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COVID-19 pandemic, medical attention, and self-care of patients with type 2 diabetes at a Peru-based hospital: An analytical cross-sectional study

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ABSTRACT

Background: To determine the association between coronavirus disease-2019 (COVID-19), medical attention and self-care of patients with type 2 diabetes (T2DM) at the Archbishop Loayza National Hospital.

Methods: This analytical cross-sectional study, involved interviewing 181 T2DM patients and recording their actions regarding three aspects–self-care measures, medical care, and spending on medicines–before and during the pandemic. The relationships between the variables were established using descriptive and analytical statistics.

Results: During the pandemic, self-care decreased to 37%; 26% had access to medical care. Patients in the provinces experienced better self-care (Lima: 35%; Provinces: 61%; p=0.002). Patients with comorbidities also took good care of themselves (with comorbidities: 41%; without comorbidities: 29%; p=0.036).

Conclusions: COVID-19 had a negative influence on T2DM patients regarding self-care and medical care. One out of four patients received medical care. Additionally, being outside Lima and having comorbidities were associated with better self-care during the pandemic.

Keywords: self-care, diabetes mellitus, type 2, COVID-19

INTRODUCTION

The world is facing an unprecedented coronavirus disease–2019 (COVID-19) infection since 2019 [1, 2]. This infection causes several clinical manifestations in patients, including neurological manifestations ranging from headaches, dizziness, neuralgia, and neuropathy to musculoskeletal disorder symptoms and myalgia. People with chronic diseases have been shown to be at a higher risk of developing severe diseases and complications. Additionally, they are likely to require more medical care and also have higher rates of mortality resulting from COVID-19 and diseases such as diabetes, cardiovascular disease, and hypertension, among many others [2, 3]. This has created a serious situation for Peru as it has been one of the most affected countries worldwide, with a lethality rate of approximately 9% [4].

Type 2 diabetes (T2DM) is a chronic comorbidity more frequently present in COVID-19 patients, ranging from 5.7% to 5.9% in mild cases, and between 22.2% and 26.9% in severe cases [5, 6]. In Peru, 11.8% of the patients with severe COVID-19 were diabetic [7]. These patients could reduce the risk of serious illnesses by controlling their disease. For example, taking the medication regularly and continuing timely check-ups with their physicians are essential. However, owing to the magnitude of the current pandemic, the healthcare systems tended to collapse, thus disrupting these patients' usual care measures [8, 9].

According to the International Diabetes Federation, Peru had approximately one and a half million diabetic patients in 2019, accounting for 6.7% of the total population [10]. Hence, managing this disease and the patients is essential as they can develop complications due to COVID-19 [8, 11, 12]. However, this is usually difficult owing to the various factors and limitations in our health system [12-14]. For example, a report by the Peruvian Ministry of Health showed that medical care for diabetes mellitus (DM) had decreased by 46% in 2020, and in some hospitals, this decrease was up to 26% in comparison with the 2019 reports [15].

Several studies have reported the barriers affecting the control over diabetes in patients during the pandemic. The most important barriers are quarantines, social distancing, and difficulty in acquiring medicines and test strips for daily control [16, 17], which could increase the risk of decompensation in the short, medium, or long term [8, 9]. Thus, we aimed to

determine the association between the COVID-19 pandemic, and medical care and self-care of T2DM patients in the endocrinology department at the Archbishop Loayza National Hospital and to analyze the factors associated with self-care, medical care, and spending on medications during the COVID-19 pandemic.

MATERIAL AND METHODS

This is a primary study with an analytical cross-sectional design executed at the Archbishop Loayza National Hospital from July to October 2020. The study protocol was registered in the National Health Research Registry under the code EI00001536.

We included patients with T2DM who were older than 18 years, registered in the diabetes program of the endocrinology service at the Archbishop Loayza National Hospital, and received care during 2018-2019. Patients with the following characteristics were excluded: having another type of diabetes, not having a telephone number in their records, not ready to participate, or not having completed the survey.

We used convenience sampling and invited the patients to participate through telephone calls. On gaining access to the database, we calculated the statistical power for the main crosses (each crossover was of the dependent variable versus the independent variables), always considering good self-care as the main variable. The percentage difference was then entered into a Stata software's formula. For example, for the estimation of the power of good self-care versus comorbidities, we used the following command: sampsi 0.293 and 0.441, n (181), where 29% and 44% were the percentage differences and 181 was the number of patients obtained. Similarly, we obtained the estimation of the power in each crossing, which was 100% for residence, 81% for comorbidities, 99% for spending by residence, 100% for insurance, and 100% for using insulin [18].

Data Collection

We prepared a survey with 42-question and composed of five sections (patient and T2DM characteristics, patient self-care before and during the pandemic, medical care during the pandemic, and spending on medicines before and during the pandemic). Completing this survey required approximately 15 minutes per patient. Prior to its administration, the survey was validated qualitatively. It was reviewed by two endocrinologists; subsequently, a pilot test was performed on 30 patients to assess whether the questions were understandable. The participation of all patients in this study was voluntary, and their data were kept confidential.

A resident physician in the endocrinology service (getting specialty training), trained in questionnaire administration was in charge of calling the patient. The instrument was administered in July 2020 after obtaining the database of the diabetes education program that had all the telephone numbers of the patients called.

The researcher was responsible for explaining the study objective because the data collection was performed through telephone calls. After the patients consented to participate in the study, the questions of the survey were asked, and the answers were recorded in a Google Form. We invited the patients to participate through telephone calls in the diabetes program's roster order until the sample was completed.

Variables

The dependent variables were diabetes self-care and medical care during the pandemic.

Self-care in the patients was assessed through three main measures: glucose self-monitoring, feet self-care, and physical activity, which were operationalized according to previous studies [19-21].

Glucose self-monitoring and feet self-care were evaluated before and during the pandemic using the following questions and dichotomous answers (yes/no):

1. Did you measure your capillary glucose before the pandemic?
2. Did you measure your capillary glucose level with a glucometer during the pandemic?
3. Did you check your feet at least once a week before the pandemic?
4. Did you check your feet at least once a week during the pandemic?

Physical activity before and during the pandemic were assessed using the following question: How often did you perform any physical activity? The answers were as follows: more than five days a week/30 minutes a day, five days a week/30 minutes a day, fewer than five days a week/30 minutes a day and did not perform any physical activity.

T2DM self-care before and during the pandemic was defined as good self-care if the patient complied with at least two of three measures: self-monitoring, checking their feet at least once a week, and physical activity five days a week/30 or more minutes a day.

Medical attention before the pandemic included considerations, such as if the patients had at least one consultation during the last year before the pandemic was considered. Whereas medical attention during the pandemic, considered if the patients had at least one face-to-face or virtual consultation from the beginning of the quarantine until the moment of the survey. This was evaluated with the following questions and dichotomous answers (yes/no): Did you have a consultation of any kind (either face-to-face or virtual) with your physician during the pandemic? Spending on medicine before and during the pandemic was assessed using the following question and dichotomous answer (yes/no): Did you buy any medicine before and during the pandemic?

The other collected variables were demographic characteristics such as age, sex, educational level, residence, and health insurance type. T2DM clinical characteristics included the following: diagnosis time, associated comorbidities, current antidiabetic treatment, insulin use, insulin type, and the number of consultations per year.

Statistical Analysis

We used Stata 16.0 ® (Stata Corp LP, TX, USA) to analyze the data. For qualitative variables, we used distributions of absolute and relative frequencies. In the case of numerical variables, we calculated the best measures of central tendency and distribution according to normal or non-normal distribution (using the Shapiro-Wilk test).

Bivariate analysis was initially performed using the chi-squared test or Fisher's exact test (depending on the expected values). The analysis of the measured variables before and during the pandemic was performed using McNemar's Chi-

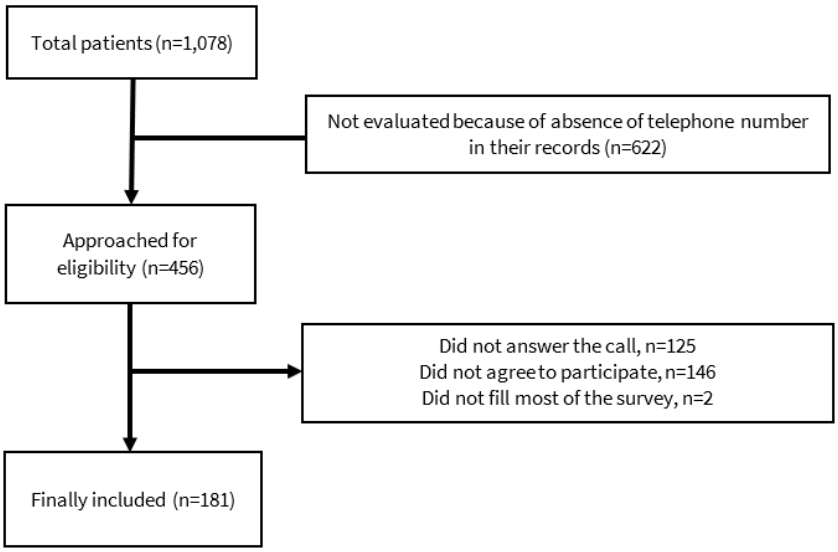

Figure 1. Flowchart for recruitment of study participants (Source: Authors' own elaboration)

Table 1. General characteristics of study population (n=181)

General characteristics	n (%)
Sex	
Male	68 (37.6)
Female	113 (62.4)
Age *(years)	60+/-10.7
Educational level	
High school	88 (48.6)
Technical	32 (17.7)
Primary	30 (16.6)
University	23 (12.7)
Illiterate	8 (4.4)
Lives in Lima	
Yes	163 (90.1)
No	18 (9.9)
Comorbidities	
None	81 (44.8)
Arterial hypertension	55 (30.4)
Obesity	10 (5.5)
Dyslipidemia	9 (5.0)
Thyroid disease	7 (3.9)
Cardiovascular disease	2 (1.1)
Others	17 (9.3)
Insurance type	
Integral health insurance	121 (66.9)
EsSalud	25 (13.8)
Armed forces and the police	5 (2.7)
Private	2 (1.1)
None	28 (15.5)
Time with diabetes (years) (n=174)**	8 (3-17)
Antidiabetic drugs	
Metformin	144 (80.9)
Insulin	56 (30.9)
Sulfonylureas	12 (6.6)
None	5 (2.8)
DPP4 inhibitors	1 (0.6)
Number of checkups a year (n=175)**	4 (2-6)

Note. *Mean & SD & **Median & IQR

squared test, along with an analysis per category. Bivariate and multivariate analyses were performed to obtain the prevalence ratios, their 95% confidence intervals, and p-values using generalized linear models (with Poisson family, log-link function, and models to obtain robust variances). We considered a 95% confidence level and the p-values <0.05 were considered significant. For the selection of variables, the theory, background, and availability of the variables in the hospital records were considered. Then, they were crossed against the dependent variable in the bivariate (raw) model. However, a variable could enter the multivariate model only if the p-value was <0.150, the latter being a statistical criterion.

RESULTS

Of the 1078 patients registered in the program, we called 456 patients whose telephone number were mentioned in the records, of whom 275 were not included (125 did not answer the call, 146 were not ready to participate, and two did not fill out the survey completely); this led to the inclusion of 181 patients (**Figure 1**).

Of the 181 participants in the study, 62.4% were women, 90.1% came from Lima, 55.2% had a comorbidity, and 66.9% had an integral health insurance. With respect to the clinical characteristics of T2DM, 50% of the respondents had had the disease between three and 17 years; the most used antidiabetic drug was metformin (80.9%), and 30.9% used insulin (**Table 1**).

T2DM Medical Care During the COVID-19 Pandemic

Only 26.3% of the study population accessed medical care for diabetes during the pandemic; 80% of them accessed it virtually, of which 90.3% accessed it through phone calls, 4.9% through video calls, and 2.4% stated that they had used both. Only 14.9% of the surveyed patients knew about the possibility of receiving medical care via telehealth.

Changes in Self-Care Measures and Spending on Medicines During the COVID-19 Pandemic

The frequency of T2DM self-care measures and the purchase of medicines before and during the pandemic are summarized in **Table 2**. During the pandemic, the frequencies of the three measures of self-care (capillary glucose self-monitoring, physical activity, and feet checking) decreased; this change was statistically significant (p<0.05).

Of all the surveyed patients, 57.9% complied with at least two of the three self-care measures before the pandemic, and

Table 2. Diabetes self-care measures & spending on medicines in study population before & during the COVID-19 pandemic

Diabetes self-care measures	Before the pandemic n (%)	During the pandemic n (%)	p-value
Capillary glucose self-monitoring			
Yes	103 (53.9)	87 (48.1)	0.009
No	78 (43.1)	94 (51.9)	
Physical activity (n=172)			
Did not perform any or fewer than 5 days a week & fewer than 30 minutes a day	125 (72.7)	157 (91.3)	<0.001
5 days a week/30 minutes a day	47 (27.3)	15 (8.7)	
Feet checking at least once a week (n=173)			
Yes	144 (81.8)	128 (73.9)	0.004
No	32 (18.2)	45 (26.1)	
Good self-care			
Yes	95 (57.9)	61 (37.2)	<0.001
No	69 (42.1)	103 (62.8)	
Spending on medicines (n=176)			
Yes	122 (69.3)	151 (85.8)	<0.001
No	54 (30.7)	25 (14.2)	

Table 3. Bivariate analysis (top) & multivariate analysis (bottom) of socio-demographic factors associated with good self-care, access to consultations, & spending on medicines during the pandemic in diabetes patients

Variables	Good self-care	Medical care	Spending on medicines
Bivariate			
Age*	1.01 (0.99-1.02) 0.539	1.01 (0.99-1.03) 0.227	0.99 (0.97-1.01) 0.559
Sex	0.94 (0.63-1.39) 0.742	1.15 (0.68-1.94) 0.595	0.99 (0.61-1.59) 0.955
Lives in Lima	0.57 (0.37-0.87) 0.010	0.77 (0.38-1.57) 0.476	0.54 (0.31-0.94) 0.028
Time with DM*	1.01 (0.99-1.03) 0.307	1.02 (0.99-1.05) 0.058	0.98 (0.95-1.01) 0.149
Comorbidity	1.50 (0.99-2.29) 0.058	1.42 (0.85-2.39) 0.182	0.97 (0.61-1.54) 0.894
Annual checkups*	1.01 (0.99-1.04) 0.330	1.00 (0.96-1.04) 0.941	0.97 (0.93-1.01) 0.158
Has insurance	0.95 (0.55-1.66) 0.861	1.23 (0.58-2.62) 0.591	2.90 (0.97-8.67) 0.057
Uses insulin	1.08 (0.72-1.64) 0.698	1.10 (0.65-1.85) 0.730	0.41 (0.21-0.81) 0.011
Multivariate			
Age*	Not included in the model	Model not used	Not included in the model
Sex	Not included in the model	Model not used	Not included in the model
Lives in Lima		Model not used	
Time with DM*	Not included in the model	Model not used	
Comorbidity	1.56 (1.03-2.36) 0.036	Model not used	Not included in the model
Annual checkups*	Not included in the model	Model not used	Not included in the model
Has insurance	Not included in the model	Model not used	
Uses insulin	Not included in the model	Model not used	

Note. *Analyzed variables in a quantitative format; p-values had to be <0.150, so the variables could enter the multivariate model; & Prevalence ratios (left), 95% confidence intervals (within parentheses), and p-values (right) were obtained using generalized linear models (Poisson family, log-link function, & adjusted for robust variances).

thus carried out a good level of T2DM self-care. During the pandemic, this decreased to 37.2%, and this change was statistically significant (p<0.001). Before the pandemic, 69.3% of the patients spent on some T2DM medicines; this increased to 85.8% during the pandemic, which was also statistically significant (p<0.001) (**Table 2**).

Association Between General Characteristics of the Study Population and Self-Care, Medical Care, and Spending on Medicines During the COVID-19 Pandemic

The analytical statistics indicated that those living in the provinces had a better level of self-care (Lima: 35%; Provinces: 61%, p=0.002), and those with comorbidity also took better care of themselves during the COVID-19 pandemic (with comorbidities: 41%; without comorbidities: 29%, p=0.036). There was no significant association with medical care during the COVID-19 pandemic. Moreover, with regard to spending on medicines during the COVID-19 pandemic, there were differences according to residence (Lima: 50%; provinces: 27%, p=0.032), access to insurance (with insurance: 32%; without insurance: 11%, p=0.038), and insulin use (with insulin: 15%; without insulin: 36%, p=0.037), adjusted for time with diabetes (**Table 3**).

DISCUSSION

This study found that during the COVID-19 pandemic, T2DM self-care decreased; only one in four patients had access to medical consultations, and the percentage of patients who spent on medicines increased. Previous studies have already found that during the COVID-19 pandemic, T2DM patients reduced their physical activity, glucose self-monitoring, and feet checking in different parts of the world, such as Singapore, the United Kingdom, India, and Brazil. However, access to medical consultations varied [19-22]. Countries such as Singapore reported a high level of communication with patients' physicians during the COVID-19 pandemic [19]; while in India, 88% of diabetic patients reported that they could not access health services [21].

These difficulties in following self-care and control measures during the pandemic would have caused the worsening of glycemic parameters, as reported by [23].

One of the most important results was that the patients residing in provinces had a better level of self-care during the pandemic (almost double and with a very significant p-value). This could have occurred because of the difficulty in accessing consultations in Lima, the capital, as the patients needed to travel for the consultations. Hence, it is possible that they were aware of the importance of controlling their disease even before the pandemic and they continued with the self-care measures during the pandemic as well. In Singapore, patients with T1DM and T2DM were evaluated, but the researchers could not find significant differences with regard to self-care between sexes, age groups, and other socio-demographic characteristics. Moreover, we could not find previous studies that mentioned self-care differences according to residence in the literature [19]. This requires further research, since there may exist a clear difference with respect to this aspect, and which may help health institutions direct their efforts to care for this population.

Patients with comorbidities also had a better level of self-care during the pandemic (four out of 10 with comorbidity conditions had good self-care compared to those without comorbidities, where only three out of 10 had good self-care). These patients may have a greater interest in self-care or better family support. However, a previous study, according to the mean scores on the diabetes health profile-18 scale (DHP-18), reported that T2DM patients with comorbidity conditions had a higher level of psychological stress and uncontrolled eating during the COVID-19 pandemic; this could have led to worse glycemic control for them [19]. This finding partly reinforces the previous finding, where, living in a province or having a comorbidity makes patients think that taking care of themselves would prevent their disease from getting worse and reduce expenditure. This difference probably arises from the knowledge that the health system has collapsed, and people with comorbidities must be more careful to lower the impact on their health; this should be further investigated.

Expenditure on medicine during the pandemic was more frequent in patients from Lima (Lima: 50%; Provinces: 27%), those with access to health insurance (with insurance: 32%; without insurance: 11%), and those who did not use insulin (did not use insulin: 36%; used insulin: 15%, p=0.037). In India, a study found that patients from rural areas spent more on medicines than those from urban areas (79% vs. 71%). In contrast to our results, another study in the US mentioned that people with T2DM who used insulin were more concerned about access to their medications, and also presented with more frequent hyperglycemia and hypoglycemia and greater glycemic variability compared to patients who did not use insulin [24].

Once again, we found results that differ from those of the world literature, and this needs to be highlighted because Peru has been the country with the highest mortality per 10,000 inhabitants [4]. Therefore, the results reflect an interesting context where a specific population behaved differently from those in other parts of the world, possibly due to the influence of the collapse of its environment.

In Peru, strict quarantine due to the COVID-19 pandemic began on March 16, 2020. Subsequently, work and activities progressively resumed but with restrictions for people with comorbidities and other risk groups. During this period of quarantine, all outpatient activities from primary care to hospitals were suspended, and the care of patients with COVID-19 was prioritized [25]. The Ministry of Health established that medical care should be delivered through telehealth; however, this system was not known to most patients; in our study, only 14.9% of the surveyed patients knew of that service. This phenomenon has been very common in all countries, mainly because people were not prepared for the use of virtual services, and because of the collapse of many health systems. However, in our context, this also meant that chronically ill patients did not receive care, and when they found themselves at a greater risk of complications due to COVID-19, they behaved differently because they were aware of the fact that they could even die in the want of action. Therefore, continuing with further research in this direction to see how this population and others at similar risk behave is important.

The World Health Organization (WHO) has reported a dramatic reduction in health services for patients with chronic non-communicable diseases during the COVID-19 pandemic and mentioned that diabetes treatment was interrupted in 49% of the countries [25]. Our results indicate that people with T2DM in our country did not continue with their self-care measures in the usual way, nor did they have access to medical consultation or medications on a routine basis. This could have led them to a greater risk of complications due to both decompensation and the COVID-19 infection. However, we also obtained results showing greater care among those who felt more vulnerable to complications. This highlights the importance of raising awareness among patients for taking care of themselves. Therefore, the following measures should be implemented:

(a) active follow-up, with information, education, and response to the patients' needs at the primary level,

(b) high-quality telehealth consultations, follow-up, and examinations,

(c) distribution of medicines and supplies for three months or more, ideally through home delivery, and

(d) sampling for scheduled laboratory examinations [22].

An important strength of this study was that the surveyed patients came from different regions of Peru; this provided greater diversity to the sample. The limitations of this study are as follows: the information collected by telephone survey was not objectively verified, use of non-random sampling, non-consideration of the dietary patterns, inaccurate quantification of physical activity. Furthermore, statistical significance was found only in the crosses where power was adequate; hence, future research should have a larger sample size to evaluate the other crosses.

Therefore, in the future, researchers should conduct studies that allow us to objectively evaluate the metabolic control of patients with T2DM during this pandemic (glucose, HbA1c, lipid profile, medical consultations recorded in their medical history, quantified physical activity, etc.). However, despite these limitations, we consider that the population taken from the diabetes program of a reference hospital in our country is representative, and the findings of our study are relevant; therefore, our findings should be confirmed in future research through more objective measures. Self-care of patients with T2DM is an important point to consider during the COVID 19 pandemic, for which health policies and strategies should be implemented to ensure adequate access to face-to-face or virtual health care.

Based on the findings, we conclude that in the patients with T2DM, the COVID-19 pandemic had a negative influence on self-care measures and medical care, and only one out of four patients could access medical care. Additionally, not residing in Lima and having comorbidities were associated with better self-care during the pandemic.

Author contributions: JC-T: idea & design of the study, data collection, data analysis & interpretation, writing the draft, & critical review of the article; **KJC-J:** idea & design of the study, data collection, writing the draft, & critical review of the article; **GKQ-P:** data collection, data analysis & interpretation, writing the draft, & critical review of the article; & **CRM:** idea & design of the study, data analysis & interpretation, writing the draft, & critical review of the article. All authors have agreed with the results and conclusions.

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Ethical statement: Authors stated that the study was approved by the Ethics Committee of the Archbishop Loayza National Hospital before its execution (Certificate 042-2020).

Declaration of interest: No conflict of interest is declared by authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

REFERENCES

1. Gupta R, Ghosh A, Singh AK, Misra A. Clinical considerations for patients with diabetes in times of COVID-19 epidemic. Diabetes Metab Syndr. 2020;14(3):211-2. https://doi.org/10.1016/j.dsx.2020.03.002 PMid:32172175 PMCid: PMC7102582
2. Del Rio C, Malani PN. COVID-19-New insights on a rapidly changing epidemic. JAMA. 2020;323(14):1339-40. https://doi.org/10.1001/jama.2020.3072 PMid:32108857
3. Puig-Domingo M, Marazuela M, Giustina A. COVID-19 and endocrine diseases. A statement from the European Society of Endocrinology. Endocrine. 2020;68(1):2-5. https://doi.org/10.1007/s12020-020-02294-5 PMid: 32279224 PMCid:PMC7150529
4. Ministry of Health of Peru. Sala situacional COVID-19 Perú: MINSA Lima; 2020 [COVID-19 situational room Peru: MINSA Lima; 2020]. Available at: https://covid19.minsa.gob.pe/sala_situacional.asp (Accessed: 31 November 2021).
5. Wang D, Hu B, Hu C, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. JAMA. 2020;323(11):1061-9. https://doi.org/10.1001/jama.2020.1585 PMid:32031570 PMCid:PMC7042881
6. Guan W-J, Ni Z-Y, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med. 2020;382:1708-20. https://doi.org/10.1056/NEJMoa2002032 PMid:32109013 PMCid:PMC7092819
7. Acosta G, Escobar G, Bernaola G, et al. Caracterización de pacientes con COVID-19 grave atendidos en un hospital de referencia nacional del Perú [Characterization of patients with severe COVID-19 treated at a national reference hospital in Peru]. Rev Peru Med Exp Salud Publica. 2020;37(2):253-8. https://doi.org/10.17843/rpmesp.2020.372.5437 PMid:32876213
8. MSCBS. Guia de actuación para personas con condiciones de salud crónicas y personas mayores en situación de confinamiento. Estado de alarma por COVID-19 [Action guide for people with chronic health conditions and the elderly in a situation of confinement. State of alarm for COVID-19]. Available at: www.mscbs.gob.es (Accessed: 4 April 2020).
9. Kaiser U, Mirmira R, Stewart P. Our response to COVID-19 as endocrinologists and diabetologists. J Clin Endocrinol Metab. 2020;105(5):dgaa148. https://doi.org/10.1210/clinem/dgaa148 PMid:32232480 PMCid:PMC7108679
10. International Diabetes Federation. Atlas de la diabetes de la FID [IDF diabetes atlas]. Available at: https://diabetesatlas.org/ (Accessed: 29 May 2022).
11. Katulanda P, Dissanayake H, Ranathunga I, et al. Prevention and management of COVID-19 among patients with diabetes: An appraisal of the literature. Diabetologia. 2020;63(8):1440-52. https://doi.org/10.1007/s00125-020-05164-x PMid:32405783 PMCid:PMC7220850
12. Curioso W, Galan-Rosas E. El rol de la telesalud en la lucha contra el COVID-19 y la evolución del marco normativo peruano [The role of telehealth in the fight against COVID-19 and the evolution of the Peruvian regulatory framework]. Acta Med Peru. 2020;37(2020):139-48. https://doi.org/10.35663/amp.2020.373.1004
13. Jendle J. The use of ehealth for the care of patients with diabetes in connection to the COVID-19 pandemic. J Diabetes Sci Technol. 2020;14(4):739-40. https://doi.org/10.1177/1932296820922623 PMid:32375494 PMCid: PMC7673160
14. Pesantes M, Lazo-Porras M, Cárdenas M, et al. Los retos del cuidado de las personas con diabetes durante el estado de emergencia nacional por COVID-19 en Lima, Perú: Recomendaciones para la atención primaria [The challenges of caring for people with diabetes during the national state of emergency due to COVID-19 in Lima, Peru: Recommendations for primary care]. Rev Peru Med Exp Salud Publica. 2020;37(3):541-6. https://doi.org/10.17843/rpmesp.2020.373.5980 PMid:33295559
15. Hancoo J. Gap of cases attended 2019-2020 of non-communicable diseases. Virtual conference in Lima-Peru.
16. Banerjee M, Chakraborty S, Pal R. Diabetes self-management amid COVID-19 pandemic. Diabetes Metab Syndr. 2020;14(4):351-4. https://doi.org/10.1016/j.dsx.2020.04.013 PMid:32311652 PMCid:PMC7194953
17. Xue T, Li Q, Zhang Q, et al. Blood glucose levels in elderly subjects with type 2 diabetes during COVID-19 outbreak: A retrospective study in a single center. MedRxiv. 2020. https://doi.org/10.1101/2020.03.31.20048579
18. Camacho-Sandoval J. Potencia estadística en el diseño de estudios clínicos [Statistical power in the design of clinical studies]. Acta Med Costarric. 2007;49(4):203-4. https://doi.org/10.51481/amc.v52i6.333
19. Yeoh E, Tan SG, Lee YS, et al. Impact of COVID-19 and partial lockdown on access to care, self-management and psychological well-being among people with diabetes: A cross-sectional study. Int J Clin Pract. 2021;75(8):e14319. https://doi.org/10.1111/ijcp.14319 PMCid:PMC8236933
20. Sauchelli S, Bradley J, England C, Searle A, Whitmarsh A. Exploring support needs of people living with diabetes during the coronavirus COVID-19 pandemic: Insights from a UK survey. BMJ Open Diabetes Res Care. 2021;9(1):e002162. https://doi.org/10.1136/bmjdrc-2021-002162 PMid:34099440 PMCid:PMC8186741
21. Khader MA, Jabeen T, Namoju R. A cross sectional study reveals severe disruption in glycemic control in people with diabetes during and after lockdown in India. Diabetes Metab Syndr. 2020;14(6):1579-84. https://doi.org/10.1016/j.dsx.2020.08.011 PMid:32858476 PMCid:PMC7434486

22. Barone MTU, Harnik SB, de Luca PV, et al. The impact of COVID-19 on people with diabetes in Brazil. Diabetes Res Clin Pract. 2020;166:108304. https://doi.org/10.1016/j.diabres.2020.108304 PMid:32623040 PMCid:PMC7332443
23. Eberle C, Stichling S. Impact of COVID-19 lockdown on glycemic control in patients with type 1 and type 2 diabetes mellitus: A systematic review. Diabetol Metab Syndr. 2021;13(1):95. https://doi.org/10.1186/s13098-021-00705-9 PMid:34493317 PMCid:PMC8423337
24. Olickal JJ, Chinnakali P, Suryanarayana BS, Ulaganeethi R, Kumar SS, Saya GK. Effect of COVID19 pandemic and national lockdown on persons with diabetes from rural areas availing care in a tertiary care center, southern India. Diabete Metab Syndr. 2020;14(6):1967-72. https://doi.org/10.1016/j.dsx.2020.10.010 PMid:33059300 PMCid:PMC7548067
25. The Peruvian. Suspenden consultas externas en hospitales del Minsa y Essalud [External consultations are suspended in Minsa and Essalud hospitals]. Available at: https://elperuano.pe/noticia/93120-suspenden-consultas-externas-en-hospitales-del-minsa-y-essalud (Accessed: 31 November 2021).
26. Dyer O. COVID-19: Pandemic is having “severe” impact on non-communicable disease care, WHO survey finds. BMJ. 2020;369:m2210. https://doi.org/10.1136/bmj.m2210 PMid:32493728