ORIGINAL ARTICLE

Structure and work process for implementing medical teleconsultation in the Brazilian National Health System, a cross-sectional study using 2017-2018 data*

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Abstract

Objective: To compare the structure and the work process in Primary Care for implementing medical teleconsultation in municipalities in different regions and with different population sizes (<25,000; 25,000-100,000; >100,000 inhabitants). **Methods:** Cross-sectional study, with descriptive and bivariate analysis, using data from 2017-2018 to assess the availability of computers with internet access, webcam, microphone, speaker, as well as to assess the work processes (use of Telehealth, service supply and demand control center, and communication flow). **Results:** 30,346 primary health centers and 38,865 teams were evaluated. Presence of teleconsultation equipment in the health centers ranged from 1.2% in large northern municipalities to 26.7% in small southern municipalities. Established work process ranged from 10.7% in small northern municipalities to 39.5% in large southern municipalities. Compared to the South, medium-sized municipalities in the North (OR=0.14 – 95%CI 0.11;0.17) and Northeast (OR=0.21 – 95%CI 0.18;0.25) regions were less likely to have the necessary equipment. **Conclusion:** Significant regional inequalities call for investments in Digital Health.

Keywords: Telemedicine; Remote Consultation; Information Technology; Policy Making; Cross-Sectional Studies.

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Introduction

In several countries, alternatives to face-to-face medical consultation are already being used, despite their limitations, despite the need to investigate situations and contexts in which teleconsultation is safe and effective, and despite the political and corporate challenges for implementing it.[1] Video-based medical teleconsultation can present results equivalent to face-to-face consultation in providing care for people with diabetes mellitus, asthma, kidney disease, obstructive pulmonary disease, mental health conditions and chronic pain,[2] among other benefits.[1]

> *Health care needs and access to services are profoundly influenced by social determinants and, in order to propose alternatives to face-to-face consultation, several internet access and technological equipment scenarios, varying digital literacy levels, financial problems and health service user living conditions must be considered.*

In Brazil, the first restrictions on medical treatment without patients being physically examined were imposed in 1965.[3] At the end of 2018, the Federal Council of Medicine published a resolution which regulated remote medical care, detailing premises, operational recommendations, and requirements for performing it. The publication of the resolution generated controversy and its subsequent suspension, subject to amendments.[4] In March 2020, the Ministry of Health, on an exceptional and temporary basis, regulated telemedicine actions for remote interaction during the novel coronavirus (SARS-CoV-2) pandemic,[5] infection with which causes severe acute respiratory syndrome (COVID-19). Teleconsultation has been used in several countries to provide medical care without risk of spreading the disease.

In May 2020, the Brazilian Ministry of Health presented a medical teleconsultation strategy for Primary Health Care (PHC), enabling health workers in Brazilian primary health care centers to perform virtual consultations in order to reduce the spread of SARS-CoV-2.[6]

Another possibility for teleconsultation, in addition to using it to provide Primary Care services, is to use the structure, reach and coverage of primary health care centers[7] for specialized care, given the uneven distribution of specialist doctors.[8] In this specialized teleconsultation model, service users would go to health centers to interact, by video call - in a safe environment supported by a technical health professional - with a specialist doctor situated in a remote location, but with access to the service user's medical records.

This model ensures that the appointment with the doctor is made in advance, according to the doctor's availability. Moreover, the presence of a technical professional at the moment of the consultation can help if a physical examination is needed when digital equipment is unavailable, as well as reducing the barrier of having a first virtual consultation with an unknown doctor. Studies have already linked the beneficial effects of teleconsultation when the physician is known to the service users.[2] As such, the presence of a health professional in person ensures (i) service user identification if there are no unified digital records, (ii) assistance in the use and connectivity of electronic devices, as well as promoting (iii) understanding the context of the service user's life and improving (iv) communication - for greater service user trust and better decisions by the specialist.[9]

Health care needs and access to services are profoundly influenced by social determinants[10] and, in order to propose alternatives to face-to-face consultation, several internet access and technological equipment scenarios, varying digital literacy levels, financial problems and health service user living conditions must be considered. Teleconsultation may not be adequate for all health service users or situations, such as when it constitutes an obstacle to access for the most vulnerable or those with difficulties in using technology.[1] The specialized teleconsultation model therefore depends on the resources available at the primary health care centers and integration between Primary and Specialized Care levels.

In order to indicate priority investment points for the implementing large-scale medical teleconsultation in the Brazilian public health system, the possible

regional particularities and the different municipal population levels must be addressed. A study of primary health care center typology examined information and communication technologies using data from the 1st cycle of the National Program for Primary Health Care Access and Quality Improvement (PMAQ-AB),[11] although its capacity for structural analysis was limited, since this cycle of the program only included data referring to the presence of computers with Internet access. The addition of new data in the 3rd cycle of PMAQ-AB, the worldwide advancement of medical teleconsultation[1] and the progress made in regulating telemedicine actions in Brazil, driven by the SARS-CoV-2 pandemic, indicate the need to update current reality.

This study aimed to compare structure and work process conditions in Primary Care for implementing medical teleconsultation in municipalities in different regions and with different population sizes.

Methods

This is a cross-sectional study of Brazilian primary health care center structure and health team work process, according to the region of the country and municipal population size, aimed at implementing medical teleconsultation.

PMAQ-AB, the data source, is the main Primary Care evaluation strategy in Brazil, leading to access expansion and improvement in the quality of this health care level through financial transfers based on performance. PMAQ-AB researchers visit all primary health care centers and primary care staff throughout Brazil participating in the program to check for the presence of characteristics indicating improved Primary Care.[12] Among the teams working in the Brazilian National Health System in January 2018, 70% formalized their participation in the 3rd PMAQ-AB cycle and were evaluated by the program.[13]

For this study, a 'desirable structure' for implementing teleconsultation consisted of equipment needed to perform an online video call;[14] while a 'minimal structure' did not require peripheral equipment, since although it is necessary for making a video call, it is low-cost and easily obtainable.

When analyzing the work process of the health centers, it was established that there needs to be integration between Primary Care and Specialized Care, according to three minimal requirements: (i) use of the National Telehealth Program platform (a tele-education and tele-care initiative focused on the Family Health Strategy), considering the importance of transmitting and storing personal data on a secure platform, therefore assuming the teams' familiarity with the use of technology to mediate clinical processes; (ii) existence of a specialized consultation supply and demand control center, to direct service users to other care points; and (iii) institutionalized communication flow between the Primary Care team and Specialized Care, to ensure integration between care levels.

The variables analyzed are described below.

a) Minimal structure variables for implementing medical teleconsultation:
   - presence of at least one computer with internet access (yes; no);
   - sufficient internet connection (continuous; irregular; not working).
b) Variables added to a desirable structure for implementing medical teleconsultation:
   - presence of at least one webcam in working condition (yes; no);
   - presence of at least one speaker in working condition (yes; no);
   - presence of at least one microphone in working condition (yes; no).
c) Work process variables for implementing specialized medical teleconsultation:
   - telehealth use by staff (yes; no);
   - existence of a consultation supply and demand control center to refer service users to other care points (yes; no);
   - types of appointment booking centers available (specialized consultation; exams; hospital beds; none);
   - presence of institutionalized communication flow between the Primary Care team and Specialized Care (yes; no).

The data used originated from the external evaluation of the 3rd PMAQ-AB cycle, conducted in 2017-2018.[15] Primary health care center structure profiles were described based on PMAQ-AB Module I, which aimed to evaluate the infrastructure conditions, materials, supplies and medication available at health care centers. In turn, the work process profile was described based on Module II, which aimed to evaluate

the work process of the teams as well as organization of services and care practices.[12]

The analyses were presented by Brazilian regions and by municipalities according to their population size: (i) small municipalities with less than 25,000 inhabitants; (ii) medium-sized municipalities with 25,000 to 100,000 inhabitants; and (iii) large municipalities with over 100,000 inhabitants. To identify the odds of the minimal structure and minimal work process being present in a given region, the following were calculated for municipalities of similar size: (i) the odds ratio (OR) in bivariate form, comparing each region individually with the Southern region, since it presented the best results, both for structure and work process, and (ii) the 95% confidence interval (95% CI) for each OR. The analyses were performed with the Stata® statistical package (version 14.3).

The PMAQ-AB project was approved by the Research Ethics Committee of the Federal University of Pelotas Faculty of Medicine: Approval No. 2.453.320, issued on December 27, 2017.

Results

Data from the 30,346 primary health care centers that adhered to the 3rd PMAQ-AB Cycle and 38,865 Primary Care teams distributed throughout Brazil were incorporated.

The Northern region's large municipalities had a lower proportion of health centers with the desirable structure for implementing medical teleconsultation (1.2%); the highest proportion of health centers with this structure was found in small-sized municipalities in the Southern region (26.7%). As a whole, small-sized municipalities had a higher percentage of desirable structure throughout Brazil (small, 10.7%; medium, 8.3%; large, 7.2%) and, regionally, in the North, Midwest, Southeast and South. The exception was the Northeast, as shown in Table 1:

a) North - small, 3.7%; medium, 2.0%; large, 1.2%;
b) Midwest - small, 16.4%; medium, 11.4%; large, 6.9%;
c) Southeast - small, 9.4%; medium, 6.4%; large, 8.3%;
d) South - small, 26.7%; medium, 20.4%; large, 13.1%;
e) Northeast - unlike the range of percentages in the other regions, in this region 5.8% of small-sized municipalities, 7.1% of medium-sized municipalities (the highest percentage) and 4.4% of large-sized municipalities had desirable structure.

Regardless of population size, the Southern region concentrated the largest number of health centers with desirable structure, whereas the Northern region had the smallest number.

The Southern region had the largest number of health centers equipped with a computer with sufficient and continuous Internet access, this being a structure considered minimal for teleconsultation, ranging from 887 health centers in medium-sized municipalities (78.2%) to 1,587 health centers in small-sized municipalities (81.6%). The Northern region had the smallest number of health centers with minimal structure, varying from 288 health centers in medium-size municipalities (33.2%) to 336 health centers in large municipalities (45.3%). Microphones were the least found peripheral equipment in the health centers, being absent in 1,316 health centers (67.6%) in small-sized municipalities in the Southern region and in 809 health centers (93.3%) in medium-sized municipalities in the Northern region.

In four regions, the health centers of small-sized municipalities had higher minimal structure percentages, the exception being the Northern region (Table 1):

a) Northeast - small, 48.6%; medium, 43.3%; large, 48.0%;
b) Midwest - small, 73.9%; medium, 63.8%; large, 52.3%;
c) Southeast - small, 76.3%; medium, 66.3%; large, 65.4%;
d) South - small, 81.3%; medium, 78.2%; large, 78.4%;
e) In the North, 45.3% of the large-sized cities' health centers had higher minimal structure rates for implementing teleconsultation, followed by 42.3% of the small-sized cities' health centers, and 33.2% of the medium-sized cities' health centers.

Between 18.9% of Primary Care teams in small-sized municipalities and 27.5% of teams in large-sized municipalities throughout Brazil had a minimal work process for implementing specialized teleconsultation,

Table 1 – Number and percentage of primary health care centers with desirable and minimal structure for implementing medical teleconsultation, according to region of the country and municipality population size, Brazil, 2017-2018

Region	Population size	Computer with internet access[a]		Continuous internet		Camera[b]		Speaker[b]		Microphone[b]		UBS[c] with desirable structure		UBS[c] with minimal structure	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
North	Large (n=741)	479	64.6	337	45.5	114	15.4	195	26.3	51	6.9	9	1.2	336	45.3
	Medium (n=867)	397	45.8	295	34.0	82	9.5	166	19.1	58	6.7	17	2.0	288	33.2
	Small (n=776)	435	56.1	334	43	143	18.4	263	33.9	77	9.9	29	3.7	328	42.3
Northeast	Large (n=2,244)	1,275	56.8	1,113	49.6	404	18.0	577	25.7	211	9.4	99	4.4	1,076	48.0
	Medium (n=4,786)	2,285	47.7	2,238	46.8	1,030	21.5	1,706	35.6	652	13.6	339	7.1	2,072	43.3
	Small (n=5,566)	3,006	54.0	2,938	52.8	1,274	22.9	2,039	36.6	737	13.2	323	5.8	2,707	48.6
Midwest	Large (n=568)	410	72.2	297	52.3	80	14.1	175	30.8	62	10.9	39	6.9	297	52.3
	Medium (n=625)	527	84.3	402	64.3	174	27.8	345	55.2	107	17.1	71	11.4	399	63.8
	Small (n=1,037)	938	90.5	772	74.4	342	33.0	682	65.8	244	23.5	170	16.4	766	73.9
Southeast	Large (n=3,267)	2,493	76.3	2,164	66.2	716	21.9	1,288	39.4	495	15.2	272	8.3	2,135	65.4
	Medium (n=2,433)	1,932	79.4	1,621	66.6	448	18.4	998	41.0	249	10.2	155	6.4	1,612	66.3
	Small (n=3,095)	2,614	84.5	2,380	76.9	775	25.0	1,791	57.9	448	14.5	290	9.4	2,360	76.3
South	Large (n=1,261)	1,162	92.1	989	78.4	425	33.7	669	53.1	243	19.3	165	13.1	988	78.4
	Medium (n=1,134)	1,040	91.7	887	78.2	466	41.1	776	68.4	305	26.9	231	20.4	887	78.2
	Small (n=1,946)	1,782	91.6	1,587	81.6	958	49.2	1,527	78.5	630	32.4	519	26.7	1,582	81.3
Brazil	**Large (n=8,081)**	**5,819**	**72.0**	**4,900**	**60.6**	**1,739**	**21.5**	**2,904**	**35.9**	**1,062**	**13.1**	**584**	**7.2**	**4,832**	**59.8**
	Medium (n=9,845)	**6,181**	**62.8**	**5,443**	**55.3**	**2,200**	**22.3**	**3,991**	**40.5**	**1,371**	**13.9**	**813**	**8.3**	**5,258**	**53.4**
	Small (n=12,420)	**8,775**	**70.7**	**8,011**	**64.5**	**3,492**	**28.1**	**6,302**	**50.7**	**2,136**	**17.2**	**1,331**	**10.7**	**7,743**	**62.3**

Notes: a) Has at least one; b) Has at least one in working condition; c) UBS: primary health care center.

varying regionally: from 10.7% in small-sized municipalities in the North to 39.5% in large-sized municipalities in the South (Table 2). Small-sized municipalities in all regions, with the exception of the Midwest, had the lowest percentages of teams with minimal work process:

a) North - small, 10.7%; medium, 13.5%; large, 12.9%;
b) Northeast - small, 19.7%; medium, 28.3%; large, 22.1%;
c) Southeast - small, 18.1%; medium, 23.6%; large, 30.6%;
d) South - small, 22.2%; medium, 34.9%; large, 39.5%;
e) Midwest - 17.5% of teams in small-sized municipalities, compared to 27.5% of teams in medium-sized municipalities and 16.6% of teams in large-sized municipalities - the latter having the lowest percentages of teams with a minimal work process for implementing teleconsultation in the region.

Throughout Brazil, 56.5% of teams in small-sized municipalities, 53.8% of teams in medium-sized municipalities and 48.1% of teams in large-sized municipalities used Telehealth. In the Southern region, 70.9% of teams in large-sized municipalities used this service, while in the Northern region, 27.3% of teams in large-sized municipalities used it. In the North, Northeast and Midwest regions, use of Telehealth was greater among teams in medium and small-sized municipalities, as shown in Table 2.

For Brazil overall, between 86% of health teams in small municipalities and 94.1% in medium-sized municipalities had a specialized consultation supply and demand control center for referring service users to other points of care. Between the regions, this proportion varied from 78.5% in small municipalities in the North to 95.4% in medium-sized municipalities in the South (Table 2).

Taking Brazil as a whole, between 31.9% of Primary Care teams in small-sized municipalities and 45.1% of these teams in large-sized municipalities had an institutionalized communication flow with Specialized Care, whereas the Southeast and Southern regions had higher percentages for all three municipal population sizes. Small-sized municipalities had the lowest percentages of teams with this institutionalized communication flow, regardless of the region (Table 2).

Large-sized municipalities in the North (OR=0.23 - 95%CI 0.19;0.28), Northeast (OR=0.25 - 95%CI 0.22;0.30) and Midwest (OR=0.30 - 95%CI 0.24;0.37) had lower odds of having the minimal structure necessary to implement teleconsultation, compared to municipalities in the South, as shown in Table 3. The Southeast region (large-sized [OR=0.52 - 95%CI 0.44;0.61]; medium-sized [OR=0.55 - 95%CI 0.46;0.64]; small-sized [OR=0.74 - 95%CI 0.64;0.85]) also had lower odds of having this minimal necessary structure, compared to the Southern region, although its odds were higher than that of other regions for all three population sizes.

Regardless of population size, the Northern region municipalities had lower odds of having adequate 'work process', according to the criteria adopted in this study, for implementing specialized teleconsultation (large-sized [OR=0.23 - 95%CI 0.19;0.27]; medium-sized [OR=0.29 - 95%CI 0.24;0.36]; small-sized [OR=0.42 - 95%CI 0.33;0.53]), and statistical difference was found.

Discussion

Most health centers did not have minimal structure for teleconsultation, with evident regional and population size inequalities: lower percentages for all population sizes in the North and Northeast regions; and higher percentages in small-sized municipalities in all regions except the North. Approximately one quarter of the teams had a minimal work process for implementing teleconsultation. The smallest percentages for this variable were found in the small-sized municipalities of four regions, with exception of the Midwest. Small-sized municipalities in all regions had higher odds of having a minimal work process. The North and Northeast were the two regions with municipalities that had the lowest odds of having a minimal structure for medical teleconsultation, regardless of municipal population size.

The data used in this analysis are dynamic. Health centers continuing to have appropriate equipment and continued internet access could have varied since the time the data were collected. It is known that computer availability at health centers varied from 88% in 2017 to 90% in 2018, and the proportion of health centers

Table 2 – Number and percentage of Primary Care teams with minimal work process for implementing medical teleconsultation, according to region of the country and municipality population size, Brazil, 2017-2018

Region	Population size	Uses Telehealth		Specialized consultation supply and demand control center		Institutionalized communication flow (from Primary to Specialized Care)		Teams with minimal work process	
		n	%	n	%	n	%	n	%
North	Large (n=1,141)	312	27.3	1,024	89.7	362	31.7	147	12.9
	Medium (n=1,094)	445	40.7	977	89.3	318	29.1	148	13.5
	Small (n=964)	411	42.6	757	78.5	221	22.9	103	10.7
Northeast	Large (n=3,629)	1,555	42.8	3,055	84.2	1,298	35.8	801	22.1
	Medium (n=5,075)	2,847	56.1	4,765	93.9	2,222	43.8	1,437	28.3
	Small (n=5,785)	3,092	53.4	4,941	85.4	2,003	34.6	1,139	19.7
Midwest	Large (n=920)	358	38.9	865	94.0	295	32.1	153	16.6
	Medium (n=672)	422	62.8	585	87.1	258	38.4	186	27.7
	Small (n=1,077)	660	61.3	867	80.5	289	26.8	188	17.5
Southeast	Large (n=6,761)	3,277	48.5	6,116	90.5	3,592	53.1	2,072	30.6
	Medium (n=2,738)	1,232	45.0	2,578	94.2	1,234	45.1	645	23.6
	Small (n=3,355)	2,002	59.7	2,940	87.6	1,051	31.3	607	18.1
South	Large (n=2,130)	1,510	70.9	1,970	92.5	1,024	48.1	842	39.5
	Medium (n=1,294)	855	66.1	1,235	95.4	601	46.4	452	34.9
	Small (n=2,230)	1,412	63.3	2,060	92.4	715	32.1	494	22.2
Brazil	**Large (n=14,581)**	**7,012**	**48.1**	**13,030**	**89.4**	**6,571**	**45.1**	**4,015**	**27.5**
	Medium (n=10,873)	**5,849**	**53.8**	**10,229**	**94.1**	**4,678**	**43.0**	**2,895**	**26.6**
	Small (n=13,411)	**7,577**	**56.5**	**11,565**	**86.2**	**4,279**	**31.9**	**2,531**	**18.9**

with internet access increased 7 percentage points in the same period,[16] indicating that changes in structure were not substantial.

Increased internet access can be linked to federal government structural incentives, especially in certain regions and public health institutions lacking in technology, such as the National Broadband Plan (Decree No. 7.175 dated May 12, 2010), the Primary Care Informatization Strategy (Ministry of Health Ordinance GM/MS No. 1.412 dated July 10, 2013) and the Primary Care Health Center Informatization Program (Ordinance GM/MS No. 2.920 dated October 31, 2017). However, regional inequalities and the lack of a State policy for Digital Health persist. Progress with programs of this kind is usually interrupted by changes in government and policy redefinition, causing fragmentation, investment reduction and/or interruption in services offered. In 2018, only 13% of public health facility managers agreed that financial resources were sufficient for information technology investment needs.[16]

A similar scenario of inequality across the Brazilian regions has already been documented in other studies assessing regional health disparities.[17,18] Inequalities in access to information and communication technologies in Brazil are substantial: at the end of 2018, the Northern region had only 3.7% of the national total fixed broadband access.[19] Solving this issue goes beyond the limits of Health. It requires investments and joint actions by multiple sectors, both public and private.

Small-sized municipalities were found to have better structure and work process. Since 2006, when the local health system management was put entirely under municipalities' responsibility, it has been possible to observe how differences in management

Table 3 – Odds ratio and respective confidence interval for the existence of a minimal structure and minimal work process for implementing specialized medical teleconsultation in the regions of the country, according to municipal population size, Brazil, 2017-2018

Population size	Region	Minimal structure		p-value[c]	Minimal work process		p-value[c]
		OR[a]	95%CI[b]		OR[a]	95%CI[b]	
Large	North	0.23	0.19;0.28	<0.001	0.23	0.19;0.27	<0.001
	Northeast	0.25	0.22;0.30	<0.001	0.43	0.38;0.49	<0.001
	Midwest	0.30	0.24;0.37	<0.001	0.30	0.25;0.37	<0.001
	Southeast	0.52	0.44;0.61	<0.001	0.68	0.61;0.75	<0.001
	South	1.00	–		1.00	–	
Medium	North	0.14	0.11;0.17	<0.001	0.29	0.24;0.36	<0.001
	Northeast	0.21	0.18;0.25	<0.001	0.74	0.65;0.84	<0.001
	Midwest	0.49	0.40;0.61	<0.001	0.71	0.58;0.87	0.001
	Southeast	0.55	0.46;0.64	<0.001	0.57	0.50;0.66	<0.001
	South	1.00	–		1.00	–	
Small	North	0.17	0.14;0.20	<0.001	0.42	0.33;0.53	<0.001
	Northeast	0.22	0.19;0.25	<0.001	0.86	0.76;0.97	<0.001
	Midwest	0.65	0.54;0.78	<0.001	0.74	0.62;0.89	0.004
	Southeast	0.74	0.64;0.85	<0.001	0.78	0.68;0.89	0.001
	South	1.00	–		1.00	–	

Notes: a) OR: odds ratio; b) 95%CI: 95% confidence interval; c) Pearson's chi-squared test.

quality lead to different structures. It can be said that small municipalities have certain advantages over larger ones: they are less heterogeneous and have fewer services to manage, enabling greater commitment to Primary Care.[20]

In this analysis, small and medium-sized municipalities in the North, Northeast and Midwest reported higher rates of Telehealth utilization, which suggests that it is possible to implement teleconsultation in places where there are fewer specialist professionals, surpassing the barrier of uneven geographical distribution of physicians in Brazil.[8]

The need for continued investment in telehealth, a resource used by approximately half of Brazilian health teams, is evident for the maintenance and expansion of their service package, including medical teleadvice, which was not initially envisaged due to regulatory restrictions. The population already makes use of several telemedicine and telehealth services offered by the regional centers, in a safe system, and only small adjustments to these platforms are needed in order to be able to perform teleconsultation. In 2018, 36% of primary health care centers used teleadvice (second opinion) and 27% used telediagnostic services.[16]

In order to implement teleconsultation, the adaptation of an existing and familiar platform, such as the Telehealth portal, can contribute to reducing certain limitations, already described in the literature, such as difficulties in use, concern with data safety, structural changes, difficulties in establishing new routines and resistance by health professionals and health service users.[1] Furthermore, integration of medical teleconsultation into a set of already existing services can strengthen the evidence for supervised self-management for chronic cases,[2] in accordance with the models presented in this study.

The presence of a service supply and demand control center in most Brazilian municipalities, ranging from 78.5% in the North's small-sized municipalities to 95.4% in the South's medium-sized municipalities, can facilitate directing patients to face-to-face consultation or to teleconsultation, according to pre-established protocols, as yet unavailable in Brazil. In some regions of Australia, for example, for specialties for which

teleconsultation is provided, the choice is at the service user's discretion, but relies on the health care team's assessment of digital capacity and literacy, internet connection quality, and functionalities of the device used by the service user.[21]

When elaborating such teleconsultation protocols, choice of this type of service must be documented, in accordance with the General Data Protection Law, which provides for the handling of personal data, including in digital media, and is expected to come into force in May 2021.[22] The need for Informed Consent signed by the service user in order for medical teleconsultations to be performed was stated in the revoked CFM Resolution No. 2.227, dated December 13, 2018,[4] but is not mentioned in the new Ministry of Health Ordinance.[5]

Discussions and arrangements with regard to this theme are imminent and adaptation to different realities will be necessary. Accordingly, a unified proposal for teleconsultation, both for Primary and Specialized Care, covering the entire Brazilian territory, is likely to be exclusionary as it will favor municipalities with greater technological structure – namely small-sized municipalities and municipalities in the South -, aggravating regional disparities.

The next step would be to incorporate teleconsultation into care models, allowing for significant rearrangements and improvements in care and access to health and, therefore, beter clinical outcomes. The renowned Chronic Care Model,[23] in an updated version,[24] incorporated Digital Health elements to improve clinical outcomes, stressing the importance of effective communication using technological resources, digital education for self-care, and virtual communities for service user support.[24]

In an ideal scenario, implementing teleconsultation in Brazil should undergo a slow and gradual transition, with incorporation of this novel approach of care provision as an additional service or partially replacing other services, and not just a total shift.[1] The potential for strengthening care networks would therefore be maintained, keeping Primary Care as coordinator of care and responsible for health within its its coverage area, in order not to weaken comprehensive health care and the fundamental principles of an already-established care model.

In the current SARS-CoV-2 pandemic scenario, in some countries such as Italy, lack of telemedicine integration to health services has limited its capacity to contribute to the fight against COVID-19, with immeasurable consequences.[25] The teleconsultation experiences during the pandemic in Brazil for both suspected cases of the disease and for chronic cases follow-up have shown this model's potential, although it had not been evaluated at the time this publication was submitted.

This study indicated that the desirable structure as a whole, consisting of all the equipment and internet connections necessary to perform teleconsultations, whether for Primary or Specialized Care, was very poor in the health centers of all municipalities and population sizes surveyed. It is noteworthy that investment must be prioritized in the North and Northeast regions, as well as in the medium and large-sized municipalities of the other regions where insufficient structural conditions for implementing medical teleconsultation are evident. Small-sized municipalities must commit to organizing their work processes. Besides the need to invest in research and development of medical teleconsultation, as well as in evaluating its pertinence and the challenges for its implementation on a large scale, taking regional particularities into account, regulation of its incorporation into care models also needs to be enhanced and implemented.

Authors' contributions

Catapan SC and Calvo MCM designed the study, interpreted the data and performed a critical review of the manuscript. Willemann MCA and Catapan SC obtained and analyzed the data. All authors took part in drafting the manuscript, approved its final version and are responsible for its accuracy and integrity.

References

1. Catapan SC, Calvo MCM. Teleconsulta: uma revisão integrativa da interação médico-paciente mediada pela tecnologia. Rev Bras Educ Med [Internet]. 2020 mar [citado 2020 abr 20];44(1):e002. Disponível em: https://doi.org/10.1590/1981-5271v44.1-20190224

2. Greenhalgh T, Shaw S, Wherton J, Vijayaraghavan S, Morris J, Bhattacharya S, et al. Real-world implementation of video outpatient consultations at macro, meso, and micro levels: mixed-method study. J Med Internet Res [Internet]. 2018 Apr [cited 2020 Jan 08];20(4):e150. Available from: https://doi.org/10.2196/jmir.9897

3. Conselho Federal de Medicina - CFM. Código de ética médica [Internet]. Diário Oficial da União, Brasília (DF), 1965 jan 11 [citado 2019 jan 08];Seção:96-9. Disponível em: https://portal.cfm.org.br/images/stories/documentos/ EticaMedica/codigoeticamedica1965.pdf

4. Conselho Federal de Medicina - CFM. Resolução nº 2.227, de 13 de dezembro de 2018. Define e disciplina a telemedicina como forma de prestação de serviços médicos mediados por tecnologias [Internet]. Diário Oficial da União, Brasília (DF), 2018 dez 13 [citado 2019 jan 08]:Seção 1:58. Disponível em: http://www.in.gov.br/materia/-/asset_publisher/Kujrw0TZC2Mb/content/id/62181135

5. Brasil. Ministério da Saúde. Portaria MS/GM n° 467, de 20 de março de 2020. Dispõe, em caráter excepcional e temporário, sobre as ações de Telemedicina, com o objetivo de regulamentar e operacionalizar as medidas de enfrentamento da emergência de saúde pública de importância internacional previstas no art. 3º da Lei nº 13.979, de 6 de fevereiro de 2020, decorrente da epidemia de COVID-19 [Internet]. Diário Oficial da União, Brasília (DF), 2020 mar 29 [citado 2019 jan 08]. Disponível em: http://pesquisa.in.gov.br/imprensa/jsp/visualiza/index.

6. Ministério da Saúde (BR). Notícias: postos de saúde do SUS terão consulta virtual [Internet]. Brasília: Ministério da Saúde; 2020 [citado 2020 abr 28]. Disponível em: https://www.saude.gov.br/noticias/agencia-saude/46773-postos-de-saude-do-sus-terao-consulta-virtual

7. Neves RG, Flores TR, Duro SMS, Nunes BP, Tomasi E. Tendência temporal da cobertura da Estratégia Saúde da Família no Brasil, regiões e Unidades da Federação, 2006-2016. Epidemiol Serv Saúde [Internet]. 2018 set [citado 2020 jan 20];27(3):e2017170. Disponível em: https://doi.org/10.5123/S1679-49742018000300008

8. Scheffer M. Demografia médica no Brasil 2018 [Internet]. São Paulo: FMUSP; CFM; Cremesp; 2018 [citado 2020 jan 20]. 286 p. Disponível em: http://www.flip3d.com.br/web/pub/cfm/index10/?numero=15&edicao=4278

9. Caffery LJ, Bradford NK, Smith AC, Langbecker D. How telehealth facilitates the provision of culturally appropriate healthcare for Indigenous Australians. J Telemed Telecare [Internet]. 2018 Dec [cited 2019 Jan 08];24(10):676-82. Available from: https://doi.org/10.1177/1357633X18795764

10. World Conference on Social Determinants of Health. Rio political declaration on social determinants of health [Internet]. Geneva: World Health Organization; 2012 [cited 2020 Jan 08]. Available from: http://cmdss2011.org/site/wp-content/uploads/2011/10/Rio-Political-Declaration-on-SDH-20111021.pdf

11. Bousquat A, Giovanella L, Fausto MCR, Fusaro ER, Mendonça MHM, Gagno J, et al. Tipologia da estrutura das unidades básicas de saúde brasileiras: os 5 R. Cad Saúde Pública [Internet]. 2017 [citado 2020 abr 08];33(8):e00037316. Disponível em: https://doi.org/10.1590/0102-311x00037316

12. Ministério da Saúde (BR). Secretaria de Atenção à Saúde. Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica (PMAQ-AB): manual instrutivo para as equipes de Atenção Básica (Saúde da Família, Saúde Bucal e equipes parametrizadas) e NASF [Internet]. Brasília: Ministério da Saúde; 2017 [citado 2020 jan 08]. Disponível em: http://189.28.128.100/dab/docs/portaldab/documentos/Manual_Instrutivo_3_Ciclo_PMAQ.pdf

13. Ministério da Saúde (BR). Cadastro Nacional de Estabelecimentos de Saúde - CNES. Banco de dados do Sistema Único de Saúde – Datasus. [Internet]. Brasília: Ministério da Saúde; 2018 [citado 2020 ago 12]. Disponível em: http://tabnet.datasus.gov.br/cgi/tabcgi.exe?cnes/cnv/equipebr.def

14. New Zealand Telehealth Resource Centre. Technology. PC Hardware [Internet]. New Zealand: NZ Telehealth Resource Centre; 2020 [cited 2020 mar 20]. Available from: https://www.telehealth.org.nz/getting-started/technology/pc/

15. Ministério da Saúde (BR). Secretaria de Atenção à Saúde. Programa Nacional de Melhoria do Acesso e da Qualidade da Atenção Básica (PMAQ-AB). Microdados da avaliação externa [Internet]. Brasília: Ministério da Saúde; 2017 [citado 2020 jan 08]. Disponível em: https://aps.saude.gov.br/ape/pmaq/ciclo3/

16. Comitê Gestor da Internet no Brasil. Pesquisa sobre o uso das tecnologias de informação e comunicação nos estabelecimentos de saúde brasileiros. TIC Saúde 2018 [Internet]. Núcleo de Informação e Coordenação do Ponto BR (ed.). São Paulo: Cetic; 2019 [citado 2020 abr 03]. 408 p. Disponível em: https://www.cetic.br/publicacao/pesquisa-sobre-o-uso-das-tecnologias-de-informacao-e-comunicacao-nos-estabelecimentos-de-saude-brasileiros-tic-saude-2018/

17. Albuquerque MV, Viana ALA, Lima LD, Ferreira MP, Fusaro ER, Iozzi FL. Desigualdades regionais na saúde: mudanças observadas no Brasil de 2000 a 2016. Ciênc Saúde Coletiva [Internet]. 2017 abr [citado 2020 mar 20];22(4):1055-64. Disponível em: https://doi.org/10.1590/1413-81232017224.26862016

18. Uchimura LYT, Felisberto E, Fusaro ER, Ferreira, MP, Viana ALA. Avaliação de desempenho das regiões de saúde no Brasil. Rev Bras Saúde Mater Infant [Internet]. 2017 [citado 2020 mar 20];17(1):S259-70. Disponível em: https://doi.org/10.1590/1806-9304201700s100012

19. Agência Nacional de Telecomunicações – ANTT (BR). Relatório anual 2018 [Internet]. Brasília: ANTT; 2019 [citado 2020 abr 3]. 166 p. Disponível em: https://sei.anatel.gov.br/sei/modulos/pesquisa/md_pesq_documento_consulta_externa.php?eEP-wqk1skrd8hSlk5Z3rN4EVg9uLJqrLYJw_9INcO5qCMSr1EMcIpgzizi6JB11ZfIGUkLQFuv-nQ2rlXU4epBnwl_RtrJMm4TFmg79Z9fViw1qMyG2njP4-8SlBgOO

20. Calvo MCM, Lacerda, JT, Colussi CF, Schneider IJC, Rocha TAH. Estratificação de municípios brasileiros para avaliação de desempenho em saúde. Epidemiol Serv Saude [Internet]. 2016 out-dez [citado 2020 abr 03];25(4):767-76. Disponível em: https://doi.org/10.5123/s1679-49742016000400010

21. Queensland Government. Metro South Health. Princess Alexandra Hospital Telehealth Centre Administration. COVID-19 Telehealth Offer of Appointment – Flowchart. Brisbane (QLD), Australia [Internal document. Unpublished]. Queensland: Princess Alexandra Hospital; 2020.

22. Brasil. Presidência da República. Secretaria Geral. Subchefia para assuntos jurídicos. Lei nº 13.709, de 14 de agosto de 2018. Lei Geral de Proteção de Dados Pessoais [Internet]. Diário Oficial da União, Brasília (DF), 2018 ago 15 [citado 2020 abr 29]. Disponível em: http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2018/lei/l13709.htm

23. Wagner EH. Chronic disease management: what will it take to improve care for chronic illness? Eff Clin Pract. 1998 Aug-Sep;1(1):2-4.

24. Gee PM, Greenwood DA, Paterniti DA, Ward D, Miller LMS. The eHealth enhanced chronic care model: a theory derivation approach. J Med Internet Res [Internet]. 2015 Apr [cited 2020 Apr 03];17(4):e86. Available from: https://doi.org/10.2196/jmir.4067

25. Omboni S. Telemedicine during the COVID-19 in Italy: a missed opportunity? Telemed J E Health [Internet]. 2020 Aug [cited 2020 Apr 22];26(8). Available from: https://doi.org/10.1089/tmj.2020.0106

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