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Research Article

Medical justifications for telecardiology in primary health care in Joinville, Brazil

Justificativas médicas para as teleconsultorias em cardiologia na atenção primária à saúde em Joinville (SC)

Justificaciones médicas para teleconsultas en cardiología generada en la atención primaria de salud en Joinville/SC

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Abstract

Introduction: It is essential to properly understand the main signs and symptoms, complementary tests, and therapy most commonly used in cardiology by physicians who work in the gateway to the healthcare system to ensure problem-solving care in most cases, thus avoiding unnecessary referrals to secondary health care and, consequently, overloading the healthcare system. In cardiology, some situations demand rapid diagnosis and treatment, in order to avoid damages that include serious sequelae and death of the patient, which justify care in emergency room. In other cases, the specialist's evaluation can contribute to diagnosis, indication of the most appropriate complementary tests, a differentiated therapy and, mainly, the confirmation of the measures taken by primary health care physicians. However, for various reasons, including insecurity, there is an excess of referrals to specialists. **Objective:** In this study we aim to identify the main gaps related to cardiology in primary health care that contribute to or result in unnecessary referrals to cardiologists. **Methods:** This is a descriptive research on the database of 588 telecardiology sessions of Health Centers of primary health care in Joinville (state of Santa Catarina), Brazil, carried out from January 2020 to March 2021. The need for specialized face-to-face care for patients was evaluated by analyzing the cases. **Results:** A total of 74.15% cases could be resolved in primary health care. In addition, we identified that the main doubts of the primary health care physicians were related to alterations in signs and symptoms, followed by doubts about heart diseases and results of complementary tests. Other consulting sessions addressed questions about noncardiac diseases, medications, and inquiries that did not fit into any of the previous categories. **Conclusions:** Teleconsulting can avoid a significant number of unnecessary referrals, preventing specialist's overload. Likewise, it can contribute to guidance to other professionals that enable the solution of these and future cases in primary health care.

Keywords: Telecardiology; Primary Health Care; Referral and consultation; Cardiovascular diseases.

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Resumo

Introdução: É imprescindível a compreensão adequada dos principais sinais e sintomas, dos exames complementares e da terapêutica mais comumente utilizados na cardiologia pelos médicos que atendem a porta de entrada do sistema de saúde a fim de garantir atendimento resolutivo na maioria dos casos, evitando assim encaminhamentos desnecessários à atenção secundária à saúde e, consequentemente, sobrecarga do sistema de saúde. Na cardiologia, algumas situações demandam diagnóstico e terapêutica rápidos, visando evitar prejuízos que incluem sequelas graves e o óbito do paciente, as quais justificam atendimento em unidades de pronto atendimento ou pronto-socorro. Em outros casos, a avaliação do especialista pode contribuir com o diagnóstico, a indicação dos exames complementares mais adequados, terapêutica diferenciada e, principalmente, com a confirmação das medidas tomadas pelo médico da Atenção Primária à Saúde (APS). Todavia, por diversos motivos, entre os quais a insegurança, ocorre um excesso de encaminhamentos ao especialista. **Objetivo:** Este trabalho busca identificar as principais lacunas relacionadas à cardiologia na atenção primária à saúde que contribuem ou geram encaminhamentos desnecessários ao cardiologista. **Métodos:** Trata-se de um estudo descritivo a partir do banco de dados das 588 teleconsultorias em cardiologia das Unidades Básicas de Saúde da APS de Joinville/SC realizadas no período de janeiro de 2020 até março de 2021. O estudo compreendeu todo o período. Mediante a análise dos casos, foi avaliada a necessidade de atendimento presencial especializado aos pacientes. **Resultados:** Considerou-se que em 74,15% dos casos seria possível a sua resolutividade na APS. Ademais, foi possível identificar que as principais dúvidas dos médicos da APS estavam relacionadas com alterações de sinais e sintomas, seguidas por questionamentos sobre doenças cardíacas e resultados de exames complementares. Outras consultorias abordavam questões sobre doenças não cardíacas, medicamentos e indagações não enquadradas em nenhuma das categorias anteriores. **Conclusões:** A teleconsultoria pode evitar uma quantidade significativa de encaminhamentos desnecessários, prevenindo sobrecarga do especialista. Simultaneamente, pode contribuir com orientações aos demais profissionais que possibilitem a solução destes e de futuros casos na APS.

Palavras-chave: Telecardiologia; Atenção Primária à Saúde; Encaminhamento e consulta; Doenças cardiovasculares.

Resumen

Introducción: El conocimiento adecuado de los principales signos y síntomas, exámenes complementarios y terapias más utilizadas en cardiología por parte de los médicos que actúan en la puerta de entrada del sistema de salud es fundamental para garantizar una atención resolutiva en la mayoría de los casos, evitando derivaciones innecesarias a la atención secundaria de salud y, en consecuencia, sobrecarga del sistema de salud. En cardiología, algunas situaciones exigen diagnóstico y terapia rápidos, a fin de evitar daños que incluyen secuelas graves o la muerte del paciente, que justifican la atención en las salas de emergencias. En otros casos, la evaluación del especialista puede contribuir al diagnóstico, indicación de las pruebas complementarias más adecuadas, una terapia diferenciada y, principalmente, la confirmación de las medidas tomadas por el médico de la atención primaria de salud. Sin embargo, por diversas razones, entre ellas la inseguridad, existe un exceso de derivaciones a especialistas. **Objetivo:** Este estudio busca identificar las principales brechas relacionadas con la cardiología en la atención primaria de salud que contribuyen o generan derivaciones innecesarias a los cardiólogos. **Métodos:** Se trata de un estudio descriptivo de la base de datos de 588 teleconsultas en cardiología en centros de atención primaria de la atención primaria de salud de Joinville/SC realizadas entre enero de 2020 y marzo de 2021. A través del análisis de los casos se evaluó la necesidad de atención presencial especializada de los pacientes. **Resultados:** Se consideró que en el 74,15% de los casos sería posible resolverlo en la atención primaria de salud. Además, fue posible identificar que las principales dudas de los médicos de la atención primaria de salud estaban relacionadas con las variaciones de los signos y síntomas, seguidas de las dudas sobre enfermedades del corazón y resultados de exámenes complementarios. Otras consultorías atendieron dudas sobre enfermedades no cardíacas, medicamentos y consultas que no encajaban en ninguna de las categorías anteriores. **Conclusiones:** La teleconsulta puede evitar una cantidad importante de derivaciones innecesarias, previniendo la sobrecarga de especialistas. Al mismo tiempo, puede contribuir con orientación a otros profesionales que viabilicen la solución de estos y futuros casos en la atención primaria de salud.

Palabras clave: Telecardiología; Atención Primaria de Salud; Derivación y consulta; Enfermedades cardiovasculares.

INTRODUCTION

Primary Health Care (PHC) is the users' gateway to the health system. It is important for this service to be problem-solving in most cases, thus avoiding unnecessary referrals to Secondary Health Care and, consequently, overloading the Health System. Therefore, it is paramount to properly understand the main signs and symptoms, complementary tests, and therapy most commonly used in specialties by physicians who work in the gateway to the Health System. In cardiology, it is worth highlighting that some situations involving cardiac arrhythmias, acute heart failure, and acute ischemic diseases require rapid diagnosis and treatment to avoid damages that include serious sequelae and

death of the patient. Conversely, alterations in complementary tests may be insignificant or caused by extracardiac abnormalities, and the correct interpretation of data on the anamnesis and physical examination of the patients is indispensable in PHC. Adequate knowledge, associated with correct conduct, serves both for the management of heart diseases and to avoid unnecessary procedures and iatrogenesis.

Possible damages to the patient and PHC due to lack of knowledge of interpretation of signs and symptoms, drugs used, interpretation of the electrocardiogram (ECG) and other tests can be a major problem. It is notorious that such a gap in knowledge produces excess referrals of patients to services of the public and private systems. This results in queues, delays in the provision of care, iatrogenesis to patients, and costs to the system. Referrals often result from physiological alterations in the tests due to age; physical type; athletic activity; alterations produced by chest wall deformities, diseases of the lungs, thyroid, and other organs; and findings deemed insignificant or without clinical repercussions, such as ECG with ectopic beats, conduction disturbances in the HIS bundles, and nonspecific changes in ventricular repolarization — or even cardiovascular abnormalities of less complexity and risk, which could be resolved with PHC.

Telemedicine is the use of information and communication technology to exchange medical information remotely, offering remote healthcare services. It is a tool that can be broken down into: teleconsulting, which consists in consultations carried out between professionals through telecommunication to clarify doubts; telediagnosis, which is the evaluation of complementary tests, allowing more agile treatment to users of the system; telemonitoring of patients' health parameters; teleregulation, which are regulatory systems for evaluating adequate responses to existing demands, ensuring equity and facilitating access to healthcare services; and tele-education, with educational content aimed at improving professional training. Therefore, the technology can be used for teleconsultations (physician-patient appointments) and for teleconsulting sessions (consultations between physicians and other healthcare professionals), integrating important points for the diagnosis and treatment of diseases.[1-3]

Teleconsulting, regulated by the Brazil Networks National Telehealth Program (*Programa Nacional Telessaúde Brasil Redes*), in addition to being an ongoing education strategy, can prevent unnecessary referrals in the short and long term.[4-6] Thus, it enables the integration of family health teams to university reference centers, promoting a better political, operational, methodological, and practical problem-solving capacity in the face of the encountered difficulties. Telehealth provides the exchange of knowledge and clinical data among healthcare providers, assisting in the decisions of professionals in medium-complexity health centers located in the outskirts, with the support of university centers of high complexity, avoiding unnecessary transfers of patients to these centers.[7] Hence, the patient's situation can be better established and directed to the correct specialty if it is not resolved in PHC, with the possibility of obtaining diagnosis and treatment more quickly, avoiding iatrogenesis.[8]

Taking this into consideration, telemedicine assists in creating a large-scale organizational axis that aims to expand access, provide a quality service, and optimize human and financial resources.[9] In addition, digital health interventions can be used to guide the implementation and evaluation of conducts in clinical practice environments.[10] In this context, it is a fact that telemedicine, by using information and communication technologies, can be a great tool to expand the coverage area of care; ensure the exchange of information on diagnosis, treatment, and prevention of diseases; and ensure continuing education for PHC professionals.[1] Thus, in case professionals opt for referral, they will do so to share decisions and the best care for the patient.[11] Furthermore, ensuring patient safety

and improving health care are the essence of what newly trained professionals should be able to do after graduation.[12]

In clinical practice, we notice that healthcare professionals enter the labor market with many doubts and insecurity concerning their actions, resulting in excessive requests for complementary tests and unnecessary referrals to specialists. Within this context, physicians feel more confident when having access to reliable local opinion leaders, such as specialists in certain medical areas, who communicate with them and serve as a model and support to assist in evidence and improvements in clinical practice, promoting a decision more appropriate to the patient's demand.[13]

Unnecessary referrals to secondary care, due to situations that could be resolved in Health Centers (*Unidades Básicas de Saúde* – UBS), can be reduced since the beginning of the physician-patient relationship, with qualified auscultation, thorough anamnesis, and physical examination, which can provide or facilitate diagnosis and indicate the best conduct. If there are any doubts, teleconsulting is advised before referring the patient to the specialist or requesting extensive complementary tests. Thus, it reduces the patient's wait to have their health problem resolved.[14]

Medical teleconsulting is of great value both to relieve health services, improving access to medical care, and to reduce public expenses and that of patients — who, to avoid prolonged waits, pay for appointments and tests. However, we ratify that the provision of remote service by a specialist does not replace the in-person physician-patient relationship, anamnesis, and physical examination. Teleconsulting aims at the advice and monitoring of a specialist to the UBS physician, when this professional has doubts about the diagnostic or therapeutic management.[8] Taking this into consideration, and given that cardiovascular diseases are the main cause of death in Brazil,[15] we can use telemedicine for a faster treatment of patients with life-threatening diseases and reduce unnecessary referrals to cardiologists or hospitals.[16]

In this article we present the main justifications that resulted in referrals and telecardiology and that, after analysis, allowed the teleconsultant to select and include patients in two groups: the group in which care would be guided and shared between the teleconsultant and PHC, and the group with initial care guidance and referred to in-person specialized consultation.

Correlating with this research, the provision of telecardiology to PHC physicians during the period of the new coronavirus (COVID-19) pandemic was of fundamental importance as, in addition to sharing the conduct of care with colleagues, it ensured the reduction of the number of visits to specialists and hospitals and the consequent exposure to the SARS-CoV-2 virus. Moreover, researchers show that most patients infected with the virus had cardiovascular diseases or cardiovascular risk factors (advanced age, obesity, hypertension, and diabetes). This population required health care and hospitalization the most, in addition to being the most at risk of death from COVID-19.[17] Thus, teleconsulting contributed to reducing the overcrowding of physical public health sites, reducing cases of transmission and contamination by the virus.[18]

Joinville, the largest city in the state of Santa Catarina (SC), the third most populous in the southern region of the country, had 597,658 inhabitants in 2019. The organizational structure of municipal public health includes a primary health care network composed of 58 Family Health Centers (*Unidades Básicas de Saúde da Família* – UBSF), in which there are 160 teams qualified for the Family Health Strategy (FHS), with an estimated coverage of 92% of the municipality. In this context, teleconsulting allows the expansion and improvement of the service network and the interaction of PHC with other levels of care. By establishing a health education process and a

shared care management model among professionals, it is possible to increase the problem-solving capacity of PHC.[19,20]

Teleconsulting was not mandatory in the study period — between 2020 and 2021 —; however, all referrals to the specialist were necessarily forwarded to the Regulation Unit of the Municipal Health Department (*Secretaria Municipal da Saúde* – SMS). The Regulation recommended the use of teleconsulting and, by working together, authorized the performance of complementary tests recommended by the teleconsultant. The waiting list for cardiology consultations, in the order of thousands of patients, exceeded the capacity for specialized care, being organized into three priority levels, in which those included in the third level waited up to four years to see the specialist. In 2020, according to data provided by the Regulation Unit of the Department of Health (*Secretaria da Saúde* – SES) of the municipality of Joinville (SC), responsible for managing municipal access and care flows, 1,867 initial cardiology consultations were scheduled. In January 2021, there were 4,949 patients in the queue for the first consultation in the specialty and, in the same year, 3,634 consultations were scheduled, with 1,315 patients remaining in the queue. In August 2022, the queue grew to 2,605 patients, and in 2022, 2,165 first cardiology consultations were scheduled, reducing the queue to 440 patients.[19,20]

Although it was not compulsory, teleconsulting contributed to the reduction of queues, as indicated by our results and the satisfaction responses of users, satisfied and very satisfied with the provision of the service. In 2020, the monthly average number of accesses to Telehealth was 249. Municipal management aimed to improve continuous awareness of the use of teleconsulting and telediagnosis tools, including elective training offered to professionals. Subsequently, in the following year (2021), 1,431 PHC professionals accessed these tools at least once a month.[19,20]

METHODS

This is a descriptive study on the database of the 588 teleconsulting sessions of the UBSF of the PHC of Joinville (SC) to the teleconsultant cardiologist of the SMS from January 2020 to March 2021. The telecardiology sessions carried out in the period described in the municipality of Joinville were included in their entirety in the performed analysis. Therefore, there are no exclusion criteria applied in the study.

The reasons for teleconsulting were classified into six large groups for the analysis. Thus, each teleconsulting session was classified into one of the following categories: alteration in complementary tests, heart diseases, noncardiac diseases, alterations in signs and symptoms, medications, and others. The analyses were performed based on these classifications, quantifying the indications for referral to the cardiologist and according to the year of the consulting. It is noteworthy that the category “alterations in signs and symptoms” included any signs or symptoms related to the cardiovascular system in which the PHC physician had questions about the best management of the case and requested assistance from the cardiologist of the teleconsulting for conduct, management, and the need or not to refer the patient to Secondary Care. In this group, patients with a previous diagnosis of any cardiovascular disease or not who present a new symptom or exacerbation of an existing symptom were included; and patients with some sign of cardiac alteration who required the specialist’s consultation. Within this context, the Brazilian Ministry of Health indicates the referral of PHC to the cardiologist in the following cases presented in Chart 1.[11]

Chart 1. Clinical conditions with indication of referral to the cardiologist according to guidelines from the Ministry of Health.

Ischemic Heart Disease	Patient in need of risk stratification after an acute event; Patient still symptomatic, under pharmacological clinical treatment or when there is no possibility of starting drug treatment due to adverse effect or contraindication; Cases of suspected ischemic heart disease, without the possibility of performing noninvasive examinations or indication for cardiac catheterization.
Heart failure	Patients under pharmacological clinical treatment using angiotensin-converting enzyme inhibitor, beta-blocker, and diuretic, NYHA functional class III and IV; Patient with an episode of hospitalization due to decompensated heart failure in the last year; Patient with suspected heart failure without the possibility of investigation with echocardiography.
Arrhythmias	Case of symptomatic or asymptomatic sinus bradycardia with heart rate less than 45 bpm; Case of bifascicular block; Case of symptomatic or recurrent supraventricular tachycardia, without response to treatment; Case of atrial fibrillation with the possibility of cardioversion; Investigation of recurrent palpitations of unknown origin; Other tachyarrhythmias or potentially serious alterations in cardiac conduction.
Syncope or transient loss of consciousness	Case of syncope associated with signs and symptoms of probable cardiac origin; Case of syncope in a patient with alteration in the electrocardiogram; Case of syncope in a patient with established heart disease; Case of syncope/presyncope of unknown origin; Case of syncope in a patient with family history of sudden death before the age of 40.
Systemic Arterial Hypertension	Patient with poorly controlled hypertension with at least three full-dose antihypertensive medications; Cases of suspected secondary hypertension;
Valvular heart disease	All patients with moderate/severe valvular heart disease; Symptomatic patient with any valvular heart disease detected on echocardiography.

Source: adapted from the Brazilian Ministry of Health and Universidade Federal do Rio Grande do Sul.[11]

Research ethical issues

As this is a research project involving human beings, the research proposal was submitted to and approved by the Research Ethics Committee (REC) of the Universidade da Região de Joinville (UNIVILLE) after obtaining the consent letter from the UNIVILLE University Outpatient Clinic. The Informed Consent Form was not necessary, and its waiver was provided and approved by the REC via *Plataforma Brasil* (a national and unified database of research involving human beings), through opinion number 5.147.596. The research presented minimal risks to the participants, as the collected data were objective, already existing in the database of the entity responsible for providing care. The privacy of the 588 teleconsulting sessions, soliciting professionals, and patients included in the study period will be guaranteed in the dissemination of the results as well as the anonymity of the professionals and health centers submitting the requests. The Certificate of Presentation for Ethical Consideration (CAAE), approved by the Ethics Committee of UNIVILLE (5366) via *Plataforma Brasil*, for this research was 51991421.6.0000.5366.

RESULTS

When analyzing the 588 teleconsulting sessions, whose results are presented in Table 1, we identified 452 teleconsulting sessions carried out in 2020 and 136 in 2021. In 2020, 112 (24.78%) referrals to the specialist were recommended and carried out, and the other patients were recommended to maintain exclusive care in PHC. In January and February 2021, 40 (29.41%) patients were referred to the specialist, totaling 152 referrals from January 2020 to March 2021.

Table 1. Teleconsulting sessions.

	Number of teleconsulting sessions	Referrals to the specialist	Percentage of referrals	Cases WITHOUT referral indication	Percentage of those NOT referred
Teleconsulting sessions in 2020	452	112	24.78%	340	75.22%
Teleconsulting sessions in 2021	136	40	29.41%	96	70.59%
Total teleconsulting sessions	**588**	**152**	**25.85%**	**436**	**74.15%**

Source: prepared by the authors (2023).

According to the classification of the reasons for the teleconsulting sessions of UBS physicians (Table 2), 219 cases (37.24%) were justified by alterations in signs and symptoms and, of these, 179 cases (30.44%) did not meet the criteria for specialized face-to-face care. Other 182 consulting sessions (30.95%) were due to heart diseases, of which 104 (17.69%) did not meet the criteria for referral to Secondary Care. In addition, 80 cases (13.61%) were due to alterations in complementary imaging tests and, of these, 73 cases (12.41%) did not qualify for referral to the specialist. Conversely, 52 cases (8.84%) were due to noncardiac diseases, with 43 cases (7.31%) that did not justify referral to the cardiologist.

Furthermore, 32 patients (5.44%) sought care at UBS because they did not fit into any of the five categories. Of these, 18 cases (3.06%) had no indication for referral, remaining 14 cases (2.38%) that were referred to the specialist. Finally, 23 cases (3.91%) were due to medications, and 18 of them (3.06%) did not require referral to the specialist.

DISCUSSION

After categorization, we verified that, in 2020, more than one third (37.61%) of doubts that motivated teleconsulting with the cardiologist were related to signs and symptoms such as chest pain, dyspnea, and syncope. Another third (33.19%) corresponded to heart diseases, and the other categories were less expressive. However, referrals to the cardiologist mostly corresponded to teleconsulting for heart diseases (14.38%), whereas only 5.97% of the total motivated by signs and symptoms were indicated. In this sense, we observed that many patients in the group of nonspecific alterations in signs and symptoms would enter the cardiology queue if teleconsulting was not offered. The cardiologist analyzed that many requests attributed to signs and symptoms could be resolved by the general practitioner at the UBS. Moreover, in 2020, 76.19% of doubts about drugs were resolved by teleconsulting, reducing the demand for face-to-face consultations.

In 2021, similar results were observed, and even though the greatest demand was motivated by signs and symptoms, the category that generated the most indication for specialized consultation

Table 2. Classification according to the reason for teleconsulting.

	Reason for teleconsulting	Alteration in complementary tests	Heart diseases	Noncardiac diseases	Alterations in signs and symptoms	Medications	Other	TOTAL
2020	Absolute values	57	150	41	170	21	13	452
	Percentage values	12.61%	33.19%	9.07%	37.61%	4.65%	2.88%	100%
	Referrals to the specialist	5	65	6	27	5	4	112
	Percentage of referrals in relation to total values	1.11%	14.38%	1.33%	5.97%	1.11%	0.88%	24.78%
	Percentage of referrals in relation to referrals	4.46%	58.04%	5.36%	24.11%	4.46%	3.57%	100%
	Cases WITHOUT referral indication	52	85	35	142	16	9	339
	Percentage of those NOT referred in relation to total values	11.50%	18.81%	7.74%	31.42%	3.54%	1.99%	75%
	Percentage of those NOT referred in relation to those not referred	15.34%	25.07%	10.32%	41.89%	4.72%	2.65%	100%
2021	Absolute values	23	32	11	49	2	19	136
	Percentage values	16.91%	23.53%	8.09%	36.03%	1.47%	13.97%	100%
	Referrals to the specialist	2	13	3	12	0	10	40
	Percentage of referrals in relation to total values	1.47%	9.56%	2.21%	8.82%	0.00%	7.35%	29.41%
	Percentage of referrals in relation to referrals	5%	32.50%	7.50%	30%	0%	25%	100%
	Cases WITHOUT referral indication	21	19	8	37	2	9	96
	Percentage of those NOT referred in relation to total values	15.44%	13.97%	5.88%	27.21%	1.47%	6.62%	70.59%
	Percentage of those NOT referred in relation to those not referred	21.88%	19.79%	8.33%	38.54%	2.08%	9.38%	100%
Total	Absolute values	80	182	52	219	23	32	588
	Percentage values	13.61%	30.95%	8.84%	37.24%	3.91%	5.44%	100%
	Referrals to the specialist	7	78	9	39	5	14	152
	Percentage of referrals in relation to total values	1.19%	13.27%	1.53%	6.63%	0.85%	2.38%	25.85%
	Percentage of referrals in relation to referrals	4.61%	51.32%	5.92%	25.66%	3.29%	9.21%	100%
	Cases WITHOUT referral indication	73	104	43	179	18	18	435
	Percentage of those NOT referred in relation to total values	12.41%	17.69%	7.31%	30.44%	3.06%	3.06%	73.98%
	Percentage of those NOT referred in relation to those not referred	16.78%	23.91%	9.89%	41.15%	4.14%	4.14%	100%

Source: prepared by the authors (2023).

was heart diseases. In addition, in this period, all doubts regarding medications were resolved in the consulting. In this context, alterations in complementary tests and noncardiac diseases were mostly remedied online.

The Centro de Telessaúde de Santa Catarina [Santa Catarina Telehealth Center], in partnership with the Regulation of the Municipal Health Department of Joinville, implemented a pilot project that made teleconsulting mandatory before referral to Secondary Care (endocrinology and orthopedics), leading to an exponential increase in its use as of 2015. The number of people in the queue and the waiting time for the first appointment became practically nil after six months of mandatory implementation. About 40% of cases were resolved exclusively in PHC.[21]

Furthermore, with the present study, we can perceive how important telemedicine is for the Public Health System. Other researchers corroborate this fact, considering that telecardiology has been used in other countries, such as Mexico and Spain, as a tool to improve the reach of healthcare services. In Brazil, the telecardiology system presented a low cost for small cities, with significant improvement in the quality of care and cost reduction for the Brazilian Unified Health System (SUS). The service provides subsidies for decision-making in PHC, training and managing teams. In Mexico, it reduces the time of diagnosis and treatment; in Spain, it reduces the distance between professionals and users, promotes continuing education, improves the monitoring of chronic patients, increases patient admission, and reduces morbidity and mortality.[22]

In the state of Pará, Brazil, the Brazil Networks Telehealth Program has all municipalities registered on the platform, in which a physician who serves distant regions in small cities can, via teleconsulting, describe clinical cases with photographs and reports and, within 72 hours, a remote specialist clarifies doubts and assists in planning the conduct while this patient awaits a face-to-face consultation. In this study, the main reason for teleconsulting by PHC physicians concerned pharmacological treatment. We verified that 76.9% of the appointments were problem-solving in PHC itself, without the need for referral. Moreover, in the professional assessment regarding satisfaction with the response of teleconsulting sessions, 53.4% were evaluated as “very satisfied,” followed by 38.3% of the responses evaluated as “satisfied.”[23] Accordingly, in our research we obtained a similar percentage: 76.19% of doubts about medications were resolved with the teleconsultant.

In Betim (state of Minas Gerais, Brazil), it was concluded that teleconsulting services were of great value to UBS physicians. However, while the teleconsultants considered that 73.9% of the patients could be treated in PHC, for the UBS physicians the percentage would be less than 45%.[24] We found similar results, and 74.15% of the patients maintained exclusive follow-up in PHC. Without telemedicine available, most of these referrals would probably have overburdened the system.

The advance of telemedicine has created alternatives to assist patients in improving quality of life and reducing hospitalizations, promoting self-care strategies capable of identifying signs of disease decompensation and providing early and effective interventions to optimize the treatment. Authors of some studies on the effectiveness of telemonitoring have shown a reduction in hospitalizations and mortality from several causes, including heart disease.[25]

Conversely, the Espírito Santo Telehealth Program (*Programa Telessaúde Espírito Santo*) identified a difficulty for healthcare professionals in adapting to technology tools. The incorporation of information technologies in the daily life of healthcare services is still a complex and dynamic process, being little explored. Moreover, only after the availability of regional seminars — seeking to raise awareness and instigate the use of telehealth tools by professionals — there was progress in their

use and a higher rate of use of asynchronous consultancies. The use of technologies also depends on the familiarity of professionals with technological tools and their judgment regarding the potential of the service in qualifying health care. It is paramount that managers invest in improving the structure and integration of services, training professionals to use technologies in favor of their work and promoting their acceptance. Thus, amid structural precariousness, work overload, and lack of computerization, as is the case with Brazilian PHC, it is expected that the acceptance and use of these technologies by healthcare professionals is hampered.[26]

The telecardiology in Joinville presents several fundamental medical justifications to improve cardiovascular care at the primary care level. This technology has been showing to be highly beneficial in the interaction between PHC and Specialized Care, providing significant ongoing education for the professionals involved. In addition, the approach is innovative in reducing access barriers, optimizing care and improving continuing medical education, providing benefits for patients and the healthcare professionals involved.[5]

Our study is limited for being carried out in a large city and including a limited number of teleconsultations. It is likely that in smaller cities, where the population has less access to specialized services, the results differ from our reality.

Although telemedicine is widespread and is implemented as an auxiliary service for the health of the population, there are still few analytical scientific studies and a small number of professionals dedicated to analyzing its influence on PHC. The city of Joinville, for example, has a pilot project of medical teleconsulting through video calls and nursing teleconsultations for UBS users.[27] Nevertheless, these services must have an information database to generate quantitative and qualitative research. Taking this into consideration, there are challenges for the implementation and effectiveness of telemedicine as a necessary technology for the expansion and improvement of health care, including cultural aspects, with regard to the traditional view of the practice of medicine; barriers related to the administrative difficulty in reconfiguring the care system; lack of technological infrastructure in remote regions; physician-patient confidentiality; insufficient normative instructions, protocols, laws; lack of standardization of the implementation methodology, among several other nonexistent, limited, or outdated resources.

CONCLUSION

The telecardiology made available in Joinville (SC) in the study period (2020–2021) allowed carrying out continuing education and confirmed the possibility of reducing unnecessary referral to Secondary Health Care, as more than half of the discussed cases could be completely addressed at the UBS. However, the refusal of referral does not guarantee that it will not happen, considering that some PHC physicians would disagree with and maintain the request for specialized consultation. We noticed that the percentages of questions did not significantly vary between the analyzed years, suggesting the need to add continuing education in other ways such as Matrix Support. The joint work of Matrix Regulation and Support has already demonstrated its effectiveness, and can be enhanced by telemedicine.[21,28-30]

In this context, there is a need for broader research in all areas of medicine, with more data, longer analysis period, and in different regions of the country to have a better understanding of the impact of the use of telemedicine in PHC, its gaps, and also the success of the program, aiming at improvements in public health.

CONFLICT OF INTERESTS

Nothing to declare.

AUTHORS' CONTRIBUTIONS

IZP: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Validation, Visualization, Writing – original draft, Writing – review & editing. HCdS: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Validation, Visualization, Writing – original draft, Writing – review & editing. SRP: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Validation, Visualization, Writing – original draft, Writing – review & editing. RLK: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Validation, Visualization, Writing – original draft, Writing – review & editing. CH: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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