

# "CURRENT TRENDS AND CHALLENGES IN THE TRAINING OF ULTRASONOGRAPHERS IN BRAZIL: A COMPREHENSIVE ANALYSIS"

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## ABSTRACT

**INTRODUCTION:** The training of ultrasound physicians is a specialized field of medicine that involves the use of ultrasound for diagnosing and monitoring diseases in various parts of the body. Preparation in this area requires specialized training after graduation from medical school, typically in fields such as radiology, gynecology, obstetrics, or related areas. This allows physicians to acquire the necessary knowledge to perform and interpret ultrasound examinations in their specific fields. Ultrasonography in Brazil began in the 1970s and has evolved significantly, extending beyond anatomical identification to include the study of cardiovascular physiology through Doppler velocimetry.

**OBJECTIVE:** This study aimed to understand the role of ultrasound physicians in Brazil and propose a training model for general and specialized ultrasound physicians in medical fields.

**METHODS:** In 2017, EURP/FATESA conducted a survey to estimate the number of ultrasound physicians in the Brazilian market, which was approximately 79,000 at the time. Responses from 864 ultrasound physicians were validated through a questionnaire covering topics such as the work region, reasons for choosing ultrasound, years of experience, possession of specialization titles, and perceptions regarding the need for additional ultrasound training.

**RESULTS:** The survey results showed that the Southeast region had the majority of ultrasound physicians, followed by the South, Northeast, Midwest, and North regions. The choice of the profession was related to both aptitude and preference, as well as job opportunities and lifestyle. However, most physicians did not possess specialization titles in ultrasound. The majority of respondents had less than six years of experience in ultrasound, highlighting the relatively new nature of this field in medicine. Moreover, more than half of the physicians believed that additional specialization was necessary to work in ultrasound subareas, with most considering that training should take at least two years.

**DISCUSSION:** The results revealed that regions with higher medical density and economic and technological resources had more ultrasound physicians. The lack of specialization titles and proper training was a concerning finding, given the importance of ultrasound in medical practice. The survey emphasized the need for standardization in the training of physicians in ultrasound.

**CONCLUSION:** The authors propose that the training of a general ultrasound physician should involve two years of training with an established program, allowing the physician to work in outpatient and hospital settings and take an evaluation exam. Additionally, ultrasound physicians with more than four years of experience could be allowed to take the general ultrasound certification exam if they were recommended by qualified members. For specialization in specific areas, the professional should obtain a recognized title in the specialty, pursue postgraduate studies in the field, and be recommended by a qualified ultrasound physician. This study highlights the importance of proper training for ultrasound physicians to ensure the quality of healthcare.

**KEYWORDS:** ULTRASOUND, CERTIFICATION, TRAINING, SPECIALIZATION, EXTENSION, PRACTICE, PERFORMANCE

## INTRODUCTION

The training of medical ultrasonographers is a specialized area of medicine that involves the use of ultrasound for diagnosis and monitoring of related diseases in all parts of the body.

Training in this field requires a specialized training program after completing medical school. Typically, doctors interested in becoming ultrasonographers pursue specialization in radiology, gynecology and obstetrics, or related fields

such as fetal medicine, internal medicine, or cardiology, or they seek out specialized courses. This additional training enables them to acquire the necessary knowledge to perform and interpret ultrasound examinations in their respective areas of practice <sup>1,2</sup>.

The practice of ultrasonography in Brazil began in the 1970s, and over this period, we have witnessed significant technological advancements. These advancements have allowed ultrasonography to go beyond simple identification of

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organ anatomy. With the incorporation of Doppler velocimetry, it has become possible to study cardiovascular physiology and understand its pathological mechanisms.

During the ultrasound examination, the patient is present, and it is crucial for the ultrasonographer to ask relevant clinical questions to understand the purpose of the exam. This clearly demonstrates that ultrasonography is based on three essential pillars: anatomy, physiology, and clinical aspects. These elements play a fundamental role in the practice of medicine in Public Health.

After the medical history-taking, the physician performs a physical examination of the patient, using the images generated by ultrasound of the relevant structures. This process starts with the patient's chief complaint to understand the current illness and reconstruct their clinical history. The result is a comprehensive ultrasonographic report.

The training of medical ultrasonographers is ongoing and involves the continuous updating of knowledge and skills due to technological advancements and the evolution of medical practices. Participation in conferences, workshops, and continuing medical education courses is crucial for ultrasonographers to stay current and enhance their skills<sup>3-7</sup>.

Medical ultrasonographers play an important role in modern medicine because ultrasonography is a valuable tool for early disease diagnosis, guiding invasive procedures, monitoring pregnancies, and tracking various medical conditions. Their specialized training and technical skills enable them to provide quality patient care, contributing to the improvement of healthcare<sup>4-10</sup>.

## METHODS

A research study conducted by EURP/FATESA in 2017 estimated that there were approximately 79,000 ultrasonographers in the Brazilian market at that time.

In light of this data, a questionnaire was developed and validated by 864 medical ultrasonographers. The questionnaire consisted of the following questions:

Work region? Why did you choose to be an ultrasonographer? How long have you been performing ultrasounds? Do you have specialist titles? What is your training in ultrasound? Do you believe that to work in a sub-area of ultrasound, additional specialization is necessary? And how long do you believe it takes to train a medical professional in ultrasound?

The objective of collecting responses to this questionnaire was to gain an understanding of how medical professionals are practicing in the field of ultrasonography and to facilitate the development of a proposal for training general ultrasonographers in specialized medical areas.

## RESULTS

The results of the research conducted by EURP on the profession of ultrasonographers reveal valuable information about their work regions, reasons for choosing this career, possession of specialist titles, experience in the field, and training in ultrasonography.

Table 1 shows the distribution of the working regions of the interviewed ultrasonographers.

Brazilian region	%
South	45%
Southeast	20%
North East	16%
Midwest	10%
North	9%

Table 1: Work Regions of Ultrasonographers.

Table 2 presents the reasons why the respondents chose the profession of ultrasonographer.

Reasons	%
Aptitude/preference	45%
Good job opportunities	21%
Lifestyle	16%
Others (professional enhancement)	15%
No response	3%

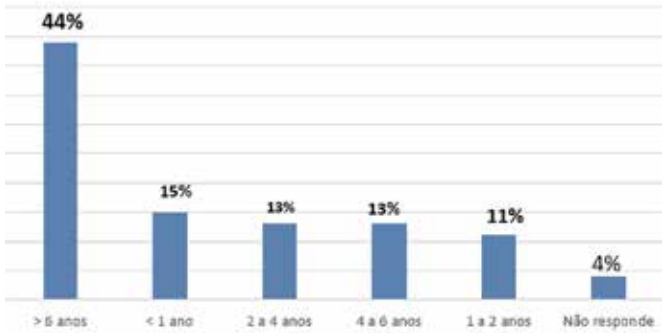
Table 2: Reasons for Choosing the profession of ultrasonographer

Table 3 illustrates an analysis of the possession of specialist titles in ultrasonography.

Specialist title	%
Does not have	69%
FEBRASGO	14%
CBR	12%
No response	5%

Table 3: Do you have any specialist titles in your field of practice?

Graph 1 shows how long the ultrasonographer has been performing ultrasound examinations.



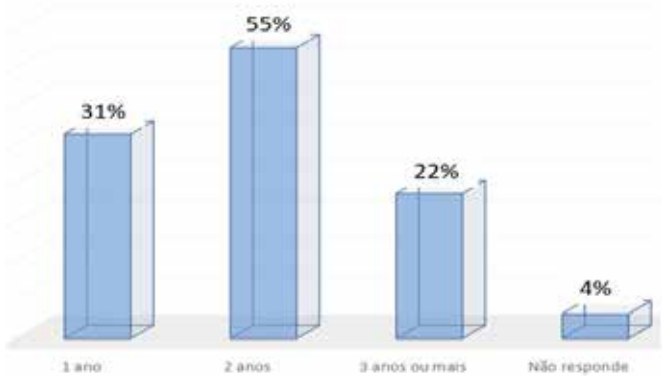
Graph 1: How long have you been performing ultrasounds?

Table 4 displays the responses regarding the need for additional specializations to work in subareas of ultrasonography.

Need for specialization	%
Yes	51%
No	45%
Did not answer	4%

Table 4: Does Working in a Subarea of Ultrasonography Require Additional Specialization?

Graph 2 illustrates the time considered necessary for the training of a professional in ultrasonography.



Graph 2: Time Believed to Be Necessary for the Training of an Ultrasonographer.

Table 5 provides information about the training of professionals in ultrasonography.

Professional Training	%
Improvement Course (180 to 360 hours)	39%
Extension Course (<180 hours)	21%
Training Course (Medical Residency, 2800 hours/year for two years)	16%
LATU SENSU Graduate Course (>360 hours)	15%
No Response	9%

Table 5: What is your background in US?

## DISCUSSION

The distribution of medical ultrasonographers in Brazil.

When evaluating the distribution of medical ultrasonographers by region in Brazil, it can be observed that 45% of them are located in the Southeast region, which is home to the largest portion of the Brazilian population, estimated to be around 52-53% currently. Following that, we have the South region, with 17% of the doctors, equivalent to its population proportion. The Northeast region, representing 18% of the Brazilian population, comes in third place. Finally, the Central-West and North regions, which account for approximately 10% of the population, have a lower presence of medical ultrasonographers.

It is evident that regions with higher medical density, economic power, and technological advancements have a significantly larger number of ultrasonographers. Additionally, the Southeast region, which concentrates the largest centers for education, research, job markets, and technological investments, has the highest proportion of specialist physicians in ultrasonography per 100,000 inhabitants. States such as São Paulo, Rio de Janeiro, Rio Grande do Sul, and Santa Catarina exhibit a ratio between 6.6 and 13.9 doctors per 100,000 inhabitants, while the North and Northeast regions have a ratio between 1.3 and 3.7. This reinforces the correlation between the concentration of ultrasonographers and medical density, highlighting that areas with more doctors per capita also have a higher number of specialists in ultrasonography (Table 1).

Motivation for choosing the profession of ultrasonographer.

When asking the respondents why they chose ultrasonography as their profession, 45% of them indicated it was due to their aptitude and personal preference, while 37% mentioned being attracted to the job opportunities and lifestyle associated with this career. This preference for ultrasonography based on aptitude can be attributed to the increasing demand for rapid diagnostic exams, which significantly contribute to improving patient care and monitoring.

On the other hand, the emphasis on good job opportunities underscores the importance of promoting the training of more ultrasonographers, recognizing the growing demand for these professionals in the healthcare field (Table 2).

Qualification in the area of ultrasonography.

An analysis of the possession of specialist titles in ultrasonography revealed a significant concern, as approximate-

ly 70% of professionals do not possess any title certifying them as medical ultrasonographers. This is relevant because doctors can work in various areas of medicine, emphasizing the importance of enhancing the qualification of these professionals. Improving qualification is essential for obtaining more accurate results in exams, which, in turn, directly impacts the quality of medical care. This situation highlights the need to establish guidelines and standards for the training of doctors in ultrasonography (Table 3).

### **Experience in the area of ultrasonography.**

Analyzing Graph 1, we can observe that the significant majority of the physicians who participated in the survey, equivalent to 66%, have less than six years of experience in the field of ultrasonography. This data reflects the relatively recent incorporation of ultrasonography into the landscape of medical semiology.

The increasing participation of professionals in ultrasonography in recent years suggests a growing interest in this imaging diagnostic technique. This can be attributed to its essential role in contemporary medicine, providing rapid and non-invasive diagnoses, as well as detailed patient monitoring.

This trend also underscores the importance of continuous improvement and education for physicians in the field of ultrasonography, ensuring the provision of quality services and contributing to the advancement of diagnostic medicine (Graph 1).

### **Need for specialization.**

Table 4 presents revealing data regarding the need for additional specializations to work in subareas of ultrasonography. According to the responses of the research participants, 51% stated that yes, it is necessary to pursue additional specialization, while 45% claimed it is not necessary. A small group, corresponding to 4%, did not provide a response.

These results indicate that half of the interviewed professionals are involved in specific areas of practice in addition to ultrasonography. This underscores the relevance of ultrasonography in clinical and diagnostic practice across various medical specialties. As ultrasonography technology advances, understanding specializations within specific areas of medicine becomes essential.

The role of ultrasonography in contemporary medicine is undeniably essential, enabling precise and non-invasive diagnoses in various specialties. Therefore, the pursuit of additional specializations in this field demonstrates the commitment of physicians to provide quality care and stay abreast of technological advancements to better serve patients (Table 4).

### **Time required for professional training in ultrasonography.**

The analysis of the research reveals valuable information about the time considered necessary for the training of a professional in ultrasonography. According to the responses of the participants, 31% believe that one year of training is sufficient, while the significant majority, representing 55%,

considers that at least two years of training are necessary. Additionally, 22% of the respondents mentioned that ideal training requires three or more years. A smaller group, equivalent to 4%, chose not to answer this question.

These data highlight the complexity and scope of the field of ultrasonography, as well as the importance of the time dedicated to the training of professionals. The majority agrees that a period of at least two years is essential to acquire the knowledge and skills necessary to competently work in this field.

This perception reinforces the idea that ultrasonography is a medical discipline that requires a broad range of knowledge and specific practices. The pursuit of continuous improvement and a more robust training in this field contributes to ensuring the quality of services provided and the advancement of diagnostic medicine (Graph 2).

Table 5 presents crucial information about the training of professionals in ultrasonography. The responses of the participants reveal that:

- 39% completed advanced training courses, lasting from 180 to 360 hours.
- 21% took extension courses, lasting less than 180 hours.
- 16% underwent training courses, which include medical residency with a workload of 2,800 hours per year over two years.
- 15% obtained training in LATU SENSU undergraduate courses, lasting 360 hours or more.
- 9% chose not to answer the question.

These data raise significant concerns, as 60% of professionals reported having less than 360 hours of training in ultrasonography, while the previous Graph 2 indicates that the ideal training requires a minimum of two years. Therefore, the majority of respondents appear to lack the appropriate training time to become proficient in this field.

This situation raises important questions about the qualification of professionals in ultrasonography and underscores the need to establish stricter training and certification standards to ensure the quality of services provided to patients. The pursuit of a more solid and comprehensive training is essential to enhance the practice of ultrasonography and promote advancements in diagnostic medicine (Table 5).

The pursuit of specialization courses (postgraduate lato sensu) is a trend observed among ultrasonography professionals, not only as a means of enhancing their knowledge in this field but also as a way to establish a strong professional identity. This quest for specialization plays a crucial role in advocating for the profession of medical ultrasonographer.

Over more than three decades, we have played an active role in the training of professionals in ultrasonography. During this period, over a third of the practicing ultrasonographers in Brazil, estimated at 90 thousand physicians, have undergone our training. Since 2003, we have been offering specialization programs in ultrasonography (postgraduate lato sensu), which means that approximately 18 thousand physicians have completed these specializations in our institution.

Furthermore, since 2010, we have been promoting the

Advanced Course, which is recognized by the Brazilian College of Radiology (CBR). Currently, we offer 15 slots per year, over two years, totaling a workload of 4,200 hours. This course is considered a comprehensive training for medical ultrasonographers, as all participants, at the end of the two years, take the General Ultrasonography title examination offered by the CBR and pass it.

In 2022, we established a partnership with the Brazilian College of Radiology, under the presidency of Prof. Dr. Valdair Muglia, and with the current president of the Brazilian Society of Ultrasonography (SBUS), Prof. Dr. Rui Gilberto Ferreira. The aim of this partnership was to bring ultrasonographers together and strengthen the field of Ultrasonography.

In 2023, in Brazil, which currently has 546,000 physicians, averaging about 2.56 doctors per inhabitant, it is estimated that there are approximately 90,000 ultrasonographers and around 51,350 ultrasound machines, representing an average of 1.75 ultrasonographers for each device. Ideally, considering two doctors per device, we would expect to have 102,700 ultrasonographers in Brazil. It's important to note that ultrasonography has been recognized as a specialized field, being the most recent specialty established by the Federal Council of Medicine (CFM).

Regarding the role of ultrasound in medical specialties, we believe that a physician's training should include obtaining a specialist title in the specific area of the specialty, a postgraduate specialization in that field, and proof of at least one year of experience in ultrasound within that specialty. These criteria are essential to ensure the quality and competence of professionals working in this important field of diagnostic medicine.

## CONCLUSION

The profession of ultrasonographer in Brazil has undergone various transformations and challenges over the years. The rapid advancement of technology in the field of ultrasound has led to a significant increase in demand for qualified professionals capable of conducting precise exams and contributing to the diagnosis and treatment of a wide range of medical conditions.

It has been observed that currently, the majority of physicians working in ultrasonography have less than six years of experience in this field, reflecting the relatively recent emergence of this specialty within medical semiology. However, the pursuit of specialized courses, such as Postgraduate *Lato Sensu*, has become a trend among ultrasonographers, not only as a way to enhance their skills but also to strengthen their professional identity and the advocacy for the profession.

The training of these professionals is crucial to ensure the quality of ultrasonography exams and proper patient care. Although there are different types of courses and training programs, it is evident that a significant portion of ultrasonographers have less than 360 hours of training in the field. It is important to highlight that more comprehensive courses, such as postgraduate *Lato Sensu* specialization and the course of improvement recognized by the CBR, play a fundamental

role in the training of competent ultrasonographers.

The partnership between the Brazilian College of Radiology (CBR) and the Brazilian Society of Ultrasonography (SBUS) demonstrates a joint effort to strengthen the field of ultrasonography in Brazil. Ultrasonography is recognized as a medical area of expertise, and the pursuit of specialist titles in the specific specialty area, postgraduate *Lato Sensu* specializations, and proven experience are essential criteria for physicians who wish to excel in this area.

The training of a general ultrasonographer should follow a two-year training program with well-defined guidelines. This program should prepare the ultrasound physician to work not only in outpatient settings but also in hospitals, providing comprehensive practical training that allows them to take an assessment exam in which they can demonstrate their solid knowledge and clinical skills.

Furthermore, it's important to consider that ultrasound physicians with more than four years of experience in the field may be allowed to take the general ultrasound certification exam. To do so, they should be recommended by other qualified ultrasound professionals who can attest to their competence and experience.

When it comes to Ultrasound serving as a medical subspecialty within a specific field, professionals must meet additional requirements. They need to obtain the specialist title in the specific specialty area in question, complete a postgraduate course in that specific area, and be recommended by experienced ultrasound physicians who can validate that the professional has been working in the field for more than one year.

These measures are aimed at ensuring that ultrasonographers have the proper training and experience to provide high-quality services, whether they are working as general ultrasonographers or in specialized areas. These guidelines promote excellence in the practice of ultrasonography.

Despite the challenges and the need for improving the training and qualification of ultrasonographers, the profession plays a crucial role in diagnostic medicine, contributing to the early detection of diseases and effective patient monitoring. With a growing number of physicians seeking to enhance their skills in ultrasonography, it is expected that the quality of exams and patient care will continue to improve, benefiting the overall health of the population.

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