ORIGINAL ARTICLE

https://doi.org/10.1590/1806-9282.20220697

Teleconsultations in neurology in a universal health system amid COVID-19: a descriptive study

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SUMMARY

OBJECTIVE: This study aimed to characterize teleconsultations in neurology executed by Regula+Brasil project in Recife, a capital city in northeastern Brazil.

METHODS: A descriptive study carried out by four private hospitals, in a partnership with the Ministry of Health in Brazil. Teleconsultation was performed preferably in the video modality. Conditions eligible for teleconsultation were headache, epilepsy, and cerebrovascular disorders. Period of analysis was May to September 2020.

RESULTS: A total of 243 teleconsultations were analyzed, of which 76.95% was a first appointment. In 48.97% of cases, the teleconsultation represented the first opportunity for the patient to be consulted with the specialist. Among cases of first appointment, 20.16% were further referred to a face-to-face consultation and 21.81% could be redirected to primary health care. Headache disorders were the most predominant clinical conditions.

CONCLUSIONS: The implementation and development of telemedicine by Regula+Brasil during the COVID-19 pandemic represented an opportunity to assess the value of having teleconsultations added along the line of care from primary care to a medical specialty, promoting the coordination of care across different levels of complexity of care in the health system and improving access to specialized care.

KEYWORDS: Neurology. Referrals and consultation. Effective access to health services. Public Health.

INTRODUCTION

Brazil's unified health system (Sistema Único de Saúde, SUS) is one of the largest universal health systems worldwide[1]. Ever since its conception, primary health care (PHC) was designed to be the main form of access to the health services, to facilitate a structured and coordinated care[2]. Despite these efforts, there are still important gaps between primary and specialized care due to the fragmentation of health care networks and to the expressive demand for consultations in secondary and tertiary care, ultimately resulting in long waiting lists for many medical specialties, including neurology[3].

In 2020, the SARS-CoV-2 pandemic brought additional challenges to the referral of cases to specialized care, since consultations needed to be postponed or canceled as a strategy to promote social distancing or to relocate resources to manage the public health emergency imposed by the coronavirus, which made the access to secondary and tertiary care even more difficult to the general population[4,5]. Telemedicine was impressively catalyzed by COVID-19 as a viable alternative given the challenge of increasing access to health care while preventing agglomerations, especially after the unprecedented approval of telehealth in a wider context during the pandemic by the Brazilian Federal Government through publication of Federal Law no. 13.989 in April 15, 2020[6].

The Regula+Brasil project is a partnership between five Brazilian private hospitals and the Ministry of Health of Brazil aiming to improve the efficiency in the referral of cases from PHC to specialized care, by the employ of telehealth strategies, including the implementation of a protocol-oriented, centralized referral management system. To minimize the impact of the pandemic on the access of patients to specialized care, the project expanded its activities by initiating the offer of teleconsultations[7].

The aim of this study was to describe the characteristics of teleconsultations in neurology, carried out by the Regula+Brasil project as a contingency measure to the COVID-19 crisis, and to assess the proportion of averted face-to-face appointments.

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Conflicts of interest: the authors declare there is no conflicts of interest. Funding: Programa de Apoio ao Desenvolvimento Institucional do Sistema Único de Saúde (PROADI-SUS).
Received on June 27, 2022. Accepted on June 28, 2022.

METHODS

A descriptive study carried out by the Hospital Sírio-Libanês, Hospital Alemão Oswaldo Cruz, Hospital do Coração, and Hospital Moinhos de Vento, in a partnership with the Ministry of Health in Brazil. The study report was structured in a way to adhere to the Strengthening the Report of Observational Studies in Epidemiology (STROBE) Statement[8].

The teleconsultation activities were directed to patients living in Recife, a capital city in northeastern Brazil, who were allocated in waiting lists for face-to-face appointments with a neurologist. Conditions eligible for teleconsultation were headache, epilepsy, and cerebrovascular disorder (CVD). These criteria were defined based on the high prevalence of such cases in waiting lists and the current evidence regarding the possibility of proper management of these conditions through telehealth[9]. Other eligibility criteria were patients aged 18 years or older; preserved cognitive function or the availability of a companion during the teleconsultation; and willingness to be assisted by the employ of telemedicine.

During the appointment, the physician would request laboratory or imaging examinations and/or prescribe medication through an electronic prescription platform. Follow-up appointments were scheduled according to the clinical assessment by the neurologist. In case of possibility of proper follow-up in PHC after the measures taken during teleconsultation, the patient was then redirected to the PHC unit. For all urgent situations, referral would be made to the correspondent emergency department for continuity of care. Cases requiring face-to-face evaluation by a neurologist would be approved, and adjustment of the priority level on the SISREG platform was performed (Figure 1).

Data were extracted from the database of the Regula+Brasil project for the period comprised between May and September 2020. The unity of analysis was the teleconsultation rather than the individual. Variables extracted from the database included information on gender, age, education, type of the platform employed for teleconsultation, type of consultations (first or follow-up appointment), attachments to previously performed

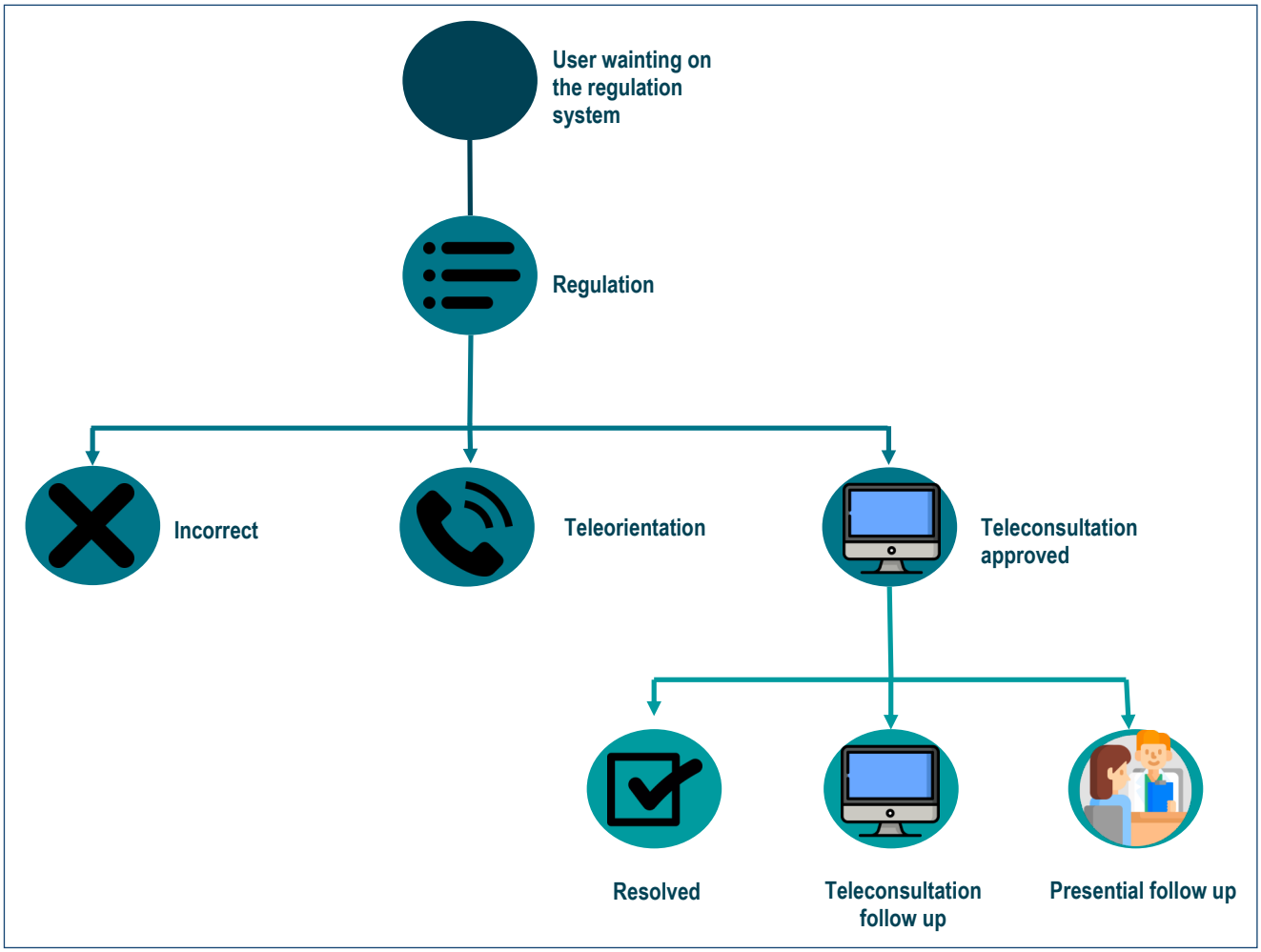

Figure 1. Neurology teleconsultation care process.

medical examinations, prescribed medications, requested medical tests, diagnosis, teleconsultation outcomes, previous consultations in neurology, and waiting time to the first consultation with a neurologist.

The study protocol was approved by the Institutional Research Ethics Committee of Hospital Sírio-Libanês, under the identifier CAAE 28453420.5.0000.5461, with waiver of informed consent.

RESULTS

A total of 243 teleconsultations were analyzed, of which 76.95% was a first appointment (Table 1). Mean age was 47 years (±18.31), 78.6% were female. Follow-up appointments were solicited in 57.2%. All patients accepted the teleconsultation after reading the consent form. If they do not agree, then patients would follow the municipal waiting list for neurology consultation. In most teleconsultations, a medical prescription was issued 69.54%, with medications for headache prophylaxis in 45.68%. In 48.97% of cases, the teleconsultation represented the first opportunity for the patient to be consulted with a neurologist. There was a neuroimaging request for 20.98% of cases, of which brain computed tomography corresponded to 68.62%. Laboratory tests were requested in 14.4%. Diagnosis of cases is presented in Table 2. Among the cases related to the first consultation, 20.16% were further referred to a face-to-face consultation and 21.81% could be followed up in PHC units (Table 3). The choice for the teleconsultation modality was made according to the availability of digital channels and the patient's preference. Among video teleconsultation, 10.65% were waiting list for in-person consultation with a neurologist and 18.93% could be followed up in PHC units.

The Net Promoter Score (NPS) is a methodology that uses research and classification tools to analyze the level of customer satisfaction and recommendation, and results above 90 demonstrate service promoters. Our NPS had a response rate of 22% and a result of 91[10].

DISCUSSION

To the best of our knowledge, this is the first study to address the characteristics of teleconsultations in neurology as part of a strategy to minimize the pent-up demand for specialized health care in SUS, as imposed by the COVID-19 pandemic. Our results demonstrate the importance of having implemented alternatives of care, since the median of waiting times until consultation was 270 days, and for 48.97% of cases, teleconsultation was the first access to a consultation with the neurologist.

Another important finding is the number of cases that could be redirected to PHC units after teleconsultation, without the need of face-to-face appointments with the specialist. Roughly

Table 1. Characteristics of teleconsultations.

Total*	n (%)
	243 (100)
Sex*	
Male	52 (21.40)
Female	191 (78.60)
Age (years)†	47.06 (±18,31)
Min–Max	16–107
Teleconsultation*	
First appointment	187 (76.95)
Follow-up appointment	56 (23.05)
Level of education*	
Illiterate	20 (8.23)
Elementary school	68 (27.98)
Secondary school	88 (36.21)
Higher education	22 (9.05)
No information	45 (18.52)
Teleconsultation follow-up plan*	
Yes	136 (55.97)
No	107 (44.03)
Number of medications in use*	
0	74 (30.45)
1	82 (33.74)
2	68 (27.98)
3	15 (6.17)
4	4 (1.65)
Modality of teleconsultation*	
Video	169 (69.55)
Telephone	74 (30.45)
Attachment of medical exams on the platform*	
Yes	16 (6.58)
No	227 (93.42)
Previous consultation with neurologist*	
Yes	77 (31.69)
SUS	61 (25.10)
Supplemental health care	15 (6.17)
No	119 (48.97)
No information	47 (19.34)

*Data are presented in absolute numbers and %. †Continuous variables without normal distribution are presented as medians and interquartile ranges.

Table 2. Variables.

Prescribed medications*	%
Amitriptyline	95 (26.69)
Anti-inflammatory	63 (17.7)
Analgesics	22 (6.18)
Prednisone	12 (3.37)
Propranolol	11 (3.09)
Fluoxetine	8 (2.24)
Others	70 (19.66)
None	75 (21.07)
Request for laboratory tests*	
No	208 (85.60)
Yes	35 (14.4)
Request for imaging tests*	
No	203 (83.54)
Yes	40 (16.46)
Imaging tests requested*	N 51 (100)
Computed tomography	35 (68.62)
Carotid and vertebral Doppler	5 (9.8)
Electroencephalogram (EEG)	5 (9.8)
Echocardiogram	2 (3.9)
Magnetic resonance	2 (3.9)
Computed tomography angiography	1 (1.9)
Electromyography (ENM)	1 (1.9)
Symptoms motivating teleconsultation (ICD-10)*	
Headache	187 (76.95)
Epilepsy	25 (10.28)
Stroke	24 (9.87)
Others	7 (2.88)
Diagnosis after consultation*	
Headache	178 (73.25)
Unspecified headache (CID R51)	126 (51.85)
Migraine (CID G43)	26 (10.70)
Tension-type headache (CID G44.2)	26 (10.70)
Epilepsy (CID G40)	18 (7.41)
Cerebrovascular disorder	16 (6.58)
Stroke, not specified as hemorrhage or infarction (CID I64)	9 (56.25)
Occlusion and stenosis of precerebral arteries (CID I65)	3 (18.75)
Transient ischemic attacks and related syndromes (CID G45)	3 (18.75)
Cerebral infarction (I63)	1 (6.25)
Syncope and collapse (CID R55)	4 (1.64)
Unspecified dementia (F03)	3 (1.23)
Others	24 (9.87)
Clinical decision*	
Follow up through teleconsultation	139 (57.20)
Follow up in PHC units	53 (21.81)
Waiting list for in-person consultation with a neurologist	47 (19.34)
Immediate in-person consultation	4 (1.65)
Waiting time for the neurologist's evaluation from the request by primary care to the date of teleconsultation (days)†	270 (±180)
Min-Max	5–750

*Data are presented in absolute numbers and %; †Continuous variables without normal distribution are presented as medians and interquartile ranges.

one-fifth of cases were deemed appropriate to be followed at the PHC unit, reducing the pressure on the in-person specialized service. Additionally, a minority of cases needed laboratory or imaging tests, which may be explained by the existence of previous results, or the possibility of managing the case based solely on the information provided by patients.

Among the conditions considered eligible for teleconsultation by neurologists in the project, the predominant condition in this series was headache (73.3% of cases), including migraine, tension-type, and nonspecified headache, followed by epilepsy and CVDs. This may explain the high predominance of females (78.6% of cases), since migraine and some other types of headache are more frequent among women[11]. The high frequency of headache cases among all health conditions imposing referrals to neurologists was reported by previous studies[7,11-13]. The profile of most prescribed medications could also be explained by the dominance of migraine cases. Most prescribed medications were prophylactic agents for chronic headaches, widely available in public health facilities, such as amitriptyline, as well as anti-inflammatory and analgesic agents.

Previous studies have also provided evidence of effectiveness of telemedicine for headache disorders, when compared to face-to-face consultations, as assessed by the Migraine Disability Assessment Score (MIDAS) and the Headache Impact Test (HIT-6)[14,15]. Furthermore, Muller et al. have estimated that the proportion between cases of missed secondary headache and total number of teleconsultations would be 1:20,000[15]. Kristoffersen reported that, during the COVID-19 pandemic in Denmark and Norway, there was a reduction in referrals due to headache and a shift to teleconsultation[16].

The literature has also demonstrated evidence supporting the successful use of telemedicine for patients with epilepsy[17-19], the second most prevalent condition in our series. Follow-up outpatient epilepsy visits rely characteristically on phenomenological interview, adherence, and counseling rather than physical examination[19]. In a study comparing telemedicine with face-to-face consultation, no differences were observed in relation to the number of seizures, emergency visits, or hospitalizations[17,19]. However, acceptability of telemedicine and its role in this context still need to be further explored, since a previous study suggests that patients presenting epilepsy may consider telemedicine a complementary service rather than a substitute for face-to-face consultation[20].

Finally, stroke was the reason for teleconsultation in 6.6% of cases. Although there are many studies assessing the role of telemedicine in the management of acute stroke[21-23], there are relatively fewer studies on the use of telemedicine in outpatients after stroke. Most of these studies suggest that telemedicine

Table 3. Teleconsultation outcomes.

n (total)	Video (n%)	Telephone (n%)
	169 (69.55)	74 (30.45)
Diagnosis after consultation*		
Headache		
Unspecified headache (CID R51)	87 (51.5)	39 (52.70)
Migraine (CID G43)	20 (11.83)	6 (8.10)
Tension-type headache (CID G44.2)	20 (11.83)	6 (8.10)
Epilepsy (CID G40)	11 (6.5)	7 (9.45)
Cerebrovascular disorder		
Stroke, not specified as hemorrhage or infarction (CID I64)	6 (3.55)	3 (4.05)
Occlusion and stenosis of precerebral arteries (CID I65)	2 (1.18)	1 (1.35)
Transient ischemic attacks and related syndromes (CID G45)	2 (1.18)	1 (1.35)
Cerebral infarction (I63)	1 (0.6)	0
Syncope and collapse (CID R55)	4 (2.36)	0
Unspecified dementia (F03)	1 (0.6)	2 (2.70)
Others	15 (8.87)	9 (12.16)
Clinical decision*		
Follow up through teleconsultation	118(69.82)	21 (28.37)
Follow up in PHC units	32 (18.93)	21 (28.37)
Waiting list for in-person consultation with a neurologist	18 (10.65)	29 (39.2)
Immediate in-person consultation	1 (0.59)	3 (4.05)

*Data are presented in absolute numbers and %.

may play a role in the improvement of care by, for example, improving the titration of anticoagulants and the management of modifiable risk factors[24,25].

Our results related to averted referral cases are also consistent with the one from a previous study. Constanzo et al., carried out in Chile, a teleneurology program has been showed to reduce the number of patients waiting for first appointments with a neurologist, as well as the waiting time from the referral made by PHC units and the consultation with a specialist[12].

Our data suggest a contribution of telemedicine to the reduction in the number of patients waiting for the first appointment with the neurologist, as well as the reduction in waiting times to specialized care, an important aspect in contexts with high demand and relatively limited resources, as it is the case in Brazil. A significant proportion of cases could be managed by specialists through telemedicine and redirected to PHC units, averting unnecessary face-to-face appointments, and helping the prioritization of cases that really needs in-person care.

Limitations

First, cases were selected based on predefined eligibility criteria, which makes results not generalizable to neurologic conditions that were not considered for inclusion in the study. Second, despite the efforts to provide a stable platform for video teleconsultation, almost 30% of consultations were carried out via phone, which is far from ideal for initial assessment of neurological patients. Therefore, technological access should be considered a barrier for the access to video teleconsultation in Brazil.

Our study did not assess the effectiveness of telemedicine since we did not assess clinical outcomes. Future studies are still needed to assess not only the acceptability and preferences of patients regarding telemedicine in this context but also the impact of telemedicine on health outcomes.

CONCLUSIONS

The implementation and development of telemedicine by Regula+Brasil during the COVID-19 pandemic represented an opportunity to assess the value of having teleconsultations added along the line of care from primary care to a medical specialty, promoting the coordination of care across different levels of complexity of care in the health system and improving access to specialized care.

AUTHORS' CONTRIBUTIONS

ERSA: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **DLGR:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **CEAB:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **JB:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **SDG:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **KYK:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **DVP:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **SS:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **SCIS:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **CEM:** Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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