
THE ADAPTED PHYSICAL ACTIVITY OR THERAPEUTIC EDUCATION ACTIVITY, "REVIEW OF CURRENT TECHNIQUES AND OPPORTUNITIES FOR PEOPLE WITH LOSS OF AUTONOMY"

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Abstract

Physical activity is known to promote the health and well-being of the population. When people are unable to perform a classical physical activity due to disability, age or disease, we will talk about Adapted Physical Activity (APA). For these people, the practice of such activity has an important role to prevent the loss of independence and to fight against post hospitalization deconditioning. In the current climate, recommendations for physical activity have been published. However, to ensure the effectiveness and safety of patients, it is important to customize the APA by analyzing and quantifying it. Various tools exist to measure it. The main objective will be to find the measurement method which best suit the patient according to his personal physical abilities and to adapt the APA program for his return home.

1. Introduction

Currently, physical inactivity remains a public health problem especially as it concerns most of the world's population (Haskell W. L., 2007, p. 1424). Strong evidences show that inactivity increases the risk of developing adverse health diseases, the risk of recurrence and shortened life expectancy. Physical inactivity is responsible for 6 to 10% of the morbidity of major noncommunicable diseases (coronary heart disease, type 2 diabetes, breast and colon cancer ...) worldwide (Lee, 2012, p. 227). It kills as many people each year than tobacco. These findings allow us to assume that physical activity is the best treatment as of today, to insure the health and well-being of the population.

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2. The adapted physical activity: why and for whom?

The APA has been internationally known in the late 70s. Jean Claude De Potter defines as follows "every movement, physical activity and sport, mainly based on the skills and motivations of people with special needs that prevent them from practicing under ordinary conditions" (Fabre, 2010, p. 628). The APA will help to offset or reduce the practitioners' deficit, by complying with the security, technical, educational and ethical codes. Many studies have shown the value of a regular exercise for health and well-being of people regardless of age and condition (Vuillemin, 2011, p. 184). One of the major public health problems is the aging of our population and the increasing number of chronic diseases. Depending on the age or condition, the risk of entering a vicious cycle of deconditioning (VCD) is very important. This VCD is defined as the physical, psychological and social consequences of physical inactivity secondary to a disease which became chronic. This process shows the progressive maladjustment to the environment, often unintentionally, causing the chronic patient to dependency, quality of life deterioration and disability situations' increase (Fleg, 2005, p. 681). In addition, the aging causes a loss of marker for the person, especially concerning his sense of effort and desire to do the activity. The APA can play an important role in preserving the independence of these individuals.

The objectives of the APA will be divided into three areas. Initially the goal will be to mobilize and develop the physical resources to maintain independence or repel patient dependency. In a second phase we will help the patient to measure his capacities and give him the keys to a safe practice (effort and equipment management) regardless of the environment. Finally we will help him to maintain or improve his life in society (Fabre, 2010, p. 629). Warburton et al (2006, p. 801) confirmed the effectiveness of regular physical activity in the primary and secondary prevention of several chronic diseases and premature death. The authors focus their researches on cardiovascular diseases, diabetes, cancer, hypertension, obesity, depression and osteoporosis. They highlighted a graded linear relationship between the level of practice and the risk of developing these diseases (Warburton, 2006, p. 801). In this study the list of diseases for which the APA has a beneficial effect is not exhaustive. The APA is also used with other audiences such as mobility, sensory and mental impairments, poly-pathologies, seniors, neuromuscular disorders, eating disorders, respiratory diseases or drug addicts.

3. Recommendations

Recommendations for physical activity are regularly published by the high international scientific authorities such as the American College of Sports Medicine and the American Heart Association. They generally involve two categories of age, 18 to 65 and over 65, or specific diseases (Haskell, 2007, p. 1425 et Nelson, 2007, p. 1436). These recommendations have an impact in preventive health. The goal is to reduce the risk of chronic diseases and

premature mortality.

Regarding the first category of age (Haskell, 2007, p. 1425-1426), in terms of aerobic exercise, it is recommended to perform an activity of moderate intensity for at least 30 minutes, five times a week or vigorous activity for a minimum of 20 minutes, three times per week. A combination of the two may also be feasible. For example, a moderate activity will correspond to a brisk walk which significantly speeds up the heart rate. An activity of more vigorous intensity will be similar to a jog, causing rapid breathing with a significant increase in heart beat. In addition to this endurance activity, we need to add muscular strengthening exercises to carry out at least twice per week (non-consecutive). It is advisable to perform 8 to 10 exercises using the major muscle groups and repeat each of them 8 to 12 times. Like that people are working on different functions of the organism.

Regarding the over 65 category, the recommendations are almost identical. They vary only concerning the muscular strengthening which needs to increase due to advanced aging and its role in the loss of muscle and bone mass. The number of repetitions will also grow for each exercise (10 to 15). The authors give a clarification on the level of muscular effort for strengthening activities which should be moderate (5 to 6 on a scale of 10) to high (7 to 8) (Nelson, 2007, p. 1439).

The literary article written by Vuillemin A. (2011, p. 186), brings the latest updates in recommendations regarding activity. The author mentions that physical activity should be performed on consecutive sessions of minimum 10 minutes to be effective. Physical activity of vigorous intensity increases to at least 75 minutes per week or three sessions of 25 minutes (Vuillemin, 2011, p. 187). This review also makes recommendations on the number of steps to be performed depending on the intensity of the activity to be performed (Table 1). It is necessary to achieve an average of 100 steps per minute for a moderate intensity activity and 130 for a vigorous activity.

Table 1: *Activity recommendations based on the number of steps.*

	Moderate activity	Vigorous activity
Number of steps / week	15000	9750
Number of steps / day	3000 (5 days)	3250 (3 days)

4. The practice of these activities and the current methods

The APA can be done in different structures such as conventional or outpatient hospitalization, at home with help or in complete autonomy. For Inpatient or outpatient clinics, the overall characteristics of adapted physical activity (more commonly referred to effort training) programs are relatively large. The duration of the programs varies from 4 to 36 weeks, sessions can last

from 20 to 90 minutes with a frequency per week from 2 to 7 times. The intensity of these sessions is highly variable; between 40 to 80% of maximum heart rate reserve (Ramas, 2007, p. 38; Rimaud, 2005, p. 263 et Hautier, 2007, p. 471-472). This type of protocol requires an initial assessment to adapt the program and make it evolve in accordance with the physical conditions of each person. This rehabilitation effort is reassuring for the patient who practices a physical activity in a safe environment and supervised by health professionals. However, such institutions are rare and very expensive. The hospital stays are relatively short (3-8 week) and have steadily declined over the years. The patient is then forced to return to his home and has two options, either to join a sports club which offers group sessions of physical activity or to practice at home in complete autonomy. Associations offering group activities are promoting social link for usually a very low cost (Archambault, 2009, p. 84). However, the associative functioning is often based on the investment of volunteers, not necessarily formed, which can in the current economic environment become increasingly rare. Control and monitoring are often less well made and there is almost no feedback. As for the physical, psychological and physiological benefits, we have only few results in the scientific literature.

We now have to create a link between what is done in institutions and daily activity recommendations when patients return home. There is an important gap between the programs offered to the subjects and what they can actually achieve at home. The programs need to be adapted beforehand and reusable at home. People need to be able to manage their effort safely and to evaluate themselves with appropriate tools.

5. Measurement of methods of APA

"Physical activity corresponds to all the body movements generated by the contraction of skeletal muscle that lead to increase the energy expenditure above the resting energy expenditure" (Jacobi, 2008, p. 279). The definition is the same for the APA. There are various direct and indirect methods, more or less reliable for measuring the activity and energy expenditure associated with it. One of the most reliable methods is the technique of doubly labeled water to measure energy expenditure in situations of everyday life, without external constraints. However, this method is complex and unusable at home. An equally reliable method used for indirect measurement of VO_2 is done using a portable gas analyzer. This tool is unusable in everyday practice because it is too expensive, bulky and with a reduced scope. The accelerometer, which measures the movement of the body in terms of acceleration, seems for the moment the most powerful tool for assessing the physical demands of a person. The problem occurs only for static exercise such as rowing or muscular strengthening exercises. The pedometer is used to quantify the number of steps. This tool is useful both for its size and weight, inexpensive but not very accurate because it depends on the length of the step that changes all the time on a full day. The heart-rate meter allows for proper monitoring of heart rate during exercise and

allows a more detailed analysis at a later stage. It is a reliable indicator during the exercise, but the price is high if you want to purchase a tool of quality and it is sometimes complicated to use. In the same type of device you will find the Global Positioning System (GPS) that can only provide information on outdoor activities, and which is more expensive than the heart rate tool. The Physical Activity Questionnaire is perhaps the most simple, fast, inexpensive method, but which is approximate. We can associate to those effort perception scales, such as the Borg scale, to be more precise.

In the view of all these tools, it is important to choose with great interest the equipment to be used depending on the pathology of the patients but also the tools cost and what we really want to measure.

6. Conclusions

The recommendations are to be used, but it is necessary to adjust them for each person and disease. An APA program is beneficial to the patient if it is appropriate and individualized. It must therefore be done by a professional APA (Master License or APA) able to make an initial assessment of the subject in order to set up a personalized program that will evolve with the progress made.

Monitoring the activity at home seems to be the tomorrow's solution. However, it is necessary to strengthen two specific points before allowing them to return home with the help of health professionals. The first point is the therapeutic education which should be taught to patients regarding activity recommendations and its benefits. The second point focuses on adaptation and preparation of subjects to new technologies of information and communication (ICT) that will enable the processing and transmission of data on their physical activity. Nevertheless, we must remain vigilant about the cost of care for such a business model as it has so far not been analyzed.

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