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Who and where are the doctors trained by the residence of the *Hospital das Clínicas* of the University of São Paulo?

Quem são e onde estão os médicos formados pela residência do Hospital das Clínicas da Universidade de São Paulo?

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ABSTRACT: *Introduction:* The *Hospital das Clínicas* of the University of São Paulo (HCFMUSP) has an essential role in the training of specialist doctors. However, the profile of the residents from the biggest medical complex of Latin America is still unclear. *Objective:* To describe the general characteristics and the geographic distribution of the HCFMUSP residents and to compare residents graduated from the "Faculdade de Medicina da Universidade de São Paulo" (FMUSP) and from other institutions. *Methodology:* This is a descriptive cross-sectional study based on secondary data from professional and medical training records. The geographic information and location of the doctors were plotted using point maps and the tables presented were elaborated in the IBM 24.0 SPSS ® software. The differences between the FMUSP and non-FMUSP groups were analyzed using the chi-square test for categorical variables and the t-test for continuous variables. A p-value of less than 0.05 was considered significant. *Results:* The study considered 8,468 doctors who had completed or were still in Medical Residency at the *Hospital das Clínicas* of the University of São Paulo between 1999 and 2019. Of these, 47.5% were women, 77.1% came from public medical schools and the mean age of admission was 26.8 years. The most popular specialties were Internal Medicine (11.2%), General Surgery (8.7%) and Pediatrics (7.7%). Most residents were born (58.0%) and live (71.9%) in the state of São Paulo. Moreover, it is observed that residents were concentrated in the main capitals of Brazil in 2019. Regarding the undergraduate institution of the residents, it was found that 66.2% came from institutions other than the FMUSP. In this group, 65% graduated from public medical schools and about 25% came from the Northeast region. *Discussion:* Beyond the offer of vacancies in residency programs, the characteristics, profile, trajectory, origin, and training institution of the doctor must also be considered, as these factors can be determinant in the choice of specialty and in their future decision about location and insertion in the job market. *Conclusion:* This study showed that demographic characteristics and information about the trajectories and choices of residents are relevant for the evaluation of the training institution and for the planning of policies for the medical workforce.

Descriptors: Medical education; Internship and residency; Medical schools.

RESUMO: *Introdução:* O Hospital das Clínicas da Universidade de São Paulo (HCFMUSP) exerce importante papel na formação de médicos especialistas. Contudo, o perfil dos residentes do maior complexo médico da América Latina ainda é pouco estudado. *Objetivo:* Buscou-se descrever as características gerais e a distribuição geográfica dos médicos residentes HCFMUSP, bem

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como comparar aqueles graduados na Faculdade de Medicina da Universidade de São Paulo (FMUSP) e os que se graduaram em outras instituições de ensino. *Metodologia:* Trata-se de um estudo transversal descritivo baseado em dados secundários de registros profissionais e de formação dos médicos. Para analisar a localização e a distribuição geográfica dos médicos foram utilizados mapas de pontos e as tabulações apresentadas foram realizadas com o Software IBM 24.0 SPSS ®. Para comparações entre grupos distintos de médicos foi usado o teste de qui-quadrado para variáveis categóricas e o teste de t para variáveis contínuas. Um valor de p inferior a 0,05 foi considerado significativo. *Resultados:* O estudo considerou 8468 médicos que cursavam ou haviam concluído a Residência Médica no Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo entre os anos de 1999 e 2019. Desses, 47,5% eram mulheres. A média de idade de ingresso foi de 26,8 anos. 77,1% dos médicos residentes foram graduados em escolas públicas. As especialidades mais escolhidas foram Clínica Médica (11,2%), Cirurgia geral (8,7%) e Pediatria (7,7%). A maioria dos residentes nasceu (58,0%) e reside (71,9%) no estado de São Paulo. Além disso, observa-se que os residentes, estavam, em 2019, concentrados principalmente nas capitais. Quanto à escola de graduação dos Residentes, 66,2% graduaram-se em outras escolas (não FMUSP). Neste grupo, 65%, graduaram-se em escolas médicas públicas e aproximadamente 25% vieram da região Nordeste. *Discussão:* Nos programas de Residência Médica devem ser consideradas a oferta de vagas mas também as características, perfis e trajetórias dos médicos, assim como a origem e a escola de graduação, fatores que podem ser determinantes nas escolhas de especialidades e nas decisões futuras sobre inserção e localização do exercício profissional. *Conclusão:* O estudo mostrou que características sociodemográficas e informações sobre trajetórias e escolhas dos médicos Residentes são relevantes para a avaliação da instituição formadora e para subsidiar políticas de planejamento sobre força de trabalho médico.

Descritores: Educação médica, Internato e residência, Faculdades de medicina.

INTRODUCTION

The increasing scientific production and the continuing renewal of medical knowledge demonstrate significant advances in medicine, a science that has become increasingly able to understand human nature and prevent, diagnose, and treat diseases[1]. In this context, multiple medical specialties have been instituted and socially legitimized over time, according to the advancement of science and techniques, but also due to economic, political, corporate, and institutional motivations[2]. Specialized medical training, complementary to undergraduate medical degrees, varies between countries, with differences in rules of admission, duration, nomenclatures, curriculum content, recognition, and standardization of programs in specialties and subspecialties of medicine. However, Medical Residency (MR) is the most common and traditional method for training specialist doctors[3]. Admission to the MR may be through open competition or may consider the doctor's experience in internships during undergraduate studies. Australia, United Kingdom, the USA, and Canada use one of these criteria or a combination of them. In Germany, MR comprises work-based and service-based learning, unlike graduate studies in academic institutions, as is the case in many countries. The time of training in the MR may vary. For example, a MR in Family Medicine or in Internal Medicine lasts five years in Germany, three years in the USA and the Netherlands, and two years in Canada. The training of a specialist may require different prerequisites. For example, orthopedic surgery is considered a specialty in Canada, the Netherlands, the United Kingdom and the United States, while in Austria and Germany it is an area of expertise linked to other specialties[4].

In Brazil, the MR was established in 1977, along with the National Medical Residency Commission (CNRM), linked to the Ministry of Education (MEC)[5]. It is characterized as graduate education for general practitioners or specialists, coordinated by health institutions that can be linked to the university or not. It is developed through in-service training under the guidance of qualified medical professionals and it provides practical learning to serve the population[6]. In 2019, Brazil recognized 55 medical specialties and 59 areas of practice and had 53,776 doctors in a MR in one of 4,862 programs from 809 institutions accredited by the MEC[7,8]. The offer of specialist training is poorly distributed in the country, with 75% of all MR vacancies concentrated in the Southeast and South regions[9]. Government initiatives, such as the National Support Program for the Training of Specialized Doctors in Strategic Areas (Pro-Residency)[10], sought to reduce the inequality in the distribution of specialist doctors in the regions and in the health system. The specialties with the greatest number of MR vacancies are Internal Medicine, Pediatrics, General Surgery and Gynecology and Obstetrics[7]. The number of MR vacancies available is lower than the number of doctors who graduate each year in the country, and 39% of Brazilian doctors do not have any specialized training[7].

The *Hospital das Clínicas* of the Medical School of the University of São Paulo (HCFMUSP), managed by the Government of the State of São Paulo and linked to the Unified Health System (SUS), is one of the largest training centers for specialist doctors in Brazil and the largest teaching hospital complex in Latin America[11]. In 2019, the HCFMUSP offered 883 vacancies in 54 programs for the first year of MR, both for direct access and in areas of expertise, which require the previous completion of a specialty. In addition to the *Hospital das Clínicas* (HC), the residents' field of practice includes the USP University Hospital (HU) and Basic Health Units (UBS). Practical and in-service activities correspond to 80 to 90% of the workload, and the remaining time is reserved for complementary theoretical and pedagogical activities[5].

Admission to a MR program and the choice of a medical specialty are determined by multiple factors. In

addition to individual characteristics and trajectories, other determinant factors are the undergraduate medical training, the offer of vacancies, the profile of institutions that support MR programs and the job market and professional perspectives[12]. The profile of the doctors in MR can be classified by gender, for example, 97.7% of specialists in Urology in Brazil are men[7]; by undergraduate institution, for example, FMUSP alumni tend to attend more surgical specialties when compared to alumni from other medical schools in the country[13]; and by other reasons related to professional choice[14].

In this sense, considering the pioneering spirit and the noteworthy contribution of the HCFMUSP in the training of specialist doctors in Brazil, this article seeks to describe the general characteristics and the geographical distribution of doctors who did a MR in this institution. It also aims to compare aspects of MR graduates who came from the Medical School of the University of São Paulo (FMUSP) and those who came from other medical schools. This article is part of the studies Medical Demography in Brazil [7] and ELMU – Longitudinal Study of Doctors Graduated from FMUSP[13].

METHOD

This is a cross-sectional descriptive study that analyzed secondary data of doctors registered in the Regional Councils of Medicine (CRMs) and data on Medical Residency processed by the National Medical Residency Commission of the Ministry of Education. These databases are originally part of the study Medical Demography in Brazil[7]. Doctors enrolled in or graduating from HCFMUSP MR programs between the years 1999 and 2019 were selected.

The study involved four researchers in the extraction, critical evaluation, and validation of the data. Different researchers followed the same paths to assess completeness, duplication, or errors in the records. Data extraction and review followed two stages: 1) variables gender, place and date of birth, current place of residence and undergraduate institution attended; and 2) variables start date of the MR, and specialty/program attended at the MR. In these stages, inconsistencies and outcomes related to the MR that were not treated by the study were excluded.

Information regarding the location of doctors according to the registered address at the time of the study were plotted on point maps. The tables presented were elaborated in the IBM 24.0 SPSS® Software. Comparisons between residents who graduated from FMUSP and those who graduated from other institutions were made with the chi-square test for categorical variables and the t-test for continuous variables. A p-value of less than 0.05 was considered significant.

Note: The present study is a Scientific Initiation project inserted in USP's Unified Scholarship Program for Undergraduate Students (PUB) (Project PUB 613). It is part of the study Medical Demography in Brazil, approved by the Research Ethics Committee of FMUSP (CEP Approval 797.424).

RESULTS

Initially, 10,859 HCFMUSP MR Programs carried out between 1999 and 2019 were identified in the databases of the Regional Councils of Medicine/CFM and the CNRM (Figure 1). Of these, 644 programs were excluded for the following reasons: absence or inconsistency of data (213); dropouts (339); terminations, leaves, or transfers (92). Thus, 10,215 HCFMUSP MR Programs carried out between 1999 and 2019 were found. This total was divided between the programs already completed (N = 8,967) and those that were still in progress (N=1,248). Thus, 8,468 physicians were included in the study, of whom 7,220 had completed a MR and 1,248 were in an ongoing MR. A total of 52 medical specialties and 57 areas of practice attended by residents who were part of the study were identified.

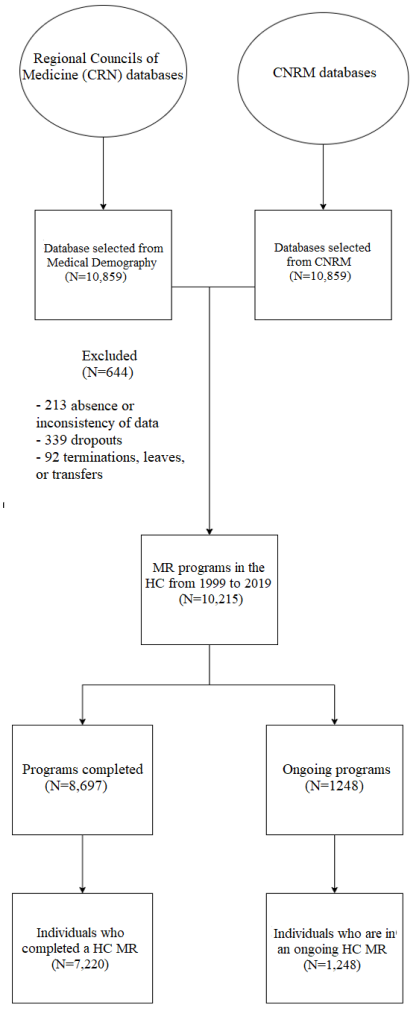

Figure 1: Study population

Profile of the doctors of the HCFMUSP MR

Of the 8,468 physicians who did a medical residency in the *Hospital das Clínicas* of the Medical School of the USP (HCFMUSP MR) between 1999 and 2019, 4,445 (52.5%) were men and 4,023 (47.5%) were women. The mean age of admission was 26.8 years (SD 2.3), with a median of 26, minimum of 22 and maximum of 53 years. As for the nature of the undergraduate institution, 6,498 (77.1%) doctors graduated from public universities and 1,926 (22.9%) graduated from private universities.

For the analysis of the specialist doctors who completed the HCFMUSP MR, 1,248 individuals who were still in their MR at the time of the study were excluded, leaving 7,220 individuals who had already completed the HCFMUSP MR and who, in total, attended 8,967 MR specialties/programs. Note that a doctor may have completed a program in more than one specialty.

The specialties with the highest number of doctors trained at the HCFMUSP MR were Internal Medicine with 1,006 doctors (11.2%), General Surgery with 783 (8.7%), Pediatrics with 690 (7.7%), Cardiology with 453 (5.1%), Anesthesiology with 362 (4.0%), Gynecology and Obstetrics with 288 (3.2%), Radiology and Diagnostic Imaging with 272 (3.0%), Psychiatry with 267 (3.0%), Orthopedics and Traumatology with 264 (2.9%) and Ophthalmology with 235 (2.6%). Table 1 shows the 30 most common specialties in detail.

Table 2 shows the place of birth and the place of residence of the 7,220 doctors who completed a MR at the HCFMUSP. Most were born (70.1%) and live (77.4%) in the Southeast Region, and 58.0% were born and 71.9% live in the State of São Paulo. In addition, 36.8% were born and 60.7% live in the capital of São Paulo. The second region where most students were born and live was the Northeast, where 17.0% came from and 12.5% live. Table 3 shows the 10 states (except São Paulo) with the highest and the 10 states with the lowest number of doctors who completed a MR at the HCFMUSP.

Figure 2 is a map of points that represents the distribution of doctors who completed a MR in the HCFMUSP in Brazil (a) and in the state of São Paulo (b), according to their current place of residence. The map (a) illustrates the concentration of doctors in major Brazilian capitals, such as São Paulo, Curitiba, Distrito Federal, Salvador and Manaus. The map (b) shows the location of these doctors in the State of São Paulo, highlighting their concentration in the metropolitan region of the city of São Paulo.

Table 1: Specialty/ Medical Residency Program of doctors trained at the HCFMUSP MR

Specialty/ MR Program	N	%
Internal Medicine	1.006	11,2
General surgery	783	8,7
Pediatrics	690	7.7
Cardiology	453	5.1
Anesthesiology	362	4.0
Gynecology and Obstetrics	288	3.2
Radiology and Diagnostic Imaging	272	3.0
Psychiatry	267	3.0
Orthopedics and Traumatology	264	2.9
Ophthalmology	235	2.6
Dermatology	178	2.0
Nephrology	170	1.9
Geriatrics	167	1.9
Hematology and Hemotherapy	161	1.8
Endocrinology and Metabolism	145	1.6
Neurology	142	1.6
Otorhinolaryngology	141	1.6
Clinical Oncology	141	1.6
Neonatology	135	1.5
Plastic surgery	129	1.4
Rheumatology	125	1.4
Pneumology	123	1.3
Gastroenterology	105	1.2
Digestive System Surgery	103	1.1
Infectious Diseases	103	1.1
Physical Medicine and Rehabilitation	101	1.1
Preventive and Social Medicine	98	1.1
Pathology	95	1.1
Intensive Care Medicine	94	1.0
Family and Community Medicine	93	1.0
Other Specialties/ Programs	1,798	20.1
TOTAL	8,967	100.0

Note: this analysis used the total number of programs completed

Table 2: Place of birth and place of residence of doctors who completed a MR in the HCFMUSP

Region	Place of birth*		Place of residence **	
	N	%	N	%
Southeast	4,959	70.1	5,571	77.4
Northeast	1,203	17.0	901	12.5
South	424	6.0	303	4.2
Center-West	321	4.5	289	4.0
North	171	2.4	133	1.9
Total	**7,078**	**100.0**	**7,197**	**100.0**
São Paulo (State)	4105	58.0	5176	71.9
São Paulo (Capital)	2559	36.8	4370	60.7

Note: this analysis used the total number of doctors who completed one or more residencies
* 142 individuals without information on place of birth
** 23 individuals without information on place of residence

Table 3: Distribution by state of doctors who completed a MR in the HCFMUSP

10 states with the highest number			10 states with the lowest number		
	N	%		N	%
Bahia	255	3.5	Tocantins	4	0.1
Ceará	173	2.4	Amapá	4	0.1
Espírito Santo	164	2.3	Pará	13	0.2
Paraná	163	2.3	Rondônia	15	0.2
Minas Gerais	147	2.0	Maranhão	27	0.4
Distrito Federal	136	1.9	Rio Grande do Sul	31	0.4
Santa Catarina	113	1.6	Mato Grosso do Sul	39	0.5
Amazonas	97	1.3	Mato Grosso	43	0.6
Rio Grande do Norte	97	1.3	Sergipe	51	0.7
Alagoas	88	1.2	Paraíba	65	0.9
TOTAL	**1,433**	**19.8**		**292**	**4.1**

Note: this analysis used the total number of doctors who completed one or more residencies

(a) **(b)**

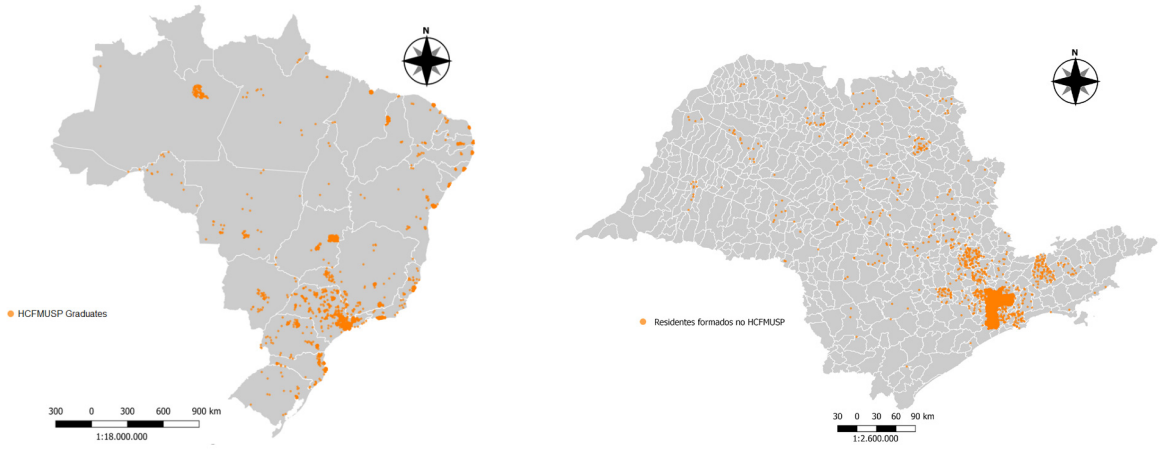

Figure 2: Map of the place of residence of doctors who completed a MR in the HCFMUSP

Physicians who completed a MR in the HCFMUSP: comparative analysis between FMUSP alumni and alumni from other medical schools

During the study period, the group of FMUSP alumni had 2,860 individuals, which corresponds to 33.8% of the total of residents, while the "non-FMUSP" group had 5,608 individuals, corresponding to 66.2% of the total sample. In this second group, 35% came from private schools and 65% came from public schools. Among the "non-FMUSP" institutions in which most doctors studied, the first one is the State University of Campinas, followed by the Santa Casa de São Paulo School of Medical Sciences and the Federal University of Bahia, as evidenced in Table 4.

Table 4: The ten most frequent non-FMUSP medical schools in the HCFMUSP MR

Medical School	N	%
University of Campinas	286	5,6
Santa Casa de Sao Paulo School of Medical Sciences	255	4,5
Federal University of Bahia	255	4,5
Medical School of ABC	231	4,1
Federal University of Ceará	210	3,7
Federal University of Espírito Santo	177	3,1
Bahia School of Medicine and Public Health	167	2,9
Federal University of São Paulo	161	2,8
São Paulo State University Júlio de Mesquita Filho	153	2,7
Medical School of Marília	144	2,5
Other universities	3569	63,6
TOTAL	**5608**	**100,0**

Note: this analysis used the total number of non-FMUSP residents

Analyzing the two groups more closely, some differences stand out. Among FMUSP alumni, there was a predominance of males (1,697 men and 1,163 women, 59.3% and 40.7%, respectively, p<0.001). In the non-FMUSP group, the proportion was 49.0% of men (N=2,748) and 51.0% of women (N=2,860) – close to 1:1. As for age of admission to the MR, the mean age in the FMUSP group was 26.2 (standard deviation 1.9) years, while in the non-FMUSP group, the mean age was 27.1 (standard deviation 2.4) years (p<0.001).

Regarding the place of birth and the current place of residence of the HCFMUSP MR graduates, there was a difference between the FMUSP and non-FMUSP groups. Regarding the place of birth, it was observed that 34.9% of non-FMUSP alumni were born in the North, Northeast and Center-West Regions, whereas this value is only 3.6% in the other group (p<0.001). As for the last registered place of residence, it was noted that 25.7% of non-FMUSP former residents live in the North, Northeast and Center-West Regions, whereas this value is only 4.9% in the FMUSP group (p<0.001). Finally, the predominance of FMUSP alumni who were born (94.0%) and live (93.5%) in the Southeast region was very clear. In the group of non-FMUSP alumni, this value is 57.2% and 68.7% for place of birth and residence, respectively (Tables 5 and 6).

Table 5: Comparison of place of birth of doctors who completed a MR in the HCFMUSP between the groups of FMUSP alumni and non-FMUSP alumni

Region of birth*	FMUSP	Non-FMUSP
	N (%)	N (%)
North	10 (0.4)	161 (3.5)
Northeast	35 (1.4)	1,168 (25.4)
Southeast	2,324 (94.0)	2,635 (57.2)
South	59 (2.4)	365 (7.9)
Center-West	45 (1.8)	276 (6.0)
TOTAL	2,473 (100.0)	4,605 (100.0)
STATE		
São Paulo	2,221 (89.8)	1,884 (40.9)
CITY		
São Paulo	1,538 (62.4)	1,061 (23.1)

Note: this analysis used the total number of doctors who completed one or more residencies

* 142 individuals with no information on place of birth

Table 6: Comparison of place of residence of doctors who completed a MR in the HCFMUSP between groups of FMUSP alumni and non-FMUSP alumni

Region of residence**	FMUSP	Non-FMUSP
	N (%)	N (%)
North	63 (2.5)	70 (1.5)
Northeast	23 (0.9)	878 (18.8)
Southeast	2,360 (93.5)	3,221 (68.7)
South	41 (1.6)	262 (5.6)
Center-West	38 (1.5)	251 (5.4)
TOTAL	2,525 (100.0)	4,682 (100.0)
STATE		
São Paulo	2,333 (92.4)	2,843 (60.9)
CITY		
São Paulo	2,085 (82.6)	2,285 (48.90)

Note: this analysis used the total number of doctors who completed one or more residencies. **23 individuals with no information on mailing address

There were also differences in the specialties and programs attended by the FMUSP and non-FMUSP groups. It was observed that General Surgery was the most common specialty among FMUSP alumni, while this position was occupied by Internal Medicine in the non-FMUSP group. It is worth noting that General Surgery appeared in fourth place in the non-FMUSP group, behind Cardiology, which is in third place, even though this is a specialty that can not be directly accessed, as it requires a residency in Internal Medicine. In addition, the 15 most frequent specialties among FMUSP alumni represent 72.6% of the total of specialties, while in the non-FMUSP group, this value is 53.4%, a fact that indicates a greater dispersion of the second group among the specialties (Table 7).

Table 7: 15 most common specialties/programs from HCFMUSP MR among FMUSP and non-FMUSP alumni

MR Specialty/Program	Non-FMUSP*		FMUSP**	
	N	%	N	%
Internal Medicine	549	9.9	457	13.4
General surgery	313	5.7	470	13.7
Pediatrics	483	8.7	207	6.1
Cardiology	376	6.8	77	2.3
Anesthesiology	192	3.5	170	5.0
Gynecology	121	2.2	167	4.9
Radiology and Diagnostic Imaging	96	1.7	176	5.1
Psychiatry	78	1.4	189	5.5
Orthopedics and Traumatology	60	1.1	204	6.0
Ophthalmology ***	135	2.4	100	2.9
Dermatology	50	0.9	128	3.7
Nephrology	152	2.7	18	0.5
Geriatrics	121	2.2	46	1.3
Hematology and Hemotherapy	136	2.5	25	0.7
Endocrinology and Metabolism ***	93	1.7	52	1.5
TOTAL	**2955**	**53.4**	**2486**	**72.6**

Note:
* this analysis used the number of medical residency programs completed by non-FMUSP alumni
** this analysis used the number of medical residency programs completed by FMUSP alumni
*** p-value >0.05

DISCUSSION

The analysis of the profile of doctors who completed a Medical Residency in the *Hospital das Clínicas* of the USP in the last 21 years showed that 52.5% of these doctors were men, 77.1% came from public medical schools and the mean age of admission was 26.8 years. It was also observed that 58.0% of the doctors were born and 71.9% live in the state of São Paulo. In the comparative analysis between FMUSP (33.8%) and non-FMUSP alumni (66.2%), there were differences in the proportion of males and females, in the age of admission and in the specialties and programs attended.

In the topic of feminization, it was found that there are differences between genders when comparing the groups of FMUSP and non-FMUSP alumni in the

residency. The percentage of women in the group of FMUSP alumni (40.7%) was higher than the frequency of 31.4% found in the study by Gameiro et al.[13], which assessed the demographics of doctors trained by this institution between the years 1940 and 2013. The period covered in the present study, 1999 to 2019, may help explaining this difference. In the group of non-FMUSP alumni, the frequency of women was 51.0%, a value more similar to the percentage of female doctors registered in CRMs in 2010 in Brazil (53.3%), which has been increasing in recent years (57.5% in 2019)[15]. This gender difference between FMUSP and non-FMUSP alumni is attenuated when analyzing the general composition of the HCFMUSP MR, with 52.5% of men and 47.5% of women, values closer to the ones found in the population of doctors in Brazil (53.4% of men and 46.6% of women)[7]. Compared with the international scenario, the percentage of female doctors in the HCFMUSP MR, analyzed through the 21-year historical series, also matches the percentage of female doctors in OECD countries (Organization for Economic Co-operation and Development) in 2019, with values of 47.6% in Austria, 47.0% in Germany and 48.6% in the United Kingdom[16].

Regarding the age of admission to the HCFMUSP MR, it was noted that the mean age of non-FMUSP alumni is higher than the mean age of FMUSP alumni (27.1 years versus 26.2 years, respectively). It is noted that both mean ages are close to the overall medical demography in Brazil in 2019, as 49.8% of medical school graduates are between 25 and 29 years old[7]. In addition, the results also corroborate the fact that graduates from public universities are significantly younger than graduated from private institutions[7]. Given that one third of non-FMUSP graduates come from private schools, this group has a higher mean age than the FMUSP group. Two reasons behind these differences could be: 1) there is a greater number of people in the non-FMUSP group who had a second specialization as their first residency program at the HCFMUSP MR, which could have increased the mean age of admission; 2) the number of students attending pre-university courses has been increasing[7], and with that, the time of admission to the medical school also increased. Thus, many people who are unable to get in public medical schools after repeated attempts, end up, hypothetically, opting for private education, which leads to an increase in the mean age of students graduating from private colleges.

Regarding the administrative nature of the graduate institution of HCFMUSP residents, it is noted that most residents come from public medical schools (77.1%). In the national scenario, the trend is the opposite: in Brazil, 74.2% of recent graduates come from private medical schools[7], which may be a consequence of the unrestrained creation of private medical schools in recent years. Analyzing the reasons for the higher number of students from public medical schools at the HCFMUSP MR, one of the hypotheses is the fact that part of the criteria for admission to the HCFMUSP MR is the analysis of the *curriculum vitae*, in which the university of the candidates is scored[17]. In this sense, public medical schools usually tend to have better evaluations, as they have more university hospitals of their own for the development of teaching, research, and assistance when compared to most private medical schools[18].

Among the 10 most frequent non-FMUSP medical schools in the HCFMUSP MR, it is observed that only 3 are private institutions (Santa Casa de São Paulo School of Medical Sciences, Medical School of ABC and Bahia School of Medicine and Public Health) and only 4 are not in the state of São Paulo (Federal University of Bahia, Federal University of Ceará, Federal University of Espírito Santo and Bahia School of Medicine and Public Health). In total, these 10 non-FMUSP institutions account for 36.6% of doctors graduated from institutions other than the FMUSP, among the 357 medical schools in the country[6].

A possible reason for the concentration of residents from these medical schools is the network of social relationships (friends, doctors, relatives, teachers, etc.) that can recommend or influence the choice of the residency[19,20]. In addition, it is noted that 3 of these 10 medical schools are in the Northeast Region, which, together with the North, are the regions with the lowest concentration of specialist doctors in the country[21]. Among those born in the Northeast, 56.4% return to their home state after graduation.

Regarding the place of birth and residence, it was observed that most of the doctors who completed a MR in the HCFMUSP were born (70.1%) and live (77.4%) in the Southeast Region, more specifically in the State of São Paulo (where 58.0% were born and 71.9% live) and its capital (where 36.8% were born and 60.7% live). This is consistent with the geographical concentration of doctors recorded in the medical demography study[7]. This increase in the percentage of doctors living in the capital shows the tendency for doctors to stay in the same city or region where they finish their medical residency, as already evidenced in other studies[22,23]. Other reasons for doctors to stay in the same city where they completed their MR are greater opportunities for employment and income, more technological resources, greater number of hospitals and areas of activity, possibility of maintaining the bond with the university of origin, among others[9,13,23].

Regarding the choice of specialty among the various programs offered by the HC, there is a clear difference between the groups of FMUSP and non-FMUSP alumni. The choice of a medical specialty is a complex and multifactorial phenomenon: it is related to endogenous factors, such as the characteristics, profile, and trajectories of individuals; and to exogenous factors, such as the influence of the undergraduate course, the availability of vacancies as determined by institutional policies, the corporatism of entities and groups, the organization and demands of the health system and the dynamics and

demands of the healthcare job market[12].

In the group of FMUSP alumni, the General Surgery program was highlighted. It was the most popular program among these residents, which contradicts the national trend, in which General Surgery is in 3rd place among the most frequent specialties in Brazil[7]. This may be due to FMUSP's strong history of training surgeons, as pointed out in previous studies, which reported that, over 74 years, the most frequent specialty of FMUSP graduates was Surgery, with a total of 826 surgeons in the period evaluated (more than 10% of all graduates who specialize)[13].

Among FMUSP alumni, it is noted that all the 10 most popular specialties were direct access programs, which may indicate a tendency for graduates to continue in the same educational institution after their graduation. Among non-FMUSP alumni, it is noted that General Surgery is in fourth place, behind Cardiology, which is a specialty with a prerequisite for admission. In this sense, it is interesting to note that 3 of the 10 most frequent specialties in this group do not have direct access. One of the possible causes of this is the fact that non-FMUSP graduates do not normally attend their first residency program at the HCFMUSP MR, and prefer the specializations that have prerequisites, which they complete in other institutions.

The present study has some limitations, which are partially related to the use of secondary databases. Information found in the doctors' last registration in their CRM was considered. This information may be out of date in relation to the status and current location of the professional. It is worth noting, however, that the databases used in this study are the best available sources on medical records in Brazil, as the completeness of data is guaranteed by the institutions and they are mandatory for all active physicians. Another advantage of the study was the analysis of a wide population of residents of the HCFMUSP, adding an unprecedented approach to national literature, which is usually more focused on case studies of undergraduate medical courses or the profile of residents of a particular specialty.

CONCLUSION

This study sought to understand who are the individuals being trained in the *Hospital das Clínicas* of the Medical School of the USP (HCFMUSP), where they come from and where they go after the conclusion of the residency, as well as their motivations and choices of medical specialties.

Although focused on a specific training center, the study showed the importance of analyzing the profile of residents of public institutions that train specialists.

Given the predominantly public funding of MR scholarships and the fact that specialist doctors are strategic workforce for the SUS, this study can be replicated to guide institutional training practices and support the planning of public policies in health human resources.

The information on socio-demographic characteristics, origin and destination of these professionals are concrete elements to support initiatives for retention and better distribution of the specialized workforce in the national territory and in the health system.

The results obtained enable a discussion on the social role of specialty training centers, allow medical students to make informed career choices, and support public managers in decision-making processes related to medical education and resource and workforce allocation in the health system.

The analysis of the profile of doctors who completed or are still in a MR at the HCFMUSP in each specialty, as well as similar studies in other specialty training centers, are other possible developments of the present study.

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