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Theoretical-Practical Model for Professional Development to Improve the Performance of Optometry and Optics Technologists in the Use of Spectralis Optical Coherence Tomography (OCT) Differentiation of Student's Curricula

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Abstract

Introduction: Health problems in Cuba and around the world impose a need for workers to update their knowledge. The development of technical and professional skills facilitates performance appropriate to their work area through professional development.

Objective: To evaluate the theoretical and practical professional development model for improving the performance of Optometry and Optics technologists in the use of the Spectralis Optical Coherence Tomography (OCT) scanner at the Ramón Pando Ferrer Cuban Institute of Ophthalmology.

Materials and Methods: A cross-sectional descriptive study was conducted from September 2022 to September 2023. A validated instrument was administered to 10 specialists. Thirteen components of the model were evaluated using an integrated assessment scale, analyzing their adequacy in terms of foundations, stages, and methods of improvement.

Results: 90% of specialists considered the foundations to be very adequate. The stages: diagnosis, planning, execution, and evaluation were rated as very adequate (100%), as were the training methods: specialized conference, course, training program, and integrative workshop. Overall, specialists rated the model as very adequate (95%) and adequate (5%).

Conclusions: The theoretical-practical model is adequate and contributes to the prognosis, detection, diagnosis, and treatment of ocular diseases, as well as to the ongoing and continuous development of optometry and optics technologists to enhance their performance in the use of biomedical technologies.

Keywords: Professional Development; Spectralis Optical Coherence Tomography; Model; Performance Improvement; Optometry and Optics Technologists

Abbreviations: OCT: Optical Coherence Tomography; ICORPF: Ramón Pando Ferrer Cuban Institute of Ophthalmology; WHO: World Health Organization

Introduction

Health problems in Cuba and around the world impose a need for workers to update their knowledge. The development of technical and professional skills facilitates performance appropriate to their work area through ongoing and continuous professional development. This is necessary to address the transformations and advances in biomedical technologies, thereby improving the quality of services and social well-being. In recent years, the development of biomedical technologies has had a significant impact on the health sector worldwide. It has improved the quality, accessibility, and efficiency of patient care by reducing the incidence of disease and enabling the prognosis, detection, diagnosis, and treatment of many conditions.

In Cuba, most medical specialties, and ophthalmology in particular, have not been immune to this development, with the installation of the Spectralis Optical Coherence Tomograph (Spectralis OCT) at the Ramón Pando Ferrer Cuban Institute of Ophthalmology (ICORPF), which examines approximately 20,080 patients annually. Statistical data obtained from the health information system, non-commercial services. The ICORPF is the national governing center for undergraduate and graduate education, with international relevance and prestige, characterized by the study,

treatment, and research of ocular diseases. It is responsible for assuming, evaluating, adopting, and transferring new technologies to the national network of ophthalmology centers and services at the country's clinical, surgical, and pediatric hospitals. It participates, through its healthcare, teaching, and scientific-research work, in the control of ocular diseases and the prevention of blindness [1].

Eye diseases are a group of conditions that can affect any part of the eye, with varying severity, ranging from mild discomfort to total vision loss. According to the World Health Organization (WHO) annual report on vision, 2.2 billion people worldwide suffer from eye diseases at different stages due to uncorrected refractive errors, near vision impairment, cataracts, glaucoma, corneal opacities, diabetic retinopathy, age-related macular degeneration, and trachoma [2,3]. Cuba is not exempt from this problem. This fact requires that optometry and optics technologists, as part of the multidisciplinary health team, contribute to the prognosis, detection, diagnosis, and treatment of eye diseases that can leave serious physical and psychological consequences and affect the quality of life of individuals, families, communities, and society [4,5].

Spectralis OCT is a noninvasive, rapid, interferometric biomedical imaging technology that does not require eye contact. It allows for the analysis and monitoring of structures that would be more difficult to view with other equipment in a matter of seconds. It provides objective, quantitative, and reproducible depth data on the anterior and posterior segments of the eye, as well as the ganglion cell complex, using the latest generation system, thus positioning it as a necessary device in ophthalmologic consultations [6-8]. Spectralis OCT is the biomedical technology with the highest level of precision and detection on the market, thus positioning it as a necessary device in ophthalmologic consultations. Therefore, optometry and optics technologists responsible for the use and management of biomedical technology contribute to medical-surgical therapy and promote optical, rehabilitative, and hygienic-epidemiological treatment, reflected in work performance [9].

Where professional development, based on the identification of learning needs through scientific methods, will address the updating of knowledge and the development of skills that allow optometry and optics technologists to integrate epidemiological and clinical methods in their work. The epidemiological method studies the population, whether healthy or sick. It aims to improve the quality of services offered to the population, which require capable, up-to-date, and prepared professionals to face scientific and technological advances [10,11]. After analyzing the background presented, the authors identified that the knowledge of optometry and optics technologists in the use of the ICORPF Spectralis TCO is insufficient.

The contradiction between technological advances in ophthalmology requires ongoing professional development for technologists in this field, contributing to the prognosis, detection, diagnosis, and treatment of eye diseases and providing excellent health care to individuals, families, communities, and society. To address this contradiction, a theoretical-practical professional development model is proposed to enhance the performance of Optometry and Optics technologists in the use of Spectralis OCT. The theoretical-practical model demonstrates the set of knowledge, skills, and technical expertise, encompassing modification and use of equipment and instruments, used to achieve a specific objective by Optometry and Optics technologists in providing solutions to a specific societal problem.

This model combines theory with practice, ensuring the continuous updating of Optometry and Optics technologists' knowledge and skills, adapting to innovations and improvements in optical and optometric technological procedures and performance. It increases the ability to perform in-depth studies of the retina, analyze the optic nerve, and contributes to the prognosis, detection, diagnosis, and treatment of ocular diseases from a comprehensive perspective. At the same time, it deepens and enriches the theory that underpins the model and ensures its relevance and effectiveness in professional practice. Based on the above, the authors undertake to evaluate the theoretical and practical models of professional development for improving the performance of Optometry and Optics Technologists in the use of the Spectralis TCO, from ICORPF.

Materials and Methods

A cross-sectional descriptive study was conducted on the theoretical and practical professional development model for improving the performance of Optometry and Optics technologists in the use of the Spectralis OCT, from ICORPF, Cuba. The study was conducted from September 2022 to September 2023. Ten specialists were selected. To evaluate the theoretical and practical model, the 10 selected specialists were assessed using the following qualities or criteria: professional ethics, impartiality, intuition, independent judgment, creativity, willingness, motivation to participate in the study, analytical skills, teamwork, and a collectivist and self-critical spirit.

They were also required to meet the following requirements: more than 10 years of professional experience, training and up-to-date knowledge of professional development models, and experience in the development of new biomedical imaging technologies for ocular diseases. An instrument was administered to the 10 selected specialists, who offered opinions and suggestions regarding the changes needed to the theoretical-practical model. This resulted in 13 sections and one open-ended question:

1. Foundations of the theoretical-practical model.
2. Purpose of the theoretical-practical model.
3. Graphic representation.
4. Characteristics of the theoretical-practical model.

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5. Stage I. Diagnosis.
6. Stage II. Planning.
7. Stage III. Execution.
8. Stage IV. Evaluation.
9. Method of improvement: specialized conference.
10. Method of improvement: course.
11. Method of improvement: training program.
12. Method of improvement: integrative workshop.
13. The theoretical-practical model in general.

The following comprehensive rating scale was used, with the following ranges shown below: [12]

- **Very Suitable:** Denotes something that not only meets the necessary requirements but does so exceptionally well. It is the ideal and outstanding option for the situation.
- **Fairly Suitable:** Denotes that something is very convenient and appropriate, although it does not reach the level of excellence of very suitable. It is a very good and satisfactory option.
- **Adequate:** Suggests that something meets the minimum requirements necessary to be considered acceptable. It is functional and appropriate for the situation but does not particularly stand out.
- **Poorly Suitable:** Denotes that something barely meets the requirements or is only slightly appropriate for the situation. It may have deficiencies that make it less suitable.
- **Inadequate:** Denotes that something does not meet the necessary requirements and is not appropriate for the situation. It is an inappropriate and possibly unwise option.

Data processing was performed with the support of Microsoft Excel software. The information was summarized in absolute and relative frequencies displayed in tables and graphs. Informed consent was obtained from the specialists. Data processing was carried out under the principle of anonymity. The criteria of the Declaration of Human Rights and the Declaration of Helsinki were met.

Results

The results of the specialists' assessments show that no responses were generated in the categories: adequate, slightly adequate, and inadequate. Therefore, the categories used were very adequate and adequate. In section one, the foundations of the theoretical-practical model, the opinion of very adequate predominated among 90% of specialists [9], followed by 10% [1] who rated it as adequate. In section two, the purpose of the theoretical-practical model, it was rated very adequate by 100% [10]. In section three, the graphic representation of the theoretical-practical model, 60% [6] rated it as very adequate and 40% rated it as adequate.

In section four, the characteristics of the theoretical-practical model were evaluated as very adequate by (9) of the specialists for 90% and quite adequate by [1] specialist for 10%. Items five, six, seven, and eight, referring to the stages:

1. Diagnosis
2. Planning
3. Execution

4. Evaluation were rated as very adequate by 100% of the specialists [10] each. Items nine, 10, 11, and 12, referring to the forms of improvement: specialized conference, course, training program, and integrative workshop, were rated as very adequate by 100% [10] each specialist. In item 13, the theoretical-practical model in general was rated as very adequate by all 10 specialists, giving 100% (Figure 1).

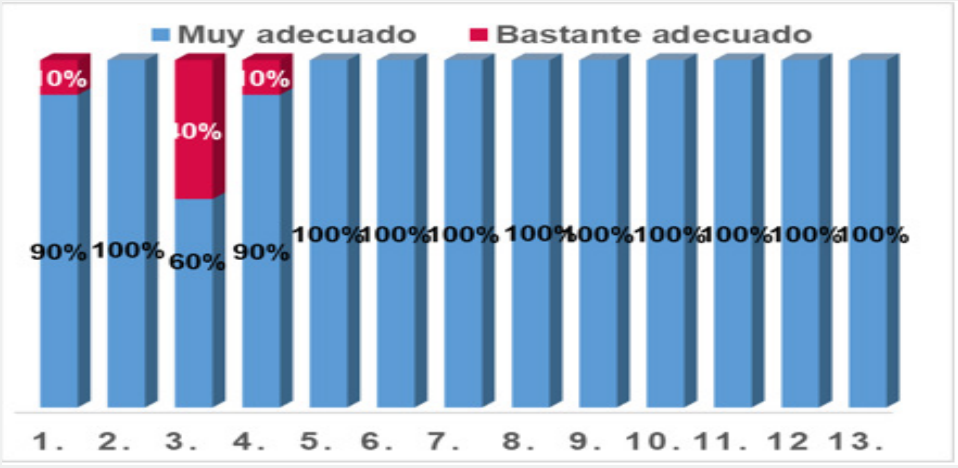

Figure 1: Feasibility of the components of the theoretical-practical model according to specialists.

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In general, the specialists rated the theoretical-practical model as very adequate by 95% and adequate by 5% (Figure 2). The 10 specialists consider the theoretical-practical model to be relevant, feasible, and flexible for optometry and optics technologists. They approve of the proposed training methods. The 10 specialists consider the theoretical-practical model to be relevant, feasible, and flexible for optometry and optics technologists. They approve the proposed professional development methods to improve the performance of these professionals and, consequently, the improved care services provided to the population. Regarding the open question, for the specialists to express their opinions on what they would modify or include in each of the 13 aspects to be evaluated, the analysis of opinions and suggestions identified the following:

Figure 2: Assessment of the theoretical-practical model by the specialists.

They agreed on the possibility of publishing the results of the clinical case presentations developed in the integrative workshop. They reflect that it is a means of information and knowledge management for undergraduate and graduate levels in the specialty, both in Havana and throughout the country, where Optometry and Optics technologist's work. This allows them to update their knowledge and share the results of their professional development and research. In this regard, the authors state that the open-ended questions were taken into consideration, and the results were included accordingly. The opinions were complemented by the closed-ended questions; therefore, a second round was not necessary to refine the theoretical-practical model based on the specialists' criteria.

Discussion

The study by Deroncele A [13] is based on the following challenge: (…) doctoral theses must provide a theoretical contribution (…) a contribution in the field of science, of theory… a transformative scientific contribution (…) that contributes knowledge to a scientific discipline, on the one hand, and allows that knowledge to be applied to practice, on the other, (…) based on a methodological instrument as a practical contribution that meets criteria of connection, organization, viability, applicability, and clarity. In line with the previous approach, other authors define the constituent elements of a theoretical model but also offer three additional elements in case that theoretical model were to be implemented or put into practice, these being methodological, procedural, and validation elements [14].

This approach coincides with the results found in this article, where the model establishes a set of integrated theoretical and practical relationships through a set of steps or actions that drive the solution to a problem. The results of these three components cannot be viewed separately, but rather in an integrated and holistic manner as an articulated operational contribution to solving the problem selected by the researchers in each context. One of the main challenges of the theoretical-practical model is finding the right balance between theory and practice. Optometry and optics technologists must be able to effectively combine theoretical concepts with practical application, which may require a deep understanding of both aspects and the ability to integrate them coherently.

The theoretical-practical model offers professionals the opportunity to develop a wide range of valuable skills, including research skills, data analysis, problem-solving, effective communication, and informed decision-making. It should be noted that a theoretical-practical model is a combination of theoretical and practical approaches to address a specific phenomenon or problem. This type of model integrates the abstract concepts and fundamental principles of a theoretical model with the tangible applications and solutions of a practical model. The goal is to provide a comprehensive understanding of the phenomenon and guide the implementation of effective solutions in the real world [15-17].

In different fields [18-20] theoretical-practical models have been applied, addressing how the foundations, purpose of the model, as well as the stages of motivation, planning, execution,

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and evaluation allow for enriching knowledge, strengthening skills, achieving great adaptability to the reality in which professionals find themselves, and improving job performance. This coincides with the results of the evaluation of the theoretical-practical model, where most specialists considered the model to be very adequate and quite adequate in several aspects, such as its foundations, stages, and methods of improvement. This is based on several key reasons:

Integration of theory and practice: This allows technologists to effectively apply the acquired knowledge in a real-life context. Optometry and Optics are highly technical fields and require a deep understanding of both theoretical principles and practical skills to use advanced biomedical technologies such as the Spectralis OCT.

Continuous Updating: Biomedical technology in the field of Optometry and Optics is constantly evolving. A theoretical-practical model ensures that technologists maintain their knowledge and skills up to date, adapting to innovations and improvements in optical and optometric technological procedures.

Performance Improvement: The Spectralis OCT is a complex tool that requires specialized training for effective use. By employing a theoretical-practical model, the goal is to improve the performance of Optometry and Optics technologists, increasing their ability to perform in-depth studies of the retina, analyze the optic nerve, and contribute to the prognosis, detection, diagnosis, and treatment of ocular diseases.

Comprehensive Approach: This theoretical-practical model not only focuses on the technical aspect but also addresses professional development from a comprehensive perspective. It considers the relationship between the functions of optometry and optics technologists in medical education sciences and promotes holistic training that enriches theory and improves practice.

Theoretical Deepening and Enrichment: The implementation of this theoretical-practical model allows us to delve into the essence of the research object and reveals the relationships between its components and distinctive elements. This, at the same time, deepens and enriches the theory underpinning the model and ensures its relevance and effectiveness in professional practice.

Conclusions

The ICORPF theoretical-practical model of professional development for improving the performance of Optometry and Optics Technologists in the use of the Spectralis OCT was evaluated by specialists as very adequate and quite adequate, demonstrating its viability and effectiveness. The importance of professional development in contributing to the prognosis, detection, diagnosis, and treatment of ocular diseases was highlighted, as was the need for continuous development adapted to biomedical technologies. The specialists suggested publishing the results of the case presentations. The integrative workshop, where technologists work, allows them to update themselves and share the results of their professional development and research.

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