Telemedicine in the fight against COVID-19: old and new challenges in health accessibility in Vitória/ES, Brazil

A telemedicina no combate à Covid-19: velhos e novos desafios no acesso à saúde no município de Vitória/ES, Brasil

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ABSTRACT Objective: to analyze telemedicine care in Vitória, Espírito Santo, Brazil, from April 2020 to March 2021. Method: based on Thied et al.'s dimensions of access, a case study was conducted using secondary data collected from the Bem Estar Network's telemedicine reports. All 29 Basic Health Units of the municipality were included. Results: a total of 15,548 users were assisted in 21,481 consultations, 64% female (9,953) and 36% male (5,595). The most attended age group was 30-39 years old (19.5%). The number per 10,000 inhabitants for all causes ranged between 35.86/10,000 inhabitants from Oct-Dec/2020 and 65.75 from Apr-Jun/2020. Of these calls, 56% (11,946) targeted coronavirus (causes B342 and B972), ranging from 22.54 consultations per 10,000 inhabitants in Oct-Dec/2020 to 31.96 in Apr-Jun/2020. Conclusions: Results reflect the transformative impact COVID-19 had on telemedicine care as part of the first-line response to the pandemic in Vitória, Brazil. Inequalities in face-to-face access are reproduced in telemedicine, making it essential to maintain a strong relationship between the health system, health teams, and users when implementing telemedicine. Both forms of health care remain interdependent and complementary in the search to ensure equitable access to health.

KEYWORDS Telemedicine. COVID-19. Health services accessibility. Primary Health Care. Health information systems.

RESUMO *Objetivo: analisar o atendimento pela telemedicina em Vitória/ES de abril/2020 a mar/2021. Método: estudo de caso ancorado na categoria acesso de Thiede et al. e em dados secundários. Utilizaram-se relatórios das consultas de telemedicina da Rede Bem Estar. Incluíram-se todas as 29 Unidades Básicas de Saúde do município. Resultados: no período foram atendidos 15.548 usuários, 64% do sexo feminino (9.953) e 36% do masculino (5.595), em 21.481 consultas. O grupo etário mais atendido foi o de 30-39 anos (19,5%). O número por 10.000 hab. para todas as causas oscilou entre 35,86/10.000 hab. de out-dez/2020 e 65,75 de abr-jun/2020. Destes atendimentos, 56% (11.946) foram coronavírus (causas B342 e B972), sendo, 22,54 consultas por 10.000 hab. de out-dez/2020 e 31,96 de abr-jun/2020. Conclusões: Os resultados refletem o impacto transformador da Covid-19 nos cuidados à saúde por telemedicina como parte da resposta de primeira linha à pandemia no município de Vitória/ES. As desigualdades no acesso presencial se reproduzem na telemedicina, o que torna imprescindível manter um relacionamento forte entre o sistema de saúde, as equipes de saúde e os usuários na implantação da telemedicina. As duas formas permanecem interdependentes e complementares na busca de garantia do acesso equitativo em saúde.*

PALAVRAS-CHAVE *Telemedicina. Covid-19. Acesso aos serviços de saúde. Atenção Primária à Saúde. Sistemas de informação em saúde.*

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Introduction

The World Health Organization (WHO) declared COVID-19 a pandemic on March 11, 2020[1]. Since then, the disease has caused a global health urgency, with rapid evolution[2] and unprecedented serious consequences[3-5]. Hand hygiene, social distancing, isolation of cases and quarantine of contacts, restriction on non-essential travels, social protection measures covering policies aimed at economic protection, food security and school closures, among others, featured among the main measures used by countries to mitigate its spread and reduce health care system overload[6-9].

The mobility restrictions imposed to combat COVID-19 resulted in important changes in the organization and provision of health care services worldwide, mainly driven by digital health[10-14]. Digital health refers to the use of technologies (digital, mobile and wireless) in implementing health goals[15]. It is also defined as thew use of information and communication technologies to improve human health, health care provision, and individual and population welfare[16].

The WHO describes digital health as the general use of Information and Communication Technologies (ICTs), covering: electronic health or eHealth[17], defined as the cost-effective and secure use of ICTs for health-related fields[15,18]; and also mobile health or mHealth, which describe the use of mobile and wireless technologies in public health[15,19]. eHealth is an important reference term in this field[18-20], but the preferred expression is digital health[15,21-24] (OMS. Digital health. https://www.who.int/health-topics/digital-health#tab=tab_1). The present article uses both terms as synonyms when referring to the use of ICTs in health[17,21].

Electronic health records, telehealth (including telemedicine), m-Health or health by mobile devices, eLearning (including distance learning), continuing ICT education, standardization and interoperability, etc., are among the main components of eHealth[17,20].

Of these, telehealth or the provision of treatment, diagnosis and image processing services via ICTs[25,26], particularly telemedicine or synchronous, remote, audiovisual communication between patients and health professionals, are being used in several countries to organize Primary Health Care (PHC) responses during the pandemic[12,13,27-31].

Although not a perfect solution to every scenario[29], telemedicine has shown invaluable potential for combating the pandemic in PHC as it allows to: a) identify cases and screen contacts, supporting early detection via existing surveillance systems; b) significantly improve screening, care coordination for COVID-19 patients[13,28] through follow-up of mild and moderate cases, and referral of severe cases, especially in more vulnerable areas[28]; c) treat COVID-19-related urgencies[12]; d) improve access to regular services, meeting the continuing care needs of non-COVID patients with other comorbidities (chronic illness, for example)[29,30]; e) protect high-risk patients (older adults and those with comorbidities) by reducing their exposure in health units that can receive people with acute COVID-19 infection[27]; f) actively protect health professionals by reducing interactions between patient and care provider, minimizing the risk of COVID-19 transmission between infected individuals[27,31]; g) avoid overcrowding in health units and reduce the risk of transmission by reducing face-to-face appointments[29,30], among others.

Brazil developed, via the Unified Health System (SUS), several initiatives based on telehealth and telemedicine to improve its response to COVID-19, both in the Ministry of Health and several state and municipal health departments[26]. Law no. 696/2020 of April 15, 2020[32] innovated telemedicine by authorizing, for the duration of the pandemic, the use of telemedicine in different health-related areas in Brazil, including remote consultation.

This innovation, however, emerges amidst a bleak outlook of Brazil's weak response to COVID-19[33], characterized by the lack of articulated and coordinated actions; science denialism; simplification of the pandemic and its impacts; the promotion of treatments

devoid of scientific evidence; the refusal of some segments to implement internationally recommended non-pharmacological interventions, among others[33-36]. On August 28, 2021, Brazil ranked third among the countries with the most cases, 20,570,891, and second in mortality, with 574,527 deaths (OMS. WHO Coronavirus – COVID-19 – Dashboard. https://covid19.who.int).

The municipality of Vitória in Espírito Santo, Brazil, pioneered the implementation of digital health with the Bem Estar Network (RBE), a health management software developed by municipal employees from the Undersecretariat for Information Technology (Sub-TI). Since 2009, RBE has been connecting the municipal health network – Basic Health Units (UBS), emergency care, clinical analysis laboratories, pharmacies, dental offices, specialty centers and reference centers – into a single system.

Among the strategies for combating COVID-19, the Municipal Health Department (Semus) of Vitória implemented telemedicine in March 2020 through emergency number 156, aiming to ensure the population's access to health services and facilitate population isolation and optimization of face-to-face care infrastructure for priority cases[37]. The strategy was regulated through Technical Note no. 0007/2020 of March 24, 2020[37].

Hence, this article analyzes telemedicine care in Vitória from April 2020 to March 2021 and discusses aspects of the experience to support reflections on the potentialities and challenges emerging in the fight against COVID-19.

Methods

This case study draws on Thiede et al.'s[38] dimensions of access, on the guidelines for digital health, telehealth and telemedicine proposed by the WHO and the Pan American Health Organization (PAHO)[15,17,18,21,23,39], and on similar studies developed in other countries[12,13,27-31]. Based on these documentary sources and secondary data, we sought to examine the telemedicine care process implemented in the UBS of the municipality of Vitória to combat COVID-19. The city of Vitória was chosen due to its pioneer implementation of RBE and database availability when the research was approved by Semus. On-site work was replaced by online meetings.

Data was collected from records regarding telemedicine care offered to the population of Vitória through emergency number 156. The variables analyzed comprised: date of care; time of care; type of professional; age; gender; ethnicity/color; patient's UBS of origin; code and description according to the International Classification of Diseases (ICD-10); risk classification; classification, referrals, and documents generated in the last follow-up.

The study included all 29 UBS and considered the period from April 1, 2020, to March 31, 20200, using data from RBE's report 'Telemedicine – Performed Care'[40]. We also used official documents about the process of telemedicine implementation in the municipality in 2020[32,37,41,42], consultations with the Sub-IT, discussions in virtual workshops (by Zoom, Meet or WhatsApp) and e-mails exchanged with the management bodies or those indicated as having greater knowledge of the process.

Number of consultations per 10,000 inhabitants was calculated for the municipality and health regions using as numerator the quarterly averages of telemedicine care according to the user's UBS of origin and as denominator the number of inhabitants living in neighborhoods/sectors for 2020 according to the 2010 census projections by the Brazilian Institute of Geography and Statistics (IBGE)[43]. Thus, any random fluctuations that may occur in health regions with small denominators, such as possible reporting errors, were minimized. In calculating COVID-19 consultations per 10,000 inhabitants, the numerator was the quarterly averages of care classified by the ICD-10 codes B342 (Coronavirus infection,

unspecified site) and B972 (Coronavirus as the cause of diseases classified to other chapters), and as denominator the number of inhabitants by neighborhoods/sectors for 2019, according to IBGE 2010 census projections. Descriptive analysis was performed based on the selected variables summarized in tables and graphs developed in Microsoft Excel® 2020 and Microsoft Word® 2020 programs.

Results were analyzed based on WHO's and PAHO's guidelines on digital health, telehealth and telemedicine[15,18,21,23,39] (as described in the introduction); in similar studies developed in other countries[12,13,27-31]; and in the theoretical framework on access[38]. Thiede et al. consider the multidimensionality of access through three dimensions: availability, financial viability and acceptability. Factors that influence access are systematically grouped in each dimension at different levels (health system, individual or family).

The three dimensions are interdependent and conceptually separable, as each one is delimited and concentrates factors strongly associated with each other. Thiede et al. define access as the 'degree of adequacy' between the health system and its users, that is, access takes place in the communicative interaction between the health system factors and the individual or family factors in each dimension[38].

Availability includes adequate health services available to users, at the place and time required by users. It encompass the relation between the location of health services and their users (distance); transportation options; the degree of schedule adequacy; the type, quantity and quality of health services provided; the composition of each team, availability of equipment and supplies[38].

Financial viability refers to how well the cost of using health care services matches the individuals' ability to pay. A key point of this dimension is to know how the costs of health services and the families' ability to pay interact, to avoid generating social costs with catastrophic effects on the most vulnerable population groups[38].

Acceptability, understood as "the social and cultural distance between health services and their users"[44(163)], consists of three components: the match between users' and professionals' beliefs about health; the commitment and dialogue between provider and user; and the influence of organizational arrangements on users' decisions about whether or not to seek care and where. Hence, improvements in accessibility depend on the communicative interaction between the actors involved[38]. This dynamic process represents the potential to interact and make adjustments for the better operation of health systems, besides being the guiding axis for promoting equitable access[38].

Study results are limited to the municipality of Vitória, and the analyses consider consultations made through emergency number 156.

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Results

Context

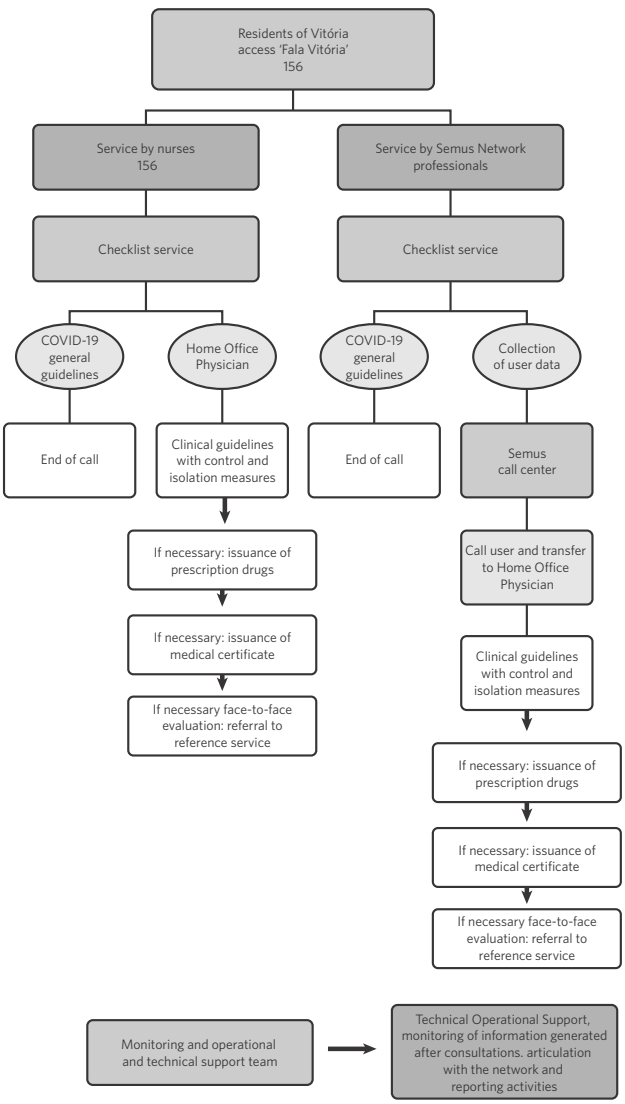
Vitória, along with 19 other municipalities makes up the Metropolitan Health Region of the state of Espírito Santo (ES), is the capital and the fourth most populous city of the state's 78 municipalities, with 365,855 inhabitants and a population density of 3,766.92 inhabitants/km (IBGE, 2020 https://cidades.ibge.gov.br/brasil/es/vitoria/panorama). Health care organization encompasses six health regions (Santo Antônio, Maruípe, Forte de São João, Continental and Centro), 29 Health Territories/UBS (TS/UBS), and 79 neighborhoods.

The city's Municipal Health Department (Semus), by means of Technical Note No.

0007/2020, of March 24, 2020[37], implemented telemedicine via emergency number 156 as one strategy to combat COVID-19. Teleconsultation, telemedicine, teleorientation and telemonitoring services were made available aiming to expand the population's access to health care for risk stratification, early identification and proper referral of severe cases[37].

Emergency number 156 provides information to guide users and allow access to safe and qualified medical evaluation[37,41]. Care (*figure 1*) is initiated by a nurse aided by a specific checklist with closed and self-reported questions answered by the user to identify possible flu-like syndromes, epidemiological linkage, general and specific guidelines, among others. In case of a clinical demand, the call is transferred for medical evaluation. Professionals can also transfer calls for clinical evaluation by physicians.

Figure 1. Flowchart of telemedicine consultations via emergency number 156. Vitória, Espírito Santo, Brazil, 2020



Source: Municipality of Victoria, Municipal Health Department, Health Care Management[41].

In the period analyzed, telemedicine clinical care was performed exclusively by physicians in home office. To meet the demand, the strategy included different expert physicians from the entire health network. In April 2020, RBE created the 'Escritório na Casa' (Home Office) to register all calls made to emergency number 156. Within RBE, physicians who already worked at a UBS used the same user profile to join the system. Specialized care physicians were virtually allocated within RBE, mostly at UBS Forte São João.

All telemedicine calls were entered into the RBE with procedure codes 03.01.01.007-2 (Consultation in Specialized Care) and 03.01.01.TELE (Teleconsultation) and the respective ICD-10 code. In the electronic health record, physicians could fill out one or more of the following forms: record of respiratory symptom care; notification of suspected COVID-19 case; request for RT-PCR COVID-19 testing; issuance of health certificates, reports, prescriptions, and test requisitions; sending documents with digital signature by e-mail; referral for on-site evaluation at the UBS or Emergency Services (PAs).

To answer the transferred calls, physicians used their personal phones on which they registered the telephone line 'Fala Vitória' 156 service. Another resource to ensure the virtual work environment was the availability of a computer connected to the internet and with remote access to the RBE. Each physician used their personal computer and had the support of a technical team when necessary for installation and remote access to the RBE.

Telemedicine care

From April 2020 to March 2021, telemedicine served 15,548 users (*table 1*), of which 64% were women (9,953) and 36% men (5,595). Regarding age group, most patients were 30-39 years old (19.5%), followed by 40-49 years old (17.8%), with mean age of 41 years. As for ethnicity/color, 38.6% of the users declared themselves white and 33.5% Brown. Black and Indigenous users totaled only 7.7% and 0.1%, respectively. A total of 3,084 user records lacked information on the ethnicity/color variable, with better completion in the last two quarters analyzed.

Table 1. Characterization of telemedicine users by quarters according to age groups, gender, ethnicity/color, and health regions. Vitória, Espírito Santo, Brazil, from April 2020 to March 2021

	2020			2021	Overall total	
	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	n	%
Total	4,936	4,071	3,020	3,521	15,548	100.0
Gender						
F	3,087	2,634	1,944	2,288	9,953	64.0
M	1,849	1,437	1,076	1,233	5,595	36.0
Age groups						
<1	44	40	18	14	116	0.7
1-9	274	240	148	173	835	5.4
10-19	331	235	231	242	1,039	6.7
20-29	794	660	492	533	2,479	15.9
30-39	1,083	757	577	611	3,028	19.5

Table 1. (cont)

	2020			2021	Overall total	
	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	n	%
40-49	903	701	541	616	2,761	17.8
50-59	703	655	503	564	2,425	15.6
60-69	460	442	312	441	1,655	10.6
70-79	230	210	133	216	789	5.1
80-89	100	111	53	94	358	2.3
90-99	13	19	12	17	61	0.39
100 and older	1	1	0	0	2	0.01
Ethnicity/color						
Asian	10	10	9	8	37	0.3
White	1,696	1,518	1,366	1,421	6,001	38.6
Indigenous	5	1	8	4	18	0.1
Brown	1,761	1,419	890	1,141	5,211	33.5
Black	457	299	156	285	1,197	7.7
No information	1,007	824	591	662	3,084	19.8
Health regions*						
Santo Antônio	604	659	448	694	2,405	15.5
Maruípe	1,421	1,050	729	898	4,098	26.4
São Pedro	562	293	143	186	1,184	7.6
Forte São João	718	591	424	400	2,133	13.7
Continental	1,283	1,212	1,060	1,100	4,655	29.9
Centro	348	266	216	243	1,073	6.9

Source: Report 'Telemedicine - Performed Care' from Bem Estar Network, Municipality of Vitória, Espírito Santo[40].

*Distribution refers to the user's UBS of source. The following details the geographic coverage of the six health regions in the municipality of Vitoria:

Region 1 – Santo Antônio: 3 TS/UBS (Grande Vitória, Santo Antônio and Arivaldo Favalessa) and 9 neighborhoods.

Region 2 – Maruípe: 8 TS/UBS (Maruípe; Consolação; Da Penha; Bonfim; Andorinhas; Santa Marta; Tabuazeiro/São Cristovão; Itararé) and 16 neighborhoods.

Region 3 – São Pedro: 4 TS/UBS (Resistência; Ilha das Caieiras; Santo André; Conquista/Nova Palestina) and 10 neighborhoods.

Region 4 – Forte de São João: 5 TS/UBS (Forte São João; Ilha de Santa Maria; Jesus de Nazareth; Praia do Suá; Santa Luiza) and 19 neighborhoods.

Region 5 – Continental: 5 TS/UBS (Bairro República; Jabour; Maria Ortiz; Jardim da Penha e Jardim Camburi) and 14 neighborhoods.

Region 6 – Centro: 4 TS/UBS (Fonte Grande; Ilha do Príncipe; Avelina/Santa Tereza e Vitória) and 11 neighborhoods.

In the period analyzed, emergency number 156 registered 21,481 consultations (*table 2*) distributed among 15,548 users. Of these, 55.2% correspond to users with one consultation (11,862) and 44.8% (9,619) to 3,686 users (24%) with more than one consultation. Clinicians and pediatricians performed 64% of the consultations. Most telemedicine users and services according to the UBS of origin was concentrated in the Continental and Maruípe health regions; the Centro and São Pedro regions registered the lowest number (*tables 1 and 2*). The municipality registered the highest number of consultations (7,216) from April to June 2020, and the lowest number from October to December 2020 (3,936 – *tabela 2*). June 2020 showed the highest number of telemedicine consultations (3,074) and November, the lowest (651).

Table 2. Telemedicine care per quarter according to number of consultations, type of professional and health regions. Vitória, Espírito Santo, Brazil, from April 2020 to March 2021

	2020			2021	Overall total	
	Apr-Jun	Jul-Spt	Oct-Dec	Jan-Mar	n	%
Total	7,216	6,134	3,936	4,195	21,481	100.0
Number of consultations						
1	4,253	3,039	2,271	2,299	11,862	55.2
2	1,600	1,515	861	966	4,942	23.0
3-5	1,138	1,281	646	749	3,814	17.8
6-10	211	261	128	159	759	3.5
11 and more	14	38	30	22	104	0.5
Type of professional						
General practitioner	2,286	2,674	1,559	1,487	8,006	37.3
Pediatrician	1,858	1,428	1,183	1,266	5,735	26.7
Family health strategy physician	428	482	358	473	1,741	8.1
General surgeon	302	471	341	589	1,703	7.9
Homeopathic physician	898	400	202	74	1,574	7.3
Gynecologist and obstetrician	701	403	4	0	1,108	5.2
Cardiologist	519	274	137	100	1,030	4.8
Otorhinolaryngologist	165	0	25	80	270	1.3
Endocrinologist and metabologist	0	0	49	117	166	0.8
Neurologist	0	0	51	2	53	0.2
Ophthalmologist	12	2	27	7	48	0.2
Psychiatrist	24	0	0	0	24	0.1
Rheumatologist	23	0	0	0	23	0.1
Health regions*						
Santo Antônio	1,040	1,120	706	848	3,714	17.3
Maruípe	2,087	1,607	936	1,070	5,700	26.5
São Pedro	740	373	174	213	1,500	7.0
Forte São João	1,017	884	520	472	2,893	13.4
Continental	1,847	1,754	1,325	1,297	6,223	29.0
Centro	485	396	275	295	1,451	6.8

Source: Report 'Telemedicine - Performed Care' from Bem Estar Network, Municipality of Vitória, Espírito Santo[40].

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Region 6 – Centro: 4 TS/UBS (Fonte Grande; Ilha do Príncipe; Avelina/Santa Tereza e Vitória) and 11 neighborhoods.

Of the 21,481 consultations performed, 56% (11,946) were classified as Coronavirus infection, unspecified site (B342) and Coronavirus as the cause of diseases classified to other chapters (B972 – *table 3*)

Table 3. Telemedicine care classified with ICD-10 codes B342 and B972, per quarter according to number of consultations, risk classification and health regions. Vitória, Espírito Santo, Brazil, from April 2020 to March 2021

	2020			2021	Overall total	
	Apr-Jun	Jul-Spt	Oct-Dec	Jan-Mar	n	%
Total	3,508	3,380	2,474	2,584	11,946	100.0
Number of consultations						
1	2,387	2,061	1,716	1,649	7,813	65.4
2	711	799	501	583	2,594	21.7
3-5	380	469	233	319	1,401	11.7
6-10	30	46	18	32	126	1.1
11 and more	0	5	6	1	12	0.1
Risk classification						
No warning signs	2,468	2,517	2,020	2,076	9,081	76.0
With warning signs	829	801	396	401	2,427	20.3
With severity signs	19	3	3	8	33	0.3
No information	192	59	55	99	405	3.4
Health regions*						
Santo Antônio	398	426	259	420	1,503	12.6
Maruípe	1,040	834	583	692	3,149	26.4
São Pedro	403	218	121	160	902	7.6
Forte São João	479	536	386	323	1,724	14.4
Continental	903	1,118	928	776	3,725	31.2
Centro	285	248	197	213	943	7.9

Source: Report 'Telemedicine - Performed Care' from Bem Estar Network, Municipality of Vitória, Espírito Santo[40].

*Distribution refers to the user's UBS of source. The following details the geographic coverage of the six health regions in the municipality of Vitoria:

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Region 5 – Continental: 5 TS/UBS (Bairro República; Jabour; Maria Ortiz; Jardim da Penha e Jardim Camburi) and 14 neighborhoods.

Region 6 – Centro: 4 TS/UBS (Fonte Grande; Ilha do Príncipe; Avelina/Santa Tereza e Vitória) and 11 neighborhoods.

Risk classification occurred without warning signs in 76% of these consultations (9,081) and 20.3% showed warning signs (2,427). Severity signs were indicated in 33 consultations (0.3%). Essential hypertension (primary – I10) was the second cause for consultations (2.3%) A total of 1,444 records did not inform the ICD-10 code (6.7%). The Continental and Maruípe health regions concentrated the highest number of appointments for causes B342 and B972 with 31.2% and 24.4%, respectively.

For these causes, 34.6% of the calls (4,133) referred to uses with one or more consultations; in these, classification of the last monitoring reported was 'better' (34.5%). However, 1,493 records failed to fill this variable (36,1%). The most frequent referral in the last monitoring was 'maintain follow-up in home isolation' (32.7%), and 1,537 records

(37.2%) lacked information on this variable. The most frequently generated documents in the last monitoring were prescriptions and laboratory test requests for COVID-19 (34.6%). However, in almost 21% (847) this variable was missing information.

In the municipality, the number of telemedicine consultations per 10,000 inhabitants considering all causes ranged from 35.86 consultations per 10,000 inhabitants between October and December 2020, to 65.75 between April and June 2020 (*table 4*)

Table 4. Telemedicine care for all causes and those classified with ICD-10 codes B342 and B972 per 10,000 inhabitants, quarter and health regions. Vitória, Espírito Santo, Brazil, from April 2020 to March 2021

	Telemedicine care per 10,000 inhabitants							
	2020						2021	
	April- June		July- Sept		Oct- Dec		Jan- March	
Health region*	All causes	B342 and B972	All causes	B342 and B972	All causes	B342 and B972	All causes	B342 and B972
1. Santo Antônio	106.12	40.61	114.28	43.47	72.04	26.43	86.53	42.86
2. Maruípe	95.64	47.66	73.64	38.22	42.89	26.72	49.03	31.71
3. São Pedro	65.48	35.66	33.01	19.29	15.40	10.71	18.85	14.16
4. Forte São João	52.75	24.84	45.85	27.80	26.97	20.02	24.48	16.75
5. Continental	51.25	25.06	48.67	31.02	36.77	25.75	35.99	21.53
6. Centro	56.50	33.20	46.13	28.89	32.03	22.95	34.36	24.81
Municipality of Vitória	**65.75**	**31.96**	**55.89**	**30.80**	**35.86**	**22.54**	**38.22**	**23.54**

Source: IBGE data (Population 2019, projections of the IBGE/2011 census)43 and Report 'Telemedicine - Performed Care' from Bem Estar Network, Municipality of Vitória, Espírito Santo[40].

All causes: Number of consultations per 10,000 inhabitants, calculated for the health regions and the municipality, using as numerator the quarterly averages of telemedicine care for all causes, and as denominator the number of resident inhabitants for 2020.

B342 and B972: Number of consultations per 10,000 inhabitants, calculated for the health regions and the municipality, using as numerator the quarterly averages of telemedicine care classified with ICD-10 codes: B342 (Coronavirus infection, unspecified site) and B972 (Coronavirus as the cause of diseases classified to other chapters) and as denominator, the number of inhabitants.

*Distribution presented refers to the user's UBS of origin according to the geographic coverage of the six health regions in the municipality of Vitoria:

Region 1 – Santo Antônio: 3 TS/UBS (Grande Vitória, Santo Antônio and Arivaldo Favalessa) and 9 neighborhoods.

Region 2 – Maruípe: 8 TS/UBS (Maruípe; Consolação; Da Penha; Bonfim; Andorinhas; Santa Marta; Tabuazeiro/São Cristovão; Itararé) and 16 neighborhoods.

Region 3 – São Pedro: 4 TS/UBS (Resistência; Ilha das Caieiras; Santo André; Conquista/Nova Palestina) and 10 neighborhoods.

Region 4 – Forte de São João: 5 TS/UBS (Forte São João; Ilha de Santa Maria; Jesus de Nazareth; Praia do Suá; Santa Luiza) and 19 neighborhoods.

Region 5 – Continental: 5 TS/UBS (Bairro República; Jabour; Maria Ortiz; Jardim da Penha e Jardim Camburi) and 14 neighborhoods.

Region 6 – Centro: 4 TS/UBS (Fonte Grande; Ilha do Príncipe; Avelina/Santa Tereza e Vitória) and 11 neighborhoods.

Differences between health regions ranged from 15.40 telemedicine consultations per 10,000 inhabitants in São Pedro from October to December 2020 to 114.28 in Santo Antônio from July to September 2020. In Vitória, the number of telemedicine consultations per 10,000 inhabitants considering only causes B342 and B972 ranged from 22.54 consultations per 10,000 inhabitants between October to December 2020 to 31.96 between April to

June 2020. Between health regions, variation was 10.71 telemedicine consultations per 10,000 inhabitants in São Pedro from October to December 2020 and 47.66 in Maruípe from April to June 2020.

Discussion

Our findings reflect the transformative impact COVID-19 had on telemedicine-oriented health care[12,14,25,28] as part of the first-line response systems[45] to the pandemic in Vitória, Espírito Santo, Brazil. As in other experiences, expansion of these services was limited to the COVID-19 scenario and not to their broader use within the health care system[10,12,25], despite its feasibility. Telemedicine and more specifically teleconsultation were the main tools used by the municipality to maintain the secure availability of services, enabling diagnosis, screening, treatment prescription and follow-up of confirmed and suspected COVID-19 cases, among others[10,25,26].

To ensure the necessary elements for 'availability'[38], the municipality designed a strategy to mobilize a team of physicians from different areas of the network for home office care, between 8 a.m. and 10 p.m. This allowed to adapt service provision to the pandemic context; make care schedules more flexible; ensure that services would be provided by qualified medical personnel; include in the care scale those professionals in the risk group for COVID-19; maintain the necessary staff in the UBS to perform on-site care for cases that required it, including the continuous care of non-COVID patients and protect UBS professionals and users, among others.

Although the distance between health services and users in eHealth does not constitute a barrier, other key elements are needed to ensure availability, which may or may not be required when care is performed face-to-face[11,46]: the physicians' digital literacy[11,21,46] to fill RBE data and perform care; have the necessary technological resources (telephone, computer, internet connection); staff training to improve its communication skills via phone; coordination between primary care and other user referral services; promotion of the emergency number 156 among vulnerable populations, among others.

Studies show that telemedicine interventions in PHC are low cost, feasible and accessible to health professionals and users[47]. They can generally result in cost savings and easier access to health-related information in real time (as in the case of the municipality of Vitória)[45,47]. Personalized telephone care of cases and subsequent follow-up allows to contain coronavirus dissemination, as well as a better use of human resources, especially in areas with scarce infrastructure or under circumstances of high stress for the health care team[27]. Besides, it reduces input consumption due to the reduced need for personal protective equipment, which can represent substantial savings when considered on a large scale[27].

Other aspects regarding 'financial viability'[38] in telemedicine includes possible improvements to health care accessibility, saving time and money for both users (specially those living in remote and less favored social territories) and the health system; possible interconsultation and sending diagnosis via internet to the assistant physician[26,48,49].

As in face-to-face care, user 'acceptability' is essential to ensure access to telemedicine; but this dimension remains largely neglected[44]. Acceptability and trust barriers can influence the behavior and interaction of health care users and providers, disproportionately affecting socially disadvantaged groups with lower digital literacy and less access to ICTs[11,21,38,44,46]. Vitória has a user satisfaction evaluation system, but there is no possibility of obtaining data by type of care. Evaluations made by telemedicine users are included in the total responses sent, which hindered extracting RBE data on telemedicine user acceptability.

Health information systems play a key role in data production on knowledge, attitudes and behaviors of health care professionals and users, as well as on the other dimensions of access in the face-to-face care and telemedicine[50]. Hence, integrating different data sources is fundamental[12,14], as is promoting a more comprehensive data ecosystem where information is included to monitor and evaluate care access and its different dimensions[50]. Despite some advances, the integration of the e-SUS PHC strategy systems with the municipalities own existing systems (such as RBE in Vitória) remain a challenge in Brazil.

RBE-generated data allows to evaluate primarily the availability dimension. Financial viability can only be analyzed with proxy variables not available in RBE reports. The municipality of Vitória has real-time data and it is possible to fill in data directly into the health record. For better RBE usability, however, we must invest in a culture of systematic data quality auditing, where completeness is key. Data integration on the care provided to the same user in the different modalities is still limited. This hinders knowing the access route followed by the user after consultation at emergency number 156, as well as following up on cases that were referred to telemedicine and whose data were filled out in another form. Countries that have advanced in producing information on health accessibility via telemedicine and eHealth and their impact on the pandemic show efforts in data integration[14,51].

Final considerations and challenges

Long-term inclusive digital health strategies can accelerate the implementation of effective public health responses to pandemics, as well as process changes needed for emergencies[11,14,46]. COVID-19 unveiled part of this untapped potential to some countries[10,12,27,45] and to several Brazilian municipalities and states[26], such as Vitória (ES), where strategies to include digital health into health care services were implemented at an unprecedented rate[12].

However, much of this potential remains little explored[11]. Among the main barriers[10,11] we highlight: limited digital literacy among the population (with greater gaps for the most vulnerable) and health professionals; tendency to suppress data if deficient; limited capacity of health information systems to integrate data from multiple sources; resistance of health users and services to new ways of working; digital security and associated costs; poor internet access and access to digital technologies in disadvantaged areas; reproduction, in virtual spaces, of face-to-face care inequalities; among others. WHO's 'Global Strategy on Digital Health 2020-2025'[21] and PAHO's 'Eight Guiding Principles of Digital Transformation of the Health Sector'[46], dictate the design of inclusive and sustainable public policies over time to overcome those barriers.

Among the challenges to improving health care accessibility via telemedicine and eHealth is the unraveling of obstacles and facilitators from the perspective of health professionals, managers, and users[25]. Investments are needed for integration of data from various sources and its usability, and for digital inclusion of the population and health professionals. As face-to-face access inequalities are reproduced in telemedicine access[51], it is essential to maintain a strong relationship between the health system, health teams, and users when implementing telemedicine[49]. Although the latter is considered an innovation, both care models remain interdependent and complementary in the quest to ensure equitable access to health care.

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Collaborators

Heredia-Martínez HL (0000-0002-4609-0481)* and Artmann E (0000-0002-8690-5964)* designed the article, collected, analyzed and interpreted the data, wrote and revised the article. Cruz SCS (0000-0002-5499-4405)* and Faria DCS (0000-0002-7408-1988)* collected data, discussed the results and approved the version to be published. ■

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