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Original Article

A Retrospective Assessment of the Continuous Health Care Provided to COVID-19 Patients Consulted Via Videoconference

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Abstract

OBJECTIVE: Telemedicine has been defined as a valuable tool in delivering care for COVID-19 patients. However, clinicians and policymakers should be convinced that traditional and new technological methods of clinical management may be equally effective. The purpose of this study was to generate some initial recommendations based on the clinical utility of videoconference consultation in forward triage and follow-up for COVID-19 patients.

MATERIAL AND METHODS: This retrospective cross-sectional study evaluated the medical records of 100 COVID-19 patients consulted using a videoconference program (Skype), from September 1, 2020, to February 3, 2021. The data were analyzed on demographic characteristics, disease history, the need for physical examination after videoconference consultation, pre-diagnostics and diagnostics, treatment decisions, number of videoconference consultation sessions in follow-up, duration of sessions, and final outcome.

RESULTS: The male COVID-19 patients constituted 54% of the total sample. The median age was 51 (42-61) years. The median duration of the initial videoconference consultation session was 16 (12-21) minutes. Following the initial videoconference consultation session, 14 patients required follow-up with all face-to-face visits; the remaining patients were primarily followed with videoconference consultation sessions. For 25 patients, it was sufficient to provide only videoconference consultation sessions; they were not required to be in the hospital for physical examination or any subsequent investigation at all. A total of 14 patients were hospitalized. There was no statistically significant difference between the high-risk group and the other patients according to the components of the disease management process via videoconference consultation.

CONCLUSION: Videoconference consultation enables a holistic assessment regardless of the patient's characteristics and allows for more time to be spent on each patient, particularly during the pandemic period without risk of contagion. It can be used as a forward triage and follow-up tool to identify patients in need of emergency hospitalization and continuous health care.

KEY WORDS: COVID-19, telemedicine, teleconsultation, outpatient clinic, triage, follow-up
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INTRODUCTION

The World Health Organization (WHO) officially announced the coronavirus disease 2019 (COVID-19) a pandemic on March 11, 2020.[1] This day coincided with the day when Turkey declared its first case of COVID-19. Since then, until the next 3 months, the pulmonology and infectious disease clinics in both public and private hospitals were transformed into isolated COVID clinics. In June 2020, the majority of outpatient clinics resumed face-to-face consultations, but access to healthcare facilities remained restricted due to the risk of COVID-19 contagion. Furthermore, delivering required care and follow-up was not always possible for COVID patients, with the exception of hospitalized patients. However, mild or moderate cases were not hospitalized. In this context, telemedicine's use for providing health care and self-quarantine guidance to COVID-19 patients, before they arrive at hospitals via a central strategy called forward triage, can protect clinicians, other patients, and the community from exposure.

A comprehensive review depicts the utility of telemedicine for different purposes in various epidemics, such as severe acute respiratory syndrome (SARS) or Middle East respiratory syndrome, and it outlines the enhanced preferences for telemedicine due to many advantages.[2] Several reports suggest that remote monitoring, sensors, and warning systems can be applied in COVID-19 intensive care services.[3] Telemedicine has been assessed as a *virtually perfect solution* to ensure that COVID-19 patients receive the required care and has been defined as a valuable tool in delivering care for COVID-19 patients.[4-6]

However, clinicians and policymakers should be convinced that traditional and new technological methods of clinical management may be equally effective, at least with evidence that telemedicine worked well for COVID-19 patients during the pandemic.

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Due to strict requirements for contagion prevention, this group of patients may be an excellent candidate for implementing telemedicine in medical practice. However, numerous studies have been conducted to determine the necessary interventions for COVID-19 patients.[2,5,7] Similarly, there is a need for studies revealing the clinical utility of remote approaches and the effectiveness of using telemedicine. Precisely at that point, the urgency for studies demonstrating the clinical utility and effectiveness of using telemedicine for initial clinical evaluation, follow-up, and emergency guidance for COVID-19 patients becomes apparent. The purpose of this study was to generate some initial recommendations based on the clinical utility of videoconference consultation in forward triage and follow-up for COVID-19 patients.

MATERIAL AND METHODS

Although all outpatient clinics in the university hospital, in Aegean Region, were opened for traditional face-to-face visits after the first 3 months of the pandemic, 1 physician (a pulmonologist) initiated a voluntary videoconference consultation (VCC) service. In this internet-based teleconsultation, the telemedicine implementation process utilized a personal account for a videoconference program (SkypeTM, version 6.4, Microsoft, Redmond, Wash, USA), as recommended by the University's Information Technologies Department as being free, user-friendly, easy to join without downloading the program, and most importantly, suitable for real-time videoconferencing. On the hospital's website, an announcement for an "online physician meeting" and an appointment system were posted. Although telemedicine was advocated by the Ministry of Health at the onset of the pandemic, there was no official videoconferencing infrastructure in place at that time. As suggested by the hospital's IT department, Skype was utilized within the limited known parameters of the data security level for personal communications, with no video recording. The patient has registered, and the conversation link has been sent through a short message to that registered smartphone number. The patient and his or her attendant, if one is present, accept the invitation to join the VCC. For consent to be verbal, the physician begins to explain the rationales and procedure to the patient, and after agreement, the VCC process begins. During the initial VCC session, all traditional patient evaluation practices, including also general views of inspection, are part of good clinical practice while excluding physical examination practices and this serves as a "forward triage." All sessions were conducted with the patients personally, as well as their family if they accompanied them with the patient's permission. After the initial VCC session, the physician tells the patient about the findings and plans for further VCC follow-ups, or a hospital visit for further examination at a scheduled time to help avoid lengthy waits. Reciprocal communication continues according to the same videoconference program (Figure 1). Videoconference consultation is completely free of charge, the virtue of the physician's initiative, since working for government prohibits and the regulations for reimbursement are still lacking.

MAIN POINTS

- Alternative methods should be developed to care for the patient burden during the COVID-19 pandemic.
- Telemedicine can be an alternative to providing patient care during the pandemic period.
- Clinical results regarding the care of COVID-19 patients with the videoconferencing consultation are presented.

In the given context, this retrospective cross-sectional study evaluated the medical records of 100 COVID-19 patients from September 1, 2020, to February 3, 2021. The reasons COVID-19 patients applied for VCC varied according to their current health situation, ranging from their suspicion of persistent symptoms after treatment completion to their attempt to get a second opinion. The data were extracted from the detailed medical records of officially registered patients and anonymized before being stored on the researchers' personal computer. The study analyzed data on demographic characteristics (age, gender, location, occupation, and working status) and disease history (comorbidities and new or previously diagnosed COVID-19). It also analyzed information about how the physician attended to the COVID-19 patients, the need for physical examination after the videoconference consultation, on-hold investigations, pre-diagnostics and diagnostics, treatment decisions, number of VCC sessions in follow-up, duration of sessions, and final outcome. The data also noted the need for in-hospital or intensive care unit treatment at any time before the first VCC session and whether a treatment has been initiated. Patients evaluated by the initial VCC session within the first 14 days after the diagnosis of COVID-19 were classified as "active COVID-19" cases. Patients who completed their quarantine period (14 days) prior to receiving their initial VCC were classified as "after active COVID-19" patients, regardless of the duration passed since their quarantine.

The analysis of follow-up period was analyzed in 3 groups—only face-to-face follow-ups, only VCC follow-ups, and hybrid follow-ups (alternating between VCC and face-to-face follow-ups according to the need). The groups were spontaneously formed during the process, based on the physician's preference and need. The time and duration of each VCC session were retrieved from the historical part of the videoconferencing program. The statistical analyses were performed using the statistical package for the social sciences (SPSS 26.0) software (IBM SPSS Statistics Data Editor, IBM Corp., Armonk, NY, USA). The descriptive analysis was performed for all the demographic features. The continuous variables were reported as medians (25th to 75th percentile) with the interquartile range, which implies that the variables were not distributed normally. Categorical variables were reported as numbers and percentages. A chi-square test was performed to analyze differences in categorical groups. For the variables assuming an abnormal distribution, the Mann–Whitney *U* test and Kruskal–Wallis test were used for 2-group and more than 2-group comparisons, respectively. A *P*-value of .05 was used for statistical significance. This study was carried out following the Helsinki Declaration; it was approved by the Institutional Review Board of Pamukkale University (decision no: 03; date: February 02, 2021) and additional permission from the Ministry of Health.

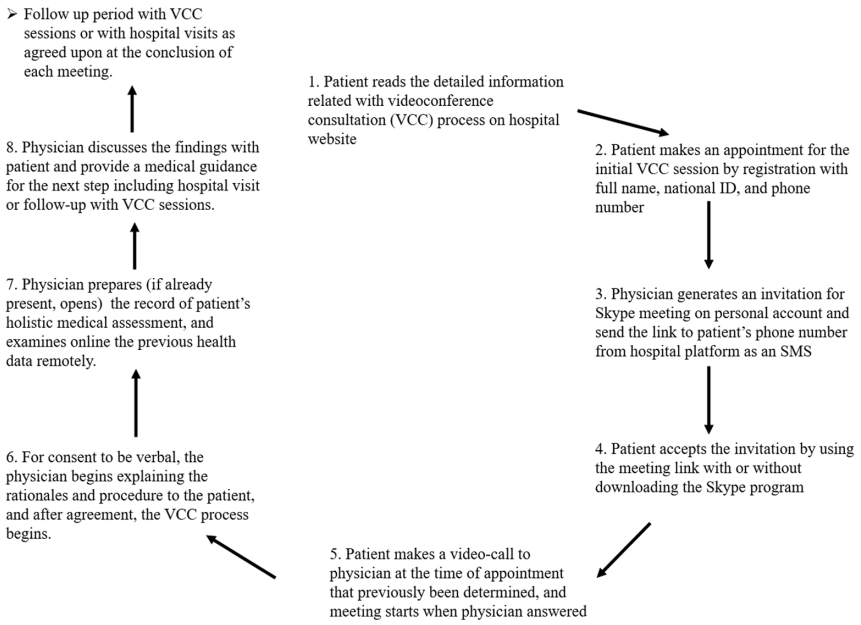

Figure 1. Diagram for videoconference consultation (VCC) process.

RESULTS

Patient Population

The male COVID-19 patients accounted for 54% of the total sample. The median age was 51 (42-61) years and 20% of the patients were in the 65-year-old age group. According to the occupations, 40% of the patients had a job that required at least an undergraduate or 2-year degree study program. The healthcare workers accounted for 11% of the total sample. The sample comprised 19% of patients from cities other than the location of the university hospital. The analysis revealed accompanying diseases in 56 of the patients, and pulmonary diseases in half of them. Table 1 summarizes the demographic characteristics of the patients.

Data from Initial Videoconference Consultation Sessions

At the time of the initial VCC session, 95 of 100 sampled patients were already diagnosed in a different (62 patients) or the same hospital (33 patients) where the interviewer physician was working. The median duration since the diagnosis was 27 (14-42) days. Of these 95 patients, 35 were previously hospitalized for COVID-19, while 13 were hospitalized in the intensive care unit. The remaining 5 patients in the sample were diagnosed within the initial VCC session by the physician. Table 2 presents the related data.

While 90 patients directly approached the physician for the initial VCC session, 5 patients were referred by another physician. In the remaining 5 instances, the patient's relative contacted the physician before doing the initial VCC personally with the patient.

The median duration of the initial VCC session was 16 (12-21) minutes. The shortest duration of the initial VCC session was observed for patients who produced medical records from pre-pandemic face-to-face visits with the same physician.

Patients who had previously been diagnosed by physicians other than those at the university hospital did not have a medical record at the university, but 50 of them were known to have been tested in other hospitals prior to their application, and the physician obtained data on medical test results, particularly radiological images, for 27 of these 50 patients from eNabiz (a national health record system). Table 3 presents the details of the applications and VCC process.

For 25 patients, it was sufficient to provide only VCC sessions; they were not required to be in the hospital for physical examination or any subsequent investigation. 74 Seventy-five patients underwent a physical examination in the hospital; 31 on the same day as the initial VCC.

At the time of booking the initial VCC session slot, 63 of the 95 patients who had previously been diagnosed with COVID-19 were taking treatment either for active COVID-19 or for ongoing COVID symptoms. For almost half of all attended patients (47%), the physician performing the teleconsultation suggested a novel treatment or some additional drugs. Table 4 presents the characteristics of the patient population according to their diagnosis and treatment information within the initial VCC session.

About 11 patients were hospitalized on the same day, as well as provided the initial VCC; of these, while 3 patients were diagnosed as "active COVID-19" cases (2 of them were newly diagnosed by the physician), 8 were diagnosed as "after active COVID-19."

Follow-Up Videoconference Consultation Sessions

The median duration of the follow-up VCC sessions was 5 (3-6) minutes. The median interval between follow-up VCC sessions was 13 days (9-24).

No follow-up was required in 17 patients. After the initial VCC session of 83 patients, 14 patients required follow-up with only face-to-face visits; the remaining 69 patients were primarily followed with VCC sessions. Around 39 of those 69 patients followed up with VCC sessions without the need to be in the hospital at all; 30 patients were given appointments for face-to-face visits as needed (Figure 2).

Table 1. Demographic Characteristics of the Patient Population

Parameter	N = 100
Gender	
Men	54
Women	46
Age (years) median (P25-P75)	51 (42-61)
Age groups	
≤45	30
46-64	50
≥65	20
Settlement	
In the city where the university hospital is located	81
In cities from the same geographical region	16
In cities from other regions	3
Occupation	
Requirement for undergraduate education	40
Housewife	12
Healthcare workers	11
Others (mostly farmers)	37
Working status	
Active working	62
Unemployed/disabled	21
Retired	17
Comorbidities	
Asthma	28
Interstitial lung diseases	4
Other lung diseases	6
Hypertension	14
Diabetes mellitus	10
Rheumatic disease	11
Cardiovascular disease	5
Thyroid disease	5
Chronic kidney disease	4
Other	7
Total	56

Three patients were hospitalized during the follow-up period, and 1 of them was pursuing follow-up as an "active COVID-19" case. Two other patients with ongoing COVID-19 symptoms were hospitalized, owing to bacterial superinfection in 1 patient and acute cholecystitis in the other.

Follow-Up Outcomes

A total of 83 patients needed to be followed up on. Five patients did not attend their most recent VCC appointment, and thus, the final outcome of the disease process for these patients could not be determined. Among the 78 remaining patients who received follow-up, 71 were cured, and 5 patients were still being followed due to persistent respiratory symptoms following COVID. Two patients died. The first patient died shortly after being admitted to the hospital following the initial VCC session due to severe respiratory failure. The second patient was cured of respiratory problems but died of sudden cardiac death after a 68-day follow-up.

Follow-Up in the Risk Group

The disease process was classified as high-risk in 12 previously diagnosed COVID-19 patients (9 female and 3 male), all of whom had chronic diseases or were over the age of 65. Among those patients, 7 patients had been hospitalized prior to submitting the initial VCC application. One patient among 12 was classified as having "active COVID-19," diagnosed by another physician prior to the first VCC session, and the remaining patients were from "after active COVID-19" group. While 3 patients received face-to-face follow-ups, 9 participated in hybrid follow-ups (followed up with VCC sessions and additionally face-to-face visits when needed). None of these patients required hospitalization. There was no statistically significant difference between this high-risk group and the other patients according to the components of the disease management process via VCC (Table 5).

DISCUSSION

The key findings of this study demonstrate the utility of VCC in terms of forward triage, clinical follow-ups, and emergency guidance for COVID-19 patients both during and after the quarantine period of COVID-19. Additionally, these VCCs provide physicians with an option for safety meetings with patients who may be contagious and thus pose a high risk during traditional face-to-face consultations. This option may result in a decrease in the number of people who visit the hospital for COVID-19 follow-ups, except when diagnostic intervention is required. If a diagnostic intervention was

Table 2. Characteristics of the Patient Population by Diagnosis and Prognosis of COVID-19 in the Period of the Initial Videoconference Consultation (VCC) Session

	Diagnosis Before First VCC Session	Hospitalization Before First VCC Session	ICU Need Before First VCC Session
In the university hospital	33	15	6
In another hospital in the same city	47	15	5
In a hospital in another city	15	5	2
Total	95	35	13

ICU, intensive care unit; VCC, videoconference consultation.

Table 3. Characteristics of the Patient Population by Attendance and Procedure in the Period of the Initial Videoconference Consultation (VCC) Session

Attendance	
First and self-attendance	49
Previously followed up by the university hospital	26
Previously followed up by the physician who made VCC sessions	12
Attended by the family members on behalf of the patient	5
Referred by another physician	5
A member of known healthcare workers	3
Investigation reports	
None	12
Exist	88
Having the university hospital records	38
Having national health system records	27
Having the reports held themselves	23
Procedure	
The initial VCC session + follow-up with only VCC sessions (never needed to be in the hospital)	25
The initial VCC session + physical examination and/or investigation in the hospital	75
Physical examination on the same day with the initial VCC session	31
Physical examination on another day after the initial VCC session (in their investigation appointment day)	44

ICU, intensive care unit; VCC, videoconference consultation.

required within the initial or follow-up VCC sessions, a time slot for the planned investigation was scheduled following the sessions. As a result, their hospital stay was reduced, and the results of the investigations were evaluated via additional VCC sessions, most of which occurred on the same day. In other words, this option enables online follow-ups that do not require lengthy hospital visits.

The home isolation of patients and those residing with them has become one of the main methods of preventing the spread of the virus; this practice stipulates a quarantine period of 14 days.[8] It must be noted that, besides the symptoms, increased levels of anxiety, depression, and stress were also observed in patients quarantined as a result of the diagnosis or for prevention of the contagion.[9] The COVID-19 symptoms and an increased level of anxiety increase the need for medical advice. However, the difficulty to get a hospital appointment owing to quarantine and lockdown regulations may make it difficult for active COVID-19 patients to receive continuous health care. This difficulty emphasizes the critical nature of remote medical assistance for them. Around 29% of the study population was evaluated during the home quarantine period, 45% (13 patients) were offered new/additional treatment, and the remaining patients were not offered additional treatment. While medical guidance was the primary intervention for those with mild to moderate disease, face-to-face follow-ups were only received for those with severe symptoms and follow-up investigations indicated were conducted in the hospital.

Studies show that about 85% of COVID-19 patients have mild to moderate symptoms.[10] However, unnecessary hospital admissions of patients linked to an intense fear called "*Coronaphobia*" have increased the burden on the healthcare system.[11] The unnecessary hospital appointments can be avoided by placing the patients under the supervision of a physician. However, patients determined as non-responsive to treatment and/or those with worsening conditions can be referred to the hospital immediately. Along with the forward triage, there must be a focus on the use of telemedicine for daily clinical practice. This option can be used for informing laboratory results to patients and for shortening the waiting time to see a specialist physician in healthcare

Table 4. Characteristics of the Patient Population by New Diagnosis, Therapy After the Initial Videoconference Consultation (VCC) Session, and Hospitalization Outcome

	Active COVID-19	After Active COVID-19	Total
New diagnosis by the physician	5	35	40
The duration between the diagnosis of COVID-19 to the initial VCC session			100
≤14 days	29	-	
15-29 days	-	30	
30-90 days	-	33	
>90 days	-	8	
Having treatment while pursuing the initial VCC session	11	52	63
New/added therapy after the initial VCC session	13	34	47
Hospitalization	3	8	11
Newly diagnosed	2	5	
Previously diagnosed	1	3	

VCC, videoconference consultation.

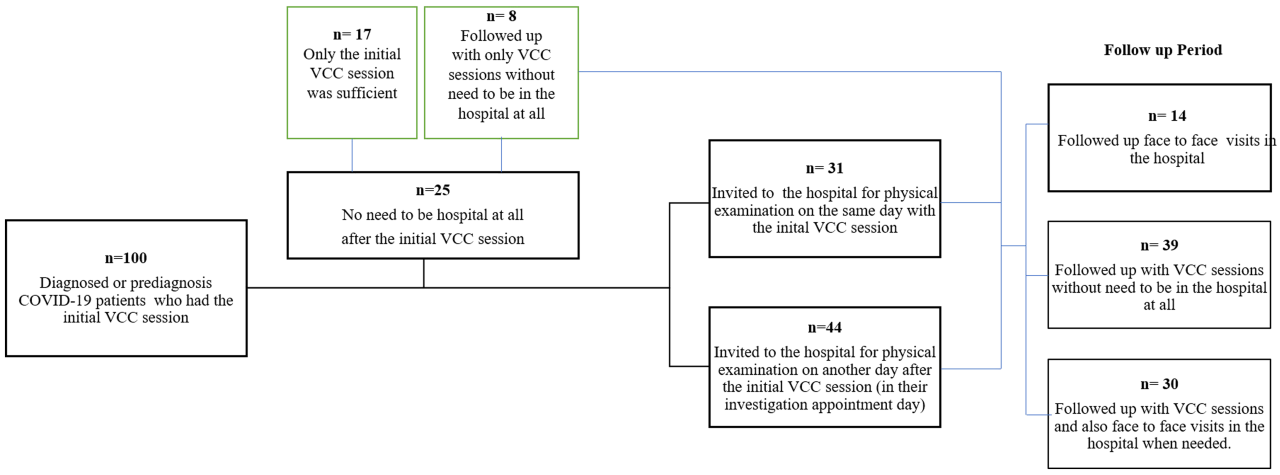

Figure 2. Flowchart of videoconference consultation (VCC) sessions.

units. This intervention can be more fruitful for patients having sophisticated device support and monitoring devices in their homes.[6,12] The clinical history and monitoring data with patient interviews may provide important information for determining health status; telemedicine also establishes a solid foundation for the relationship between a physician and the patient.[13]

The restrictions and individual follow-up avoidance may more adversely affect patients in the aforementioned high-risk group—elderly patients and those with accompanying chronic diseases.[14] This is attributed to the fact that such patients might need to visit hospitals frequently. In this study, 20% and 56% of the total sample, respectively, were 65 years and older and had an accompanying chronic disease. Twelve patients with these risk factors were found to be comparable to those without risk factors; according to the components of the disease management process via VCC, there was no statistically significant difference between this high-risk group and the other patients. Thus, it can be stated that VCC is also suitable for the evaluation of the patients with risk factors. Particularly, concerning COVID-19 patients who had a higher possibility to be symptomatic and a high-risk disease process, telemedicine can be an appropriate alternative for close follow-up. This could facilitate effective guidance in case of immediate remote triage.

While spending a considerable amount of time in patient evaluation is considered good medical practice, the pandemic has unfortunately forced a change in this medical practice, as in many other areas. Our knowledge of the spread of COVID-19 by aerosols and larger droplets and the factors affecting this situation is increasing every day.[15] Hence, it has become important to reduce the time spent in gatherings in a close environment and to create a safe atmosphere because of contagion risk. This can also be attributed to uncomfortable work conditions owing to the use of personal protection equipment for long periods. Vidal-Alaball et al[3] focused on the implementation of telemedicine, as a new channel, for facilitating more fluent, easy, and efficient patient and physician communication, during and maybe even after the pandemic. The collection of medical history has been addressed as the longest part of the medical evaluation, with a mean duration of 5-36.6 minutes.[16] The median duration of the initial VCC in the recent study was 16 (12–21) minutes. As the diagnostic spectrum in general pulmonology practice is quite broad, the needed time may be longer than that of a recent study. This duration may vary for examining COVID-19 patients who have already been diagnosed, have no comorbid conditions, and require only follow-up, as indicated by our data for this specific ailment. The test results of the previous examinations of patients in other hospitals could also be examined in detail with remote access by obtaining their consent during

Table 5. Univariate Analysis of the Disease Process in 12 Previously Diagnosed COVID-19 Patients (9 Female and 3 Male) with Chronic Diseases and Those Aged Over 65 Years, Relative to Others

	Patients in Risk Group N = 12	Others N = 88	*P**
Duration of the initial videoconference consultation (VCC) session in minutes**	16 (10.75)	16 (9.75)	.8
Number of total follow-ups**	3 (5)	2 (4.75)	.4
Number of VCC sessions in follow up**	3 (3.50)	3 (3)	.3
Number of face-to-face visits in follow up**	1 (0)	1 (1)	.1
Duration of VCC sessions in follow up**	5 (1)	4 (3)	.1
Average time in days between VCC sessions in follow-up**	14 (20)	13 (15)	.3
Duration of total follow-up period in days**	50 (31)	35 (61)	.4

*Mann–Whitney *U* test was used;**Median (inter-quartile range).
VCC, videoconference consultation.

the VCCs. When necessary, the current radiological images were compared with the previous ones. The proportion of patients who were investigated before in other state hospitals in the same province or another, except for the university hospital, was 62% among the study population but the physician could view prior investigations during the teleconsultation by retrieving data from eNabiz with patient's consent. This database reduced unnecessary examination, cost, and time. Given this, it must be noted that the need for the patients to come to the hospital can be reduced by combining anamnesis and prior investigations. These provisions comprise the priority expectations for the fruitful implementation of telemedicine during pandemic conditions.

According to a recent comprehensive review of studies from 18 countries (mostly United States and China), the most common purpose for different sorts of telemedicine applications in various disciplines was follow-up (53%), followed by prevention, screening, triage, diagnosis, and treatment aspects of COVID-19. In the review, the primary impediments to widespread use of telemedicine approaches were identified as data and resource availability, as well as patient and provider access to them, standards and legal considerations, insurance policies and reimbursement, and data privacy and security.[17] It is worth noting that the majority of the studies analyzed in that review were experimental in nature, with only a few publishing real-world results, possibly due to the pandemic's critical conditions. The uniqueness of our study appears to be in its representation of real-world data, and the areas in which the benefits of VCC implementation for COVID-19 patients appear to be promising. Our study is also significant in terms of acquiring experience and institutionalizing telemedicine as a non-inferior alternative to traditional healthcare delivery, particularly in exceptional circumstances such as the ongoing pandemic but is limited to this one instance of telemedicine implementation for diagnosing and monitoring COVID-19 patients in Turkey, countrywide recommendations and comparisons were not possible.

One limitation of the study may be the digital inequality, due to the lack of technical infrastructure and the ability to use technology that hindered many other patients to access VCC. However, the increased use of videoconference programs for work and educational activities, as well as for social support provision through family communication by cell phones, may enhance convenience in this regard. The pandemic situation teaches us a valuable lesson about overcoming similar technological equipment deficiencies in the future (creating different internet access areas outside the hospital, etc.).[18]

As a conclusion, while this study focused on the experience of a single physician in a single center, the findings indicate that VCC enables holistic assessment regardless of the patient's characteristics and allows for more time to be spent on each patient, particularly during the pandemic period without risk of contagion. It can be used as a forward triage and follow-up tool to identify patients in need of emergency hospitalization and continuous health care. Since telemedicine has been demonstrated to be a safe and beneficial practice over the world, particularly in special situations such as the pandemic, Turkey has yet to regulate its legal and ethical principles on telemedicine.

Ethics Committee Approval: This study was approved by Ethics committee of Pamukkale University, (Approval No: 03, Date: 02.02.2021).

Informed Consent: Written informed consent was obtained from the patient for publication of this research and accompanying image.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – G.A.; Design – N.C, G.A.; Data Collection – P.B., N.C.; Analysis and/or Interpretation – P.B., N.C.; Methodology: P.B., N.C., G.A.; Supervision: P.B., G.A.E.; . Writing – P.B., N.C.,G.A., Critical Review – P.B., N.C.,G.A.

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