

The scope of practice of primary health care physicians in rural and urban areas in Brazil

O escopo da prática de médicos na atenção primária nas áreas rural e urbana do Brasil

Alcance de las consultas médicas en la atención primaria en salud en áreas rurales y urbanas brasileñas

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Abstract

This study aimed to identify differences in the scope of practice of primary care physicians and find the main factors associated with expanded practice in rural and urban areas of Brazil. Data from an online survey with 2,277 primary care physicians, conducted between January and March 2016, were used. Differences regarding activities and procedures performed by physicians per area were verified using Kruskal-Wallis/Dunn's post hoc and chi-square tests. Multivariate linear regression analyses were done using a bootstrap technique to identify the main factors associated with an expanded scope of practice. Regardless of the location, the results showed that the practices of the primary care physicians are below their competences. Rural physicians performed a higher number of procedures and activities compared with their peers from intermediate and urban municipalities. Within the overall sample, the variables related to a broader scope of practice included: male gender, work in rural municipalities, participation in training and continuing education programs and consultation of clinical protocols, articles and books. This study contributes with evidence that the medical scope of practice varies according to location. Recognizing and understanding the differences and associated factors for an expanded scope of practice is necessary to determine the skills and resources required for practice in rural and urban areas, collaborating in proposals of strategies to improve quality and access of health care services.

Scope of Practice; Physicians; Health Services Accessibility; Primary Health Care

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Introduction

Primary healthcare (PHC) in Brazil is crucial to the Unified National Health System (SUS) ¹. The consolidation of PHC over the past decades is one of the major advances made by SUS as a public policy and universal system. Different policies and programs contributed to the expansion of PHC. The adoption of the Family Health Program in 1994 can be highlighted as responsible for changing and reorganizing the model of care. In 2006, it became known as the Family Health Strategy (FHS) after the publication of the National Policy on Primary Care (PNAP, in Portuguese). Although under strong recent threats (some reported in the discussion), FHS is considered the main PHC model in Brazil. Composed by a multiprofessional team of physicians, nurses, nurse technicians and community health agents, it has reached more than 40,000 teams ^{1,2,3}. Physicians play an important role in this team, however, attracting and retaining them in PHC to rural, remote and unsafe areas of urban centers is a continuous challenge ⁴.

Access to PHC is strongly related to health policies, geographic location of the place of residence and workforce availability ⁵. Shortage and maldistribution of health professionals are among the main barriers. Providing enough professionals, at the right time, in the right places, and with the right skills is essential to ensure health access to the population ^{5,6}. The difficulty in reducing inequality of access to care in large countries, such as Brazil, is well known. Policymakers worldwide are under constant pressure to ensure health access to the population and find innovative ways to deliver services with less cost and without compromising the quality ^{4,5,6}.

In Brazil, the latest, and one of the most impactful strategies adopted is the More Doctors Program (PMM, in Portuguese) implemented in 2013 to reduce physician shortage and health inequalities in underserved areas. It is a multidimensional program with three main components: (1) investments to improve the infrastructure of health units; (2) reforms and expansion of medical undergraduate courses and residency programs focused on PHC; and (3) emergency provision of physicians in most needed areas ⁷. Concerning the third component, one of its boldest initiatives was the recruitment of over 10,000 foreign physicians, mostly from a cooperation agreement established with Cuba via the Pan American Health Organization (PAHO) ⁸. However, at the end of 2018, the newly elected Federal Government ended the agreement, leading Cuban physicians to return to their country and, consequently, leaving behind a large and vulnerable population, mainly in rural, remote and peripheral urban areas, unassisted. This sudden departure caused a shortage of physicians and a change in the professional profile in several places, left the program with no investment ⁸. In 2019, the government launched the Doctors Through Brazil program, with the expectation to replace the PMM. The new program focuses on providing physicians to rural and remote areas and does not include urban and peripheral areas; components 1 and 2 of the original program were also removed ⁸.

To address the shortage of health professionals, amendments in the legislation that regulates their scope of practice have been carried out since the early 1970s in countries such as Canada and the United States ^{9,10}. The scope of practice defines the parameters of a profession; in practical terms, it describes the set of activities and functions that a professional is qualified to perform based on education, training, competence and regulation ^{11,12}. Many of these regulatory amendments include a comprehensive review of the health professionals' scope of practice, seeking to expand and optimize their practice by balancing professional competences and practice with population and health system needs ^{9,10}.

In health care, the profession scope of practice is determined and restricted by law. In Brazil, the physician's legal scope of practice is defined by *Act n. 12,842/2013*, which attributes to physicians a set of exclusive diagnostic, prescriptive and therapeutic activities ¹³. The definition of scope of practice, however, goes beyond the legal field. Several other key determinants for a health professional's scope of practice exist, such as their education/training credentials and competencies, which can differ in levels, standards, and duration, impacting on scope of practice ^{12,14,15}. In Brazil, the educational component of PMM was responsible for the implementation of curricular guidelines, which included at least 30% of medical undergraduate courses in PHC ^{7,8}. The Brazilian Society of Family and Community Medicine also launched a new competency-based curriculum for graduate programs to help as a guide for better preparing physicians for practice in PHC ¹⁶. Higher education institutions have, however, autonomy over their curriculum, leading to high heterogeneity in approaches to PHC contents, consequently leading to different practice patterns. In addition to formal education, the avail-

ability of other modalities of training is also considered important in determining scope of practice. Continuing education programs are a good example due to bringing knowledge closer to practice¹⁷.

Sociodemographic factors such as age may also play an important role in scope of practice. Older physicians tend to have more practice experience, whereas younger physicians can be more up to date on new drugs, technologies and procedures. Personal factors such as lifestyle, background, and personal interests, are also known to influence practice^{14,15}. Finally, scope of practice is also strongly determined by the location of practice, being driven by population size, demands, characteristics, geographic factors, isolation, socioeconomic status, availability of health services, supplies, professionals, among others^{14,18}.

Expanded scope of practice among PHC physicians working in rural and remote areas has been observed in international literature. Physicians working in these areas often develop a broader range of skills in response to population needs, a lack of professionals, services and referral opportunities. Unlike in urban areas, general practitioners and family physicians are often the only medical professionals available in rural municipalities^{19,20,21,22,23}.

Understanding the differences between rural and urban physicians' scope of practice is an essential step in searching for ways to ensure universal access to healthcare. Comprehension of practice in different locations enables policymakers to offer better support to physicians and provide targeted resources and training for enhancing competencies in medical practice²². Besides, promoting an expanded scope of practice is expected to contribute to better retention of physicians in most needed areas, reducing costs, referral rates and inequalities in access to healthcare^{5,14,19,23}.

In Brazil, few studies focus on this topic. The purpose of this study was to identify differences in PHC physicians' scope of practice and identify the main factors associated with expanded practice in rural and urban areas in Brazil.

Methods

Study design

Data from a major exploratory cross-sectional study on the regulation of health professionals in Brazil were; the survey was carried out by Human Resources for Health Observatories from the Federal University of Minas Gerais (UFMG) and the State University of Rio de Janeiro (UERJ)²⁴. The collection took place between January and March 2016, through a self-administered questionnaire since this type of instrument is widely used in studies that aim to measure the scope of practice^{14,20,21,25}.

The sample was reached through convenience from a list of physicians enrolled in the Family Health Specialization Program and other short-term courses focused on PHC offered by the Open University System of SUS (UNA-SUS, Portuguese). The choice of this database was based on the large number of physicians registered and the availability of email addresses, which are essential for making the research feasible. The questionnaire was mailed to all 17,536 physicians registered. In total, 4,218 physicians consented to participate, of which 2,277 responses were considered for the present analysis (physicians who reported working in PHC facilities at the time and answered the question concerning their scope of practice).

Definition of practice location

To meet the objectives of this article, respondents were stratified according to their practice location, considering the classification and characterization of rural and urban spaces, proposed by the Brazilian Institute of Geography and Statistics (IBGE)²⁶. This proposal defines a rural-urban typology that considers first the demographic density and population sizes to classify the municipalities into rural, intermediate, and urban. This study then considers the location of the municipalities in relation to major urban centers to classify rural and intermediate municipalities adjacent to urban centers of higher hierarchy from those that are remote (or further away from these centers). IBGE defines a final classification of five categories: (1) rural remote, (2) rural adjacent, (3) intermediate remote, (4)

intermediate adjacent, (5) urban²⁷. For analysis purposes, the categories intermediate adjacent and intermediate remote were aggregated into intermediate. The choice for this aggregation was due to the low number of respondents in these categories (n = 25 physicians).

Instrument

The development of the instrument involved different steps²⁵: interviews with key informants, literature review^{14,21,22,27}, and consultation of PHC standards and technical manuals – *Procedures* – from the Brazilian Ministry of Health²⁸. The survey included sociodemographic variables (gender, age, nationality, year and country of graduation); work-related variables (workplace and experience in PHC); and support resources for practice (use of telehealth, participating in training and continuing education programs and consulting clinical protocols, articles and books).

To identify scope of practice, a list of 49 activities/procedures was presented to the respondents, for which they were asked to indicate if they practiced the procedure or activity in their work unit, and if not, if they knew how to perform them. The number of procedures/activities performed was considered as a proxy of an enhanced scope of practice of PHC physicians. The 49-items list was classified into (i) invasive/surgical procedures, and (ii) clinical activities, considering the appropriate *Medical Act 16* (Box 1).

Data analysis

Sociodemographic variables and scope of practice items were stratified according to the rural-urban typology. Calculation of absolute and relative frequencies was done for categorical variables and measures of central tendency (mean, standard deviation, and median) for continuous variables. Nonparametric Kruskal-Wallis/Dunn's post hoc test was used to verify the differences regarding the groups of activities/procedures (invasive/surgical procedures and clinical activities) that respondents performed and knew how to perform since the data did not present a normal distribution (Shapiro-Wilk test). Differences regarding the 49-items by location category (rural remote, rural adjacent, intermediate, and urban) were calculated by the chi-square test.

Nonparametric bootstrap linear regression model with 4,000 repetitions was used to investigate the factors associated with an expanded scope of practice by category. At this stage, the rural remote and rural adjacent categories were aggregated into rural, resulting in four models, general (overall sample), rural, intermediate, and urban. First, we performed univariate analyses using the total of activities and procedures performed as a dependent variable and sociodemographic and support resources as independent variables. Variables with a p-value < 0.2 were included for the subsequent multivariate analysis. From the initial models of multivariate analysis, the variables whose p-values were not significant were removed one by one until all variables were within the desired significance level. We used 95% confidence intervals (95%CI) and 0.05 as the level of significance. All analyses were done using R statistical software (<http://www.r-project.org>).

In accordance with *Resolution n. 466/2012*, of the Brazilian National Health Council, due to the participation of human subjects, this study was submitted to the Ethics Research Committee of UERJ, and approved under the number 46779115.5.0000.5260, on September 29, 2015.

Results

Table 1 describes the study population according to the four municipality categories. Most respondents (63.9%) were working in Urban municipalities, followed by 24.4% in rural adjacent, 9.1% in intermediate, and 2.6% in rural remote municipalities. This distribution approaches the proportion of physicians working in PHC facilities in the same year of the survey, according to data from the National Register of Health Facilities (CNES). Concerning the geographic regions of the respondents, except for urban physicians, most were from the Northeast of the country, especially rural adjacent physicians (57.2%). Regarding urban physicians, 41.9% were from Southeastern Brazil.

Box 1

List of the activities and procedures included in the study (N = 49).

CLINICAL ACTIVITIES	INVASIVE/SURGICAL PROCEDURES
Skin scraping for fungal identification	Abscess incision and drainage
Cryotherapy (cold treatment) of skin lesions	Sutures
Cryotherapy or chemical therapy for genital wart	Skin lesion removal
Superficial wounds treatment	Paronychia drainage
Immobilization of injured extremities	Callus removal
Subungual hematoma treatment	Foreign body removal (upper, lower limbs, and extremities)
Venous puncture	Ingrown toenail removal
Intramuscular injection	Molluscum contagiosum removal
Subcutaneous injection	Cysts, lipomas, and nevi removal
Acupuncture	Ear wax removal
Fracture immobilization	Airway foreign bodies removal
Low-risk prenatal care	Ear foreign body removal
High-risk prenatal care	Corneal or conjunctival foreign body removal
Normal low-risk delivery	Cauterização de epistaxe (sangramento nasal)
High-risk delivery	Local anesthetic infiltration
Fecal occult blood test request	Nasogastric tube insertion / Gastric lavage
Electrocardiogram (perform)	Ureteral catheter insertion
Oxygen therapy	Pap test
Visual acuity screening	
Addressing decreased visual acuity	
Addressing red eye complaints	
Low back pain treatment	
Recurrent urinary tract infection treatment	
Allergic rhizopathies treatment	
Recurrent sinusitis treatment	
Recurrent otitis treatment	
Asthma treatment	
Anemia treatment	
Epigastric pain/peptic ulcer treatment	
Mycoses treatment	
Dermatitis treatment	

Source: prepared by the authors, from the *Health Professional Regulation* ²⁵.

More than half of the respondents were foreigners (55,4%), mostly from Cuba (89%). 61% graduated outside Brazil, from which 82.5% in Cuba. There was a higher concentration of foreigners in rural remote (97.7%) and rural adjacent (74.7%), with a predominance of Brazilian physicians only in urban municipalities (55.5%). The proportion of physicians according to gender was well distributed for all categories, except for rural remote physicians, where 64.6% were female. This same category had a slightly higher mean age than others (44.9). The mean time of graduation in years was 16.3 between for urban physicians and 20.2 for rural remote physicians. The years of experience in PHC ranged from 10.4 to 12.6 years between urban and rural remote physicians.

Table 1

Physician's sociodemographic characteristics according to rural-urban typology (Brazil, 2017).

Sociodemographic characteristics	Total		Rural remote		Rural adjacent		Intermediate		Urban	
	n	%	n	%	n	%	n	%	n	%
Population	190,747,731	100.0	3,524,597	1.9	28,689,820	15.0	13,767,814	7.2	144,765,500	75.9
PHC physicians *	107,620	100.0	1,762	1.6	21,029	19.5	8,535	7.9	76,294	70.9
Respondents	2,277	100.0	60	2.6	556	24.4	207	9.1	1,454	63.9
Geographic region										
North	206	9.0	20	33.3	39	7.0	43	20.8	104	7.2
Northeast	819	36.0	24	40.0	318	57.2	97	46.9	380	26.1
Southeast	752	33.0	7	11.7	99	17.8	37	17.9	609	41.9
South	360	15.8	1	1.7	82	14.7	21	10.1	256	17.6
Central West	140	6.1	8	13.3	18	3.2	9	4.3	105	7.2
Nationality										
Brazilian	840	44.6	1	2.1	115	25.3	57	31.5	667	55.5
Foreign **	1,044	55.4	46	97.9	339	74.7	124	68.5	535	44.5
Country of graduation										
Brazil	729	39.0	1	2.1	102	22.6	44	24.7	582	48.8
Other ***	1,140	61.0	46	97.9	349	77.4	134	75.3	611	51.2
Gender										
Female	1,009	53.3	31	64.6	228	49.8	90	49.2	660	54.8
Male	884	46.7	17	35.4	230	50.2	93	50.8	544	45.2
Telehealth										
Yes	720	31.6	19	31.7	183	32.9	74	35.7	444	69.5
No	1,557	68.4	41	68.3	373	67.1	133	64.3	1 010	30.5
Training and continuing education programs										
Yes	1,305	57.3	27	45.0	307	55.2	118	57.0	853	58.7
No	972	42.7	33	55.0	249	44.8	89	43.0	601	41.3
Clinical protocols, articles, and books										
Yes	1,624	71.3	40	66.7	401	72.1	160	77.3	1,023	70.4
No	653	28.7	20	33.3	155	27.9	47	22.7	431	29.6
Age (years) [n = 1,884]										
Mean	23.0		44.9		43.3		42.9		42.8	
SD	9.7		7.8		8.9		9.3		10.2	
Median	43		47		44		44		42	
Time since graduation (years) [n = 1,987]										
Mean	16.8		20.2		17.6		17.2		16.3	
SD	10.3		8.5		9.1		9.7		10.7	
Median	17		23		19		19		15	
Experience in PHC (years) [n = 2,261]										
Mean	10.8		12.6		11.5		11.5		10.4	
SD	9.1		9.5		9.1		9.8		8.9	
Median	8		12		10		8		7	

PHC: primary healthcare; SD: standard deviation.

* Total physicians with work bond in primary care facilities according to the National Register of Health Facilities (CNES);

** 89% was Cubans;

*** 82.5% graduated in Cuba .

Source: prepared by the authors, with data from the survey ²⁴ and Brazilian Institute of Geogrpny and Statistics ²⁶.

Rural remote, rural adjacent, and intermediate physicians had lower rates of telehealth usage (31.7%, 32.95%, 35.7%) when compared to urban physicians (69.5%). As for participating in training and continuing education programs, the proportion of respondents ranged from 45% to 58.8% between rural remote and urban physicians. Finally, consultation of clinical protocols, articles, and books presented a smaller variation between the categories, with the highest proportion among rural remote physicians (33%).

Table 2 presents the mean, standard deviation (SD) and median of the number of activities and procedures that the respondents claimed to perform and know how to perform, considering the total items, and the groups invasive/surgical procedures and clinical activities. Respondents from all locations informed to know how to perform a higher mean number of procedures and activities (35.9, SD = 10.9) than they actually performed in the health facility (20.7, SD = 9.1). The same was observed concerning invasive/surgical procedures and clinical activities, for which respondents declared practicing a lower number of items, compared with the total they declared to know how to practice.

The mean of the total of procedures and activities that the respondents declared to perform and know how to perform was significantly lower among urban physicians compared to the other three categories ($p < 0.001$). The same was observed for clinical activities.

Table 2

Mean, standard deviation (SD) and median of activities and procedures that respondents declared to practice and know how to practice, according to the groups and the rural-urban typology (Brazil, 2017).

Activities and procedures	Practiced			Known		
	Total (N = 49)	Invasive/Surgical (n = 18)	Clinical (n = 31)	Total (N = 49)	Invasive/Surgical (n = 18)	Clinical (n = 31)
Total						
Mean	20.7	4.9	15.8	35.9	12.9	23.0
SD	9.1	4.6	5.7	10.9	4.7	7.2
Median	20.0	4.0	16.0	39.0 ^a	14.0	25.0
Rural remote						
Mean	24.9	7.2	17.7	39.9	14.8	2.05
SD	8.8	4.8	5.6	10.9	4.3	7.5
Median	26.0 ^a	7.5 ^a	19.0 ^a	44.0 ^a	16.5 ^a	28.0 ^a
Rural adjacent						
Mean	23.1	6.3	16.7	38.0	14.0	24.0
SD	9.4	4.9	5.8	10.7	4.5	7.1
Median	22.5 ^a	6.0 ^a	18.0 ^a	42.0 ^a	15.0 ^a	26.0 ^a
Intermediate						
Mean	21.9	5.2	16.6	38.3	13.9	24.4
SD	9.4	4.9	5.6	10.0	4.5	6.4
Median	21.0 ^a	4.0 ^b	17.0 ^a	41.0 ^a	14.0 ^a	26.0 ^a
Urban						
Mean	19.5	4.3	15.2	34.7	12.3	22.3
SD	8.7	4.3	5.9	10.8	4.7	7.2
Median	9.5 ^b	3.0 ^b	16.0 ^b	38.0 ^b	14.0 ^b	24.0 ^b

Note: test Kruskal Wallis/Dunn's post hoc. For each variable, equal letters indicate statistically equal groups, and different letters indicate statistically different groups ($p < 0.001$).

Source: prepared by the authors, with data from the survey ²⁴ and Brazilian Institute of Geogrphy and Statistics ²⁶.

Regarding invasive/surgical procedures, rural remote and adjacent physicians reported performing a higher mean than their peers from urban and intermediate municipalities ($p < 0.001$). The practice of these types of procedures showed, however, to be low in all categories. The highest mean was observed among physicians working in rural remote municipalities, whose reported mean was 7.2 (SD = 4.8) out of 18 procedures (Table 2).

Table 3 illustrates the proportion of the 49 procedures and activities listed by practice location. The results showed a significant variation in the proportion of rural and urban physicians. Respondents from rural remote and adjacent municipalities showed a higher proportion for most of the items, especially when compared with urban physicians, presenting significant differences for 34 of the items listed.

Table 3

Proportion of physicians who performed the activities and procedures (N = 49), according to the rural-urban typology (Brazil, 2017).

Activities and procedures	Total		Rural remote		Rural adjacent		Intermediate		Urban		p-value
	n	%	n	%	n	%	n	%	n	%	
Invasive/Surgical											
Abscess incision and drainage	2,122	42.8	56	53.6	518	53.3	193	43.0	1,355	38.0	< 0.001
Sutures	2,133	41.9	57	61.4	525	62.1	192	40.6	1,359	33.5	< 0.001
Skin lesion removal	2,071	26.8	54	35.2	495	37.3	190	24.7	1,332	22.8	< 0.000
Paronychia drainage	2,071	31.1	54	46.3	505	39.4	186	33.3	1,326	27.1	< 0.001
Callus removal	2,041	12.0	53	17.0	498	15.9	188	15.4	1,302	9.8	< 0.001
Foreign body removal (upper, lower limbs and extremities)	2,071	32.4	56	57.1	508	41.9	191	31.4	1,316	27.7	< 0.001
Ingrown toenail removal	2,064	26.7	54	40.7	506	39.3	189	27.5	1,315	21.2	< 0.001
Molluscum contagiosum removal	2,049	19.1	53	17	503	21.5	186	19.9	1,307	18.2	0.435
Cysts, lipomas and nevi removal	2,047	12.2	53	13.2	499	16.2	188	11.2	1,307	10.7	0.014
Ear wax removal	2,094	59.1	54	68.5	515	68.5	193	60.6	1,332	54.8	< 0.001
Airway foreign bodies removal	2,068	26.2	55	47.3	504	32.7	189	32.8	1,320	21.9	< 0.001
Ear foreign body removal	2,093	40.4	56	69.6	513	51.7	190	41.1	1,334	34.8	< 0.001
Corneal or conjunctival foreign body removal	2,078	24.3	56	42.9	505	36.8	189	33.9	1,328	17.3	< 0.001
Cauterization of epistaxis (nosebleeds)	2,048	17.2	54	31.5	499	20.6	188	19.1	1,307	15.0	< 0.001
Local anesthetic infiltration	2,079	45.6	56	67.9	505	61.4	190	48.9	1,328	38.3	< 0.001
Nasogastric tube insertion/Gastric lavage	1,918	17.5	50	24.0	473	22.0	183	20.8	1,212	14.9	0.002
Ureteral catheter insertion	1,904	26.6	48	33.3	468	35.0	182	29.7	1,206	22.6	< 0.001
Pap test	1,942	45.0	52	69.1	476	43.1	182	39.0	1,232	45.5	< 0.001
Clinical											
Skin scraping for fungal identification	2,054	5.1	53	13.2	494	4.9	188	5.9	1,319	4.8	0.052
Cryotherapy (cold treatment) of skin lesions	2,060	2.9	53	3.8	496	3.8	188	3.2	1,323	2.5	0.478
Cryotherapy or chemical therapy for genital wart	2,057	13.4	51	9.8	499	11.0	188	11.7	1,319	14.6	0.157
Superficial wounds treatment	2,152	79.7	59	79.7	524	84.5	199	82.9	1,370	77.4	0.004
Immobilization of injured extremities	2,079	29.5	56	57.1	508	38.8	189	26.6	1,326	24.8	< 0.001
Subungual hematoma treatment	2,053	25.9	53	32.1	501	29.9	190	32.1	1,309	23.2	0.003

(continues)

Table 3 (continued)

Activities and procedures	Total		Rural remote		Rural adjacent		Intermediate		Urban		p-value
	n	%	n	%	n	%	n	%	n	%	
Venous puncture	2,078	35.4	54	50.0	506	46.8	189	36.5	1,329	30.3	< 0.001
Intramuscular injection	2,122	50.7	58	77.6	521	58.0	190	54.2	1,353	46.3	< 0.001
Subcutaneous injection	2,107	48.4	58	74.1	515	54.2	192	54.7	1,342	44.2	< 0.001
Acupuncture	1,886	6.0	49	10.2	467	9.2	180	6.1	1,190	4.6	0.003
Fracture immobilization	2,065	25.0	55	45.5	510	34.7	190	29.5	1,310	19.7	< 0.001
Low-risk prenatal care	2,035	91.3	55	100	499	94.2	190	94.7	1,291	89.3	< 0.001
High-risk prenatal care	1,964	50.5	54	79.6	482	62.9	186	64.5	1,242	42.4	< 0.001
Normal low risk delivery	1,909	11.6	51	21.6	467	15.4	181	14.9	1,210	9.2	< 0.001
High-risk delivery	1,894	3.5	50	12.0	465	4.5	179	6.7	1,200	2.2	< 0.001
Fecal occult blood test request	2,007	94.0	52	88.5	493	93.9	190	93.7	1,272	94.3	0.371
Electrocardiogram (perform)	1,896	16.7	49	6.1	469	19.2	181	16.2	1,197	16.3	0.101
Oxygen therapy	1,928	45.8	52	61.5	471	50.7	184	40.2	1,221	44.1	0.003
Visual acuity screening	1,912	44.6	48	50.0	467	44.3	177	42.4	1,220	44.8	0.810
Addressing decreased visual acuity	1,923	45.2	50	58.0	468	44.9	181	44.2	1,224	44.9	0.329
Addressing red eye complaints	1,969	86.1	50	86.0	484	88.4	187	88.2	1,248	84.9	0.228
Low back pain treatment	2,007	98.2	53	98.1	497	99.2	189	97.9	1,268	97.8	0.264
Recurrent urinary tract infection treatment	2,020	97.9	53	98.1	497	98.6	190	98.4	1,280	97.5	0.498
Allergic rhizopathies treatment	2,015	95.5	52	96.2	495	96.0	190	96.8	1,278	95.1	0.691
Recurrent sinusitis treatment	2,008	95.5	52	98.1	494	97.2	185	96.8	1,277	94.6	0.068
Recurrent otitis treatment	2,003	91.9	52	98.1	493	95.7	187	94.1	1,271	89.8	< 0.001
Asthma treatment	2,010	97.3	52	98.1	496	99.2	189	98.9	1,273	96.3	0.003
Anemia treatment	2,014	98.9	53	98.1	495	100.0	187	99.5	1,279	98.4	0.030
Epigastric pain/Peptic ulcer treatment	2,016	97.7	51	98.0	497	99.4	190	98.9	1,278	96.9	0.031
Mycoses treatment	2,023	98.9	53	96.2	497	99.6	190	99.5	1,283	98.7	0.073
Dermatitis treatment	2,016	98.4	53	98.1	498	99.8	189	98.4	1,276	97.8	0.031

* Chi-square test.

Source: prepared by the authors, with data from the survey²⁴ and Brazilian Institute of Geogrpny and Statistics²⁶.

Invasive/surgical procedures presented the lowest proportions. The only item performed by over 50% of the total of respondents was “ear wax removal”. Even between rural remote and adjacent physicians who presented the highest proportions, less than 60% practiced procedures such as “cyst, lipoma and nevus removal”, “corneal or conjunctival foreign body removal” and “epistaxis cauterization (nasal bleeding)”. The highest proportions (over 60% up to 69.6%) for both rural remote and rural adjacent physicians were “suture”, “ear wax removal” and “local anesthetics infiltration”. Concerning only rural remote, we can also highlight “ear foreign body removal”, performed by 69.6%, and “pap test” by 69.1%. Regarding urban physicians, the only procedure performed by over 50% was “ear wax removal” (54.8%).

Regarding the clinical activities, about half of the activities were performed by over 50% of the physicians. The lowest proportions included “cryotherapy (cold treatment) of skin lesions” (2.9%), “high risk delivery” (3%), “scraping for fungus identification” (5.1%), “acupuncture” (6%), “low normal delivery” (11%), “cryotherapy or chemical therapy for genital wart” (13.4%). In all categories, over 90% declared to perform activities related to the treatment of most common diseases (Table 3).

Given the results described above, we sought to verify which explanatory variables were associated with practicing a higher number of procedures and activities by category. Table 4 presents the results of four final regression models. Considering all respondents, we found that the variables associated with an expanded scope of practice were: work in rural municipalities, male gender, participa-

tion in training and continuing education programs, and consultation of clinical protocols, articles, and books. Among the rural respondents, the factors associated with an expanded practice were: being graduated outside Brazil, male gender, less time since graduation, more experience in PHC, and consultation of clinical protocols, articles, and books. For the intermediate model, the only variables that explained a higher practice were male gender and consultation of clinical protocols, articles, and books. Finally, considering the urban physicians, the factors associated with an expanded SOP were: male gender, telehealth usage, and participation in training and continuing education programs (Table 4).

Discussion

This study sought to identify the variation of PHC physicians' scope of practice in Brazil, according to the municipality's rural-urban typology and the main factors associated with an expanded practice. The results showed that the variables related to a broader practice included: work in rural municipalities, male gender, participation in training and continuing education programs, and consultation of clinical protocols, articles, and books.

The large proportion of foreign physicians is notable in the sociodemographic characteristics of the respondents and can be explained by the period when the survey was conducted. At that time, over 10,000 PHC physicians participating in the PMM were from Cuba²⁹. This scenario, however, has changed; at the end of 2018, with a newly elected federal government, approximately 8,000 Cuban physicians left the country, leaving behind a large and mostly vulnerable population, mainly

Table 4

Multivariate linear regression models for the total number of activities and procedures.

Variables	Final model - total respondents			Final model - rural			Final model - intermediate		
	Coefficient β	95%CI	p-value	Coefficient β	95%CI	p-value	Coefficient β	95%CI	p-value
Intercept	23.14	21.94; 24.33	< 0.001	23.18	20.86; 25.51	< 0.001	20.41	17.91; 23.03	< 0.001
Rural	Ref.								
Intermediate	-2.18	-3.57; -0.76	0.003	-	-	-	-	-	-
Urban	-3.89	-4.72; -3.05	< 0.001	-	-	-	-	-	-
Country of graduation									
Brazil	-	-	-	Ref.	-	-	-	-	-
Other	-	-	-	2.73	0.79; 4.64	0.005	-	-	-
Gender									
Female	-1.85	-2.56; -1.13	< 0.001	-2.2	-3.70; 0.69	0.005	-2.76	-5.13; -0.45	0.025
Male	Ref.			Ref.			Ref.		
Age (years)	-	-	-	-	-	-	-	-	-
Time since graduation (years)	-	-	-	-0.16	-0.25; -0.07	0.001	-	-	-
Experience in PHC	-	-	-	0.13	0.04; 0.20	0.004	-	-	-
Telehealth	-	-	-	-	-	-	-	-	-
Training, continuing education programs	1.43	0.69; 2.20	< 0.001	-	-	-	-	-	-
Clinical protocols, articles, and books	2.20	1.25; 3.14	< 0.001	2.66	0.82; 4.49	0.004	4.41	1.87; 7.06	0.002

95%CI: 95% confidence interval; PHC: primary healthcare; Ref.: reference.

Source: prepared by the authors, with data from the survey²⁴ and Brazilian Institute of Geography and Statistics²⁶.

from rural and remote areas without medical assistance⁸. The government, since then, attempted to provide physicians in these areas. At first, they sought to attract only physicians who were certified in Brazil. However, with the difficulty in replacing the Cuban physicians, continuous shortage and high turnover rates³⁰, the government recently considered the inclusion of about 1,900 of Cubans that remained in the country³¹.

The results suggest that physicians were practicing below their competencies since they reported to know how to perform more activities and procedures than they performed in their work unit. The same tendency was observed in a similar study with physicians from the PMM³². International studies have been reporting the decline of PHC physicians' scope of practice^{15,33}. These phenomena go against the principle of the integrality of PHC, which reinforces that comprehensive care and a broader practice are fundamental to achieve better health outcomes³⁴.

Physicians from all categories practiced a low number of invasive/surgical procedures. Experiences of minor surgeries in PHC reported in previous studies point up several benefits, such as greater comprehensive care, better pre- and post-procedure follow-up, greater patient satisfaction, better cost-effectiveness, reduced waiting for lines in secondary care, good results and fewer complications^{34,35}. Bousquat et al.³⁶ found that the shortness of equipment and material observed in PHC units in Brazil limits health professionals' scope of actions and capacity to respond to population health problems.

In the present study, similar to others^{14,18,19,20,21}, rural physicians reported having a broader scope of practice, especially when compared to urban ones. The development of a higher number of skills and an expanded scope in rural and remote areas can be explained due to the lack of health services and professionals to refer and share functions when needed¹⁴. Also, rural areas tend to have fewer PHC physicians. In Brazil, a Primary Healthcare Physicians Shortage Index shows that among municipalities identified as suffering due to physician shortage, the ones with up to 10,000 inhabitants are the most affected³⁷. Consequently, they may require a broader scope of practice, than their urban peers.

The persistence of strong inequalities in living conditions and access to health services associated with the high concentration of professionals and services in urban areas is well known. However, we also must consider the specificities of urban health. The access to health services can differ not only from city to city, but also among the population due to socioeconomic disparities, existence or not of services, and due to conditions of accessibility of services dependent on the location. Living conditions arising from urban dynamics have a big influence on the functioning of the health system, especially concerning PHC. Cities with more than 100,000 inhabitants are considered to have the greatest social and economic disparities and challenges concerning the consolidation and effectiveness of PHC. It is still important to consider the different urban profiles of these cities that show differences in the degree of PHC expansion³⁸. Concerning the health workforce, urban areas are not immune to PHC physician shortage. Violent and peripheral urban areas are usually the most affected. The shortage and the high turnover rates of physicians in these areas can have an important effect on their practice⁴.

Factors associated with an expanded scope of practice are still poorly understood. The present study made it possible to identify different factors of PHC physicians. Male gender was the only significant in all models tested, consistent with other studies^{15,34}. None of them, however, has deepened this issue. The feminization trend of the medical profession is a topic that deserves some questioning.

Less time since graduation was associated with a broader practice within rural and urban physicians. Similar studies attest that younger and newly graduated are more willing to practice an expanded scope of practice^{15,32}. Only among physicians from rural municipalities, more experience in PHC had a positive association, indicating that experience is an essential attribute for rural practice. Still considering the rural model, being graduated abroad showed to be associated with practicing a more significant number of procedures and activities. This can be explained by the number of foreign physicians in this category, mostly Cuban. Medical education in Cuba is well known to have an essential emphasis on primary care, and study has shown that their performance encompasses a wide range of actions and services, consistent with the principle of comprehensiveness³⁹.

The access to support resources for practicing in PHC showed an important impact on scope of practice. Regarding the three resources tested, participation in training and continuing education programs and telehealth usage showed a positive association for an expanded practice among urban physicians, and consultation of clinical protocols, articles, and books among rural and intermediate. These results suggest that the use of support resources can be related to financial and infrastructure issues. The offer of telehealth and promotion of education activities is more feasible in more developed urban municipalities.

Encouraging and enabling the provision of telehealth and education activities in a non-urban area could favor an expanded practice between physicians and better health outcomes. Telehealth in PCH has well-known benefits, being an important strategy to the decentralization of care, reducing referral rates, improving access to specialized services in remote areas, reducing health costs and patients' travel time^{40,41}. However, the results indicate that the reach of this resource, especially in rural municipalities, is insufficient. Similarly, the benefits of continuing educational programs are also consolidated, including the improvement of professional qualification and practice, an increase in quality of care, and a decrease in incorrect diagnoses and prescriptions^{42,43,44}.

Ensuring the population's access to health services in Brazil has always been challenging. Since 2016, SUS has undergone several changes having the PHC as the main target. The publication of the new Brazilian National Basic Health Care Policy (PNAB, in Portuguese) in 2017, introduces, with concern, new forms of the service organization, team composition, work process, and scope of practice. The priority given to the FHS is put in check, evidenced by federal funding for the traditional primary care models, admitting teams composed of only physicians and nurses, with reduced hours and flexibility of the population coverage by each team^{8,44,45}.

Concerning possible changes in scope of practice, in 2019 the ministry of health presented a *Primary Health Care Service Portfolio*, establishing a list of basic and essential services to be delivered in PHC. The municipality has authority to add or remove items. The list of services has a predominance of clinical practices of individual nature, with emphasis on pathologies and procedures, in a biomedical approach. While some institutions showed to be favorable to the list, such as the Brazilian Society of Family Medicine, claiming it can contribute to a greater resolution and efficiency of services, others, as the National Health Council, argue that the list can, on the contrary, impair resolution, reduce scope of practice and favor a segmentation of minimal standards, typical of a selective primary health care^{44,46}.

The present study provides important information on physicians' scope of practice, identifying regional differences in PHC practice, for rural and urban areas. Pointing out these differences in practice is important since there is a tendency by policymakers to create health strategies without recognizing the variability between practices¹⁹. Our findings are relevant for policymakers on health-care professionals to develop educational and training programs and provide resources necessary to allow physicians to practice at their best level. Regarding attracting and retaining physicians in rural and remote areas – an ongoing challenge in Brazil^{4,6} –, was aggravated now by the departure of Cuban physicians located mainly in these areas³⁰, the comprehension of the extent of rural practice can enable to discern the clinical competencies required for practice, allowing more informed target planning of recruitment. Besides, it can contribute to incoming physicians to know what is expected from a practice perspective¹⁹. Some studies indicate that expanded scope of practice is considered an essential factor in physicians' choice for the workplace²³.

A positive association between a broader scope of practice of health professionals, better health outcomes, lower cost and impact on retention of physicians in rural and remote areas has been observed in several studies^{11,19,23,25,47}. It is undeniable that policymakers should pay attention to this subject. Despite not being the focus of the present study, it is important to emphasize that studies on practice should cover all health professionals. Especially by recognizing some procedures and activities that can, and should be, shared among them, for example between physicians and nurses. Scope of practice's law and regulations have been an active and growing area of debate within human resource for health planners. Flexibilizing and enhancing the scope of practice of health professionals flexible and enhancing it, and not only physicians, have shown to be effective in improving access to care and reducing health costs^{10,11,19}. Further research including all professionals in the FHS team must be carried out in Brazil, seeking innovative ways to maximize and optimize the skills and competencies

of the entire PHC team. Teamwork presumes shared responsibilities that should be regulated in Brazil, as it has been regulated worldwide.

This study has limitations. The first, at the time of the survey, Cuban physicians represented a significant part of the PHC workforce in Brazil, especially in rural and remote municipalities. With the recent ending of the cooperation between Cuba and Brazil, this scenario has changed. Future research should evaluate the chance of scope of practice considering the differences in professional profiles. Second, we recognize that there are differences in medical training and post-graduation of all respondents, which are important determinants for scope of practice, reflecting also differences in professional skills and views on health. However, this variable was not suitable for analysis due to data quality issues. In this sense, the lack of this information could have affected the accuracy differences in scope of practice measured. Third, being an exploratory study, the findings should be complemented by other studies, such as explanatory and qualitative studies. Fourth, the unit of analysis was the municipality, which does not permit to measure of internal differences regarding scope of practice. This is a limitation, especially when considering the urban municipalities, where there is certainly variation in practice (e.g., center x peripheral areas). Finally, we should consider the limitations of the instrument itself, as it did not include the main barriers and obstacles for performing the activities and procedures per item, which could contribute to a more accurate analysis per location.

Conclusion

The present study corroborates with evidence that medical scope of practice varies according to location. Recognizing and detailing these differences and the factors associated with an expanded practice is relevant to determine the skills and resources required for professional practice in different areas, thus improving access to and quality of health care services. Considering that, in Brazil, primary care provided by SUS is the main contact of most of the population and a broader scope of practice of health professionals is known for its benefits, health and education policies that favor an expanded practice among PHC physicians should be encouraged.

Contributors

A. C. van Stralen contributed on the conception and design of the article, statistical analysis, data analysis, interpretation, and writing of the manuscript. C. L. Carvalho and M. L. Cherchiglia participated on the conception and design of the article, data analysis and interpretation, and critical review of the manuscript. S. N. Girardi and C. R. Pierantoni contributed on the conception and design of the article and critical review of the manuscript. I. A. Reis contributed on the statistical analysis and critical review of the manuscript.

Additional informations

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Resumo

O estudo buscou identificar diferenças no escopo da prática de médicos na atenção primária e os principais fatores associados com a ampliação dessa prática nas áreas rural e urbana do Brasil. Foram usados dados de um inquérito online com 2.277 médicos de atenção primária, realizado entre janeiro e março de 2016. Foram utilizados os testes de Kruskal-Wallis/post hoc de Dunn e qui-quadrado para verificar as diferenças em relação às atividades e procedimentos realizados pelos médicos, de acordo com o local. Foram realizadas análises de regressão linear multivariada, usando a técnica bootstrap para identificar os principais fatores associados com o escopo ampliado da prática. Independente de localização, os resultados mostraram que os médicos de atenção primária estão praticando abaixo de seus níveis de competências. Os médicos rurais realizavam mais procedimentos e atividades quando comparados aos colegas de municípios intermediários e urbanos. Na amostra total, as variáveis relacionadas ao escopo ampliado incluíam: sexo masculino, trabalho em municípios rurais, participação em programas de capacitação e de educação continuada, além de consultas a protocolos clínicos, artigos e livros. O estudo corrobora evidências de que o escopo da prática médica varia de acordo com a localização. O reconhecimento e compreensão das diferenças e fatores associados à ampliação do escopo de prática são relevantes para determinar as competências e recursos necessários para a prática médica nas áreas rural e urbana, contribuindo para propostas de estratégias para melhorar a qualidade e acesso a serviços de saúde.

Âmbito da Prática; Médicos; Acesso aos Serviços de Saúde; Atenção Primária à Saúde

Resumen

El objetivo de este estudio fue identificar las diferencias en el alcance de las consultas médicas en atención primaria, así como averiguar los principales factores asociados con las consultas practicadas en áreas rurales y urbanas de Brasil. Los datos que se usaron provenían de una encuesta en línea a 2.277 médicos de asistencia primaria, llevada a cabo entre enero y marzo de 2016. Las diferencias, respecto a las actividades y procedimientos realizados por médicos según su localización, fueron verificadas por los test post hoc de Kruskal-Wallis/Dunn y chi-cuadrados. Los análisis de regresión lineal multivariada se realizaron usando una técnica de bootstrap para identificar los factores principales, asociados con un alcance extendido de la consulta. Independientemente de la localización, los resultados mostraron que los médicos de atención primaria están realizando su trabajo por debajo de sus competencias. Los médicos rurales realizaron un número más alto de procedimientos y actividades, comparado con sus pares en municipios de tamaño medio y urbanos. En la muestra global, las variables relacionadas con un alcance más amplio de las consultas incluyeron: género masculino, trabajo en municipalidades rurales, participar en el entrenamiento y programas de educación continua y protocolos de consulta clínica, artículos, y libros. Este estudio corrobora con evidencias que el alcance de las consultas médicas varía según la localización. Reconocer y comprender las diferencias y factores asociados para un alcance extendido de las consultas, son relevantes para determinar las habilidades y recursos requeridos para realizar consultas en áreas rurales y urbanas, así como para colaborar con propuestas de estrategias en la mejora de la calidad y acceso a los servicios de salud.

Alcance de la Práctica; Médicos; Accesibilidad a los Servicios de Salud; Atención Primaria de Salud

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