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Research Article

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Characterization of the Initial State of Professional Development of Optometry and Optics Technologists in the Use of Spectralis

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Abstract

Introduction: *At an international level, professional development is essential for development in the scientific, technological, economic, environmental and social fields of any country. The incorporation of advanced biomedical technology in hospital and community institutions has required the training of professionals in Health Technology profiles, a more recently created area within Medical Education Sciences in Cuba. Therefore, the process of professional development of Optometry and Optics Technologists in the Spectralis Optical Coherence Tomography, an advanced biomedical imaging diagnostic technology that provides objective, quantitative and reproducible data, is necessary.*

Objective: *to characterize the initial state of professional development to improve the performance of Optometry and Optics Technologists in the use of the Spectralis Optical Coherence Tomograph, from the Ramón Pando Ferrer Cuban Ophthalmological Institute.*

Method: *An observational study was conducted. The selected population, 50 Optometry and Optics Technologists from the Cuban Ramón Pando Ferrer Ophthalmological Institute, was not sampled. Methodological triangulation was performed by grouping, comparing and contrasting the results obtained in the different empirical methods applied.*

Results: *The results obtained facilitated the obtaining of the inventory of the problems and potentialities of the professional development process to improve the performance of Optometry and Optics technologists in the use of the Spectralis Optical Coherence Tomograph.*

Conclusions: *The problems and potentials of the initial state of professional development were determined to improve the performance of Optometry and Optics technologists in the use of Spectralis.*

Keywords: Professional Development, Optometry and Optics Technologist; Spectralis Optical Coherence Tomography, Ocular Diseases, Parameterization, Methodological Triangulation

Introduction

Since the dawn of mankind, man has shown that it is a first to respond to his needs in interaction with the environment that surrounds him. This reality has motivated him to seek knowledge Professional development is an opportunity to prepare professionals to face the growing challenge of the country's development, the accelerated growth of knowledge and the increasingly evident need for innovation and the introduction of the latest technology in production and service processes [1-4].

In this context, the development of science and technology is highlighted to contribute to the prognosis, diagnosis and treat-

ment of many diseases. In this way, current medicine seeks new ways to solve professional and social problems, which are related to the health-disease link [5].

Ophthalmology is distinguished by the introduction of biomedical technologies used in the execution of the process of formation and obtaining of medical images, to confirm or rule out the presumptive diagnosis of eye diseases that can cause visual impairment, even blindness. According to the World Vision Report, 2.2 billion people in the world suffer from visual impairment or blindness. The Ministry of Public Health (MINSAP) reports that Cuba is not exempt from this problema [6, 7].

The Spectralis Optical Coherence Tomography (Spectralis OCT), an advanced biomedical imaging technology, provides objective, quantitative and reproducible data. It is a noninvasive, rapid and interferometric technique that does not require eye contact and allows the analysis and control of structures that would be more difficult to see with other equipment in a matter of seconds. In recent years, it has undergone great technological development, which allows in-depth studies of the anterior and posterior segments of the eye, and the ganglion cell complex [9, 10].

In various studies, They have shown that the structural evaluation of the optic nerve, the retinal layers and the ganglion cell complex that can be objectively assessed by means of OCT has acquired important value in recent years in the evaluation of multiple sclerosis, Parkinson's, Alzheimer's and in patients with bipolar disorders, being considered as a biomarker for diagnosis, progression and even prognosis of these diseases [10-18].

Although there is a wide variety of these devices and models available on the market, the Spectralis is one of the most versatile, thus positioning it as a multipurpose device, necessary in ophthalmological consultations. Therefore, it is important that Optometry and Optical Technologists (who in most situations perform this examination) get involved in a process of professional development, which allows them to contribute to medical-surgical therapy and promote optical, rehabilitative, hygienic-epidemiological treatment, from the mode of action [19].

The above background information allowed us to identify the following problematic situation in the exploratory stage of the research: insufficient professional development to improve the performance of Optometry and Optics Technologists in the use of the Spectralis Optical Coherence Tomograph, of the Cuban Ophthalmological Institute Ramón Pando Ferrer. The background and the identified situation made it possible to establish the following:

Contradiction: Technological advances in Ophthalmology require ongoing and continuous professional development of Technologists in this branch of knowledge, which contributes to the detection, diagnosis and treatment of eye diseases in order to provide an excellent health service to the individual, family, community and society. However, professional development is insufficient to improve the performance of Optometry and Optics Technologists in the use of the Spectralis Optical Coherence Tomograph of the Ramón Pando Ferrer Cuban Ophthalmological Institute.

In the search for a response from science, the scientific problem is: How to contribute to professional development to improve the performance of Optometry and Optics Technologists in the use of the Spectralis Optical Coherence Tomograph of the Ramón Pando Ferrer Cuban Ophthalmological Institute?

The object of the research is the process of professional development and the field of action: professional development to improve the performance of Optometry and Optics Technologists in the use of the Spectralis Optical Coherence Tomograph, from the Ramón Pando Ferrer Cuban Ophthalmological Institute.

The authors undertake to provide a response to the scientific problem and to do so they establish the objective of the research: to characterize the initial state of professional development to improve the performance of Optometry and Optics Technologists in the use of the Spectralis Optical Coherence Tomograph, from the Ramón Pando Ferrer Cuban Ophthalmological Institute.

Material and Methods

An observational study was conducted and analyzed with the approval of the subject at the Cuban Institute of Ophthalmology Ramón Pando Ferrer. The selected population consisted of 50 graduates in Optometry and Optics, responsible for providing a quality service. No sample was taken for the research. The instruments (initial observation guide, survey and performance test) were applied to the study universe.

To identify the dimensions and relevance of each of the indicators, 10 selected specialists were worked with. The authors considered it necessary that the 10 selected specialists meet the following requirements: have more than 10 years of professional experience, training and updated knowledge, performance in the development of new imaging diagnostic technologies for eye diseases.

All of this supported the methodology used in determining professional development to improve the performance of Optometry and Optics Technologists working in the context of the study. To solve the scientific problem, the authors relied on theoretical, empirical and statistical-mathematical scientific methods.

Theoretical Methods

- **Historical-logical:** the correspondence between the logical and historical elements was made in order to analyze the historical evolution of professional development in Medical Education.
- **Analysis–synthesis:** it was used in each of the stages of the research to summarize the information, which facilitated the transition through stages and the arrival at conclusions, from a scientific perspective.
- **Structural-functional Systemic:** reveals the guiding and organizational character as a form of scientific research, the relationships, links and concatenations between the different processes, facts and results obtained.
- **Systematization:** It facilitated the identification of the transformations in the professional development process, the technological, economic and social advances and demands, based on the analysis of the positions and results of various authors referring to the topic to be investigated, in

addition, it provided the bases for the definitions developed by the authors.

- **Modeling:** It was recognized that the degree of abstraction would enable the design of the proposed theoretical-practical model with the representation of its components and relationships.

Empirical Methods

- **Scientific Observation:** it was used to characterize the initial state of professional development shown by Optometry and Optics Technologists in the use of the Spectralis Optical Coherence Tomograph and to verify during validation, the implementation of the theoretical-practical model.
- **Survey:** This survey was applied to Optometry and Optics Technologists to obtain information related to professional development for improving the performance of Optometry and Optics Technologists in the use of the Spectralis Optical Coherence Tomograph, from the Ramón Pando Ferrer Cuban Ophthalmological Institute.
- **Performance Test:** provided the characterization of professional development for the improvement of the performance of Optometry and Optics Technologists in the use of the Spectralis Optical Coherence Tomograph, of the Ramón Pando Ferrer Cuban Ophthalmological Institute before and after applying the theoretical-practical model.
- **Specialist Criteria:** it was used to identify the dimensions, relevance of the indicators and verify the viability of the theoretical-practical model of professional development to improve the performance of Optometry and Optics Technologists in the use of the Spectralis Optical Coherence Tomograph.
- **Satisfaction Test:** allowed to determine the level of satisfaction of Optometry and Optics Technologists and to collect suggestions regarding the theoretical-practical model.

Mathematical Statistical Method

To process the information collected during the course of the research, descriptive statistics were used, which were reflected in double-entry contingency tables, as well as in graphical representation, and the information was summarized in absolute and relative frequencies.

The results obtained from the methodological triangulation, based on the characterization of the initial state, facilitated the obtaining of the inventory of problems and potentialities. The work was carried out with 50 Optometry and Optics Technologists from the Cuban Ophthalmological Institute Ramón Pando Ferrer.

Results and Discussion

To identify the dimensions and relevance of each of the indicators, we worked with 10 selected specialists who had to meet the following requirements: have more than 10 years of professional experience, training and updated knowledge, and performance in the development of new imaging diagnostic technologies for eye diseases.

As a result, it was found that 100% of the specialists rated all dimensions as very essential, fairly essential and essential. As for the indicators, all reached 100% approval, therefore, it was considered pertinent to evaluate each one. (Figure 1. Table 1)

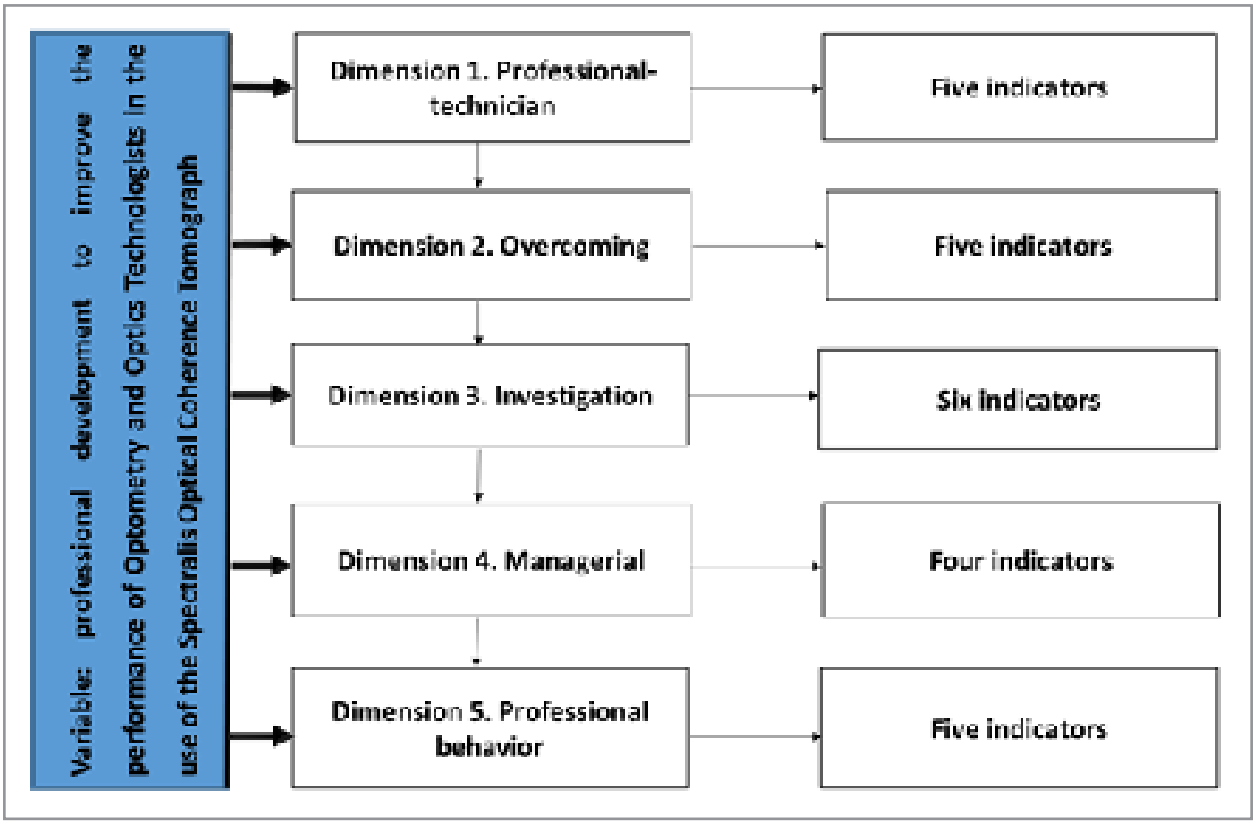

Figure 1: Flowchart of Dimensions and Indicators

Table 1: Distribution of the dimensions to be evaluated according to the specialist's assessment

Dimensions	MI		BI		I		PI		NI	
Technical-Professional	No.	%	No.	%	No.	%	No.	%	No.	%
	9	90	1	10	0	0	0	0	0	0
Overcoming	10	100	0	0	0	0	0	0	0	0
Investigation	9	90	0	0	1	10	0	0	0	0
Managerial	7	70	1	10	2	20	0	0	0	0
Professional behavior	8	80	1	10	1	10	0	0	0	0

The process described allows the parameterization of the variable, which is derived in five dimensions to explore and 25 indicators, to respond to the scientific problem.

From the identified variable, the following dimensions and indicators were derived:

Dimension 1: Technical-Professional: mastery and skills that the Optometry and Optics Technologist has in the use of the Spectralis Optical Coherence Tomograph to detect eye diseases. It consists of five indicators:

1. Level of independence in handling the Spectralis Optical Coherence Tomograph to detect eye diseases.
2. Level of independence in handling accessories and selecting the Spectralis Optical Coherence Tomograph software to detect eye diseases.
3. Level of cognitive independence with which the Spectralis Optical Coherence Tomograph user manual is applied to detect eye diseases.
4. Level of cognitive independence for the formation and interpretation of the Spectralis Optical Coherence Tomograph image to detect eye diseases.
5. Level of cognitive independence in the interpretation of clinical data from the Spectralis Optical Coherence Tomograph to detect eye diseases.

Dimension 2: Improvement: manifested in the expression of knowledge and skills on the use of the Spectralis Optical Coherence Tomograph to detect eye diseases, through ongoing and continuous improvement activities.

Indicators

1. Level at which you participate in specialized conferences on the use of the Spectralis Optical Coherence Tomograph to detect eye diseases.
2. Level at which you participate in workshops on the use of the Spectralis Optical Coherence Tomograph to detect eye diseases.
3. Level with which you participate in courses on the use of the Spectralis Optical Coherence Tomograph to detect eye diseases.
4. Level at which you participate in training on the use of the Spectralis Optical Coherence Tomograph to detect eye diseases.
5. Level at which self-preparation is carried out on the use of the Spectralis Optical Coherence Tomograph to detect eye diseases.

Dimension 3: Research: expressed as the manifested performance of investigative skills in the use of science as a tool to identify, analyze and solve eye health problems. Presenting results of scientific activity at scientific events and intellectual production.

Indicators:

1. Level of application of scientific results on the use of the Spectralis Optical Coherence Tomograph for the solution of eye health problems.
2. Frequency of publishing scientific articles related to the use of the Spectralis Optical Coherence Tomograph to detect eye diseases.
3. Frequency with which you carry out the activity of tutor in scientific research related to the use of the Spectralis Optical Coherence Tomograph for the solution of eye health problems.
4. How often is he/she the head of a research project related to the use of the Spectralis Optical Coherence Tomograph to solve eye health problems.
5. Frequency with which you participate in a research project related to the use of the Spectralis Optical Coherence Tomograph to solve eye health problems.
6. Frequency with which you participate in scientific events to socialize the results related to the use of the Spectralis Optical Coherence Tomograph for the solution of eye health problems.

Dimension 4: Managerial: manifested in management actions of technological processes when making decisions, flexible human relations through affective dialogue with the work team, the development of educational work within the work environment, the direction of the technological process in the use of the Spectralis Optical Coherence Tomograph to detect eye diseases in the patient care area.

Indicators

1. Level that is used for decision-making when interpreting images and clinical data using the Spectralis Optical Coherence Tomograph to solve eye health problems.
2. Level of development of human relations with the work team.
3. Level of requirement to manage compliance with the provisions of the Spectralis Optical Coherence Tomograph user manual.
4. Level of requirement to manage the efficient and planned use of the Spectralis Optical Coherence Tomograph.

Dimension 5: Professional behavior: aimed at the performance manifested in the expression of values of technologists with patients, family members, work team and the relationship technologist-patient-biomedical technology and multidisciplinary team based on the application of the principles of bioethics and professional ethics.

Indicators

1. Level of independence to achieve patient cooperation during the study.
2. Level of independence to achieve empathy in the technologist-family relationship.
3. Level of independence to achieve empathy in the technologist-coworkers relationship.
4. Level of maintaining discretion regarding information, facts and situations during the use of the Spectralis Optical Coherence Tomograph.
5. Level at which the application of ethics and bioethics is manifested during the use of the Spectralis Optical Coherence Tomograph.

The system of dimensions and indicators proposed by the authors allowed the determination of problems, for which the following instruments were developed: initial scientific observation, survey and initial performance test in a context where the performance occurs.

For the collection of information, the instruments were validated before applying them to the study universe.

The validation instruments were subjected to a pilot test to detect problems in the application and operation of the instrument, in relation to the language or wording and the ease of interpretation of each item. For this purpose, five Optometry and Optics Technologists were selected, full-time employees of the Optometry and Optics department who were not part of the research universe.

The two applications of the instrument were carried out two weeks apart. There was no difference between the first and second application, so there is concordance between the two.

To identify the type of correspondence between the two results when determining the intensity and statistical significance of the relationship, the interpretation of Pearson's correlation coefficient was carried out, which will consider two elements: the intensity of the association and direction [20].

In the case of instrument validation, only direct and positive relationships are of interest, that is, the correlation coefficient with a positive value (between 0 and 1). Therefore, the greater the reliability of the instrument studied, the greater the absolute value of the simple linear correlation coefficient (closer to 1). Once the calculation was made, the result was 0.87, classifying the designed instrument as good. The following classification can be accepted:

- Very good: > 0.90;
- good: 0.80 to 0.90;
- acceptable: 0.70 to 0.80;
- unacceptable: < 0.70

Now, the face validity and content validity were presented to the specialists, through the Moriyama Criteria. 20 a decision rule was established that summarizes the assessment of the indicators and dimensions, both individually and collectively, in order to establish a value judgment. With the application of the Moriyama test, useful results were obtained; all the proposed items achieved 100% of the points in each of the criteria evaluated by the specialists.

The instruments were applied from the education in the workplace, in general, in the initial observation the variable under study, the rating scales are not observed in 46% (23) Technologists. In the survey the variable under study in 46% of the technologists was inadequate. In the initial performance test the variable under study, the rating scale was inadequate in 50% (25) Technologists in Optometry and Optics.

Thus, after the characterization is carried out, the state of the integral variable is inadequate in 48% of the Optometry and Optics Technologists.

After carrying out the analysis of the results obtained from the instruments, the authors use the methodological triangulation procedure as part of the parameterization process for the object of study and the field of action of the research, thus giving greater objectivity to the results, once they are compared through different methodologies, which makes the results of the research more valid than when they come from just one of them.

This methodological triangulation allowed us to determine the inventory of problems and potentials identified in each of the dimensions in the characterization process, presented below:

Dimension 1: Technical-Professional

1. Problems in the level of cognitive independence for the formation and interpretation of the Spectralis Optical Coherence Tomograph image to detect eye diseases.
2. Problems in the level of cognitive independence in the interpretation of clinical data from the Spectralis Optical Coherence Tomograph to detect eye diseases.

Dimension 2: Overcoming

1. Problems in the level of participation in specialized congresses on the use of the Spectralis Optical Coherence Tomograph to detect eye diseases.
2. Problems in the level of participation in workshops on the use of the Spectralis Optical Coherence Tomograph to detect eye diseases.
3. Problems in the level of participation in courses on the use of the Spectralis Optical Coherence Tomograph to detect eye diseases.
4. Problems in the level of participation in training on the use of the Spectralis Optical Coherence Tomograph to detect eye diseases.

Dimension 3: Research

1. Problems in the level of application of the scientific results of the use of the Spectralis Optical Coherence Tomograph for the solution of eye health problems.
2. Problems in the frequency with which scientific articles related to the use of the Spectralis Optical Coherence Tomograph for the detection of eye diseases are published.

3. Problems in the frequency with which the activity of tutor in scientific research related to the use of the Spectralis Optical Coherence Tomograph for the solution of eye health problems is carried out.
4. Problems in the frequency with which you are responsible for a research project related to the use of the Spectralis Optical Coherence Tomograph for the solution of ocular health problems.
5. Problems in the frequency with which you participate in a research project related to the use of the Spectralis Optical Coherence Tomograph for the solution of ocular health problems.
6. Problems in the frequency with which you participate in scientific events to socialize the results related to the use of the Spectralis Optical Coherence Tomograph for the solution of ocular health problems.

Within the analysis, it was possible to approach the potentialities found with the support of the applied instruments. These are associated with the indicators that achieved positive results between 60% and 100% of the Optometry and Optics Technologists who classified in this range.

The potentialities correspond to dimension 4. Managerial (four indicators) and dimension 5. Professional behavior (five indicators). The potentialities are given to:

1. Level of decision-making when interpreting images and clinical data using the Spectralis Optical Coherence Tomograph to solve eye health problems.
2. Level of development of human relations with the work team.
3. Level of demand to manage compliance with the provisions of the Spectralis Optical Coherence Tomograph user manual.
4. Level of demand to manage the efficient and planned use of the Spectralis Optical Coherence Tomograph.
5. Level of independence to achieve patient collaboration during the study.
6. Level of independence to achieve empathy in the Technologist-family relationship.
7. Level of independence to achieve empathy in the Technologist-coworkers relationship.
8. Level of maintaining discretion regarding information, facts and situations during the use of the Spectralis Optical Coherence Tomograph.
9. Level at which the application of ethics and bioethics is manifested during the use of the Spectralis Optical Coherence Tomograph.

These potentialities are used to achieve the planned objectives, reach the desired results, actions and challenges to face with creativity, enthusiasm, through a continuous process of professional improvement of Optometry and Optics Technologists with feedback from decision making with quality, discipline to be able to correct the identified problems and improve the performance of these professionals in the use of the Spectralis Optical Coherence Tomograph, in order to raise the quality of services at the Cuban Ophthalmological Institute Ramón Pando Ferrer.

Conclusion

In conclusion, the parameterization of the professional development process of Optometry and Optics Technologists in the use of the Optical Coherence Tomograph, with its only variable, its five dimensions and 25 indicators, conditioned the preparation of the instruments applied to characterize the initial state of professional development for the improvement of the performance of Optometry and Optics Technologists in the use of the Spectralis Optical Coherence Tomograph.

Through the analysis of the results obtained with the application of the instruments, the inventory of problems and potentialities was developed, which constituted the starting point for solving the problem investigated.

Conflict of Interest

There is no conflict of interest between the authors.

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