Epidemiological and Prognostic Factors Related to COVID-19 in Primary Care in a Municipality in Southern Brazil

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Abstract: The COVID-19 pandemic crisis led to a reflection on health systems in general, addressing the importance not only of equitable, but also universal, care to populations in a global context. Numerous ways to identify and propose alternatives to COVID-19 issues are enabled by technological advances, specifically those applied to health. This study aimed to investigate COVID-19-related epidemiological and prognostic factors remotely in primary care in the Brazilian public health system. The sample consisted of 77 users of primary care who had records of respiratory symptoms during the pandemic, aged between 5 and 83 years. The study was carried out in 07 Health Centers in Porto Belo (SC), Brazil. Data analysis and subsequent evaluation found a possible demand with symptoms and sequelae of COVID-19 that was shown mainly by users who reported difficulty or "tiredness" in basic Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs), which may result in patients with chronic muscle fatigue and dyspnea as a future demand in the municipality.

1 INTRODUCTION

Since December 2019, a new coronavirus-infected pneumonia (SARS-CoV-2) (COVID-19) has emerged in Wuhan and has spread rapidly throughout China (MO, 2020). The coronavirus disease 2019 (COVID-19) is caused by SARS-COV-2 and refers to the causative agent of a potentially fatal disease that has resulted in a major concern for global public health (Rothan; Byrareddy, 2020).

The epidemic then expanded to an increasing number of countries, some of which have reported progressive transmission. There is an urgent need to expand activities in public health to clarify the epidemiology of the new virus and characterize its potential impact (Lipsitch; Swerdlow; Finelli, 2020). Broad measures have been implemented to reduce COVID-19 person-to-person transmission and control the current outbreak. Special attention and efforts are required to protect or reduce transmission in susceptible populations, including children, healthcare professionals and the elderly (Rothan; Byrareddy, 2020).

Scientists from around the world work tirelessly while information on transmission, the mechanisms, clinical spectrum of the disease, new diagnoses and prevention and therapeutic strategies are being developed. Preventive strategies are focused on patient isolation and careful infection control,

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including measures to be taken during diagnosis and provision of clinical care to the infected patient (Cascella et al, 2020).

In response to COVID-19, many countries are using a combination of containment and mitigation activities in order to delay large outbreaks of patients. Response strategies include various levels of tracking and self-isolation or quarantine, in addition to promoting public health measures. Some countries should consider a combination of response measures, and monitoring of cases and contacts. These measures should include public awareness, promotion of personal hygiene and protection, preparation of health systems for a wave of critically ill patients, stronger infection prevention and control in health facilities, nursing homes and long-term care facilities, and postponement or large-scale cancellation of public meetings (Bedford et al, 2020).

COVID-19 changed the practice of palliative care and clinical medicine as we know it. In this context, telehealth emerged as a technology capable of providing medical care to patients at a critical moment, as a way of trying to reduce the transmission of COVID-19 between patients, families and healthcare professionals. However, ensuring equitable access and accessible means of telemedicine technology for vulnerable populations, through creative solutions, has become a necessary challenge in preserving scarce resources, especially in developing countries (Calton; Albedini; Fratkin, 2020).

Integrated mobile health programs allow patients to be treated at home, with virtual top-level medical support. Other health professionals (e.g. as nurses, physiotherapists, and medical assistants) also contribute to telehealth, allowing continuous care for patients during the pandemic (Hollander; Carr, 2020).

The prevention and control of COVID-19 is extremely important due to the rapid increase in confirmed cases (Zheng et al, 2020). Therefore, some measures are recommended, such as the close monitoring of changes in local epidemiology and the effectiveness of public health with strategies and their social adherence. As well as contact tracking and health monitoring, in addition to specific guidelines in health facilities and support for individual preventive measures. In addition to health control with continued surveillance activities and restrictions imposed on the population. Monitoring the health of symptomatic individuals is also suggested through remote health consultation by phone or online and providing essential vital support for emergency services, if required (Heymann; Shindo, 2020).

Healthcare professionals must be protected from SARS-CoV-2 infection during clinical care. In this context, telehealth has become necessary and reduces the number of health professionals who interact with infected patients (Gandhi; Lynch; del Rio; 2020). This study aimed to investigate COVID-19-related epidemiological and prognostic factors remotely in public primary care.

2 METHODS

The sample consisted of 77 users of primary care who had records of respiratory symptoms during the pandemic, aged between 5 and 83 years. The study was carried out in 07 Health Centers in Porto Belo-SC (Brazil), which are among the 08 Primary Health Units (UBS) in the municipality. Data were collected between September 22 and 30, 2020.

A form was developed on Google Forms in order to identify epidemiological and prognostic factors related to COVID-19 infection. The questionnaire included questions on demographic, epidemiological, clinical and laboratory aspects for COVID-19 and was developed for each UBS. An initial telephone contact was made to explain the procedures that would be performed and the form of access, then a link was provided to answer the questions. The link included information on the work, its relevance and how it would be conducted, following the completion of the study form provided via WhatsApp. Data was collected through Google Forms and then introduced in Excel spreadsheets for further analysis.

This study was approved by the Research Ethics Committee of the UDESC – Universidade do Estado de Santa Catarina, based on the Resolution 466/12, which defines the Guidelines and Regulatory Standards for Research involving Human Beings under no. 4,268,895.

3 RESULTS

Telemedicine is a proven and consolidated way to provide care to the most vulnerable people. Now, caring for people and their families requires strict social distancing measures to protect patients and all health staff. Therefore, creative ways are required to ensure that all patients have equal access to this valuable resource, including the poorest and most

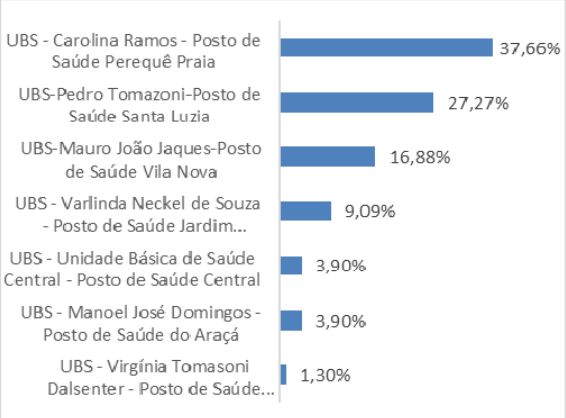
vulnerable individuals. Even though through outdated technology, people who do not have access to the most advanced technologies need access to health care (Calton; Albedini; Fratkin, 2020).

The study collected information from 77 individuals in 7 (seven) Primary Health Units in Porto Belo (SC). Porto Belo is located in the southern region of Brazil, in the state of Santa Catarina, with a territorial area of 93,673 km², an estimated population of 21,932, demographic density of 171.77 inhabitants/km² and MHDI (Municipal Human Development Index) of 0.760 (IBGE, 2019).

Choices are required during the epidemic on the interventions to be carried out and under what circumstances. The early start of surveillance activities will allow to select the most efficient ways to fight the epidemic and avoid interventions that may be unnecessarily expensive or overly restrictive (Lipsitch; Swerdlow; Finelli, 2020).

A tool with a standard screening questionnaire recommended by the Ministry of Health of Brazil (202a and 2020b) was developed in Google Forms to assist in the telemonitoring of symptomatic respiratory patients, including questions about influenza-like illness, comorbidities and questions about COVID-19 (appendix). The links of the referred medical record were submitted by the teams to the patients of each Primary Health Unit according to their territory. The monitoring instrument was provided via WhatsApp, thus providing an effective and easy tool for family health teams and simple handling by patients. Chart 1 shows the amount of data collected, by UBS.

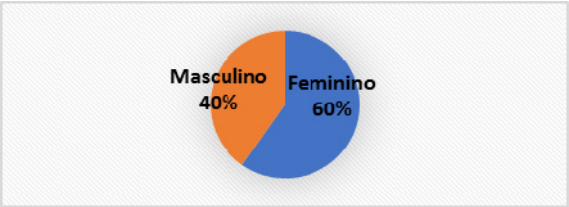
Chart 1: Distribution of Data Collection by UBS, Porto Belo (SC), 2020.



Source: Prepared by the authors (2020)

As shown by the distribution of patients by Gender in Chart 2, 60% of the participants are female.

Chart 2: Percentage of Patients by Gender, in Porto Belo (SC), 2020.



Source: Prepared by the authors (2020)

Users were asked if they were tested to COVID-19 and to report their results. Table 1 shows the results of the question about testing for COVID-19, including the 5 (five) participants who preferred not to answer. Among the respondents, 51.4% had already taken the test, 30.6% being female and 20.8% male.

Table 1: Contingency Table of Total People who took the COVID-19 test, by Gender, Porto Belo (SC), 2020.

Gender	*Tested for COVID-19*		*Total*
	No	Yes	
Female	26.4%	30.6%	57.0%
Male	22.2%	20.8%	43.0%
Total	*48.6%*	*51.4%*	*100.0%*

Source: Prepared by the authors (2020)

Table 2 shows the percentage of responses obtained between positive and negative cases in performed tests. Although 8 (eight) participants decided not to answer, most of the 69 (sixty-nine) participants who answered had not taken the test (73.9%). Thus showing a trend of denial to the diagnosis of COVID-19, even without performing the test to confirm the result. Among the people who tested positive for COVID-19, 17.4% were female,

Table 2: Contingency Table of the Test Result for COVID-19, by Gender, Porto Belo (SC), 2020.

Gender	*COVID-19 Test Result*		*Total*
	Negative	Positive	
Female	37.7%	17.4%	*55.1%*
Male	36.2%	8.7%	*44.9%*
Overall	*73.9%*	*26.1%*	*100.0%*

Source: Prepared by the authors (2020)

while 8.7%, were male. Overall, the number of females who tested positive for COVID-19 (12 cases) is exactly twice as many cases reported among males (6 cases).

In turn, this data is not in line with a study carried out in Italy comparing the number of cases by gender, which reported a greater number of cases of COVID-19 in males (59.8%) when compared to females (40.2%) (Livingston; Bucher, 2020). Public health policies and efforts have barely addressed the possible impacts of gender on COVID-19 outbreaks, so there is little knowledge of any gender analysis related to the outbreak by global health institutions or governments in affected countries or in the preparation stages (Wenham; Smith; Morgan, 2020).

As for the contact with people who tested positive for COVID-19, Table 3 shows that most participants reported not having had contact with people who tested positive (54.7%), while 45.3% reported that they had. Regarding those who reported that have been in contact with people infected with COVID-19, 28.0% were female, while 17.3% were male.

Table 3: Contingency Table of Total People Who Have Been in Contact With People Infected With COVID-19, by Gender, Porto Belo (SC), 2020.

Gender	*Have been in contact with people who tested positive for COVID-19*		*Total*
	No	Yes	
Female	32.0%	28.0%	60.0%
Male	22.7%	17.3%	40.0%
Total	*54.7%*	*45.3%*	*100.0%*

Source: Prepared by the authors (2020)

Tables 1, 2 and 3 show that the gender should be considered when analyzing the data during the COVID-19 pandemic. On the one hand, the percentage of females who answered the questions in this research (60%) should be highlighted, which is much higher than that of males (40%). At least in part, this imbalance may explain the percentage of females who tested positive for COVID-19 to be twice (17.4%) the percentage of males (8.7%) who tested positive. On the other hand, females performed more COVID-19 tests (30.6%) than males (20.8%). However, Table 3 shows a greater exposure of females with positive results in tests, as 28.0% of them reported that they have been in contact with people who had tested positive for COVID-19, while 17.3% of males have been in contact with confirmed cases.

Table 4 summarizes the crossing of three variables: close contact with any confirmed case of COVID-19 or an unwell family member, whether the participant tested positive or not, and whether or not the participant had difficulty or "tiredness" in basic Activities of Daily Living (ADLs) (e.g. self-care, hygiene and dressing). Of the 58 (fifty-eight) participants who answered the three questions, 6.9% reported having difficulty in basic ADLs. Of these, 1.7% has been in close contact with a confirmed case of COVID-19 or an unwell family member, and 1.7% also tested positive for COVID-19.

Table 4: Percentage of participants who have been in contact with people who tested positive for COVID-19 or a suspected family member, and who also tested positive, and if they reported difficulties or "tiredness" in basic ADLs, Porto Belo (SC), 2020.

Have been in contact with people who tested positive for COVID-19 or a suspected family member / Tested positive for COVID-19	**Had difficulty or "tiredness" in basic ADLs**		**Total**
	No	**Yes**	
Tested negative for COVID-19	34.6%	0.0%	34.6%
Yes and tested positive for COVID-19	17.2%	5.2%	22.4%
Subtotal 1 - No contact	**51.8%**	**5.2%**	**57.0%**
Tested negative for COVID-19	17.2%	0.0%	17.2%
Yes, have been in contact with people who tested positive	24.1%	1.7%	25.8%
Subtotal 2 - Yes, have been in contact	**41.3%**	**1.7%**	**43.0%**
Total	**93.1%**	**6.9%**	**100.0%**

Source: Prepared by the authors (2020)

Table 5 summarizes the crossing of three variables: close contact with any confirmed case of COVID-19 or an unwell family member, whether the participant tested positive or not, and whether or not the participant had difficulty or "tiredness" in Instrumental Activities of Daily Living (IADLs), such as work, leisure and physical activities. Of the 55 (fifty-five) participants who answered the three questions, 5.5% reported having difficulty in IADLs. Of these, 1.8% have been in close contact with a confirmed case of COVID-19 or an unwell

family member, and 1.8% also tested positive for COVID-19.

Although Tables 4 and 5 show a higher percentage of people who did not report difficulty or "tiredness" in ADLs or IADLs (93.1% and 94.5%, respectively), 22.4% of the first group and 18.2% of the second group, tested positive for COVID-19. The percentage of those who tested positive for COVID-19 and also had dyspnea in basic ADLs was higher compared to those who had dyspnea in IADLs (5.2% and 3.6%, respectively), thus suggesting a smaller number of people with more serious sequelae and confirming the high transmission rates of the virus when compared with the contact of these individuals with confirmed cases of COVID-19 or suspected family member (also 1.7% and 1.8%, respectively).

Table 5: Percentage of participants who have been in contact with people who tested positive for COVID-19 or a suspected family member, and who also tested positive, and if they reported difficulties or "tiredness" in IADLs, Porto Belo (SC), 2020.

Have been in contact with people who tested positive for COVID-19 or a suspected family member / Tested positive for COVID-19	**Had difficulty or "tiredness" in IADLs**		**Total**
	No	**Yes**	
Tested negative for COVID-19	36.4%	0.0%	36.4%
Yes and tested positive for COVID-19	14.5%	3.6%	18.2%
Subtotal 1 - No contact	**50.9%**	**3.6%**	**54.5%**
Tested negative for COVID-19	**18.2%**	**0.0%**	**18.2%**
Yes and tested positive for COVID-19	**25.5%**	**1.8%**	**27.3%**
Subtotal 2 - Yes, have been in contact	**43.6%**	**1.8%**	**45.5%**
Total	**94.5%**	**5.5%**	**100.0%**

Source: Prepared by the authors (2020)

Outbreaks of new and reemerging diseases, such as the current COVID-19 epidemic, can potentially overwhelm health systems at the expense of primary health care requirements in low-income countries (Velavan; Meyer, 2020). These outbreaks can have huge potential implications for planning and decision-making in confirmed cases of COVID-19, especially in high-risk areas (Petropoulos; Makridakis 2020). Each outbreak also provides an opportunity to obtain relevant information, some of which are associated with a limited window of opportunity (Fauci; Lane; Redfield, 2020).

In this context, telemonitoring contributed to the planning of health actions within the scope of each of the Primary Health Units in the municipality, in addition to generating data for epidemiological surveillance regarding the prevalence of symptoms and prognostic factors for COVID-19 in the population of each territory. Therefore, it contributes to the performance of diagnostic tests and to assist team decision making in the UBS according to the Operational Structure of the Primary Health Care Network, as proposed in Figure 1. The results were analyzed in order to generate data focused on health planning and assisting team decision making within the health field.

Source: Prepared by the authors (2020)

Figure 1: Operational Structure of the Primary Health Care Network, Porto Belo (SC), 2020.

Given the above, there is still much to be developed despite the experience and robustness of the surveillance system and public policies (Turci; Holliday; de Oliveira, 2020). Continuous surveillance of the various countries facing the pandemic is required to better understand the global epidemiology of COVID-19, including transparent and accurate reporting of patient characteristics and symptoms (Onder; Rezza; Brusaferro, 2020).

4 CONCLUSIONS

A longer period of monitoring in Health Centers is required to reach broader conclusions among suspected and confirmed cases of COVID-19 in the primary care facilities in Porto Belo.

Data analysis and subsequent evaluation found a possible demand with symptoms and sequelae of COVID-19. This was shown mainly by users who reported difficulty or "tiredness" in basic ADLs and IADLs, which may result in patients with chronic

muscle fatigue and dyspnea as a future demand in the municipality.

These data are essential for the health decision-making process of managers, through the formulation of public policies and the rational application of resources in the most sensitive segments in care, as in promotion and prevention.

The COVID-19 pandemic led to a reflection on public health systems and strategies, as well as the importance of care that is not only equitable, but also universal to populations in a global context.

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APPENDIX

Questionnaire used for telemonitoring of patients with respiratory symptoms:

Name:
Date of birth:
Gender:
( ) Male
( ) Female

Questionnaire on Influenza-like illness and Comorbidities

Do you have or had any of the following factors?
( ) Cough
( ) Temperature between 35.7ºC and 38ºC
( ) Temperature greater than 38ºC
( ) Fatigue
( ) Mucus
( ) Shortness of breath
( ) Muscle pain
( ) Sore throat / Difficulty swallowing
( ) Headache
( ) Chills
( ) Nasal congestion / runny nose

( ) Diarrhea
( ) Nausea or vomiting

Do you have any of the following comorbidities?
( ) Heart diseases
( ) Asthma, emphysema, bronchitis or other lung disease
( ) Hypertension
( ) Depression
( ) Chronic kidney or liver disease
( ) Previous transplant
( ) Immunosuppression due to disease or chemotherapy/radiotherapy (other medicines).
( ) Diabetes mellitus
( ) Smoking

Questionnaire on COVID-19

Do you have or had any of the following factors since the start of the pandemic?
( ) Severe shortness of breath at rest
( ) Difficulty breathing
( ) Chest pain or pressure
( ) Cold, moist or pale and stained skin
( ) Sudden confusion
( ) Difficulty awakening
( ) Bluish lips or face
( ) Little or no urine production
( ) Coughing up blood
Other conditions, such as:
( ) Neck stiffness
( ) Rash

Do you have or had any of the following factors before the emergence of the pandemic in Brazil?
( ) yes ( ) no

Have you been in close contact with someone who has tested positive for COVID-19 or an unwell family member?
( ) yes ( ) no

Have you been tested for COVID-19?
( ) yes ( ) no

If so, was it positive?
( ) yes ( ) no

Do you have tiredness or difficulties in performing basic activities of daily living (e.g. self-care, hygiene and dressing) after the diagnosis of COVID-19?
( ) yes ( ) no

Do you have tiredness or difficulties in performing instrumental activities of daily living (e.g. work, leisure and physical activities) after the diagnosis of COVID-19?
( ) yes ( ) no

Assistance in team decision making:

- Refer for immediate medical care if the subject has severe symptoms and report the case to the Family Health Strategy;
- In cases of relevant comorbidities, provide proactive and complete assistance to the patient;
- Refer for testing and reporting in Epidemiological Surveillance;
- Specific referral to the Support Center for Family Health, if required;
- Arrange video conference follow-up and monitor closely if pneumonia is suspected.