

Professional advancement needs of electro medicine specialists for the digitization of x-ray equipment for the Cuban healthcare system

Abstract

It's of vital importance to professionalize human resources in the healthcare sector with updated knowledge and skills through professional development. This equips them with new scientific content that contributes to their preparation and enables them to apply theoretical and practical knowledge in their work environment. Therefore, it is necessary to assess the theoretical knowledge of electro medicine professionals regarding in the digitization of X-ray equipment in three regions of the country to enhance their performance. The objective of this article is to diagnose the professional development needs of electro medicine specialists for the digitization of X-ray equipment. The research methods used include both qualitative and quantitative approaches, within statistical analysis of the data collected in you find. A selection of electro medicine specialists is made from the three regions of the country that meet the inclusion criteria, descriptive statistics are applied to the data collected and it is diagnosed that the specialists declare the need for more specific courses on digitalization, continuous updating and access to modern equipment for practical training. The experience was carried out at the University of Medical Sciences of Cienfuegos. Dr. "Raúl Dorticós Torrado". CUBA

Volume 13 Issue 4 - 2024

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Received: October 25, 2024 | **Published:** November 05, 2024

Introduction

There is currently a need to professionalize human resources in the healthcare sector with updated knowledge and skills through professional development. This aims to equip them with content that will contribute to their preparation, enabling them to apply theoretical and practical knowledge attained from science. Professional development takes on various nuances because it is impossible to incorporate all content into initial training alongside scientific and technological advances.¹

The training of Engineers, graduates, and Technologists in the Electro medicine area of Health is intended to sustain the technology of the health system. To make this possible from a technological standpoint, Continuous Education and systematic updates for specialists in this area are necessary. This also involves the improvement of their professional and academic activities and the enrichment of their cultural heritage.

The purpose of professional development is the enhancement of the individual for their professional and human betterment. Its objectives are aimed at expanding, improving, updating, and complementing knowledge, skills, and capabilities; consolidating values; promoting development and professional behavior.²

The professional development process allows for better improvement, training, education, and preparation for electro medicine professionals. This characterizes the process as contextualized and intentional in enhancing professional performance. (...) "It is aimed at various labor resource processes within the purpose of updating and improving current and/or prospective professional performance, addressing deficiencies in training, or completing previously not acquired knowledge and skills necessary for performance".³

Currently, the digitization of X-ray equipment involves a process of converting analog radiology to a digital format in seconds, allowing it to be viewed and edited on a computer⁴. This enables cost savings on radiographic films, and chemicals for development, helps protect

the environment, reduces development time and response time since the output is digital, reduces radiation exposure for patients and operators, and allows studies to be conducted remotely, involving multiple medical specialties, facilitating greater judgment.

In the Cuban Health System, digital radiography; not only improves equipment functionality but also entails a change in the use of economic resources, computer education for the population, and the exercise of professionals who require continuous training to enhance their preparation, knowledge, and performance. Despite shortcomings and inconveniences, the advantages of this technique, which allows accurate diagnoses and effective therapeutic treatments to improve the population's well-being and quality of life, should be leveraged.⁵

Today, the replacement of conventional radiology (wet film printing) with digital radiology is an irreversible path. It is practically mandatory to join this significant technological change, as improvements range from image quality, reduced ionizing radiation, and cost reduction, among others.⁶

This is why there is a need for a deep update to electro medical professionals in the theoretical knowledge of the digitization of x-ray equipment.

The main organizational forms of professional development are Courses, Diploma Training, and other secondary forms: Seminars, Workshops, Specialized Conferences, Scientific Debates, Self-preparation, Consultations, and others. Courses provide basic and professional development, responding in a short time to the needs of complementing and updating the specialized knowledge of professionals selected by the authors.⁷

According to the author's experience, the professional development of electro medicine specialist's demands organized and systematic professional development through courses at technology factories or internal courses in training centers. Therefore, it is necessary to diagnose the professional development needs of electro medicine specialists to the digitization of X-ray equipment for the Cuban health system.

Method

Qualitative and quantitative level methods were used as research methods, within statistical analysis of the data collected in surveys.

- a) Bibliographic analysis to determine the need for professional improvement of electro medicine specialists for the digitization of X-ray equipment.
- b) Synthetic analysis within the purpose of selecting the electro medicine contents for the digitization of X-ray equipment.
- c) Deductive and inductive, to specify the essential contents for the digitization of X-ray equipment.
- d) Survey of electro medicine specialists.
- e) Descriptive statistical analysis of the survey results.

Discussion

Of the 19 specialists initially chosen, 7 were selected who expressed their consent to cooperate with our investigative work and the need to participate in this research, representing the 3 regions of the country.

The selection criteria for the 7 specialists are those who meet the following conditions:

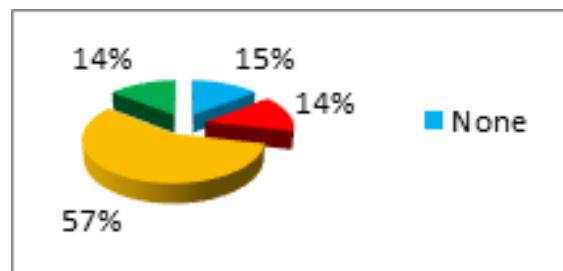
- a) Express your consent to participate in the research.
- b) Have you more than 6 years of experience in electro medicine?
- c) Are you graduated of higher education in careers related to electro medicine?
- d) Have you received some type of improvement course?
- e) Greater participation in scientific events and in science and technology FORUM?

A survey with 12 questions was applied; 11 of these were answered according to the respondent's choice and used for statistical analysis, while the last one consisted of recommendations for possible improvements to the professional development system.

Statistical results

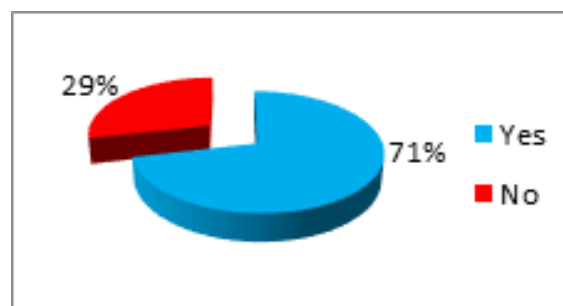
Results of the survey on professional development for electro medicine professionals in the content of X-ray equipment digitization.

- 1) What is your current level of knowledge about the digitization of X-ray equipment?
 - a) None: No knowledge on the topic. R: 14.3%
 - b) Basic: knows fundamental concepts but has no practical experience. R: 14.3%
 - c) Intermediate: Have theoretical knowledge and some practical experience. R: 57.1%
 - d) Advanced: Possesses deep knowledge and significant practical experience. R: 14.3%



What is your current level of knowledge about the digitization of X-ray equipment?

- 2) Have you received any specific training in the digitization of X-ray equipment?
 - a) Yes: Has participated in some form of specific training. R: 71.4%
 - b) No: Has not received specific training in this field. R: 28.6%

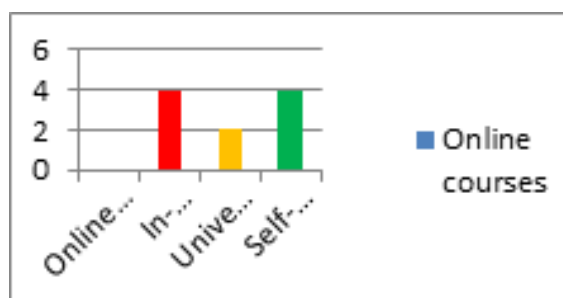


Have you received any specific training in the digitalization of X-ray equipment?

- 3) If you answered "Yes" to the previous question, what type of training have you received?

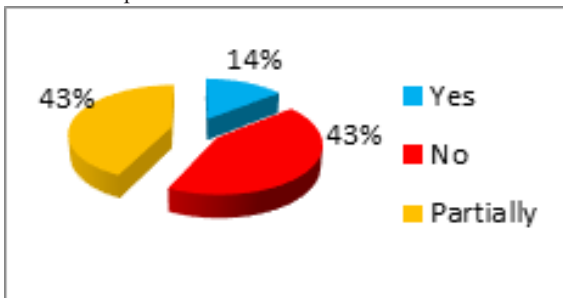
You may select one or more answers.

- a) Online Courses: Training through digital platforms. R: 0%
- b) In-person Workshops: Practical training in a face-to-face setting. R: 57.2%
- c) University Education: Formal academic courses or programs. R: 28.6%
- d) Self-taught: Learning on your own without a formal structure. R: 57.2%



If you answered Yes to the previous question, what type of training have you received?

- 4) Do you consider the training received sufficient for your professional development in this field?
 - a) Yes: The training has met all your professional needs. R: 14.3%
 - b) No: The training has been insufficient for your professional development. R: 42.9%
 - c) Partially: The training has been useful, but there are still areas that need improvement. R: 42.9%

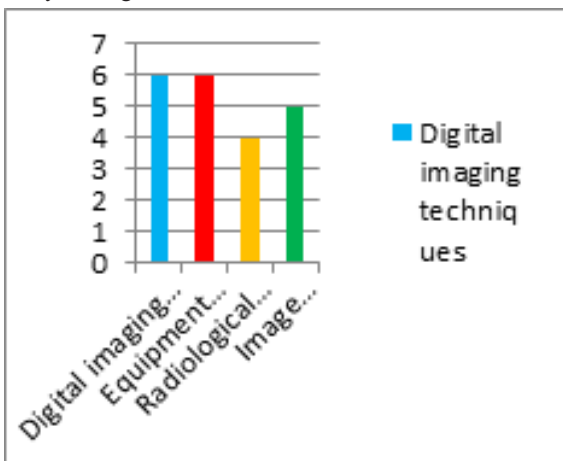


Do you consider the training received sufficient for your professional development in this field?

- 5) What aspects of the digitalization of X-ray equipment would you like to delve deeper into?

You may select one or more answers.

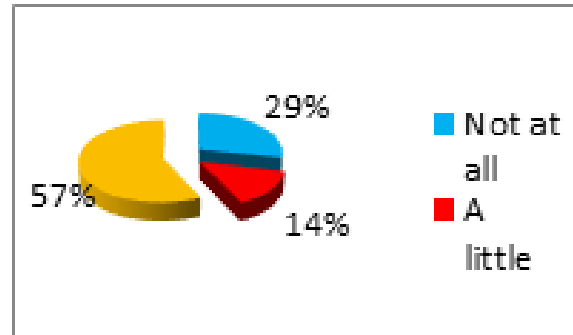
- a) Techniques for digital imaging: Methods and technologies for obtaining digital images. R: 85.7%
- b) Equipment maintenance and calibration: Procedures for maintaining and calibrating equipment. R: 85.7%
- c) Radiation safety and protection: Measures to protect against radiation. R: 57.1%
- d) Image processing software: Programs used to process and analyze images. R: 71.4%



Which aspects of the digitalization of X-ray equipment would you like to delve deeper into?

- 6) How prepared do you feel to teach about the digitalization of X-ray equipment to students?
 - a) Not at all: Does not feel prepared to teach knowledge about digitalization. R: 28.6%

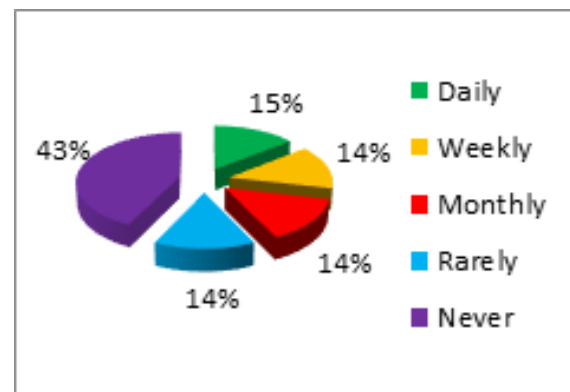
- b) Little: Only has basic theoretical knowledge. R: 14.3%
- c) Moderately: Has some theoretical and practical knowledge. R: 57.1%
- d) Very: Possesses deep knowledge and practical experience. R: 0%



How prepared do you feel to teach about the digitalization of X-ray equipment to students?

- 7) How often do you use digitized X-ray equipment in your professional practice?

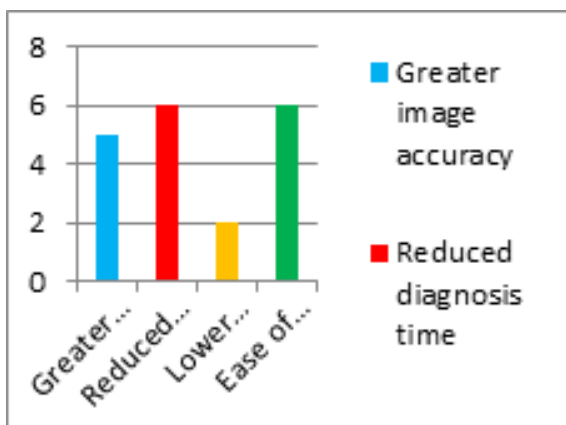
- a) Daily: Uses the equipment every day. R: 14.3%
- b) Weekly: Uses the equipment at least once a week. R: 14.3%
- c) Monthly: Uses the equipment at least once a month. R: 14.3%
- d) Rarely: Uses the equipment occasionally. R: 14.3%
- e) Never: Does not use digitized X-ray equipment. R: 42.9%



How often do you use digitized X-ray equipment in your professional practice?

- 8) What benefits have you observed in the use of digitalized X-ray equipment compared to analogic equipment?

- a) Greater precision in images: Digital images are clearer and more precise. R: 71.4%
- b) Reduced diagnosis time: Diagnoses are made more quickly. R: 85.7%
- c) Lower radiation exposure: Patients and staff are less exposed to radiation. R: 28.5%
- d) Ease of storage and access to images: Digital images are easier to store and access. R: 85.7%

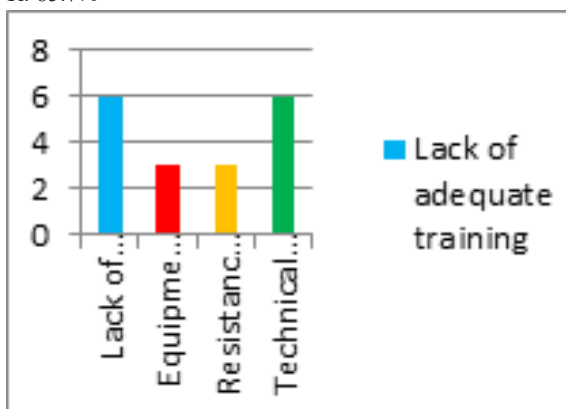


What benefits have you observed in the use of digitized X-ray equipment compared to analog equipment?

9) What challenges have you faced in the transition from analogic to digitalized equipment?

You may select one or more answers.

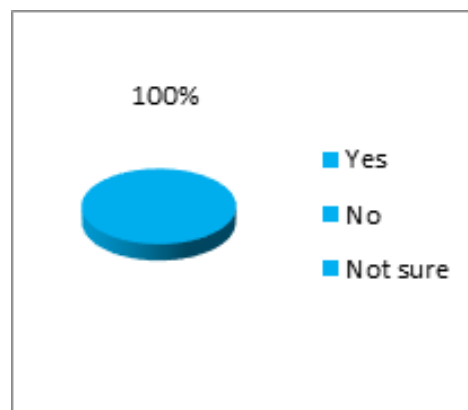
- a) Lack of adequate training: Has not received sufficient training to handle the new equipment. R: 85.7%
- b) Equipment upgrade costs: Costs associated with upgrading to digitalized equipment. R: 42.8%
- c) Resistance to change by staff: Difficulties in getting staff to accept and adapt to the new equipment. R: 42.8%
- d) Technical issues: Technical difficulties with the new equipment. R: 85.7%



What challenges have you faced in the transition from analog to digitized equipment?

10) Do you believe that the digitalization of X-ray equipment has improved the quality of patient care?

- a) Yes: Digitalization has significantly improved patient care. R: 100%
- b) No: Digitalization has not improved patient care. R: 0%
- c) Not sure: Does not have a clear opinion on the impact of digitalization. R: 0%

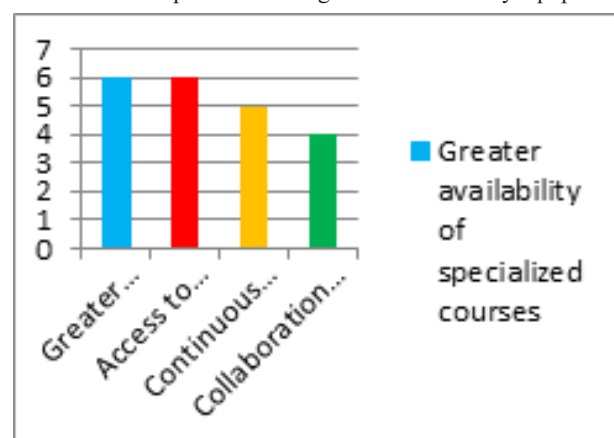


Do you believe that the digitalization of X-ray equipment has improved the quality of patient care?

11) What recommendations would you make to improve training and professional development in the digitalization of X-ray equipment? You may select one or more answers.

- a) Greater availability of specialized courses: Need for more specific courses on digitization. R: 85.7%
- b) Access to modern equipment for practice: Importance of having updated equipment for practical training. R: 85.7%
- c) Continuous update programs: Need for ongoing update and training programs. R: 71.4%
- d) Collaboration with educational institutions: Importance of collaborating with universities and other educational institutions. R: 57.1%

What recommendations would you make to improve training and professional development in the digitalization of X-ray equipment?



In the magazine *imMÉDICA*⁸ it is pointed out that there are programs to other professionals not directly in healthcare and it is of interest that the specific training program is extended to Electro medicine.

Current research should continue with the creation of a professional improvement system for electro medicine specialists in Cuba, in relation to the contents of the digitalization of X-ray equipment.

Conclusions

The professional development process allows for better improvement, training, education, and preparation for electro medicine professionals. The purpose of professional development is the enhancement of the individual for their professional and human betterment.

A survey was applied to electro medicine specialists in order to diagnose deficiencies in the content of X-ray equipment digitalization. The surveyed specialists present the following deficiencies:

- a) The current knowledge on X-ray digitalization among specialists is intermediate despite a predominance of participation in some form of training.
- b) Insufficient and partially sufficient training predominates, with specialists feeling moderately prepared to teach digitalization knowledge to students.
- c) The main challenges faced in digitalization are inadequate training and technical problems, with most specialists reporting limited or no use of digitalized equipment.

The diagnosis showed that the respondents recognize the need for systematic professional development aligned with the priorities of X-ray equipment digitalization for the health system, as urgently required by the specialists. The main benefits expressed include reduced diagnosis time, greater image precision, and ease of image storage and access. Unanimously, they responded that digitalization significantly improves patient care.

Acknowledgments

None.

Funding

None.

Conflicts of interest

There are no conflicts of interest for the authors.

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