Clinical physiology and the prescription of physical exercise in hospitals

Fisiología clínica y prescripción de ejercicio físico en el medio hospitalario

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Physiology is the branch of biology that studies the organs and how the body functions. Exercise physiology is the branch of physiology that studies the functioning of the body during physical exercise and how the body adapts when exercise is performed on a regular basis.

Clinical physiology studies the response of patients with chronic diseases (psychiatric, neurological, metabolic, cardiovascular, pulmonary) to physical exercise and their limitations to it, and uses physical exercise as an additional therapeutic resource (prescription of physical exercise).

There is unquestionable evidence of the positive relationship between physical activity or physical exercise and health, particularly over the last two decades, in which numerous studies have highlighted the importance of exercise as a first-line treatment of chronic diseases, being a cornerstone in the primary and secondary prevention of at least 35 chronic pathologies.

Non-communicable chronic diseases represent a serious public health problem and are one of the leading causes of death and disability in developed and developing countries alike. They are directly related to lifestyle, in which physical inactivity together with smoking and an unbalanced diet are the key risk factors responsible for almost 60% of deaths and 46% of global diseases.

Due to their reliability and effectiveness, interventions on lifestyle must be the main strategy for the prevention and treatment of metabolic diseases. Although much attention has been paid to a reasonable diet and weight control, doctors and patients often overlook the role of exercise.

Medicine is advancing, providing effective treatments for many pathologies that are accessible to most of the population. Furthermore, scientific advancement is also providing unquestionable evidence that the regular practice of physical exercise, even at low intensities, is extraordinarily effective in both preventing and complementing treatment for a growing number of chronic pathologies. Recent studies have reported that by performing half the physical exercise recommended by the WHO, it would be possible to prevent up to 10% of premature deaths.

Physical exercise is a "polypill" and is an essential part of medicine, as highlighted in the United States by the American College of Sports Medicine: *"Exercise is Medicine"*, and also in Europe by Pedersen and Satin: *"Exercise as Medicine"*.

Physical condition is an excellent predictor of life expectancy and quality of life. Numerous studies have reported an inverse association between physical condition and morbidity - mortality in the population, which is more pronounced in patients with cardiovascular risk factors.

Physiological values such as maximal oxygen uptake (VO_{2max}.) represent an excellent marker of the maximal cardiovascular capacity, observing an almost linear relationship between a decrease in mortality and an increase in physical condition (METs). Therefore, for each MET of improvement, there is a 12% increase in life expectancy in men and 17% in women. These figures indicate that poor physical condition is an added risk factor, as well as being a morbidity - mortality predictor.

Likewise, higher muscle strength levels are associated with a 40% decrease in the risk of death in women and 31% in men. It has even been quantified that, for every 5-kg decrease in handgrip strength, the risk of death increases by 16%.

Clinical physiology is the branch of exercise physiology which, following an assessment of a patient, prescribes physical exercise.

Good clinical physiology practice requires: a thorough knowledge of the medical pathology, exercise physiopathology and of the use of the most suitable functional assessment tests. It must be part of the overall treatment of the patient.

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Hospital-integrated sports medicine must provide a cross-cutting service that is capable of assessing patients referred from other services. Following an assessment, a personalised exercise prescription must be made, adapted to each patient's specific characteristics, by taking account of medical history, treatment, functional situation, socioeconomic and cultural aspects and patient preferences. This will ensure that the exercise programme can be maintained without the patient dropping out, achieving adherence to treatment, the enjoyment and safety of the participants in the programme.

There is a profound lack of knowledge of this branch of sports medicine at an institutional level, and also that held by most private healthcare insurance companies and even our own medical colleagues. It is now time to highlight the importance of this area of our specialty and to uphold its use. To do so, we need to be trained and retrained in clinical physiology.

Patients referred to the sports medicine unit at a hospital have their medical history taken and are treated and studied with complementary tests, which must be supplemented with any other tests considered necessary in order to obtain an adequate profile of the patient.

The assessment must include tests that evaluate the health-related physical condition qualities. The tests may either be complex such as ergometry, ergospirometry, isokinetic, or simple such as the 6-minute test, dynamometer hand-grip-or the chair sit-to-stand test.

The use of ergospirometry is essential for the quantity and quality of the data offered, making it possible to clearly establish morbidity - mortality risk values. Further research is required into the physiological personalisation of the programme, using ventilatory, lactate, dyspnoea, angina, claudication thresholds.

If it is not possible to conduct ergospirometry tests, then indirect ergometry tests are also useful, making it possible to prescribe exercise through the heart rate reserve.

A methodological proposal would be to perform, during the first visit, an ergospirometry (or ergometry) test, as well as the 6-minute walk test and the strength assessment test using the handgrip dynamometer and the chair sit-to-stand test. Physical exercise shall be prescribed based on the data obtained and the patient's characteristics. Subsequently, during the progress controls, the 6-minute and the strength assessment tests shall be performed with the tests mentioned above. Then, with the data obtained, an assessment shall be made of the patient's progress and a new physical exercise prescription shall be made.

The basic objective is to improve the health-related physical condition qualities, thereby reducing the cardiovascular morbidity and mortality risks. VO_{2max}, tolerance to aerobic resistance-exertion, muscle strength, body composition, balance and flexibility.

The prescription for physical exercise must be like any other prescription for medicine, and must contain the following: type of exercise, intensity, duration, number of repeats and sets, rest periods, progression criteria, evolution, etc.

The most obvious examples of the need to assess and prescribe physical exercise of quality, include surgical rehabilitation, cardiac rehabilitation, persistent COVID, which add to the pathologies that were typically the target of prescription, such as cardiovascular, respiratory, metabolic, oncological pathologies, among others.

We are in a situation in which, although scientific evidence indicates the benefit of the prescription of exercise for the health of individuals and populations and its positive effect on all levels of the health care systems, including economic benefits in the medium and long term, the general public is not offered this service on a widespread or generalised basis.

There is a need to raise the awareness of healthcare providers, so that they invest in a medical area which, in the medium and long term, improves the health of individuals and populations and represents a saving for the public healthcare services.

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