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Profile of Robotic Surgeons in Inland São Paulo State, Brazil: A Cross-Sectional Study of a Surgical Workforce Trained in General Surgery

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Abstract

Background: Robotic surgery, historically concentrated in Brazilian capital cities, has expanded into regional centers of São Paulo State over the past decade. In Brazil, every surgical specialty that currently performs robotic procedures requires prior completion of general surgery or an equivalent basic surgical area training, so the robotic workforce is derived directly from general surgery. Although the diffusion of the technology is well documented, the surgeons operating these platforms outside the capital have not been characterized.

Objective: To describe the sociodemographic, academic, and professional characteristics of surgeons performing robotic surgery in inland (non-capital) São Paulo State, Brazil, and to describe the training pathways through which general surgery feeds this workforce.

Materials and methods: We conducted an observational, descriptive, cross-sectional study. Surgeons credentialed to perform robotic surgery under Resolution 2,311/2022 of the Brazilian Federal Council of Medicine were invited by institutional email and completed a structured electronic questionnaire after providing informed consent. Data were collected between August 26, 2025, and June 17, 2026. Categorical variables were summarized as absolute and relative frequencies. Exploratory associations were examined using Fisher's exact test, with a significance level of 0.05. Participants were recruited through institutional contacts at a single tertiary center; the number invited could not be determined, so no response rate could be calculated. Given the sample size, all association analyses were regarded as exploratory and underpowered.

Results: Twenty surgeons participated. Most were men (17; 85.0%), and age was evenly divided between 31-40 years (10; 50.0%) and over 40 years (10; 50.0%). Fifteen participants (75.0%) were married, and 17 (85.0%) reported personal or household income above BRL 30,000 per month. Completed higher education was reported for 17 fathers (85.0%) and 13 mothers (65.0%). Eleven participants (55.0%) graduated from public institutions and 16 (80.0%) from traditional curricula; five (25.0%) held a master's or doctoral degree. Digestive tract specialties accounted for 14 participants (70.0%): digestive system surgery in 12 (60.0%) and coloproctology in two (10.0%). Eleven participants (55.0%) practiced in the supplementary (private insurance) sector and nine (45.0%) in the Brazilian Unified Health System (Sistema Único de Saúde (SUS)). No association with practice setting reached statistical significance, the largest effect being public undergraduate training (odds ratio 6.12; p = 0.092). Teaching method was significantly associated with the nature of the undergraduate institution (p = 0.026).

Conclusions: In this sample, the robotic surgeons of inland São Paulo were predominantly male, aged over 31, of high income, and of high parental educational attainment, with a marked concentration in digestive tract specialties and a balanced distribution between public and supplementary sectors. All participants had reached robotic practice through general surgery or an equivalent basic surgical area training. The timing of robotic training was not assessed, so whether competence was acquired during or after residency remains a hypothesis. These findings describe the participating surgeons rather than the regional workforce and may inform the design of general surgery residency programs and of robotic training pathways within them.

Categories: General Surgery, Medical Education, Healthcare Technology
Keywords: brazil, general surgery, health workforce, robotic surgical procedures, surgical training

Introduction

Over recent decades, minimally invasive surgery has evolved technically to the point where robotic platforms have become a reference standard for selected high-complexity procedures. The first robotic procedure is generally dated to 1985, when the Programmable Universal Machine for Assembly (PUMA) was used for a neurosurgical biopsy [1]. The technique was subsequently disseminated by the da Vinci Surgical

System (Intuitive Surgical, Inc., Sunnyvale, CA, USA), which also became the first robotic platform installed in Brazil in 2008 [2].

The transition from conventional laparoscopy to robotics was driven by the need to overcome technical limitations such as two-dimensional vision and the restricted range of motion of rigid instruments [3]. The robotic approach offers magnified high-definition three-dimensional vision, allowing precise identification of anatomical and vascular planes; instruments with a greater degree of freedom than the human hand; and physiological tremor filtration, which preserves dexterity in confined spaces such as the pelvis [4]. Ergonomics is a further consideration: operating seated at a console is associated with lower postural muscle load than laparoscopy, which may have implications for the longevity of a surgical career [5].

For patients, the precision of the robotic technique has translated into favorable perioperative outcomes in several settings. A meta-analysis comparing robotic with laparoscopic right colectomy found lower intraoperative blood loss and a lower rate of postoperative complications with the robotic approach, with comparable length of stay [6].

Since the first platform was installed in 2008, the number of robotic systems in Brazil has grown substantially. Historically concentrated in the major capitals, robotic surgery has undergone a process of regional diffusion within São Paulo State, with regional centers such as São José do Rio Preto, Ribeirão Preto and Campinas consolidating as technological hubs and attracting investment from both the private and the public sectors. Hospital de Base of São José do Rio Preto is notable for offering robotic surgery through the Brazilian Unified Health System (Sistema Único de Saúde (SUS)), thereby broadening access to a technology whose mandatory coverage remains restricted in the list of procedures of the Brazilian National Supplementary Health Agency. This dichotomy between public and supplementary practice shapes the working environment of the surgeon outside the capital, requiring adaptation to different funding and management models.

A feature of the Brazilian training system is directly relevant here. Every surgical specialty that currently performs robotic procedures in the country (digestive system surgery, coloproctology, thoracic surgery, surgical oncology and urology, among them) requires prior completion of a general surgery residency or of an equivalent basic surgical area program; general surgeons themselves also perform robotic procedures. The robotic workforce is therefore not a parallel career track, but a downstream product of general surgery training, and any description of it is, in practice, a description of where general surgery training leads.

Despite this expansion, there is a scarcity of data on the surgeons who operate these platforms outside the capital. Understanding who these surgeons are, how they were trained, and where they practice is relevant to the planning of general surgery residency programs, of robotic training pathways within them, and of service organization. It should be noted that the present study is not a survey of knowledge, awareness, or attitudes; it is a descriptive characterization of a defined and previously undescribed surgical workforce, in which the individual surgeons themselves constitute the unit of analysis.

Materials And Methods

Study design

This was an observational, descriptive, cross-sectional study with a quantitative approach, reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement for cross-sectional studies [7].

Setting and participants

The study was coordinated at Hospital de Base, São José do Rio Preto, affiliated with the Faculdade de Medicina de São José do Rio Preto (FAMERP), within the hospital complex of the Fundação Faculdade Regional de Medicina de São José do Rio Preto (FUNFARME). Eligible participants were physicians credentialed to perform robotic surgery under Resolution 2,311/2022 of the Brazilian Federal Council of Medicine [8], practicing in non-capital municipalities of São Paulo State. The specific municipality of practice was not recorded in the instrument, and the regional distribution of the sample therefore cannot be described. Under Resolution 2,311/2022, a surgeon must hold a specialist qualification registration in the corresponding surgical area, complete specific robotic surgery training during residency or through a dedicated course, and perform at least 10 robotic procedures under the supervision of an instructor surgeon before operating independently; an instructor must have performed at least 50 robotic procedures as lead surgeon [8]. Participants were identified through the institutional network of Hospital de Base, comprising surgeons who had taken part in the institution's robotic surgery training course and surgeons already credentialed in robotic surgery known to the institution. Recruitment therefore followed a convenience strategy rather than an enumerated register of all credentialed surgeons practicing in inland São Paulo State. Surgeons who agreed to participate and provided electronic informed consent were included, yielding 20 participants.

Data collection

Eligible surgeons were invited by institutional email. After consent, participants were given access to a structured questionnaire hosted on Google Forms (Google LLC, Mountain View, CA, USA), covering sociodemographic data, academic background, and professional practice profile. Data collection took place between August 26, 2025, and June 17, 2026. Because invitations were distributed through institutional contacts rather than from a closed register, the total number of surgeons invited could not be determined, and a response rate cannot be calculated.

Variables and data handling

The questionnaire was developed by the authors for this study and was reviewed by the senior author for clarity and content coverage before use; it was not pilot tested and has not undergone psychometric validation. The full instrument is reproduced in the Appendices. Responses were exported from the collection platform and tabulated in a spreadsheet (Microsoft Excel; Microsoft Corporation, Redmond, WA, USA). Information was handled confidentially and analyzed in de-identified form. During final verification of the database, data-entry errors affecting the surgical specialty field were corrected, so that this variable was available for all 20 participants. Practice setting was recorded with four response options (exclusively or primarily in the SUS; exclusively or primarily in supplementary health) and was collapsed into two categories, SUS and supplementary health, for analysis. Sexual orientation was also recorded but is not reported, because cell sizes were small enough that disclosure could have identified individual participants within this small and readily identifiable population.

Statistical analysis

Given the predominantly categorical nature of the variables and the sample size (n = 20), the analysis was primarily descriptive; categorical and ordinal variables are presented as absolute (n) and relative (%) frequencies. Associations of interest were explored using Fisher's exact test, which is appropriate for contingency tables with small expected frequencies, adopting a significance level of 5% ($p < 0.05$). Cross-tabulations addressed both the practice setting (SUS versus supplementary health) and complementary axes, including time since training, the nature of the undergraduate institution, and academic degree. Because of the sample size, the association analyses were exploratory and had low statistical power; odds ratios computed over cells with few observations are unstable, and no correction for multiple comparisons was applied across the ten comparisons performed. All analyses were performed in jamovi version 2.7 (The jamovi Project, Sydney, Australia).

Ethical considerations

The study followed the requirements of Brazilian National Health Council Resolutions 466/2012 and 510/2016 and was approved by the Research Ethics Committee of FAMERP (opinion number 7,860,435; CAAE 91035725.9.0000.5415). This approval was granted to the research project "Ensino em Cirurgia Minimamente Invasiva: Desafios, Perspectivas e Transformações" (Teaching in Minimally Invasive Surgery: Challenges, Perspectives, and Transformations), hosted at FAMERP, under which the present study was conducted as a sub-study; the corresponding author is a registered member of the approved research team. Participation was voluntary and conditional on electronic informed consent. Members of the research team belong to the eligible population and took part in the survey; this is declared in the interest of transparency.

Results

Sociodemographic characteristics

Twenty robotic surgeons practicing in inland São Paulo State took part in the study, all of whom provided formal consent. Men predominated, and age was evenly divided between the 31-40 year and over-40 year groups. Most participants were married and reported personal or household income above BRL 30,000 per month. Sociodemographic characteristics are shown in Table *1*.

Variable / category	n (%)
Biological sex	
Male	17 (85.0)
Female	3 (15.0)
Gender identity	
Man	17 (85.0)
Woman	3 (15.0)
Age group	
31-40 years	10 (50.0)
Over 40 years	10 (50.0)
Marital status	
Married	15 (75.0)
Stable union	2 (10.0)
Divorced	2 (10.0)
Single	1 (5.0)
Number of children	
One or more	11 (55.0)
None	9 (45.0)
Personal or household income (BRL per month)	
Above 30,000	17 (85.0)
20,000-30,000	2 (10.0)
10,000-20,000	1 (5.0)

TABLE 1: Sociodemographic characteristics of robotic surgeons in inland São Paulo State (n = 20)

BRL: Brazilian real

Academic background

Parental educational attainment was high, with completed higher education predominating among fathers. Public institutions and traditional curricula were slightly more frequent. Most participants held an undergraduate medical degree as their highest qualification, although a relevant proportion had a master's or doctoral degree (Table *2*).

Variable / category	n (%)
Father’s educational attainment	
Completed higher education	17 (85.0)
Incomplete higher education	1 (5.0)
Completed secondary education	1 (5.0)
Completed primary education	1 (5.0)
Mother’s educational attainment	
Completed higher education	13 (65.0)
Incomplete higher education	4 (20.0)
Completed secondary education	2 (10.0)
Incomplete secondary education	1 (5.0)
Undergraduate institution	
Public	11 (55.0)
Private	9 (45.0)
Undergraduate teaching method	
Traditional	16 (80.0)
Active methods (TBL, PBL, etc.)	3 (15.0)
Mixed	1 (5.0)
Highest academic degree	
Medical degree only	15 (75.0)
Master’s degree	3 (15.0)
Doctoral degree	2 (10.0)

TABLE 2: Academic background of robotic surgeons in inland São Paulo State (n = 20)

TBL: team-based learning; PBL: problem-based learning

Professional profile

The year of graduation from medical school ranged from 2000 to 2019 (median 2011), corresponding to a median of approximately 15 years since graduation. Two participants (10.0%) reported general surgery itself as their specialty; the remaining five specialties reported that they all require prior completion of general surgery or an equivalent basic surgical area program. The entire sample had therefore reached robotic practice through a general surgery core. Digestive system surgery was the most frequent specialty; considered together with coloproctology, specialties centered on the digestive tract accounted for 70.0% of the sample. Practice was slightly more frequent in the supplementary sector than in the SUS (Table *3*).

Variable / category	n (%)
Time since completion of surgical training	
Less than 5 years	3 (15.0)
5-10 years	8 (40.0)
11-20 years	6 (30.0)
More than 20 years	3 (15.0)
Surgical specialty	
Digestive system surgery	12 (60.0)
Coloproctology	2 (10.0)
Thoracic surgery	2 (10.0)
General surgery	2 (10.0)
Surgical oncology	1 (5.0)
Urology	1 (5.0)
Practice setting	
Supplementary health	11 (55.0)
SUS	9 (45.0)

TABLE 3: Professional profile of robotic surgeons in inland São Paulo State (n = 20)

SUS: Sistema Único de Saúde (Brazilian Unified Health System)

Exploratory association analyses

Taking practice setting (SUS versus supplementary health) as the axis of interest, seven associations were examined using Fisher's exact test, covering training, academic degree, specialty, age group, and maternal education. The largest effect size was observed for the relationship between practice in the SUS and undergraduate training at a public institution (odds ratio 6.12); this did not reach the adopted significance threshold ($p = 0.092$). The remaining associations showed smaller effects and p-values well above 0.05 (Table *4*).

Association tested (reference: practice in the SUS)	Odds ratio	p-value
Undergraduate training at a public institution	6.12	0.092
Mother with completed higher education	2.92	0.374
Ten years or less since completion of training	2.40	0.406
Master's or doctoral degree	2.25	0.617
Specialty: digestive system surgery	0.30	0.362
Specialty centered on the digestive tract (digestive system surgery or coloproctology)	0.28	0.336
Age over 40 years	0.29	0.370

TABLE 4: Exploratory associations between practice setting (SUS) and selected variables, Fisher's exact test (n = 20)

Significance level adopted: $p < 0.05$.

SUS: Sistema Único de Saúde (Brazilian Unified Health System)

These figures should be interpreted with caution. Odds ratios computed over cells with few observations are unstable, and the reclassification of a single participant materially alters the estimate. They should therefore be read as hypothesis-generating signals rather than as evidence of effect.

Beyond the practice setting, associations centered on other axes were also explored so that the analysis would not be restricted to the public-private dichotomy. A master's or doctoral degree was not significantly associated with undergraduate training at a public institution (odds ratio 4.57; $p = 0.319$).

Within this set, the only association that reached statistical significance was the segregation between teaching method and the nature of the undergraduate institution: all graduates of public institutions had followed a traditional curriculum, with active methods and mixed curricula confined to private institutions ($p = 0.026$). The odds ratio was not estimable because of a zero cell (complete separation). When the comparison was restricted to traditional versus active methods, excluding mixed curricula, the p-value was 0.058.

Discussion

The male predominance is striking: 85.0% of the sample. This is consistent with the under-representation of women that still characterizes surgical specialties in Brazil and elsewhere. It is possible that robotics accentuates this asymmetry, since it concentrates higher-complexity procedures and requires additional, often costly, training; this is a hypothesis suggested by the literature rather than a finding of the present study, which did not test it. Notably, all three women in the sample were in the 31-40-year-old age group, which may indicate that the entry of women into the specialty is more recent, although only a longitudinal study could confirm this. This inequality follows a pattern widely documented in the international literature: women remain under-represented in surgery as a whole, and the disparity is more pronounced in technologically dense surgical subspecialties, reflecting barriers ranging from access to mentorship and training to structural biases in career progression [9-12]. This asymmetry has also been documented specifically within robotic training pathways, where women remain under-represented among the surgeons who complete robotic programs [13].

The socioeconomic pattern also merits comment. Income above BRL 30,000 per month in 85.0% of participants, fathers with completed higher education in 85.0% of cases, and mothers in 65.0% together describe a group with a clearly privileged family background. These figures characterize the surgeons who participated and should not be read as an estimate for the robotic surgical workforce of the region. This is consistent with what is known about access to medical training in Brazil, and more so about access to technologically intensive surgical subspecialties, historically restricted by the cost of robotic training itself, including proctoring and fellowships.

From the professional standpoint, the exactly equal division between the 31-40-year and over-40-year groups, together with a median of approximately 15 years since graduation, is compatible with robotics having reached inland São Paulo mainly through already established surgeons. This reading is compatible with the chronology described for the diffusion of the technique in Brazil, in which the first national platform dates from 2008, and its arrival outside the capitals was later still [2]. The predominance of

digestive system surgery (60.0%) is likewise unsurprising. Together with coloproctology (10.0%), it means that 70.0% of the sample operates on the digestive tract, and these are precisely the areas in which robotics first demonstrated reproducible clinical benefit, such as the reduced blood loss and lower complication rate described for robotic colectomy [6]. The presence of urology, although a minority in this sample, is consistent with the historical role of that specialty in the early diffusion of the platform.

Two findings bear directly on general surgery training. First, the entire sample reached robotic practice through a general surgery core, which places the responsibility for early exposure to the platform squarely within general surgery residency rather than within the subspecialties alone. Second, 70.0% of participants had completed training more than five years earlier, at a time when robotic platforms were still largely absent from regional centers. This is compatible with robotic competence having been acquired after residency, through proctoring or fellowship [14,15]. The instrument did not ask when robotic training took place, however, so this inference cannot be verified with the present data and is offered as a hypothesis for future study. Taken together, these observations suggest that general surgery programs outside the capital have so far functioned as the entry point to, but not the setting of, robotic training.

A further distinctive feature of the present study is the tendency toward balance between the supplementary sector (55.0%) and the SUS (45.0%). This reflects a local particularity: Hospital de Base offers robotic surgery through the public system, which remains uncommon in Brazil given the restricted coverage of the technology in the list of procedures of the National Supplementary Health Agency. Of the seven associations explored with this variable, only one approached relevance: practice in the SUS and undergraduate training at a public institution (odds ratio 6.12; $p = 0.092$). It is not significant, but the direction of effect suggests that training trajectories may differ between the two sectors, a hypothesis that a larger sample could test more rigorously. The remaining associations did not reach statistical significance. Given the sample size and the resulting low power, this does not exclude relationships between practice setting and age group, specialty, academic degree, or maternal education; it indicates only that none could be detected in this sample. With the specialty known for all 20 participants, neither digestive system surgery alone (odds ratio 0.30; $p = 0.362$) nor the set of specialties centered on the digestive tract (odds ratio 0.28; $p = 0.336$) was associated with practice setting, although the direction of effect suggests a slight concentration of these professionals in the supplementary sector.

Because participation was voluntary and invitations were distributed through institutional contacts, surgeons with closer links to the coordinating center or with greater interest in robotic training may be over-represented; the direction of any resulting bias cannot be established, and the profile described here should be read as that of the participating surgeons. Outside the public-supplementary axis, the analysis revealed the only statistically significant finding of the study: the segregation between teaching method and the nature of the undergraduate institution ($p = 0.026$), which reflects the differing pace at which active methods were adopted by public and private schools in Brazil. A recent national survey showed that most Brazilian medical schools, 200 of 258 assessed (77.5%), already adopt active methods as a central teaching axis, a concentration that is greater among newer institutions located in regions of more recent expansion of medical education, which is compatible with the predominance of the traditional method among surgeons who trained longer ago, most of them graduates of older public faculties [16]. This association emerged from one of 10 comparisons performed without adjustment for multiple testing, and it rests on a table containing a zero cell, so the odds ratio was not estimable; when mixed curricula were excluded, it no longer reached the adopted threshold ($p = 0.058$). It should therefore be read as an exploratory, hypothesis-generating result rather than a central outcome of the study. With that caveat, it illustrates that the profile of this surgeon is shaped by formative markers that extend beyond the simple public-supplementary division.

Limitations

Several limitations must be acknowledged. Twenty participants is a small sample, which restricts statistical power and makes odds ratios sensitive to minor variation; firm inferential readings should not be drawn from them. No correction for multiple comparisons was applied, so the single significant result should be interpreted in that light. There is a risk of selection bias, common in voluntary electronic surveys, and it was not possible to establish with precision the number of eligible professionals actually invited, which prevents calculation of a response rate and precludes any claim that the sample corresponds to the totality of credentialed surgeons in the region. The questionnaire was developed for this study and was neither pilot-tested nor formally validated, which limits comparability with other surveys. Recruitment relied on institutional contacts rather than an enumerated register, so the sample is one of convenience and does not constitute a census of credentialed surgeons in the region. Income, parental education, and specialty were self-reported and were not independently verified. The municipality of practice was not collected, so the geographical dispersion of the sample within inland São Paulo State could not be characterized, and no inference can be drawn about regional differences. Finally, members of the research team belong to the eligible population and took part in the survey, which is declared here in the interest of transparency.

Notwithstanding these limitations, this is a restricted, geographically dispersed, and hitherto unstudied population, and the survey therefore offers a first portrait of the robotic surgeon outside the São Paulo capital, providing a basis on which future multicenter studies can build.

Conclusions

In this sample, the robotic surgeon of inland São Paulo State was predominantly male, married, and characterized by high personal income and high parental educational attainment. Professionally, the group was marked by a substantial interval since medical graduation, a clear predominance of specialties centered on the digestive tract, and a balanced distribution between the supplementary sector and the SUS. None of the associations tested with practice settings reached statistical significance, which is attributable at least in part to the sample size; the only significant association identified linked the undergraduate teaching method to the nature of the training institution. All participants had reached robotic practice through general surgery or an equivalent basic surgical area program. The timing of robotic training was not assessed, so whether competence was acquired during or after residency could not be established and remains a question for future studies. These results provide initial information for the planning of general surgery residency programs and of robotic training pathways within them and indicate the need for studies with larger samples.

Appendices

Study questionnaire

The instrument was administered in Brazilian Portuguese through Google Forms (Google LLC, Mountain View, CA, USA). The English version below is a faithful translation of the original items and response options; the original Portuguese instrument is available from the corresponding author on request. An asterisk marks a required question.

Free and Informed Consent Form

Dear Participant,

You are invited to take part in a study whose objective is to describe the profile of the robotic surgeon in inland São Paulo State. This research is being conducted by Dr. Ramon Jorge Guiu, affiliated with the Faculdade de Medicina de São José do Rio Preto (FAMERP).

Objective of the research: To identify demographic, professional, and academic characteristics of surgeons performing robotic surgery in inland São Paulo State, with a view to contributing to the improvement and planning of scientific and educational activities in the field.

Procedures: You will be asked to complete a questionnaire with information relating to your socioeconomic profile, academic background, and professional experience.

Confidentiality: All information provided will be treated with secrecy and confidentiality and used exclusively for the purposes of this research. Data will be presented anonymously, ensuring that no participant is identified in any publication or result. It is reiterated that there are no risks associated with participation in this research other than data leakage.

Voluntary participation: Your participation is entirely voluntary, and you may withdraw at any time without any prejudice.

Consent: I declare that I have been informed about the objectives, procedures, benefits, and risks of this research. I understand that my participation is voluntary and that the information provided in the questionnaire will be used exclusively for the purposes described above.

1. E-mail *

2. I have read and agree with the free and informed consent form described above. *

-I agree, I wish to participate

-I do not agree; I do not wish to participate

Sociodemographic variables

3. Biological sex *

-Female

-Male

-Intersex

4. Gender identity (how you see yourself) *

-Woman

-Man

5. Sexual orientation *

-Heterosexual

-Bisexual

-Homosexual

6. Age *

-0-20 years

-21-30 years

-31-40 years

-Over 40 years

7. Marital status *

-Single

-Married

-Stable union

-Divorced

-Widowed

8. Number of children *

-None

-One or more

9. Personal or household income (the latter if you have no income of your own) *

-Less than BRL 5,000.00

-BRL 5,001.00 - BRL 10,000.00

-BRL 10,000.00 - BRL 20,000.00

-BRL 20,000.00 - BRL 30,000.00

-More than BRL 30,000.00

Parental educational attainment

10. Your father's educational attainment *

-Incomplete primary education

-Completed primary education

-Incomplete secondary education

-Completed secondary education

-Incomplete higher education

-Completed higher education

-I do not know

-Other

11. Your mother's educational attainment *

-Incomplete primary education

-Completed primary education

-Incomplete secondary education

-Completed secondary education

-Incomplete higher education

-Completed higher education

-I do not know

-Other

Academic background and professional practice

12. Year in which you completed medical school *

(open-ended response)

13. Medical school attended at a *

-Public institution

-Private institution

14. Teaching method of the medical school attended *

-Traditional

-Active methods (TBL, PBL, etc.)

-Mixed

15. Your credential *

-R1 (first-year resident)

-R2 (second-year resident)

-R3 (third-year resident)

-Surgeon qualified less than 5 years ago

-Surgeon qualified 5-10 years ago

-Surgeon qualified 11-20 years ago

-Surgeon qualified more than 20 years ago

16. Your specialty *

-General surgery

-Digestive system surgery

-Coloproctology

-Surgical oncology

-Gynecology

-Thoracic surgery

-Pediatric surgery

-Other (free text)

17. You currently work *

-Exclusively in the SUS

-Exclusively in supplementary health

-Primarily in the SUS

-Primarily in supplementary health

18. Academic degree *

-Completed higher education

-Master's degree

-Doctoral degree

-Post-doctoral degree

-Livre-docência (Brazilian senior lecturing qualification)

Note on terminology

Two response options are reported in the manuscript under their standard English labels: item 16 "Proctologista" is reported as coloproctology, and item 15 options four to seven are reported as time since completion of surgical training. SUS denotes the Sistema Único de Saúde, the Brazilian Unified Health System; supplementary health denotes practice funded by private health insurance.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. Research Ethics Committee of the Faculdade de Medicina de São José do Rio Preto (FAMERP) issued approval 7,860,435 (CAAE 91035725.9.0000.5415). **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** Some authors are members of the eligible population and participated in the survey. This is declared in the interest of transparency.

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