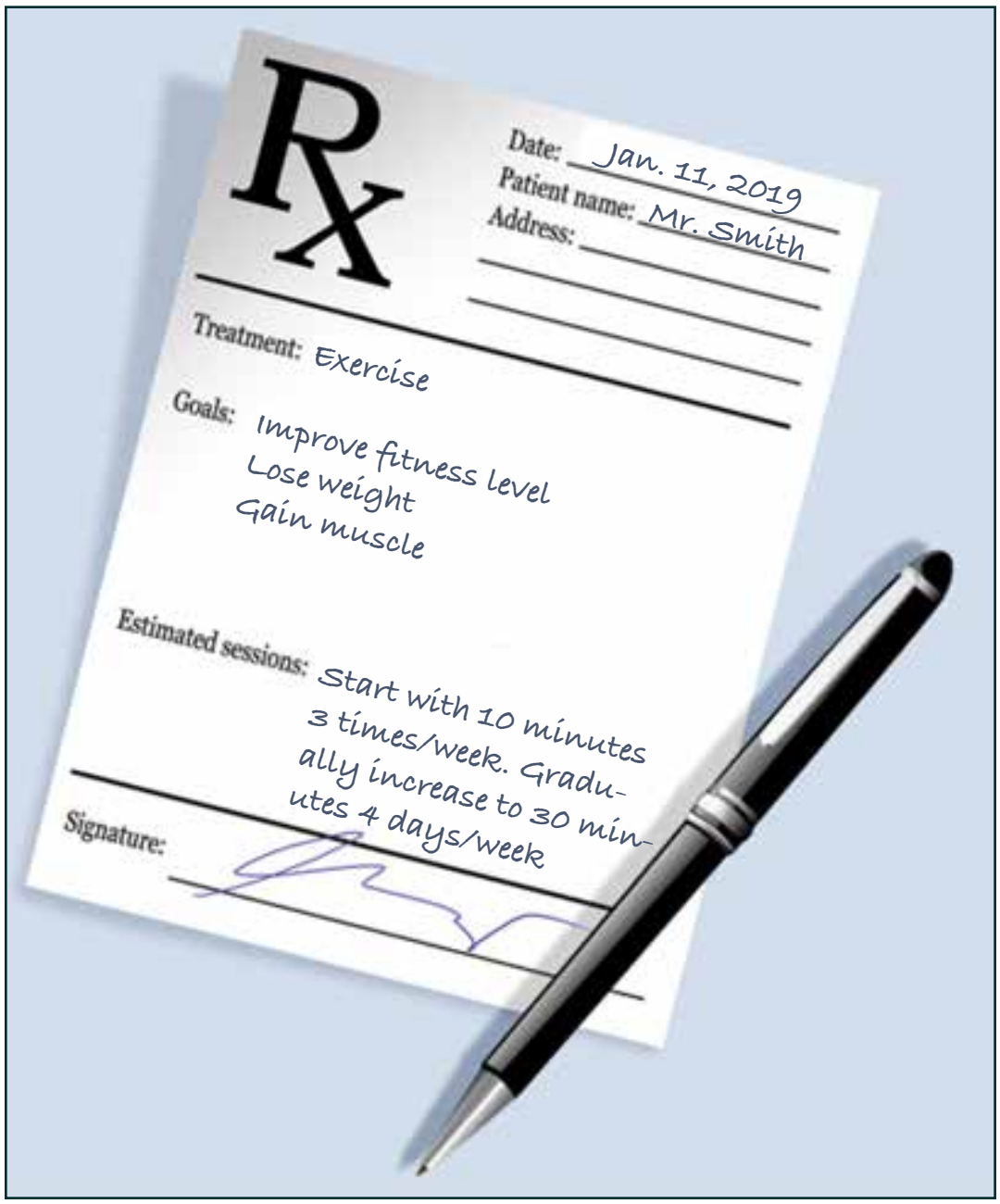
ing how to develop an exercise regimen, which happens to be my focus. Neither approach has been validated in clinical trials.

Questioning

Typically, I inquire about the patient's knowledge about the benefits of exercise. More often, these days, patients are very well-educated and have some interest in exercising but are not exercising for several reasons.[22] It is best to review their previous levels of physical activity to ensure that you challenge them appropriately. This often lets you determine the appropriate starting point, the pace of progress, and their expectations.

Preliminary Programme

In order to create long-term compliance and attain the individual patient's goals, a balance is required between the following principles of exercise prescription and human motivational techniques.[19] Every attempt should be commended, and any indiscretion should not be belaboured. The patient should be veered back to his goals without guilt. I ask the patient to choose an aerobic activity and to commit to a frequency of three to four times a week on non-consecutive days. This is recorded in the chart as a tacit contract. There are no limits placed on the minimum duration at this stage because our interest is to increase physical activity. This type of programme is acceptable as the only exercise prescription for the frail elderly. At this stage, so that it becomes a habit and prevents injury, I usually include a stretching programme that follows the aerobic activity. A series of easy-to-understand stretches are published in the American College of Sports Medicine's Fitness Book.



Finally, I ask each patient to record their heart rate upon waking and their post-exercise heart rate. This is the beginning of their exercise log, which will include the type of exercise, duration, intensity, and frequency. Patients should

SUMMARY OF KEY POINTS

1. Exercise has been shown to improve both physical and mental well-being through the following mechanisms: improved body physique, reduced disability associated with arthritis, mproved balance and a reduction in falls, and improved psychological health.

2. Most physicians are aware of the two most common types of exercise training; aerobic/cardiovascular endurance training and muscular strength/resistance training. Other types of exercise are performed to improve flexibility, balance and coordination.

3. The exercise programme's duration should begin at about 10 minutes and progress to 20-30 minutes (it is possible to divide this into tenminute aliquots).

4. The latest research confirms that only one set per exercise or strength training is required to have the same benefit as multiple sets

5. The most important caveat is not to progress if pain, discomfort, or interposing illness is encountered. Sometimes a holding pattern or regression is required

be encouraged to bring it to each appointment. This serves two purposes—ONE, it helps familiarize the patient with his or her level of exertion and progress, and TWO, it helps, within the actual exercise regimen, to target appropriate intensity levels. The appropriate juncture for promotion to the next stage is based on the dialogue between the patient and his/her physician-coach. Typically, this preliminary programme entices the patient into the first stage of the true exercise regimen.

Constituents of the Exercise Regimen

Stage One—Initial Conditioning

This stage is often an almost imperceptible extension of the preliminary programme. Each of these stages will include a warm-up, a stretching programme, resistance training, and a cardiovascular endurance component. This stage can last four to eight weeks depending upon the individual's interest and their ability to adapt to each new stage of the programme. The expectation is to follow the exercise regimen three to four days per week on non-consecutive days. The exercise programme's duration should begin at about 10 minutes and progress to 20-30 minutes (it is possible to divide this into ten-minute aliquots). This stage should start with a five-minute walk, a five-minute stretching programme, and light resistance exercises using whatever appliances or devices are available (e.g. various sizes of canned goods). As the regimen progresses the walk can be lengthened, or replaced with another low level aerobic activity (like stationary biking, swimming, walking stairs), or can be split in two,

CLINICAL PEARLS

1. The Canadian Society for Exercise Physiology (CSEP)* through Health Canada has developed the Physical Activity Readiness Questionnaire (PAR-Q) which can easily identify adults for whom physical activity might be inappropriate or those who should have a more thorough medical work-up prior to starting an exercise programme.

2. Every attempt should be commended, and any indiscretion should not be belaboured. The patient should be veered back to his goals without guilt.

3. I ask each patient to record their heart rate upon waking and their post-exercise heart rate. This is the beginning of their exercise log, which will include the type of exercise, duration, intensity, and frequency. Patients should be be encouraged to bring it to each appointment. This serves two purposes— ONE, it helps familiarize the patient with his or her level of exertion and progress, and TWO, it helps, within the actual exercise regimen, to target appropriate intensity levels.

4. The simplified calculation for determining MHR is MHR = (220-age). Intially target 40-60% MHR over 1-2 months, then improve to 70-75% MHR over 6months, then maintain.

for before and after the resistance training. In detail, the aerobic component involves a target heart rate of between 40 to 60% of maximum heart rate (MHR), which is compatible with mildly laboured ability to talk during exercise. The simplified calculation for determining MHR is MHR = (220-age).[19] This is probably the simplest method for calculating MHR, although there are considerable limitations to this calculation.[19]

In detail, the resistance training involves 6 to 8 repetitions of each exercise using proper form, taken through a full range of motion (ROM), and with a normal breathing pattern. The latest research confirms that only one set per exercise is required to have the same benefit as multiple sets.[27] Individual goals should guide progression. Patients should be realistic and should receive generous praise for their efforts.[19,25,26]

Stage Two—Improvement

This stage has the same pattern of warm-up, stretching, resistance and aerobic training. This stage typically lasts four to six months. The exercise regimen continues at the same frequency of three to four times per week, but can alternate between aerobic and weight training days. The resistance training should attempt to train all major muscle groups and to increase the number of repetitions up to 10. The goals for the end of this stage are for the patient to be able to reach 70 to 75% of maximal heart rate with aerobic training, to participate

in a regular resistance training programme using stable weights and to be able to endure a programme lasting up to 40-45 minutes. All of this should be accomplished with the patient experiencing a minimum of muscle soreness, discomfort, or injury. Commonly, progression to the next stage in exercise duration and an increase in the intensity of both resistance and cardiovascular endurance occurs every 2-3 weeks.[19,25,26] The most important caveat is not to progress if pain, discomfort, or interposing illness is encountered. Sometimes a holding pattern or regression is required and that is why the preliminary stages of education and training are so important.

Stage Three—Maintenance

This stage is usually achieved after six months of training. The key in this stage lies in providing alternatives to ensure that exercise is enjoyable, not monotonous, finding a comfortable intensity, duration, and frequency (at least three times and not more than five times a week), and in setting new goals based on the patient's newly-evoked 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. This is not common.

Conclusion

Exercise prescription has been the cornerstone of my medical practice because of its pluripotential health improvements. Older patients may require a proper assessment to determine the need for investigations before exercise prescription and to establish the right starting point. I have used it as an adjunct for treating many conditions, from helping a patient quit cigarette smoking, reversing frank type 2 diabetes into milder glucose intolerance that is diet-controlled, to minimizing the destabilizing mood disorders of a patient suffering from a somatoform disorder. The properly prescribed exercise regimen will incorporate the patient's interests, needs, and goals, and overcome their perceived barriers. It will also motivate a patient and facilitate lifelong compliance. The properly prescribed exercise regimen will really improve all types of medical conditions.

The PAR-Q form can be obtained from The Canadian Society for Exercise Physiology (CSEP). The CSEP can be reached @ 613-234-3755 or www.csep.ca for more information. The resources available for doctors interested on exercise counselling can be found at http://exerciseismedicine.org/canada/

References

1. Kane RL, et al. Essentials of Clinical Geriatrics. 2nd ed. Minnesota: McGraw-Hill,1989:20-1.
2. Brock D, et al. Demography and epidemiology of aging in the US. E. Schneider and J. Rowe (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, Public Health Service, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, 1994.
4. Hurley BF et al. Optimizing Health in Older Persons: Aerobic or Strength Training? Holloszy JO (ed.). Exercise and Sport Sciences Reviews. Missouri: Williams & Wilkins, 1998;26:61-89.
5. Evans WJ. Exercise training guidelines for the elderly. Med Sci Sports Exer 1999;31:12-7.
6. American College of Sports Medicine Position Stand. Exercise and physical activity for older adults. Med Sci Sports Exer 1998;30:992-1008.
7. Blair SN et al. Physical fitness and all-cause mortality: A prospective study of healthy men and women. JAMA 1989;262:2395-401.
8. Shephard RJ. Exercise and cancer: Linkages with obesity? Crit Rev Food Sci Nutr 1996;36:321-9.
9. Powell KE et al. The public health burdens of sedentary living habits: Theoretical but realistic Estimates. Med Sci Sports Exer 1994;26:851-6.
10. Crespo CJ et al. Race/ethnicity, social class and their relation to no leisure-time physical activity: Results from the Third National Health and Nutrition Examination Survey, 1988-94. Am J Prev Med 1999. In press.
11. Ryan AS et al. Aerobic exercise maintains regional bone mineral density during weight loss In postmenopausal women. J Appl Physiol 1998;84:1305-10.
12. Judge JO et al. Effects of resistive training and balance exercises on isokinetic strength in older Persons. J Am Ger Soc 1994;42:937-46.
13. Ettinger WH jr 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 Adults Trial (FAST). JAMA 1997;277.
14. Hochberg MC et al. Guidelines for the medical management of osteoarthritis, Part II: Osteoarthritis of the knee. Arthritis Rheum 1995;38:1541-6.
15. Province MA et al. The effects of exercise on the falls in elderly patients. A preplanned Meta-analysis of the FICSIT Trials, Fraility and Injuries: Cooperative Studies of Intervention Techniques. JAMA 1995;273:1341-7.
16. O'Conner PJ et al. Physical activity and depression in the elderly. J Aging Physiol Activ 1993;1:34-58.
17. Camacho TC et al. Physical activity and depression: Evidence from the Alameda county study. Am J Epid 1991;134:220-31.
18. Morey MP et al. Evaluation of a supervised exercise program in a geriatric population. J Am Ger Soc 1989;37:348-54.
19. Kenney WL (Sr. Ed.). ACSM's Guidelines for Exercise Testing and Prescription. 5th ed. Pennsylvania: Williams & Wilkins, 1995.
20. Thomas S et al. Revision of the Physical Activity Readiness Questionnaire. Can J Sport Sci 1992;17:338-45.
21. Shephard RJ et al. The Canadian Home Fitness Test. Sport Med 1991;11:358.
22. Christmas C and Andersen RA. Exercise and Older Patients:Guidelines for the Clinician. J Am Ger Soc 2000;48:318-24.
23. ACSM. 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 and Wilmore JH. Exercise in Health and Disease: Evaluation and Prescription for Prevention and Rehabilitation. 2nd ed. Philadelphia: WB Saunders, 1990.
25. Skinner J. Exercise Testing and Exercise Prescription for Special Cases. 2nd ed. Philadelphia: Lea & Febiger, 1993.
26. Fiatarone MA et al. Exercise training and nutritional supplementation for physical frailty in very Elderly people. 1994;330:1769-75.
27. Hass CJ et al. Single versus multiple sets in long-term recreational weightlifters. Med Sci Sport Exer 2000;32:235-42.
28. Jattan A, Kvern B. Exercise specialists should be members of our health care team. CFP 2018:64;879-882