



Application of an Algorithm as an Educational Strategy to Improve the Learning of the Intervention Model in Physiotherapy in University Students

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ABSTRACT

The objective of this article is to analyze an intervention algorithm model in physiotherapy as an educational strategy, to know its effects and benefits when applied to students in the Physiotherapy Degree at the American University of Puebla, since we consider that it has ceased to be used. aside the Physiotherapy Intervention Model as a fundamental science. This application of an algorithm, understood as an ordered set of systematic operations that allows to make a calculation and find the solution of a type of problem, is something that is already established; however, it has not been given importance as a didactic strategy for that students can correctly carry out their intervention in physiotherapy in working and professional life. This article highlights that applying a good treatment and achieving the main objective of physiotherapy, which consists in the rehabilitation of the patient, is one of the fundamental tools that a physiotherapist starts with in order to carry out his career. When investigating the various theories embodied by various authors and their strategies, we found that each one has a different application theory and a dissimilar perspective, and not all of these theories have worked as expected, however, that is why the application of the algorithm as didactic strategy that the teacher can apply for the learning of the future professional physiotherapist.

Keywords: physiotherapy, algorithm, physiotherapy intervention model, strategy, educational.

1. Introduction

Physiotherapy is the profession of the health area whose main purpose is the optimal promotion of physical health and function, including the generation and application of scientific principles in the process of examination, evaluation, diagnosis and functional prognosis and physiotherapeutic intervention to prevent, develop, maintain, and restore maximum movement and functional capacity throughout the life cycle (Albert et al., 2020).

Physiotherapy is a service provided solely by or under the direction and supervision of an accredited physiotherapist, through a degree and professional certificate, which enable him to manage the Intervention Model in Physiotherapy which includes: examination, assessment, diagnosis, prognosis, intervention or treatment plan and reassessment. Physiotherapy deals with potentiating and maximizing quality of life, identifying, and treating movement disorders within the areas of promotion, prevention, treatment and/or intervention, habilitation and rehabilitation (Hassett et al., 2022).

As Narváez (2009) mentions, the physiotherapy program is undergoing the curricular reform in Mexico that, from the second academic period of 2009 until now, in 2023, embodied its common educational project. The implementation of the curriculum demands to integrate the pedagogical strategies with the assumed didactic model, which is why, in order to know the scope of this appropriation, this document is made, where the context of decision-making in the task is shown. of the physiotherapist in the clinical field, with national references, in the case of Mexico, and international ones. Clinical reasoning models and decision-making strategies are described. In particular, the case study is addressed and a particular way of assuming it in the curricular mesh of the Physiotherapy Program of the American University of Puebla (UAMP-Mexico) is proposed, so that with this, students can favorably develop a good treatment, complying with the protocol of the Physiotherapeutic Intervention Model and as a fundamental strategy for learning, according to what was applied and analyzed during the course.

2. Literature Review

Within the field of physiotherapy there are deficiencies in undergraduate students on the application of the Intervention Model in Physiotherapy in a correct way, some authors such as Bispo (2022) mention that it is because it is not given importance to physiotherapy as an exact science and that its epistemological remnant has been left aside, This leads to erroneous diagnoses, and therefore, misleading treatments, which only have a momentary effect, without treating the pathology as a set of causes, symptoms and adequate treatment on a permanent basis.

All this has led to physiotherapy not being given the importance it really has, since it has been observed that students as graduated physiotherapists, in some occasions, do not comply with the protocol of the Physiotherapeutic Intervention Model due to the difficulty to apply and learn how to use it. Therefore, what is intended is to apply an algorithm as an educational strategy to improve the learning of the Physiotherapeutic Intervention Model, taking into account that it would not only serve for the learning of students, but also for physical therapy professionals who find it difficult to apply it, as such, this type of strategy is more professional and what is intended, as already mentioned, is that they meet the main objective of physical therapy, which is to rehabilitate and reintegrate the patient to their daily life activities.

According to the Colegio Nacional de Fisioterapia y Terapia Física A.C. (AMEFI, 2011) defines physiotherapy as the health profession, whose main purpose is the optimal promotion of health and function, including the generation and application of scientific principles in the process of examination, evaluation, diagnosis and functional prognosis and physiotherapeutic intervention to prevent, develop, maintain and restore maximum movement and functional capacity throughout the life cycle.

Physical therapy is a service provided only by or under the direction and supervision of a physical therapist, accredited by a degree and professional license, which enables him/her to manage the Physical Therapy Intervention Model which includes examination, assessment, diagnosis, prognosis, intervention or treatment plan and reevaluation (AMEFI, 2011).

Valle (2022) mentions that learning strategies encompass a set of cognitive procedures and resources that students implement when faced with learning, so that, strictly speaking, they are related to the cognitive components that influence the learning process. In any case, if we assume the hypothesis that the student's motives and intentions ultimately determine the type of strategies that he or she will implement, it implies that the cognitive mechanisms used by subjects to facilitate learning depend to a large extent on dispositional and motivational factors (Morandin-Ahuerma et al., 2023).

Canteras (1994) refers that the research function of the physical therapist is oriented towards the deepening and discovery of new fields of action of physical therapy and research activities that are performed, therefore, in the areas in which their activity is developed such as: care, teaching and management, and performs the application of the Intervention Model in Physiotherapy in a concrete way.

The method is the way in which an action is carried out in a structured manner, and although the method is unique, it has, however, differentiated techniques. That is, it has different strategies or ways of articulation, and it is precisely the application of these methodical techniques that will allow the physiotherapist to incorporate a rigorous work methodology with a scientific attitude (Pastén-Hidalgo et al., 2019).

Likewise, Canteras (1994) argues that it is precisely the application of these methodical techniques that will allow the physiotherapist to incorporate a rigorous work methodology, a scientific attitude, in his usual practice, which allows the physiotherapist to have less deficiency to perform his intervention, and less difficulty to apply this method based on an improvement for all professionals.

Narváez (2009) states that decision making in the clinical-therapeutic scenario, especially in physical therapy, involves managing personal, technological and assistance resources that the needs and opportunities of each individual and situation demand, to structure in an orderly manner the evaluation and treatment process, with indicators that reflect the effectiveness of its action. This is why it is essential that students and teachers discover and capitalize on the skills to select, capture and analyze data that provide information from the environment and the characteristics of the individual, to make a professional judgment according to the Model of Intervention in Physical Therapy regarding the capacity of movement and the level of independence to measure the scope of the therapeutic process.

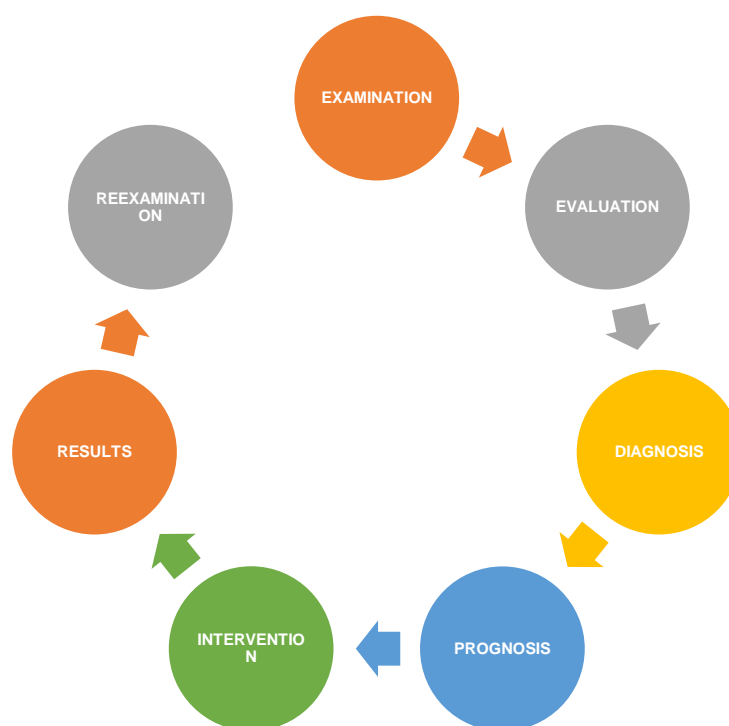
The World Confederation for Physical Physiotherapy (WCPT, 2019) refers that this guide, on the implementation of the physiotherapy intervention model in the workplace setting has been produced to support its policy statement on the regulation of the profession. It is intended to assist World Physiotherapy member organizations in developing or reviewing regulatory systems, including the preparation of legislation such as a Physiotherapy Practice Act, which is based on fundamental steps of the Intervention Model in Physiotherapy, this including the seven steps of the Intervention Model in Physiotherapy.

3. Examination, evaluation, diagnosis, prognosis, intervention, results, and reexamination

1. The examination is a comprehensive assessment of the patient's physical and functional status, including gathering information about the patient's medical history, current symptoms, and relevant personal and environmental factors. During the examination, the physical therapist performs a series of tests and assessments to evaluate the patient's range of motion, strength, balance, coordination, and endurance, and may use specialized tools and technologies to obtain more detailed information. The information gathered during the examination is used to develop a diagnosis and prognosis, identify potential risk factors or barriers to recovery, and develop an individualized treatment plan tailored to the patient's needs and goals (Tomé & Coelho, 2023).
2. Evaluation is the process of assessing the patient's progress and outcomes during and after the intervention phase. The evaluation phase consists of measuring and analyzing the patient's response to the treatment plan, including their level of function, mobility, pain and other relevant outcomes. The assessment may include objective measures, such as range of motion, strength, or balance tests, as well as subjective measures, such as the patient's reported level of pain or satisfaction with the treatment. The results of the assessment are used to determine the effectiveness of the intervention and modify the treatment plan, if necessary, in order to achieve the patient's goals and optimize their overall function and quality of life (Skivington et al., 2021).

3. Diagnosis consists of identifying and classifying the patient's condition or problem from the information gathered during the screening phase. Diagnosis is usually based on a combination of subjective and objective data, such as the patient's medical history, symptoms, and physical examination findings. The diagnosis helps guide the development of an appropriate treatment plan that is tailored to the patient's specific needs and goals. It also helps establish a baseline against which to measure progress during the intervention and evaluation phases. The diagnosis can be updated or refined as new information is gathered throughout treatment to ensure that the treatment plan remains appropriate and effective (Lu et al., 2017).
4. Prognosis is a prediction of the expected course and outcome of the patient's condition based on information gathered during the screening and diagnostic phases. The prognosis considers factors such as the severity and duration of the condition, the patient's age and general health, and any relevant personal or environmental factors that may affect the patient's recovery. The prognosis helps to guide the development of an appropriate treatment plan and to set realistic goals for the patient. It also helps to inform the patient and caregivers about what to expect during treatment and recovery. The prognosis can be updated or revised as new information becomes available or as the patient's condition changes over time (Rizzi, 1993).
5. Intervention is the phase in which the physical therapist implements the individualized treatment plan developed from the information gathered during the screening, diagnostic, and prognostic phases. The intervention may include a combination of physical modalities, such as manual therapy, therapeutic exercise, and neuromuscular re-education, as well as other interventions, such as patient education, environmental modifications and assistive technology. The intervention is designed to address the patient's specific impairments, functional limitations, and activity restrictions, with the ultimate goal of improving the patient's overall function and quality of life. The intervention can be modified over time based on the patient's response to treatment and the patient's evolving needs and goals (Holopainen et al., 2020).
6. Outcomes refer to the effects of the intervention, measured and analyzed during the evaluation phase. Outcomes may include objective measures, such as changes in range of motion, strength or balance, as well as subjective measures, such as the patient's reported level of pain, function or satisfaction with the treatment. The results are used to determine the effectiveness of the intervention in achieving the patient's goals and improving his or her overall function and quality of life. The results can also be used to modify the treatment plan if necessary to optimize patient outcomes. The results can be communicated to the patient and their caregivers, as well as other members of the healthcare team, to facilitate care coordination and ensure that the patient receives the best possible treatment (Judd & Kenni, 2021).
7. Re-examination is the phase in which the physical therapist repeats the examination to evaluate the patient's progress and identify any changes in the patient's condition since the initial examination. The reexamination may involve repeating the same tests and assessments that were performed during the initial examination, as well as incorporating new tests or assessments as needed. The reexamination helps determine if the intervention continues to be appropriate and effective, or if the treatment plan needs to be modified to optimize patient outcomes. Retesting can be performed at regular intervals throughout treatment to monitor the patient's progress and ensure that the treatment plan remains appropriate and effective. The results of the reexamination are used to modify the treatment plan as necessary to achieve the patient's goals and to optimize overall function and quality of life (Halligan & Donaldson, 2021).

Fig. 1. Intervention Model in Physiotherapy.



4. Methodology and results

The analysis began with the identification of deficiencies in the university clinic, when it was observed that students did not perform the practices properly, and there was a certain lack of interest in applying a structured methodology based on the Physiotherapy Intervention Model, this process was carried out during a semester in order to get to the exact point and find where the problem was. Therefore, it was necessary to apply a survey of 6 questions to the students of the American University of Puebla who belong to the Bachelor of Physical Therapy of the fifth semester group, being the sample of 26 students, since in that semester they begin to practice with outpatients and with whom they apply the Physical Therapy Intervention Model in order to give a good treatment and meet the required objective, which is to return the patient to their daily life activities.

The questions referred to the Physiotherapy Intervention Model and the degree of difficulty they have in applying it with their patients. In this regard, the survey showed that 18 of the 26 students have difficulty applying it (69.23%), while 4 of them (15.36%) refer that they know how to apply it partially, that is, some of the steps of the Physiotherapy Intervention Model are applied well and others have difficulties, and the remaining 4 (15.36%) master it well. This shows that it is a substantial problem, since the students are obtaining a diagnosis "by assumption", which, at the time of applying a treatment, will not have the desired effect. They also report that the traditional way of teaching them the Physiotherapeutic Intervention Model, without some type of strategy, is more problematic for them to understand it and put it into practice, which is why the aim is to teach them by means of an algorithm as an educational strategy, so that they can implement the Physiotherapeutic Intervention Model correctly.

Table 1. Questions applied to fifth semester students.

1. Do you know how to apply the Physical Therapy Intervention Model?
2. What steps do you find difficult in the Physical Therapy Intervention Model?
3. Do you think you have learned the application of the Physical Therapy Intervention Model well?
4. Do you think you need another strategy to better learn the Physical Therapy Intervention Model?
5. Do you think that an algorithm could be the best learning strategy to learn the Physical Therapy Intervention Model?
6. Do you consider the Physical Therapy Intervention Model functional to give a good treatment?

In question one, half (50%) said that they do not know how to apply it; therefore, in question two, 12% responded that they do, in terms of the difficulty of application. In question three, 30% considered that they have not been adequately taught the MIF and another 10% said that they have been taught it eventually. In question four, 100% responded that, although some do know how to apply the MIF, 32% mentioned that having another strategy would be easier for them, in terms of learning and, the majority (42%) likewise referred to an algorithm, since in the subject of Introduction to Physical Therapy they were mentioned to them and say that with a real patient it will be easier to apply. Regarding question six on the viability of the model, the answer was that 36% thought it was functional, but would like another teaching method.

4. Discussion

Nowadays there are many universities in Mexico and in the world with a Bachelor's Degree in Physiotherapy, which leads to an increasing number of graduates of this career, however, as we have seen, a large number of physiotherapists graduates with and without years of experience are not being given the right approach. Some have found it easier to "give massages" which, as such, is not a physical therapist's function; the process of academic and practical training has been valued so that a physical therapist fulfills his or her objective, which is to rehabilitate people, but to do so, it is necessary to comply with the main protocol mentioned by the College of Physical Therapists worldwide. That protocol is the Physical Therapy Intervention Model, which has been left aside, and physical therapists have become "empirical" and, in some cases are only relying on assumptions (Miciak et al., 2018), that is why people who come to them refer to them that they do not use the therapies and go to the "bonesetters", but this problem is part of the universities and teaching method of the Model of Intervention in Physical Therapy that are not taught properly and that generates such deficiency in students and professionals (García-Castañón. 2023).

Therefore, an algorithm is proposed as an educational strategy for the teaching and learning of the Intervention Model in Physical Therapy. It has been proven, and as mentioned by Urban et al. (2020) that this arises from the learning techniques and work methodology of each teacher. If teaching is left as in "the old school" and the current methodology is adapted, better results will be obtained. That is why this strategy is innovative and functional, not only for the students of the American University of Puebla (UAMP) but in general and thus begin to apply it from previous semesters so that they begin to know the Model of Intervention in Physical Therapy and its execution, so that when they are performing practices they do not present difficulties and it is more functional and useful when giving a treatment.

All of the above is worth applying because it is necessary to change the focus of what is understood as physical therapist, who are referred to as "sobadores" or masseurs, not taking importance to all the preparation they have, but that part of how they are getting the knowledge and that the profession is respected as such, and the work that physical therapists perform respecting the corresponding protocol.

5. The algorithm

- Step 1: Examination - The physical therapist performs a thorough examination of the patient, gathering information about the patient's medical history, symptoms, and physical function.
- Step 2: Assessment - The physical therapist evaluates the information gathered during the examination phase to identify the patient's impairments, functional limitations, and activity restrictions.
- Step 3: Diagnosis - The physical therapist uses the information gathered during the examination and assessment phases to make a diagnosis, classifying the patient's condition or problem.
- Step 4: Prognosis - The physical therapist makes a prediction about the expected course and outcome of the patient's condition based on the information gathered during the screening and diagnostic phases.
- Step 5: Intervention - The physical therapist implements an individualized treatment plan based on the information gathered during the screening, assessment, diagnostic and prognostic phases to address the patient's impairments, functional limitations and activity restrictions.
- Step 6: Outcomes - The physical therapist evaluates the results of the intervention, using objective and subjective measures, to determine the effectiveness of the treatment plan and identify any modifications that may be necessary.
- Step 7: Re-examination - The physical therapist repeats the examination at regular intervals to assess the patient's progress and identify any changes in the patient's condition, in order to modify the treatment plan as necessary to optimize patient outcomes.

This algorithmic approach ensures that the physical therapist follows a systematic, evidence-based process throughout treatment to achieve the best possible outcomes for the patient.

6. Conclusion

The application of an algorithm as a strategy is functional, since, according to the research conducted, more than 50% of the students want another method of teaching the Physical Therapy Intervention Model, since it would be easier for them to learn that way. Likewise, clinical decision making (Morandín-Ahuerma, 2019) skills are strongly related to experience and to the way the professional appropriates in his or her lifestyle a process of constant reflection, continuous learning and improvement, given by scientific evidence.

However, something that often helps the student is the daily practice of the physiotherapist, that all this is given only according to the years of experience and in his reputation, without taking into account other important aspects, such as the results and the clinical evolution of their patients, but in order to achieve this, it is necessary that everything arises from the Academic and thus society can recognize how the expert therapist, from the clinical setting, to those who achieve the best results with their patients, to those who reflect on a daily basis and remain in a permanent process of formal and informal education; And thanks to them there are several tools that help the reasoning and learning of the Intervention Model in Physiotherapy, based on the development of knowledge such as clinical evidence, as well as those related to methods such as algorithms, case studies, among others.

As mentioned, the application of the therapeutic algorithm would be more favorable in the aspect of clinical evolution with the patient in order to achieve the objectives that the therapist refers; this therapeutic algorithm is a fundamental basis for the student and for the teacher to apply this methodology in the formal education process for the learning of the Intervention Model in Physiotherapy.

Whatever the strategy used, it should include cognitive, procedural and attitudinal elements that allow the student and the teacher to dynamize and improve the ethical behavior that characterizes the responsible professional performance of the physical therapist.

The professional merges theoretical knowledge, research evidence and knowledge derived from experience with knowledge to give it meaning and context. This is why, for the Physical Therapy Program of the American University of Puebla in Mexico, it is essential to investigate the benefits of learning the Physical Therapy Intervention Model in order to be students as respected professionals in their field and to change the misconception of believing that they are only simple massage therapists and, on the contrary, apply a good therapeutic treatment.

Finally, we consider that, from this approach, as guides of the learning process, strategies that promote clinical decision making should be involved (Morandín-Ahuerma, 2021; 2021b) with elements of scientific evidence, assertive interpersonal relationships, and a reflective and proactive attitude. Thus, the Intervention Model in Physiotherapy, applied as an algorithm, will always have guaranteed success.

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