Improving Fitness Levels in Adults through Exercise Prescriptions

By

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The members of the Committee appointed to examine the clinical project of Tricia M. Earnhart find it satisfactory and recommend that it be accepted.

Jacquelyn Banciak 4-12-99
Chair

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Research has determined that exercise is not only beneficial to healthy adults, but can help patients who suffer from chronic disease. By not utilizing exercise prescriptions, health care providers are losing a valuable tool in promoting active lifestyles. The objectives of this paper are 1) to review exercise benefits, 2) describe exercise prescriptions that can be incorporated into patient lifestyles, 3) to establish a need for stronger implementation and compliance of exercise programs.

Various trials of exercise prescriptions have been shown to encourage and promote physical activity, but the obstacle of requiring extra provider interview time remains an issue. Several studies used direct measurable outcomes, such as increase in strength, decrease in lipid levels, decrease in body fat, increase in lean body mass, and increase in patient compliance. Several studies used subjective indicators, such as an increase in “willingness” to comply, change in mood states, and positive changes in pain perception in regard to chronic disease symptomology.

Through numerous studies, exercise has been shown to have positive health benefits, but the data are sparse regarding implementation of exercise prescriptions. Barriers have been identified from the perspectives of the health care provider in writing the
exercise prescription and from the patient in initiating the exercise program. Greater
research emphasis is needed on methods of initiating and utilizing exercise prescriptions
and addressing the individual identified barriers. Further data are also needed in regard to
longer exercise trials and exercise benefits preferably over a lifetime.

This paper will present example exercise regimens for specific populations. This
information is useful for nurse practitioners in that they serve as a guide to aid in initiating
the exercise program, and also prove to be more time efficient.
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Introduction

Americans have become increasingly unfit. The Surgeon General’s report on physical activity (1996) indicates that 33% of the population is overweight and that only 22% of U.S. adults are currently active enough to derive any health benefits from physical activity. Physical activity improves health and quality of life, decreases negative symptoms of many chronic diseases, and reduces overall mortality (Elrick, 1996).

The U.S. Preventive Services Task Force (1996) states that “clinicians should counsel all patients to engage in a program of regular physical activity tailored to their health status and personal lifestyle.” Although this seems to be obvious, health care providers are not promoting physical activity on a regular basis. The U.S. Public Health Services Clinician’s Handbook of Preventive Services (1997) estimates through surveys that only 30% of primary care providers routinely counsel and educate patients on physical activity. General practitioners see over 90% of their practice population every three years, and are in a unique position to discuss and promote regular physical activity with their patients (Browne, 1997).

It is estimated that only 50% of people who begin an exercise program will continue for greater than six months, and research has shown that exercise is most beneficial if it is maintained over several years, preferably over a lifetime (King, et al., 1992). To be successful, exercise prescriptions need to be tailored to each individual. A systematic approach to the components of frequency, duration, intensity, and progression with periodic reevaluation allows the program to be individualized (Petrie, Matthews, & Howard, 1996). Swinburn, et al., (1997) found that written exercise advice from general practitioners increased physical activity levels among sedentary patients more than verbal advice alone over a 6-week period. The practitioners
preferred giving written prescriptions to giving verbal advice alone, and felt they were a valuable tool to formalize and document mutually agreed upon exercise goals.

Several studies have addressed patient compliance in regard to exercise prescriptions, but there is little research on physical activity promotion by general practitioners. In the Swinburn et al. (1997) study a number of barriers to giving exercise advice were identified, the most common being lack of time. Other barriers included a lack of confidence in counseling patients on exercise, a lack of reimbursement, insufficient knowledge about the benefits of physical activity, a lack of a standard format for assessing and prescribing exercise, and a perceived lack of patient’s motivation (Swinburn et al., 1997). The purpose of this paper is to review current literature on exercise benefits and exercise prescriptions, and offer suggested exercise prescriptions for specific populations. Relevant literature was reviewed from 1990 to the present. The review and guides to exercise prescription will aid the nurse practitioner in efficient exercise promotion with limited available interview time. An approach to the implementation of exercise prescriptions might consist of: 1) reviewing the benefits of exercise with the patient, 2) determining exercise goals depending on current levels of health and desired outcomes, 3) writing the exercise prescription, and 4) follow up evaluation and future planning.
Benefits of Exercise

Physical activity is defined as bodily movement that is produced by the contraction of skeletal muscle which substantially increases energy expenditure (Pratt, 1999). Epidemiologic evidence indicates that 30 minutes of daily moderate physical activity yields significant health benefits (Dunn, et al., 1999, Jonas, et al., 1996). Moderate intensity physical activity is defined as between 40-50% of maximum aerobic capacity (VO₂ max) or 60% of maximum heart rate (Browne, 1997). According to the Surgeon General’s report on physical activity and health (1996) the benefits of physical activity are: 1) reduced risk of death from coronary heart disease, reduction in development of hypertension, colon cancer, and diabetes, 2) maintenance of healthy bones, muscles, and joints, 3) weight control, building of lean muscles, and reduction of body fat, 4) minimizing the side effects of many chronic diseases, and 5) reduction in symptoms of anxiety and depression and improved mood as well as feelings of well-being. Unfortunately, when routine physical activity stops, many of the benefits attained will disappear within 2-8 months (Pollock & Wilmore, 1990).

Regular exercise also aids in the prevention and treatment of obesity. Obesity is a possible independent risk factor for many disease processes such as coronary heart disease, non-insulin dependent diabetes, hypertension, sleep apnea, infertility, arthritis, and cancers of the colon, rectum, prostate, gallbladder, breast, cervix, and ovary (Jonas, Lawrence, Woolf, 1996). Most epidemiologic studies rely on relative weight, such as the body mass index (BMI) to define obesity. BMI is an index of body weight that is normalized for height to estimate the degree of obesity (Wardlaw, 1993). The average individual in the United States gains approximately a pound of weight per year annually following the age of 25. At the same time there is a loss of approximately 0.25 - 0.50 pound per year in lean body tissue, predominately muscle and bone.
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(Pollock & Wilmore, 1990). This increase in body fat and sedentary lifestyle has economic, medical, social, and psychological consequences. Many patients may become motivated to exercise because of education about these consequences as well as abnormal clinical measures such as high blood pressure or lipid levels (Petrie et al. 1996). Lowering these measures could be used as goals for continued adherence to an exercise program.

Cardiovascular benefits

Exercise reduces several coronary risk factors, such as: hypertension, high cholesterol, low high-density lipoprotein (LDL) cholesterol, and obesity (Elrick, 1996). Exercise also increases stroke volume, cardiac output and the ability to store and conserve glycogen.

A study by Grandjean, Oden, Crouse, Brown, and Green (1996) examined the effect of an aerobic training program on normal lipid levels. This study involved 37 adult females participating in a six month aerobic training program three days a week. The aerobic training consisted of walking, jogging and/or cycling. Individual logs were kept, since time and intensity of aerobic exercise varied with each individual. The study found a progressive increase in maximum aerobic capacity (VO$_2$ max) from 60 - 80%, a drop in total lipid levels of up to 20 points, and an increase of up to 6 points in HDL’s.

Strength training (weight lifting) causes an immediate increase in blood pressure and an abrupt increase in cardiac work with a modest increase in cardiac output. Apart from peripheral muscle toning, strength training exercise has little cardiovascular benefit, but does stress the heart (Murphy & Gau, 1997).

Aerobic exercise (e.g. walking, cycling, and swimming) causes an increase in cardiac output in association with a decrease in total peripheral resistance and shunting of blood to the working muscle beds. Systolic blood pressure increases and diastolic blood pressure decreases or
remains constant (Murphy & Gau, 1997, and Elrick, 1996). Aerobic exercise causes an immediate increase in heart rate due to decreased vagal nerve activity and an increase in sympathetic discharge. Myocardial oxygen demand (MVO<sub>2</sub>) is determined by heart rate, ventricular contractility, and ventricular wall tension (Murphy & Gau, 1997). With continued aerobic exercise, VO<sub>2</sub> max increases, and resting heart rate, MVO<sub>2</sub>, and systolic blood pressure decrease (Murphy & Gau, 1997). This is beneficial because the body becomes more efficient, and aids in reducing risk factors for coronary heart disease.

**Strength benefits**

Isometric exercise has positive effects on strength, muscle mass, and bone density in the prevention of musculoskeletal injuries and osteoporosis. In two separate studies, with similar results, by Caruso and Gill (1992) samples of 65 and 34 healthy adult men and women went through a 10 week weight training program. The groups met three times a week for 50 minutes. At the end of 10 weeks there was a 60-100% increase in strength. Strength was assessed by one repetition maximum for the bench press, latissimus dorsi pull down, and leg press. A similar study (Tucker, Harris & Martin, 1996) of 70 adult women completing a 12 week program of strength training and flexibility showed significant increases in strength and flexibility compared to the control group who engaged in no regular activity. Women who were sedentary prior to starting an exercise program showed the most dramatic increase in strength and flexibility along with a decrease in body fat percentage.

Improvement in strength in the elderly population under supervised weight training programs has also been documented. After four months of exercise the Lord and Castell study (1994) of 20 elderly subjects demonstrated a significant improvement in quadriceps strength, reaction time and body sway (displacements of the body at the level of the waist). Increased body
strength has also been shown to improve balance and level of daily function and to decrease pain and use of analgesics (Malmros et al., 1998).

**Mood and Sleep Benefits**

Aerobic exercise has a positive influence on mental health; characterized by, enhancement of positive affect and mood, and a decrease in negative affect as determined by self-assessment. (Tate & Petruzzello, 1995). An illustrative study was done by Tate and Petruzzello (1995). Twenty university students were divided into three groups. Two groups engaged in a 30 minute exercise session on a bike at 55-70% VO$_2$ max. The third was the control group which participated in no exercise. During each session the experimental groups were randomized as to what type of exercise was performed. The findings of the study suggest that aerobic exercise at 55 to 70% VO$_2$ max decreases negative feeling states, and increases positive affect. The study also showed, through subjective data scales, that exercise training reduced depression, improved self confidence, and increased capabilities to cope with stress.

Epidemologic survey studies indicate that daytime exercise is the behavior most closely associated with improved sleep in the general populace (Youngstedt, 1997). Two recent studies by Guillemenault, Clerk, Black, (1995), and King, Oman, Brassington, (1997) suggest that exercise training may improve sleep among insomniacs. Exercise may also promote sleep by its antidepressant effects and reduction in anxiety (Youngstedt, 1997).

The many benefits of regular exercise have been well documented through numerous studies. Primary care providers can promote exercise by taking an active role in assisting patients through exercise prescriptions. Through counseling, promotion and goal setting physical activity can become a positive change in one's lifestyle.
Exercise Prescriptions: Counseling, Scheduling, and Promotion

Often when people seek health care they are expecting to receive prescriptions to treat or prevent various conditions. The association of prescriptions with positive outcomes may be beneficial in motivating the patient to take exercise recommendations seriously, especially when they are asked to follow-up on the prescribed regimen as scheduled. Recent studies have shown that the seriousness with which the practitioner recommends changes in a patient’s lifestyle, including exercise, may significantly improve compliance. The Swinburn trial (1997) showed that written exercise prescriptions from a general practitioner increased physical activity among sedentary patients more than verbal advice alone. Physical activity promotion from general practitioners using a community coordinator has shown to maintain ongoing health programs for all age groups (Browne, 1997).

By being an exercise “role model”, a practitioner may increase a patient’s compliance with exercise prescriptions. Harsha et al. (1996) studied 411 established patients of a family medical clinic using survey questionnaires regarding their willingness to comply with physician exercise recommendations. It was found that patients with higher education and income levels could be positively influenced by a physician being of appropriate weight, a regular exerciser, and a nonsmoker. Female patients could be positively influenced by a physician being well groomed, well dressed, accessible, and a good listener. The study concluded that physicians may have a positive impact on patient willingness to comply with prescribed exercise and education through positive role modeling. The study did not attempt to correlate “willingness” with actual follow through on the prescriptions.

One of the obstacles encountered by health care providers in physical activity promotion is the extra time needed during patient visits to educate, set goals, and write the exercise
In a study by Fielder, Shorney, & Wright, (1995) it was found that patient compliance with an exercise prescription was not affected by health care provider time given for exercise education. They also found that programs were poorly followed regardless of approach used. The approaches studied included: 1) verbal advice, 2) verbal advice with a written prescription, and 3) verbal advice, written prescription and fitness assessment at a local exercise facility. Incidentally, it is interesting that data collection for this study was affected by the provider’s inability or unwillingness to find enough time to recruit patients into the study. This study is significant because it shows that without needed time for the health care provider to address exercise it becomes very difficult for providers to expect patients to follow exercise recommendations.

Before patients are prescribed an exercise program, it is important for the nurse practitioner to obtain a thorough medical and personal history. It is also important to mutually set short and long term goals that initially are easily attainable, in order to optimize the chance of success. Potential barriers that may affect compliance should be discussed when setting goals and writing the exercise prescription. Barriers to exercise include: lack of time, lack of social support, inclement weather, disruptions in routine, lack of access to facilities, and dislike of vigorous exercise (Clinicians handbook of preventive services, 1997; Loughlan, et al., 1997). If exercise is started slowly patients may notice the accomplished goals and exercise will to be more likely be incorporated into a permanent lifestyle change (Anderson, et al.; 1999, Dunn, et al., 1999). Care must be taken in setting attainable goals because failure to achieve them may reduce exercise self-efficacy (McAuley, et al. 1995). While exercise prescriptions are most effective when individualized, guidelines for certain patient populations are a useful starting point. Suggested exercise programs for the healthy adult, elderly, and those with certain diseases are presented.
Exercise prescriptions for healthy adults

Exercise programs for healthy adults generally include three standards of fitness: aerobic training for cardiovascular conditioning, resistance training for muscle and bone strength, and stretching for flexibility (DiNubile, 1999). Patients should be counseled that when exercising aerobically there can be some shortness of breath, but they should be able to talk easily (Mink, 1997). According to the Surgeon General’s report on physical activity (1996) 30 minutes or more of moderate intensity physical activity on most, preferably all, days of the week is recommended, but it is not specific regarding type of activity. The American College of Sports Medicine (1998) recommends engaging in exercise three to five days a week at an intensity of 60% to 90% of maximum heart rate for at least 20- 60 minutes of continuous or intermittent (minimum of 10 - minute session accumulated through out the day) of aerobic activity. Duration is dependent on the intensity of the activity. These recommendations are designed to aid in developing and maintaining cardiorespiratory fitness, body composition, muscular strength and endurance, and flexibility in the healthy adult.

Table 1 presents a sample exercise prescription for a healthy adult. An exercise prescription is to be used as a guide and should be tailored to each individual. With each program there should be a beginning phase with easily attainable goals, gradually moving into advanced phases of increasing duration and intensity, but with a continuing focus on specific goal attainment.

Modifying Exercise Prescriptions for Patients With Disease Processes

When establishing an exercise program with certain disease processes, it is very beneficial to tailor that program to alleviate some of the negative symptoms of the particular disease. There
has often been a general stereotype that exercise programs should only benefit the cardiovascular system, but there are certainly more benefits to exercise. In several disease processes, the exercise prescription is not focused on the cardiovascular system, although it is a beneficiary. For example, a randomized clinical study of 119 patients with chronic neck pain showed significant improvement in pain with an exercise program utilizing no cardiovascular emphasis (Jordan, Bendix, Nielsen, et al., 1998). The program focused strictly on improving strength, flexibility, and range of motion over a period of 12 months. Studies have repeatedly shown that the least fit patients are likely to derive the greatest benefit from the exercise prescription (Fielder, et al., 1995; Loughlan, et al., 1997).

**Elderly**

Aging is not technically considered a disease process, but it does warrant extra attention because many disease processes stem from aging. A well known effect of increasing age is the gradual reduction of muscle function, therefore, reduction in performance in the activities of daily living (Lexel, 1999). Recent research has shown that, even among the very elderly, exercise can improve not only strength and endurance, but also balance and mobility, thus reducing the risk of falls (King et. al., 1995; Lord et al., 1994; Vansickle, et. al., 1996). See table 2 for a review of exercise prescription trials in older adults. The inactive older adult population will most often experience muscle loss, poor nutrition, joint stiffness, ligament failure, and a higher propensity for injury, which can often contribute to disease and disability (Buckwalter, 1997). An increase in disease and disability can lead to a decrease in independence and an increase in medical costs. Older adults should begin first with stretching exercises for 10 minutes a day for two weeks and then begin incorporating light calisthenics for another cycle period of two weeks. In
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approximately four weeks they may begin light cardiovascular activities (Jette et. al., 1996). See table 3 for a sample program for older adults.

**Osteoporosis:**

Osteoporosis is often an avoidable process if addressed at an early age. Of those afflicted with osteoporosis 80% are women and 20% are men (Glynn et al., 1995). Weight bearing activities at an early age and throughout adulthood will increase bone density, create a higher bone mass at menopause, and decrease risk of osteoporosis (Heinonen et al., 1996). There are data to support the concept that increasing activity will increase bone mass, but there are varying opinions as to the optimal choice of physical activity and exercise prescriptions for the prevention and treatment of osteoporosis.

A study of 92 previously sedentary post-menopausal women who engaged in regular weight bearing exercise over a period of four years, showed slowed loss of bone mass directly related to compliance with exercise prescription (Preisinger et al., 1996). This study consisted of three groups: 1) fully compliant, 2) partially compliant, and 3) non-compliant. A significant decrease in bone mass was noted in groups two and three (partially and non-compliant), but there was no further bone loss noted in group one (fully compliant). Bone density was measured in the forearm by single photon absorptiometry at the initial entry into program and after four years. In two similar studies, Danz, et al., (1998), and Heinonen, et al., (1996) showed that exercise can halt bone mineral loss in peri- and post-menopausal women. In the Heinonen study (1996) 98 healthy, sedentary females (age 35-45) engaged in high impact (weight bearing) exercises three times a week for 18 months. There was a 1.6% increase in bone mineral density at the femoral neck, and no change at the radial head. This study concluded that high-impact exercises halt bone mineral density loss, and if done on a regular basis may help decrease the risk of osteoporotic
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fractures in later life. In the Danz study (1998) 83 females (age 40-62) engaged in 40 minutes of jogging and 20 minutes of gymnastics three times a week for one year. None of these women were on hormone replacement therapy. The results showed it was possible to prevent bone mineral density loss in peri- and post- menopausal women with general as well as localized exercise programs.

Osteoporosis is also a significant health problem among older men. Incidence rates for hip fractures have stabilized in women, but continue to increase in men (Glynn et al., 1995). In the Woitge study (1998) 20 healthy young males (age 20-29) were followed through an eight week program of aerobic (CV focus) and anaerobic (strength and flexibility focus) training to investigate how different types of exercise affect bone metabolism in men. The study concluded that aerobic and anaerobic training exert different effects on bone metabolism. Aerobic training led to changes compatible with reduced bone resorption, and anaerobic training seemed to result in an overall accelerated bone turnover without change in bone mass. See table 4 for a sample program for osteoporosis. The sample program is appropriate for both men and women with the focus being decreasing or halting bone mineral density loss.

Osteoarthritis:

Arthritis is the most common cause of disability in the U.S., with osteoarthritis being the most frequently encountered type (Dinuble, 1997). Arthritis most commonly affects the elderly population. The less a joint is used the more stiff and painful it becomes, thus starting a vicious cycle. Movement of the joint is necessary to ensure proper nourishment and maintain the integrity of the cartilage (Dinuble, 1997). One study has shown that after only 10 weeks of exercise focusing on the affected joints there was less swelling and a decrease in pain in patients with osteoarthritis and rheumatoid arthritis. (Bostrom et al., 1998).
Research shows that the vicious cycle of immobility can be interrupted by initiating an exercise program. The Ettinger, Burns, Messier, et al., (1997) trial consisted of 439 people (>60 years of age) with osteoarthritis of the knee. The subjects were started in an aerobic, resistance and health education program lasting 18 months. A total of 83% of participants completed the trial which concluded that older disabled persons with osteoarthritis of the knee had modest improvements (through subjective data collection) in measures of disability, physical performance, and pain from participating in either aerobic or a resistance exercise program. These data suggest that most types of exercise programs are acceptable as long as the focus is on movement of the affected joint.

In the Van Baar trial (1998), 201 patients with osteoarthritis of the hip or knee received treatment and education from their general practitioners, and also received exercise therapy from a physiotherapist in primary care for a treatment period of 12 weeks. After only 12 weeks of exercise therapy there was a small (0.28)% reduction in pain and disability, showing that relief from osteoarthritic pain can occur even after only short periods of exercise. See table 5 for a sample program for patients with osteoarthritis.

Chronic obstructive pulmonary disease (COPD)

Chronic obstructive pulmonary disease (COPD) is a debilitating disease affecting approximately 15 - 25 million people in the US, and is responsible for 200,000 deaths per year (Mink, 1997). Patients with COPD have a compromised ability to exercise. Exercise cannot reverse COPD, but may reduce disability by increasing endurance, breathing efficiency, and decreasing dyspnea (Mink, 1997). In a study by O’Donnel (1998) of 29 patients with COPD it was shown that exercise reduced negative symptoms of the disease process. O’Donnell studied the reproducibility of the Borg dyspnea ratings, inspiratory capacity (IC: to monitor lung
hyperinflation), and endurance time during constant-load symptom-limited cycle exercise.

Responsiveness was also studied using nebulized ipratopium bromide (IB) or a saline placebo in conjunction with these measures. Spirometry and exercise testing was performed before and one hour after receiving IB or the placebo. Over an eight week period there was a positive measurable response to exercise regardless of IB or placebo in patients with severe COPD. O’Donnell also noted the most common complaint in COPD patients when beginning the exercise program was dyspnea, but this decreased over time with proper prescription and monitoring.

The most dramatic improvements in COPD patients who exercise are often seen in the most severely impaired. A study of 47 patients with severe COPD was conducted through outpatient rehabilitation to measure improvements in activities of daily living and quality of life through physical training (Bendstrup et al., 1997). This program consisted of measuring six minute walking distance, forced expiratory volume in one second, and forced vital capacity over the course of a 12 week program which included physical training, occupational therapy, and education. The study concluded that an inexpensive, comprehensive outpatient rehabilitation program can produce long term improvement in activities of daily living, quality of life, and exercise tolerance in patients with moderate to severe COPD. A similar study by Cambach (1997) also found improvement in exercise tolerance and quality of life, but there was also more education given regarding breathing retraining, evacuation of mucus, and relaxation techniques along with physical exercise. See table 6 for a sample program for patients with COPD. The exercise program needs to be tailored in regard to the patients dyspnea ratings and SaO₂.

Individualization is important because controlling pain and dyspnea is very subjective and can vary greatly among individuals.
Coronary heart disease (CAD)

Since the early 1900’s cardiovascular disease has been the leading cause of death in the U.S. In the past decade heart disease has also become the leading killer of American women (Naimark et al., 1996; Elrick, 1996). After menopause the coronary risks increase dramatically due to the decreased protective effects of estrogen (Schirring, 1997). Researchers found that women who walked at least three hours per week had 40% lower risk of heart attack and stroke than sedentary women (Schirring, 1997). The Naimark et al. (1996) study of 79 postmenopausal women showed that a five day a week walking program for 24 weeks significantly decreased stored iron. This is clinically significant because stored iron increases significantly following menopause and excess stored iron has been cited as a risk factor for coronary disease.

The risk of heart disease doubles when comparing to active adults versus sedentary adults (Bouchard, 1993). The majority of research studies on exercise and CAD show a significant inverse relationship. The Katzel et al., (1995) study of 170 obese men showed that an exercise program accompanied with diet modifications was the most beneficial treatment to improve coronary artery disease risk factors in middle-aged and older men. A similar study of 269 men and women showed that a regular regimen of moderate-intensity exercise not only improved fitness levels, but showed improvements in cholesterol levels (King et al., 1995).

When establishing an exercise program for a patient with CAD or one who is recovering from a myocardial infarction it is important to collaborate with the patient's cardiologist. For the first 12 weeks of an exercise program, close monitoring of the patient’s heart rate needs to be done until the heart rate remains stable. For example, a recovering cardiac patient should be able to climb 20 stairs in under 30 seconds keeping their heart rate under 120 beats per minute with very mild shortness of breath before moving forward in an exercise program (Murpy & Gau,
Heart rate alone provides a poor guide to exercise tolerance after a cardiac event. When establishing an exercise program, subjective measures such as individual dyspnea and perceived exertion scales should be incorporated. Proper rehabilitation can improve peak VO$_2$, lean body mass, and perceived pain ratings (Shephard, et al., 1996). Initiating exercise prescriptions in CAD patients is extremely individualized and referral to a cardiac rehabilitation program is prudent.
Conclusion and Implications

The studies reviewed indicate that prescribing exercise to patients can promote a healthier lifestyle, reduce risk factors for several chronic diseases, and alleviate many negative symptoms of chronic disease. An increase in physical activity is most beneficial if it is incorporated as a lifestyle modification over several months (Dunn et al., 1999).

Nurse practitioners can further promote physical activity by incorporating exercise prescriptions into patient care. Patients need to be educated and empowered in engaging and maintaining physical activity into a permanent lifestyle change. Preventive care services is a major goal of the national health care agenda. Practitioners need to develop strategies to improve exercise initiation and overall adherence. There is a large body of knowledge regarding the benefits of exercise, but further studies regarding effective ways to initiate and maintain habitual exercise regimes still need to be conducted.
### Table 1.

**A Sample Program for a Healthy Adult**

<table>
<thead>
<tr>
<th>Exercise Tasks</th>
<th>Beginners</th>
<th>Advanced</th>
</tr>
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<tbody>
<tr>
<td><strong>Required Stretching:</strong></td>
<td>(at least 10 minutes) &lt;br&gt;Focus on large muscle groups i.e. back, quadriceps, hamstrings, calves, shoulders &lt;br&gt;Include joint rotations i.e. neck and ankles</td>
<td>Must always continue routine from the beginners warm ups</td>
</tr>
<tr>
<td><strong>Required Light Calisthenics:</strong></td>
<td>(10 minutes) &lt;br&gt;Jumping Jacks (2 sets of 15) &lt;br&gt;Abdominal focus: crunches, leg lifts scissors lifts (2 sets of 10) &lt;br&gt;Jumping Rope (2-3 minutes) &lt;br&gt;Mountain climbers (2 sets of 15) &lt;br&gt;Push ups (2 sets of 10)</td>
<td>Should have well established routine and moving towards shortening repetitions and increasing sets. i.e. moving toward increased strength</td>
</tr>
<tr>
<td><strong>Strength Training:</strong></td>
<td>Using weights or resistance cords focus on large muscle groups in beginning phase i.e. back, legs, arms, shoulders &lt;br&gt;Start with longer repetitions and short sets. i.e. 1 set of 20 to increase endurance then gradually increase sets and decrease repetitions over several weeks. i.e. 3 sets of 8 to increase strength</td>
<td>Should have well established routine and moving towards increasing time and intensity. i.e. up to 30-40 minutes and covering further distances in shorter time</td>
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<tr>
<td><strong>Low Intensity Aerobics:</strong></td>
<td>(start with 20 minutes and gradually increase time and intensity) i.e. walking, jogging, biking, Nordic Track™, aerobic class, swimming, stairs &lt;br&gt;Initial goal: continuous activity for 20 minutes with out stopping</td>
<td></td>
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<tr>
<td><strong>Cool Down:</strong></td>
<td>(10 minutes) &lt;br&gt;Stretching the muscles utilized in the exercise</td>
<td>(10 minutes) &lt;br&gt;Stretching the muscles utilized in the exercise. Must always continue routine from the beginners warm down (cool down).</td>
</tr>
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Source of recommendations: (Andersen et al. 1999; Brown, 1997; Dunn et al., 1999; Caruso & Gill, 1992; Frisk & Hammer, 1996; Grandjean et al., 1996)  
* Frequency will vary from individual but at least 2-3 a week working towards exercising preferably everyday of the week.
Table 2. Exercise Prescription Trials in older adults

<table>
<thead>
<tr>
<th>ARTICLE</th>
<th>MAIN POINTS</th>
<th>EXERCISE PRESCRIPTION</th>
<th>RESULTS</th>
<th>GAPS / NEED FOR FURTHER RESEARCH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ettinger W.H. (1997)</td>
<td>(439 people &gt;60 y.o.) assessed benefits of exercise to relieve arthritis pain</td>
<td>3 groups: ① Walking 3 x week for 18 months ② Resistance training for 18 months ③ Health education only, no exercise training</td>
<td>-Pain &amp; disability decreased in groups 1 &amp; 2 -x-rays showed no adverse changes</td>
<td>More long term studies to evaluate effects on arthritis over a lifetime.</td>
</tr>
<tr>
<td>Lord, S. Castell, S. (1994)</td>
<td>Mean age 62.5 y.o. studied effects of exercise on strength, reaction time and body sway.</td>
<td>2x a week for 20 weeks exercise varied with a cardiovascular and gentle exercise components -1 hour exercise sessions</td>
<td>Suggested that exercise can improve physical function in older people. Higher improvement in exercise group vs control group</td>
<td>More long term studies on exercise and elderly</td>
</tr>
<tr>
<td>Stewart, A. King, A. Haskell, W. (1993)</td>
<td>(194 adults) -studied effects on health related quality of life in 50-65 y.o. -determined quality of life, benefits in motivating older adults</td>
<td>3 different exercise programs with varying intensities -also group Vs individualized programs</td>
<td>Positive effects on endurance and health. A supposed improved quality of life. Program could lead to decrease in health care costs in the elderly population.</td>
<td>-No pretesting done, so difficult to measure results -Sample population group was also very well educated</td>
</tr>
<tr>
<td>King, A. Haskel, Young, Oka, Stefanick, (1995)</td>
<td>(269 adults 50-65 y.o.) studied long-term effects of varying intensities and formats of physical activity</td>
<td>3 - 40 minute sessions / week 5 - 30 minute sessions / week exercise RX varied over 2 year period</td>
<td>Older adults benefited in improved fitness levels, and small improvement in HDL levels</td>
<td>Longer study to further evaluate changes in lipid levels in regard to exercise.</td>
</tr>
</tbody>
</table>
Table 3.

A Sample Program for Older adults

Focus: aerobic, strength training, flexibility building up to a portion of exercise daily.

<table>
<thead>
<tr>
<th>Exercise Tasks</th>
<th>Beginning Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Stretching</td>
<td>(at least 10 minutes)</td>
</tr>
<tr>
<td>Light Calisthenics</td>
<td>(at least 10 to 30 minutes)</td>
</tr>
<tr>
<td>Strength Training</td>
<td>Light weight training and resistance training.</td>
</tr>
<tr>
<td>Aerobics Activity</td>
<td>Must begin at a low intensity (20 minutes initially). Choose gravitational exercises and weigh bearing exercises. i.e. walking, jogging, tennis, x-country skiing, aero-bics class...</td>
</tr>
<tr>
<td>Cool Down</td>
<td>(10 minutes)</td>
</tr>
</tbody>
</table>

Important thoughts to consider:

1. Initial follow-up in two weeks is to answer questions and starting program correctly.
2. Further evaluation will consist of measuring strength improvement, decreasing or halting bone density loss, maintaining and/or gaining lean body mass.
3. Strongly encourage patient to join a group or a class when initiating an exercise prescription to ensure proper mechanics and keep up motivation.

Example of established goals:

1. Aerobic gains: increase volume of maximum oxygen consumption by 30% within 6 months.
2. Resistance training: increase strength by 5% within 12 weeks
3. Increase gait speed by 20% within 8 weeks, thus decreasing use of walking aids (canes, walkers...)

Source for recommendations: (Jette, et al., 1996; King, et al., 1995)
Table 4.

A Sample Program for Osteoporosis

Begining Phase:

Focus: strength training and aerobic exercise to halt bone mass loss.

<table>
<thead>
<tr>
<th>Exercise Tasks</th>
<th>Beginning Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Required Stretching:</strong></td>
<td>(at least 10 minutes)</td>
</tr>
<tr>
<td><strong>Strength Training:</strong></td>
<td>(Focus of program along with weight bearing activities) Using weights or resistance cords. When starting focus on large muscle groups using muscle pull and resistance</td>
</tr>
<tr>
<td><strong>Aerobics Activity:</strong></td>
<td>Must begin at a low intensity (20 minutes initially). Choose gravitational exercises and weight bearing exercises. i.e. walking, jogging, tennis, x-country skiing, aerobics class...</td>
</tr>
<tr>
<td><strong>Cool Down:</strong></td>
<td>(10 minutes)</td>
</tr>
</tbody>
</table>

**Important thoughts to consider:**

1. Initial follow-up in two weeks is to answer questions and ensure patient is on track.
2. If initial goals are accomplished early then set longer term goals of increasing strength and maintenance.
3. If goals not being met then re-establish patients progress and readjust program to help patient reach goals over a longer period of time. i.e. break tasks down for them and check understanding.

**Example of established goals:**

1. Halt bone mineral density loss (measured through a bone mineral density scan /dxa).
2. Resistance training: increase strength by 5% within 12 weeks.
3. Increase gait speed by 10-20% with in 8 weeks.

Table 5.

A Sample Program for Osteoarthritis

Focus: strength, flexibility, and increasing joint mobility

<table>
<thead>
<tr>
<th>Exercise Tasks</th>
<th>Beginning Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Stretching:</td>
<td>(at least 30 minutes)</td>
</tr>
<tr>
<td></td>
<td>Focus on large muscle groups. i.e. back, quadriceps, hamstrings, calves, shoulders.</td>
</tr>
<tr>
<td></td>
<td>Start out stretching slowly for longer periods of time. i.e. each stretch x2 for 30 seconds</td>
</tr>
<tr>
<td></td>
<td>Work on positive ROM with affected joints to increase mobility</td>
</tr>
<tr>
<td>Strength Training:</td>
<td>Modify to patient, but same goals as healthy prescription will improve joint range of motion.</td>
</tr>
<tr>
<td></td>
<td>Focus on affected joints</td>
</tr>
<tr>
<td>Aerobics Activity:</td>
<td>Must begin at a low intensity (initial goal of 20 minutes without stopping).</td>
</tr>
<tr>
<td></td>
<td>Depends on degree of debilitation with arthritis. i.e. Swimming — promotes continuous passive joint motion, increases strength and improves cardiovascular fitness.</td>
</tr>
<tr>
<td></td>
<td>Bicycle — minimal weight bearing exercise</td>
</tr>
<tr>
<td></td>
<td>Increase low extremity joint motion</td>
</tr>
<tr>
<td>Cool Down:</td>
<td>(10 minutes)</td>
</tr>
</tbody>
</table>

**Important thoughts to consider:**

If goals are achieved: reestablish longer term goals for increased strength and maintenance of decreased pain to affected joints.

If goals are not achieved: determine if it’s compliance — resolve misconceptions / barriers and reestablish why this is important. Lengthen beginning phase of program and focus on decreasing pain to affected joints, so patient can succeed.

**Potential initial goals:**

1. Increase ROM in affected by 10% within 12 weeks.
2. Increase Strength by 25% within 12 weeks
3. Body weight adjustments if patient is overweight
4. Decrease patient’s pain by 50% within 12 weeks (subjective data)

Table 6.

A Sample Program for COPD

Focus: strength, flexibility, and increasing joint mobility

<table>
<thead>
<tr>
<th>Exercise Tasks</th>
<th>Beginning Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Stretching:</td>
<td>(at least 10 minutes)</td>
</tr>
<tr>
<td>Strength Training:</td>
<td>Modify to patient, but same goals as healthy prescription will improve as dyspnea decreases.</td>
</tr>
</tbody>
</table>
| Aerobics Activity:      | Modify amount and intensity to patient.  
                          | Keep c/o dyspnea below 5 on 1-10 scale (subjective data)  
                          | Keep oxygen saturation more than 90% by using oximeter, titrate oxygen if needed. |
| Cool Down:              | (10 minutes)                                                                     |

Important thoughts to consider:

If goals are achieved: reestablish longer term goals for increased strength and length of aerobic activity.

If goals are not achieved: determine if it’s compliance — resolve misconceptions / excuses and reestablish why this is important. Then lengthen beginning phase of program and focus on degree of disease, so patient can succeed.

Potential initial goals:

1. Decrease dyspnea by 10% within 12 weeks (subjective data)
2. Maintain oxygen saturation greater than 90% through exercise routine
3. Increase length of aerobic activity by 25% within 12 weeks

Improving Fitness Levels

References


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tolerance and quality of life: a randomized controlled trial. European Respiratory Journal, 10, 104-113.


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