



# Surgical research in Colombia part 3: Authorship and publications of Colombian medical students in surgery in Colombian medical journals – cross-sectional study

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**Introduction:** Research training, scientific activity and publications are cornerstones of academic surgery. Knowing the activity and trends of medical students aspiring to become surgeons it allows to identify gaps and skills to be strengthened. Currently, there is no data on the authorship and scientific activity of medical students in surgery in Latin America and Colombia.

**Methods:** A bibliometric cross-sectional study was carried out, in which the Colombian medical journals were reviewed from 2010 to 2020. The articles with topics in general surgery and subspecialties where the authorship of medical students could be identified, were selected. Data on the sociodemographic and scientific characteristics of the authors and their publications were extracted and analyzed.

**Results:** A total of 14 383 articles from 34 Colombian medical journals were reviewed. From 2010 to 2020, 807 articles related to surgery were published in Colombia. The most frequent typology of these articles was original articles ( $n = 298$ ; 37%), followed by case reports ( $n = 222$ ; 28.2%) and reviews ( $n = 137$ ; 17.3%). A total of 132 medical students and 141 authorships and were found, specifically in 9.9% ( $n = 80/807$ ) of these publications, with a higher frequency in original articles ( $n = 32$ ; 40%) and case reports ( $n = 29$ ; 36.2%). Collaboration of students with professors or surgeons was evidenced in 97.5% of the publications.

**Conclusions:** The authorship of Colombian medical students in scientific publications in surgery in Colombian medical journals was low. From 2010 to 2020, student authors were found in 1 out of every 10 publications, mainly in original articles and clinical cases.

**Keywords:** Colombia, general surgery, medical students, publishing, academic success, research

## Introduction

The academic surgeon has become the cornerstone of academic surgery today. Their comprehensive education, composed of training in surgical and non-surgical skills, is indispensable to lead the surgical team, residents and students, as well as to

guarantee satisfactory results in evidence-based practice<sup>[1–3]</sup>. This has led to an in-depth study of the archetypes and attributes that an academic surgeon should have, highlighting mentoring (inspiring and guiding others), responsible, dynamic and equitable education (sharing knowledge and skills at the highest

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level), collaborative and relevant research (scientific impact and advancement of the surgical field), surgical innovation (development of real and practical solutions, cost-effective, cost-useful and with a good risk-benefit balance), and evidence-based patient care (improving health and quality of life indicators)<sup>[2,4]</sup>. One of the ways to achieve this profile is to include medical students in the path of academic medicine from their first years of study<sup>[5,6]</sup>. Particularly, to include in academic surgery those with aspirations to become surgeons, so that they can replicate this profile in later years.

Thus, surgical research is an imperative path in the aspiring student to academic surgeon, and should be manifested through participation in scientific events, development and execution of studies, as well as scientific publications. Previous studies have found that in surgery, case reports and case series are the most frequent type of publication in some regions, followed by original studies with a focus on clinical and outcomes research<sup>[7]</sup>. In these types of manuscripts, mainly in case reports and case series, it is possible to count on the authorship of medical students, since it is much easier to achieve the criteria for authorship due to the low level of complexity of a case report or case series. However, there are no solid data on this activity in Latin America or Colombia.

These publications are an indicator of scientific activity, quality of training and production of medical students. Commissions in global surgery have emphasized the need to promote surgical research and non-surgical skills training for residents and medical students, especially in low-income and middle-income countries, with the aim of improving the quality of evidence, healthcare and disease burden indicators<sup>[8,9]</sup>. However, in order to define future strategies that can strengthen the cornerstones of academic surgery, it is necessary to know the trend of this activity and to have evidence-based results<sup>[10,11]</sup>. This is the third part of the study of surgical research in Colombia, which after knowing the scientific activity and production of research groups (research units) in surgery (first part)<sup>[7]</sup>, scientific activity, publications and research training of academic surgeons (second part)<sup>[12]</sup>, seeks to know the scientific contribution of Colombian medical students to the surgery of this country. Based on the above, the aim of this study was to evaluate authorship and publication in surgery by Colombian medical students in Colombian medical journals.

## Methods

The study has been reported in line with the STROCCS criteria<sup>[13]</sup>.

A bibliometric cross-sectional study was carried out, where the Colombian National System of Indexation of Scientific and Technological Publications (Publindex) of the Colombian Ministry of Science was consulted with the validated results up to August 2021<sup>[14]</sup>. This specialized system uses an algorithm based on several indicators to index its journals: (1) H5 score of the major knowledge area among national journals (Colombia); (2) Quartile obtained from the Journal Citation Report or (3) Quartile obtained from Scimago Journal & Country Rank. In this way, this system guarantees the quality of Colombian journals, based on international standards. This indexing is updated annually. The results of homologation and indexing of Colombian journals during the period from 1

## HIGHLIGHTS

- Only 1 out of 10 articles in surgery in Colombia has student authorship.
- Authorship of medical students are mainly based on original articles and case reports.
- From 2010 to 2020, only five medical students published more than one article in surgery.

January 2020 to 31 December 2020 were consulted. The journals were filtered by the area of knowledge of medical and health sciences. Inclusion criteria were defined as: (1) Journals that were indexed (belonging at least to Q4); (2) It was possible to access their texts completely and free of charge. Those journals or articles related to topics other than general surgery and subspecialties, such as plastic surgery, oral or maxillofacial surgery, gynaecology and obstetrics, urology, orthopaedics, paediatric surgery, neurosurgery, ophthalmology or otorhinolaryngology, were excluded.

The data from the indexed journals were exported in an excel sheet, in order to record the data extracted from the review. Subsequently, the archive of each journal from 2010 to 2020 was consulted. The following data were collected: total number of publications, total number of publications in surgery, type of manuscripts published in surgery, number of medical-student authorships in surgical publications, type of manuscripts with student authorship, author's name, institutional affiliation and city of the student author, type of collaboration. For the identification of student authorship, students whose status could be explicitly corroborated according to the data found in the affiliation section were included. These should read: Medical Student or Undergraduate Student. The data were exported to the statistical software IBM SPSS (Chicago, IL) version 26. Qualitative variables were summarized using frequency and percentages.

## Results

Thirty-four Colombian medical journals were identified, with a total of 340 volumes and 14 383 articles from 2010 to 2020. During this period, 807 (5.6%) articles related to topics of general surgery and subspecialties were published, mainly original articles ( $n = 298$ ; 37%), followed by case reports/case series ( $n = 222$ ; 27.5%) and reviews ( $n = 137$ ; 17%). Of the total number of articles in surgery, ~10% had student authorship ( $n = 80/807$ ), mainly in original articles ( $n = 32$ ; 40%), case reports/case series ( $n = 29$ ; 36.2%) and reviews ( $n = 17$ ; 21.2%), respectively (Table 1). However, the proportion of student authorship to total articles in surgery by type was higher in reviews ( $n = 17/137$ ; 13.8%) compared to case reports/case series ( $n = 29/222$ ; 13%) or original articles ( $n = 32/298$ ; 10.7%).

On the evolution of the volume of global publications over time, a variable trend was observed, with a slight growth from 2010 to 2011 ( $n = 1146 \rightarrow n = 1207$ ), then there was a modest decline from 2011 to 2012 ( $n = 1207 \rightarrow n = 1158$ ), but a notable sustained increase was observed from 2012 to 2016 ( $n = 1158 \rightarrow n = 1434$ ). Thereafter, there was a sustained downward trend until 2019 ( $n = 1434 \rightarrow n = 1291$ ), followed by an increase in volume in 2020 ( $n = 1291 \rightarrow n = 1385$ ) (Fig. 1).

**Table 1**  
**Distribution of publications in surgery in Colombian medical journal from 2010 to 2020 with and without student participation, according to the type of manuscript.**

Type of manuscript	n (%)	
	Publications in surgery	Publications in surgery with student authorship
Original articles	298 (37)	32 (40)
Narrative/systematic reviews or meta-analysis	137 (17)	17 (21.2)
Case report	222 (27.5)	29 (36.2)
Letters	23 (2.8)	0
Other	127 (15.7)	2 (2.6)
Total	807 (100)	80 (100)

Comparing this production with the volume of annual publications in surgery, it was found to be < 6%, with the exception of 2018 ( $n = 93/1381$ ; 6.7%) and 2020 ( $n = 131/1385$ ; 9.4%). When calculating the proportion of student authorship in publications in surgery from 2010 to 2020, it was evidenced that this was less than 22%, having the lowest proportion of student authorship in the years 2018 ( $n = 5/93$ ; 5.3%) and 2020 ( $n = 5/131$ ; 3.8%), and the highest in the years 2010 ( $n = 11/66$ ; 16.6%) and 2012 ( $n = 13/60$ ; 21.6%). No homogeneous evolution was found among the three groups evaluated over time (Fig. 1). However, dividing the study period into two (2010–2015 vs. 2015–2020), it was found a remarkable growth in the volume of publications in surgery in the second half of this decade [ $n = 304$  (first half) vs.  $n = 509$  (second half)], but higher student authorship in the first half of this decade [ $n = 51$  (first half) vs.  $n = 37$  (second half)].

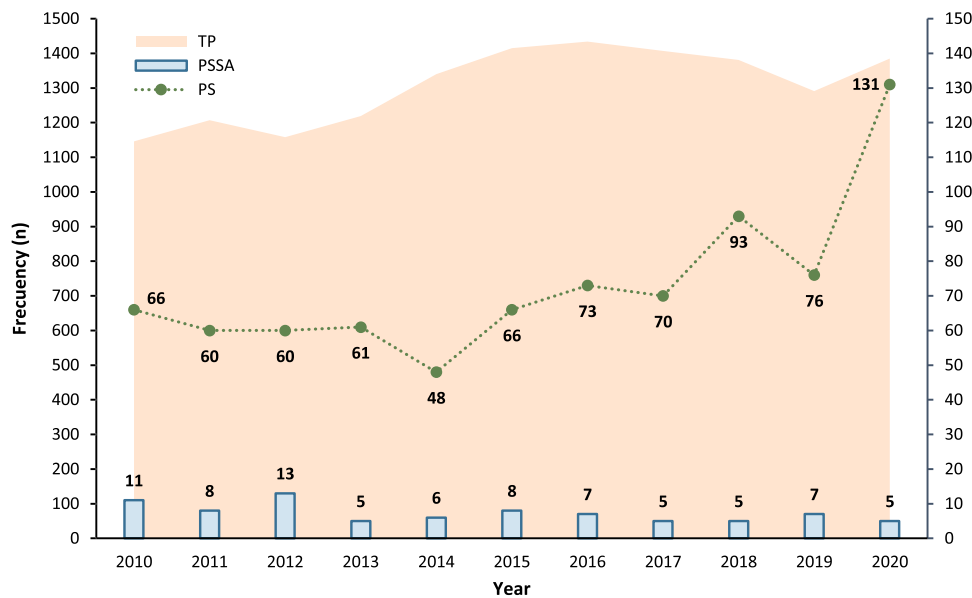
A total of 132 students and 141 authorships from 22 universities from 2010 to 2020 were found, of which only five students published more than one article in surgery (3.5%). Eighty

percent ( $n = 4/5$ ) of the student authors with the highest number of articles in surgery were from the Universidad de Cartagena. Also, it was found that 50.7% ( $n = 67$ ) of the student authors were women.

The predominant student-authored collaboration was of the professional type (97.5%), that is in the company of a professor or surgeon. The universities with the highest number of student authorships were Universidad de Cartagena ( $n = 19$ , 13.5%), followed by Universidad Industrial de Santander ( $n = 15$ ; 10.7%) and Universidad Pontificia Bolivariana ( $n = 15$ ; 10.7%) (Table 2). The cities with the highest student authorship in surgery were Bogotá ( $n = 38$ ), Medellín ( $n = 32$ ) and Cartagena ( $n = 19$ ). Figure 2 shows the cumulative frequency distribution of authorships by territorial departments.

**Discussion**

Academic surgery, as a branch of academic medicine, shares the essential items needed by today’s physician to meet the challenges of public health and global health, but specifically, to meet the goals of global surgery<sup>[15]</sup>. Among the objectives for global surgery by 2030 outlined by The Lancet Commission on Global Surgery is the strengthening of surgical research systems and research training of academic surgeons<sup>[8]</sup>. These systems may be represented by various research units, which vary from country to country, such as research groups in surgery and the inclusion of medical students and residents in research projects<sup>[16]</sup>. In this way, it is possible to achieve a comprehensive training for the student aspiring to become an academic surgeon. There are many ways to evaluate the training and scientific activity of medical students, such as abstracts presented at scientific events, oral presentations, exchanges and participation in scientific societies<sup>[17–19]</sup>. However, publications are the final product of scientific activity, which may arise from a collaborative research project with professors or a student collaborative research idea, and reflect the intellectual and methodical capacity of the student



**Figure 1.** Evolution of publications in surgery with and without student authorship, compared with the total number of publications from 2010 to 2020 in Colombian medical journals. PS, publications in surgery; PSSA, publications in surgery with student authorship; TP, total publications.

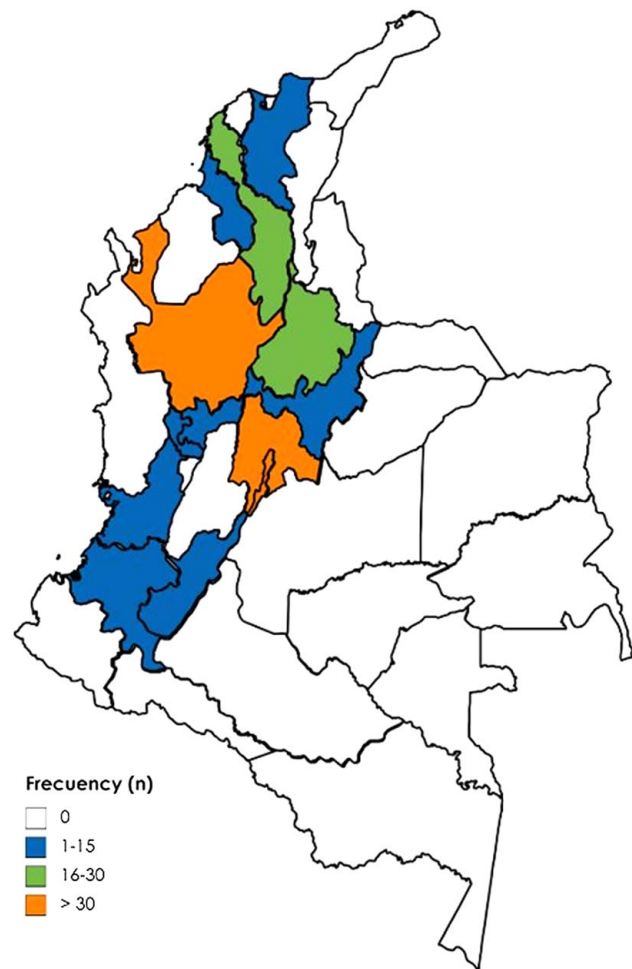
**Table 2**

**Distribution of publications with student authorship in surgery in Colombian medical journals from 2010 to 2020, by Colombian universities.**

University	n (%)
Universidad de Cartagena	19 (13.5)
Universidad Industrial de Santander	15 (10.7)
Universidad Pontificia Bolivariana	15 (10.7)
Universidad de Antioquia	14 (10)
Universidad de los Andes	14 (10)
Universidad de Boyacá	9 (6.4)
Universidad Tecnológica de Pereira	8 (5.6)
Pontificia Universidad Javeriana	8 (5.6)
Universidad del Cauca	7 (5)
Universidad El Bosque	6 (4.2)
Universidad ICESI	4 (2.9)
Universidad del Magdalena	3 (2.1)
Universidad de Caldas	3 (2.1)
Universidad Nacional de Colombia	3 (2.1)
Universidad CES	3 (2.1)
Fundación Universitaria de Ciencias de la Salud	2 (1.4)
Universidad del Rosario	2 (1.4)
Universidad Surcolombiana	2 (1.4)
Universidad de la Sabana	1 (0.7)
Universidad de Sucre	1 (0.7)
Universidad Juan N Corpas	1 (0.7)
Universidad Militar Nueva Granada	1 (0.7)
Total	141

to support a hypothesis in front of the academic community<sup>[17,18]</sup>. This is why in academic surgery, it is essential to know the authorship of medical students in surgery, in order to know the training and profile of aspiring future surgeons. In addition, authors have found that publishing during undergraduate studies is associated with greater opportunities for access to postgraduate medical degrees or research degrees, as well as professional success in the medium- and long-term<sup>[20–22]</sup>.

Wilton & Pananwala<sup>[20]</sup> conducted a cohort study with the aim of assessing the impact of authorship of 55 medical students in a medical-student journal from 2010 to 2015, observing that performing this activity was associated with future publications indexed in PubMed [odds ratio (OR) 3.43; 95% CI: 1.74–6.77,  $P < 0.001$ ], obtaining degrees (OR 4.05; 95% CI: 1.99–8.22,  $P < 0.001$ ) and access to surgical specialty (OR 2.53, 95% CI: 1.10–5.84,  $P < 0.03$ )<sup>[20]</sup>. This was defined by the authors as predictors of academic success. Al-Busaidi *et al.*<sup>[21]</sup> conducted a study with a similar objective to the previous one, where it was identified that from 2004 to 2011, there were only 49 student authors in the New Zealand Medical Student Journal. The authors followed up 7 years after graduation of these students, evidencing that compared with those students who never published, those who did publish were more likely to publish in PubMed indexed journals (OR 3.09,  $P = 0.001$ ), obtain a PhD (OR 9.21,  $P = 0.004$ ) or any other degree (OR 2.63,  $P = 0.007$ ), as well as achieve an academic position (OR 2.90,  $P = 0.047$ )<sup>[21]</sup>. Among the factors associated with publication during undergraduate studies, it has been described that belonging to a university with a high ranking ( $P = 0.04$ ), researching with a mentor belonging to the clinical area ( $P = 0.02$ ), and having a mentor with a PhD ( $P = 0.002$ ) or with previous publications ( $P = 0.03$ ), is significantly associated with achieving publications as a



**Figure 2.** Number of publications in surgery with student authorship, distributed by territorial departments of Colombia. Source: authors.

medical student<sup>[22]</sup>. Although this shows a clear trend on the impact of undergraduate publishing on academic success years after graduation, there are few data on this activity in surgery among students in the world.

In comparison to the aforementioned, this study found that from 2010 to 2020, publications in surgery accounted for 5.6% ( $n = 807/14,383$ ) of total publications in Colombian medical journals, and that medical-student authorship in surgical publications was approximately 10% ( $n = 80/807$ ), mainly in original articles and case reports/case series (76.2%). This trend could be explained by the inclusion of medical students in research projects in research groups in surgery in Colombia, which eventually culminate in original articles. Hand in hand, the case report or case series is a simple type of manuscript in terms of methodology and reporting, which facilitates student authorship of this type of manuscript. Ideally, students should participate in both research projects, which help strengthen their knowledge of the scientific method, and in other types of studies (case reports or reviews) that allow them to add publication volume, relate to evidence in medicine, and have a greater probability of participating in scientific events. Although there is no evidence with which to compare the frequency of authorship of medical students in

surgery, considering the relevance of research in the student's academic training, it could be presumed that 10% is equivalent to a very low level of authorship. These results could be related to both the knowledge gap about the importance of this in medical students by medical schools and professors, as well as the limited interest and knowledge about the impact of their training and authorship on research and global surgery<sup>[23,24]</sup>. Salgado *et al.*<sup>[23]</sup> recently published a survey-based study in which they evaluated 1345 students and found that only 21% reported having knowledge of global surgery. However, 96.5% stated that they were interested in learning about the importance of global surgery and 25.4% mentioned lack of training as a barrier to getting involved in global surgery<sup>[23]</sup>. Mehta *et al.*<sup>[24]</sup> also studied the perception of 356 medical students on global surgery, where only 34% reported that they considered global surgery as one of the priorities of global health. In addition, they found that only 3% identified surgical care as an indicator of health system effectiveness<sup>[24]</sup>. In this way, it has been previously found that students have little knowledge about global surgery, and this could be related to the lack of participation and publication in surgery, as they are unaware of the relevance of surgical care in public health.

This barrier in knowledge and interest in surgical research and global surgery on the part of medical students could also explain why over the years, a heterogeneous participation in student authorship was found, compared with the marked upward trend in surgical publications in Colombian medical journals since 2015. This is also evidenced by the fact that of the 132 student authors found, only five published more than once in the period studied. Then, student authorship in publications in surgery was probably by chance and not derived from interest in research projects or research groups, where multiple ideas for publications often arise over time. Although 97.5% of the publications were with participation of professors or surgeons, this is not necessarily related to a pre-determined surgical research system, since only 40% were original articles, which probably derived from research projects with the authors' hospitals or universities of affiliation. This means that 6 out of 10 articles probably arise as incidental research ideas for interesting or novel cases, or topics to discuss or update in narrative reviews. Furthermore, if there had been interest in academic surgery and surgical research in the period studied, a greater number of publications by universities would have been observed (77.2% of the institutions published < 10 articles in surgery with student authorship in 11 years). However, it is necessary to highlight that the institutions that stood out in volume of publications (Universidad de Cartagena, Universidad Industrial de Santander, Universidad Pontificia Bolivariana, Universidad de Antioquia, Universidad de los Andes), are universities that were ranked according to international rankings, such as QS World University Rankings 2022<sup>[25]</sup> and SCImago Institutions Rankings<sup>[26]</sup>, with outstanding participation in academia and research. This could be related to what was previously stated by Parker *et al.*<sup>[22]</sup>, on the direct association between belonging to a highly ranked university and the likelihood of publishing as a medical student.

It is also worth mentioning that only 12 of the 32 territorial departments that make up Colombia had the total volume of publications in surgery with student authorship. This means that more than half of the country has no student production in this

discipline in national journals. This has suggestive implications on the interest in supporting the growth of scientific journals in the country and objectivity in the selection of journals for the publication of evidence of local or national relevance. These findings provide an overview not previously described in the literature, which allows to direct in a real way and strategy future surgical research projects including medical students. Also, to know the strengths and weaknesses of the profiles of students aspiring to become academic surgeons in the future. Based on these results, it can be affirmed that it is necessary to design and implement a student surgical research system, which can modify this trend with very limited authorship of medical students in surgical publications in Colombian medical journals.

As a main strength, this study provides data not existing in Colombia or Latin America, on student authorship in surgical evidence, which should be studied in depth, to identify in the Colombian context, what are the factors associated with this behaviour and predictors of academic success in students participating in these publications. As limitations, it is found that not all journals in the country were included, but only those indexed by the Colombian indexing system that meet quality criteria. In addition, only those students who were explicit authors of articles were included. In other words, due to the autonomy in the layout of articles by the journals, not all of them include the author's degree in the affiliation section, and this could mean an underreporting.

## Conclusions

The authorship of Colombian medical students in scientific publications in surgery in Colombian medical journals was low. Student authors were found in 1 out of every 10 publications, mainly in original articles and clinical cases. From 2010 to 2020, only 141 authorships and 132 students were found, almost entirely in collaboration with surgeons or professors. But only five students published more than one article in surgery. Finally, a decrease in student authorship was found from 2015 onwards.

## Ethical approval

Ethical approval was not necessary for this study as it did not involve human or animal subjects, and the journals archives were open access.

## Consent

NA.

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## Conflicts of interest disclosure

The authors do not have any conflicts of interest to disclose.

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