



doi: <https://doi.org/10.5554/22562087.e1141>

# Research in anesthesiology: how much do we depend on graduate programs in Colombia?

## *Investigación en anestesiología: ¿qué tanto dependemos de los programas de posgrados en Colombia?*

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### Where are we?

In health systems, the benefits of basic and clinical research go beyond just academic prestige. Hospitals that engage in research tend to have lower mortality rates, shorter patient stays, and higher satisfaction among healthcare staff. Therefore, prioritizing research should be essential for both the healthcare system and professionals working within it. (1)

Despite Colombia's significant efforts to establish a research model that addresses the country's health needs, investment in research and development remains below 0.5% of the national GDP (2) and is expected to decrease even further this year. When we break down this expenditure, we find that health research accounts for less than 15% of the total annual investment in research and development (3). Additionally, a review of the funding directed towards research in anesthesiology, pain management, or perioperative medicine, as required by the Ministry of Science, reveals that the state's investment in these areas is nearly nonexistent. This data indicates that all funding for research in these fields primarily comes from private initiatives or various universities in Colombia.

When examining research and development outcomes through the lens of publication numbers by area of knowledge, it appears that Colombia does not rank among the top countries in Latin America, based on a biometric analysis of the Web of Science Core Collection (4). Locally, insights from journals like the Colombian Journal of Anesthesiology reveal three noteworthy points: first, over 75% of scientific publications come from fewer than 100 national researchers; second, all of these researchers are affiliated with universities or are graduate students in relevant fields; and third, the majority of original research studies—those that contribute new knowledge—are characterized by descriptive, cross-sectional, and retrospective designs (5,6).

So, where do we stand? In a country that has minimal investment in applied medical research, where perioperative medicine is not prioritized, and where the limited research available primarily comes from university researchers. Unfortunately, in most cases, these studies lack the methodological quality needed to truly impact the core of knowledge.

## The role of universities and anesthesia programs

We can conclude that the role of universities, especially anesthesia graduate programs, is not only relevant but essential for the development of research in this and other fields of clinical knowledge.

In 2011, a consensus document was created during the XXIX Colombian Congress of Anesthesiology, which provided recommendations and strategies to enhance research development across various universities in the country (7). This document implicitly acknowledges the need to strengthen basic research in anesthesiology and related fields within different anesthesia graduate programs nationwide. As a result, the primary focus areas for improvement should be graduate students and university faculty.

Currently, there are 23 active anesthesiology programs in the country, all of which include coursework aimed at developing skills and competencies for generating new knowledge through research (8). This emphasis on research training has led to an increase in original studies, contributing to higher levels of scientific output, such as presentations at national congresses and publications in academic journals.

The educational infrastructure designed to train specialists has successfully fostered the development of research groups. Many of these groups have undergone evaluations by Colciencias. According to the latest review mandated by the Ministry of Science, Technology and Innovation (MinCiencias) under resolution 894 of 2021, there has been a notable increase in the number of research groups focused on anesthesiology and perioperative medicine, totaling 12 groups. Out of these, 10 were established specifically for anesthesiology programs at various universities across the country (9).

Significant progress has been made in teaching how to search for information and think critically when reading biomedical literature. However, the development of

clinical studies remains stagnant. This stagnation is due to the reliance on modest methodological designs aimed at fulfilling immediate needs, such as submitting degree papers for obtaining specialist titles. Consequently, there is less emphasis on generating the new knowledge necessary to address broader scientific and clinical questions.

In this context, research continues to be a vital component of university education, with degree theses serving as its main driving force. However, research related to theses has multiple limitations, particularly concerning the availability of time for executing protocols and the continuity of projects that require greater personnel and resources.

These challenges are intensified by various barriers to scientific development, including limited time and insufficient incentives for anesthesiology professionals. Notably, there is a lack of direct compensation or funding available. A recent study, utilizing grounded theory, found that clinical specialists working in university hospitals, which do provide relevant incentives, face obstacles such as a lack of expertise in research methodologies, cumbersome administrative protocols, competition with other specialists, and a minimal research culture that extends beyond institutional initiatives. For many professionals, the barriers to generating new knowledge often outweigh the facilitators (10). This situation clearly restricts research efforts to projects aimed solely at obtaining degrees.

### Paradigm shift

Traditionally, applied research in anesthesiology has been closely linked to university programs' ability to conduct clinical studies. These studies demonstrate that the programs not only train professionals in anesthesiology effectively but also warrant recertification or, ideally, accreditation as high-quality programs. This accreditation is a standard used by

both national accrediting bodies and the National Accreditation Commission of the Ministry of National Education, as well as by international university ranking organizations (11,12). In essence, research is pursued not necessarily out of a genuine desire to address important clinical questions, but rather due to the necessity of graduating students and gaining recognition from the state and international peers.

This traditional view of valuing research in our clinical-surgical specialty training programs not only contributes to the previously mentioned barriers to conducting high-quality research but also serves as an additional limitation by overlooking students' attitudes toward university research processes.

For several years, we have routinely conducted a simple exercise with all our first-year residency students. We ask them how important they believe research is for their future training as specialists. To our surprise, more than 75% of the residents consider it to be irrelevant or not useful for acquiring the skills and competencies necessary for their professional practice. Even more concerning is that, once they complete their specialist training—having gone through the entire research process and published their results—their responses to the same question largely remain unchanged.

This situation raises questions about whether our perspectives as educators and researchers align with the expectations and needs of the residents in specialization programs. In short, while university programs view research as relevant, pertinent, and essential in curricula, many students do not share this perspective. As a result, the research requirement often becomes just another hurdle to achieve a degree in anesthesiology.

The ambiguity surrounding the perceived value of research in anesthesiology residency programs—and likely in many other medical-surgical specialties—compromises the entire research process, both locally and nationally. As a result, the poor outcomes in research and scientific production

highlighted earlier in this paper become increasingly apparent.

It is evident that developing research skills in our students is crucial for their overall growth as specialists, and there is ample evidence to support this assertion. However, the differing expectations between educators and students adversely affect the advancement of research within programs, universities, and the broader scientific community. And these institutions are the primary sources of scientific production.

The solution to this small yet significant problem consists of two parts. First, we need to incentivize, promote, and foster in our residents the understanding that conducting applied clinical research is not merely a requirement but the best way to address the most common clinical questions in the medical environments where professionals work. Although this solution seems obvious, it is one of the most complex challenges to tackle, as it requires overcoming the preconceptions of various stakeholders and may take considerable time to implement. In fact, this approach merits its own editorial discussion.

Second, research in anesthesiology programs should be viewed as a means of training rather than an ultimate goal. In other words, the infrastructure established by various anesthesia programs for resident research should focus on generating high-quality studies, with residents playing a collaborative role in the process rather than being the primary objective. This requires faculty members to develop serious research proposals that uphold high methodological standards and maintain a commitment to execution, data analysis, and publication of results, beyond merely producing a report that fulfills graduation requirements.

Although this shift in perspective can significantly enhance our current practices, we acknowledge that it does not eliminate many existing barriers and could potentially create new ones if not carefully structured and effectively implemented.

In such scenarios, research groups play a crucial role. The formation of these groups should go beyond merely gathering

thematic and methodological experts under a common name. Specifically, university-based research groups should operate from a strategic platform with a vision focused on achieving objectives that extend beyond specialized training. The primary mission should be to generate new knowledge that addresses research needs relevant to the academic, practical, and healthcare context of the country, with training anesthesiology specialists being a natural outcome of this process rather than its primary aim.

### Final reflection

As a country, we face numerous challenges and limitations in applied clinical research across all fields of medicine. Most of the primary research we conduct and publish stems from university projects within specialization programs. While this has been a key driver of our research development thus far, it has also become a significant barrier to pursuing higher-impact projects that genuinely address local knowledge gaps.

To overcome this obstacle, we need to rethink how research is integrated into training programs. It should not be limited to students and faculty but should focus on developing better proposals and solutions that effectively address these knowledge gaps.

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