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AN INTEGRATED CARE MODEL BASED ON HOSPITAL AND HOME DURING THE COVID-19 PANDEMIC: TELEHEALTH

COVID-19 PANDEMİSİNDE HASTANE VE EVDE KONTROLLÜ HASTA YÖNETİMİ SAĞLAYAN ENTEGRE BİR MODEL: TELESAĞLIK

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ABSTRACT

Objective: In this study, we aimed to present the details of a successfully implemented telehealth model in a university hospital during the COVID-19 pandemic.

Materials and Methods: Istanbul Faculty of Medicine is a university hospital where the first confirmed case of COVID-19 in Turkey was detected. In IFM, patients who were diagnosed with COVID-19 and received outpatient or inpatient treatment were followed up by telehealth for 21-28 days after leaving the hospital. The distinguishing features of this service are the provision of remote outpatient clinical monitoring personally by physicians and the use of web-based IP information technologies.

Results: Between March 15 and July 1, 2020, 1,042 individuals were followed up at least once, 860 patients for 21 days or more by the 26 physicians providing the telehealth service. A total of 11,736 calls were made by the physicians and 7,342 of those calls were answered and a total of 1,086 calls were made by patients. The median number of calls per patient was 4 (1-23). The median duration of the completed calls was 2.8 min (<1–50 min). During these follow-ups patients were informed about the importance of isolation. Most of the patients expressed their satisfaction with these follow-ups by thanking the calling physician.

Conclusion: In a pandemic such as COVID-19, telehealth services may increase adherence to treatment and isolation precautions among patients with diseases that require follow-up without hospitalization after diagnosis. Telehealth will facilitate early recognition of symptoms that may require hospitalization, ensuring these patients receive the care they need. Therefore, this approach should be widely adopted.

Keywords: COVID-19, telehealth, telemedicine, Turkey

ÖZET

Amaç: Bu makalede bir üniversite hastanesinde COVID-19 pandemisi sırasında başarıyla uygulanmış olan telesağlık modelinin anlatılması amaçlanmıştır.

Gereç ve Yöntem: İstanbul Tıp Fakültesi (İTF), Türkiye'de ilk doğrulanmış COVID-19 vakasının tespit edildiği bir üniversite hastanesidir. İTF'de COVID-19 tanısı almış ve ayaktan veya yatarak tedavisi düzenlenen hastaların hastaneden ayrılışından itibaren 21-28 günlük bir telesağlık izlemi yapılmıştır. Bu hizmetin örneklerinden farkı bizzat hekim tarafından uzaktan poliklinik izlemi olarak sunulmasıdır ve web-tabanlı, IP bilgi-iletişim teknolojisi kullanılmıştır.

Bulgular: 15 Mart-1 Temmuz 2020 tarihleri arasında tele-sağlık hizmeti ile 1.042 kişinin en az bir izlemi yapılmış olup 860 hastanın ise 21 gün ve üzerinde izlemi 26 hekim tarafından gerçekleştirilmiştir. Hekimler tarafından bu süreçte toplam 11.736 çağrı yapılmış ve bu çağrıların 7.342'si cevaplanmıştır. Ayrıca hastalar tarafından da toplam 1.086 arama yapılmıştır. Hasta başına medyan arama sayısı 4 (1-23) ve tamamlanan aramaların medyan süresi 2,8 dakika olarak saptanmıştır (<1-50 dakika). Bu izlemlerde hastalar izolasyonun önemi hakkında da bilgilendirilmiştir. Hastaların çoğu bu takiplerden memnuniyetini arayan hekime teşekkür ederek ifade ettiler.

Sonuç: COVID-19 gibi bir pandemide telesağlık hizmetinin tanı sonrası hastaneye yatış olmaksızın takip edilebilecek hastalarda tedavi ve izolasyon önlemlerine uyumu arttıracağı söylenebilir. Telesağlık, hastaneye yatış gerektirebilecek semptomları erken fark edip bu hastaların ihtiyaç duydukları bakımı almalarını sağlayacaktır. Tüm bu durumlar göz önüne alındığında bu yaklaşım daha yaygın olarak benimsenmelidir.

Anahtar Kelimeler: COVID-19, tele-sağlık, teletıp, Türkiye

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INTRODUCTION

Since appearing in China, the COVID-19 pandemic has affected millions of people worldwide, including people in Turkey. It seems that it will continue to do so until an effective treatment or vaccine is discovered. Since antiquity, humanity has faced many pandemics caused by infectious agents. In this and coming centuries, we may face more pandemics due to zoonotic diseases caused by existing or novel agents.

On the other hand, our technological age is opening doors to new opportunities in the fight against microorganisms, such as telehealth. Telehealth, or e-health, is the use of information and communication technologies for the diagnosis and treatment of medical conditions, as well as for health promotion and disease prevention (1). These systems encompass a wide spectrum of applications, from obtaining information from healthcare professionals to remote patient monitoring by having patients measure various health parameters such as blood pressure, oxygen saturation, pulse, temperature, and blood glucose in their homes and sending the data to healthcare professionals (2). The use of telehealth in healthcare services reduces the risk of healthcare associated infections in older and chronically ill patients due to repeated follow-up appointments and prevents unnecessary hospital/emergency admissions by people who are healthy or have mild infections (3).

The use of data communication technologies in the delivery of healthcare services is increasing, and successful examples of their use in infectious diseases have been reported in the last 10 years. Telehealth services have also been used to perform contact tracing during the Ebola epidemic and to provide consultation in SARS and influenza epidemics (4).

During the COVID-19 pandemic, it was determined that disease transmission occurs primarily through contact and droplets and that asymptomatic individuals also play a role in transmission (5, 6). This demonstrates the need to first reduce contact number and duration, followed by the use of personal protective equipment, waste management, and hygiene measures (7). Telehealth is ideally suited to these features of the pandemic and as a result, delivery of telehealth services has been increased worldwide as well as in Turkey during the pandemic. In Turkey, the use of digital systems in health began with a national action plan developed in the early 2000s (8). Since then they have been widely used, especially in the field of imaging. For the COVID-19 pandemic, the Ministry of Health (MoH) provided patient and contact tracing using two electronic monitoring systems, the Public Health Management System (PHMS) and Contact and Isolation Tracing System. All possible/confirmed COVID-19 patients were recorded in the PHMS by hospitals which provided diagnostic and treatment services and using these records, primary health care professionals were able to identify patients' close contacts to ensure isolation and generate a transmission tree.

The goal in COVID-19 pandemic management in Turkey was to prevent the demand for healthcare services to exceed the capacity of the healthcare system (9). As for the hospitals that would treat COVID-19 patients, those with at least two specialists each in the fields of Infectious Diseases and Clinical Microbiology, Pulmonary Diseases, and Internal Medicine and with level three adult intensive care beds were designated as "the pandemic hospitals" (10). Which services would be provided in primary care and at pandemic hospitals were organized based on the COVID-19 guidelines updated regularly by the MoH and used since the start of the pandemic. In the management of patients with suspected or confirmed COVID-19, patients who are discharged from hospital after treatment or who are treated at home have been followed up by primary family physicians and district health directorates until their isolation period is completed. Moreover, tracing, isolation, and screening of these patients' contacts and their follow-up until completing their isolation periods are conducted by district health directorates (11).

In the pandemic hospitals, patients with suspected COVID-19 undergo diagnostic tests and treatment is planned for those whose diagnosis is confirmed. Patient management is based on the MoH treatment algorithm. The guideline recommends inpatient treatment for patients with tachypnea (>24 beats/min), oxygen saturation <93% in room air, imaging findings of bilateral pneumonia, and signs of poor prognosis in blood tests (lymphocyte <800/μL or C-reactive protein >10 or ferritin >500 ng/mL or D-dimer >1000 ng/mL) and outpatient care for patients with uncomplicated/mild disease (12).

Istanbul Faculty of Medicine and the pandemic

Istanbul Faculty of Medicine (IFM) is a university hospital where the first confirmed case of COVID-19 in Turkey was detected. With the interventions conducted and pioneered during the pandemic, it has become one of the leading institutions in Turkey for hospital-level pandemic management. Following the first case detected at IFM on March 11, 2020, a total of 1,572 cases were diagnosed and treated as COVID-19 till June (13). In terms of disease management, patients diagnosed as having COVID-19 were either treated as inpatients or outpatients based on their clinical presentation and test results. The most important way to reduce the transmission of COVID-19 is to limit contact (7). Accordingly, in an application not previously used in Turkey, our hospital used digital communication tools for patient management and follow-up for 28 days after discharge or home treatment. These patients still continue to be monitored quarterly in a dedicated

COVID follow-up outpatient clinic established in our hospital. In this study, we aimed to present the details of a successfully implemented telehealth model in the university hospital during the COVID-19 pandemic.

MATERIALS AND METHODS

This article describes the organizational processes of the telehealth service model applied in the COVID-19 pandemic in a university hospital.

Telehealth at IFM

The telehealth service at IFM was planned to perform outpatient clinic follow-up of patients who presented to IFM and were subsequently treated at home and after discharge for patients who were hospitalized and treated in IFM, provided by the physician using web-based, IP information/communication technology. The aim of this service was to prevent unnecessary hospital admissions by maintaining continuity of care for confirmed COVID-19 patients, as well as avoid delays in case they required admission to the emergency department.

Telehealth implementation

Preparation phase

The process of implementing telehealth at IFM started in March 2020 and was coordinated and managed by the Department of Public Health. First, a management team was established, and leader and assistant faculty members were identified to be in charge of the system. A coordinator from the information technology unit was designated for the telehealth system infrastructure requirements. The leader and assistant faculty members prepared the COVID-19 follow-up protocol, the history and follow-up forms, and trained the physicians who would be delivering telehealth services, prior to its implementation. While creating the history form and determining follow-up duration, a faculty member from the Department of Infectious Diseases and Clinical Microbiology was consulted and the guidelines published by the Ministry of Health were considered. The participating physicians were trained on using the system, communication skills, and the algorithm to apply. Resident physicians (n=26) were appointed under the supervision of faculty member physicians from the department (n=5). This task-sharing aimed to facilitate rapid feedback about patients' potential health problems in daily follow-up, the generation of daily reports for each followed patient at the end of the day, and process evaluation. This process worked almost like online daily round visits. Two pulmonologists in the team undertook responsibility for intervening in cases requiring consultation. Considering the patients' ages and internet access, the decision was made to provide the service via a web-based phone system to make the system inclusive of all patients. The preparation, implementation, and evaluation of telehealth management were performed according to the administrative process shown in Table 1.

Implementation

The algorithm shown in Figure 1 was used to ensure the standardization of telehealth calls. When using the history and follow-up form, in the first interview the patients were asked about their sociodemographic characteristics, habits, physician-diagnosed chronic diseases, regularly used medicines, and contact and travel history. In subsequent calls, the physicians questioned the patients about their symptoms and compliance to isolation measures and provided information about their health status and isolation (14).

To enrol in the telehealth system, the patients were first informed that the follow-up team would contact them after they had left the hospital, and their written consent was obtained. The contact information and electronic health records of consenting patients were reported to the home follow-up coordinator in accordance with the

Table 1: Administrative process

- Establishing a telehealth management team
- Determining the scope of the provided healthcare services
- Creating history and follow-up forms to be used while providing the healthcare service
- Identifying and training the team of service providers
- Installing software on physicians' computers for use of the web-based phone system
- Obtaining patients' verbal consent to be included in the service at time of hospital presentation
- Ensuring patients are called from an institutional line
- Ensuring patients are called by the same physician
- Not imposing any additional costs to patients
- Providing consultation if patients need information from specialists related to the disease
- Providing patients the telephone numbers of physicians to address social and psychological impacts
- Reporting and evaluating daily patient follow-ups
- Organizing periodic evaluation meetings of the telehealth follow-up team
- Preparing weekly reports and informing the hospital administration about the process and cases
- Increasing adherence to isolation precautions and treatment among COVID-19 patients

Personal Data Protection Law and the Patients' Rights Act. A pool of patients was generated, and a physician was appointed to follow-up each patient for 21-28 days. A follow-up frequency was determined based on the presence and severity of active symptoms. Older patients, patients with comorbid diseases, and those with ongoing active symptoms were followed up daily, while patients who were in a stable condition and those with no active symptoms and in good general condition were followed up weekly.

Evaluation

After the resident physician followed up the COVID-19 patients receiving the telehealth service, they prepared a summary report at the end of the day to present to the supervising physician. The supervising physician monitored the process by providing daily feedback to the residents specific to each patient. Moreover, patient data was collected in a common file without including patient names and was presented weekly to hospital administration to facilitate the process management. In addition to basic descriptive information, these reports included information such as weekly changes in the patients' symptoms.

RESULTS

During the telehealth calls, the "patient follow-up algorithm" was used and the patients were followed by using the "history and follow up forms" (Figure 1). Between

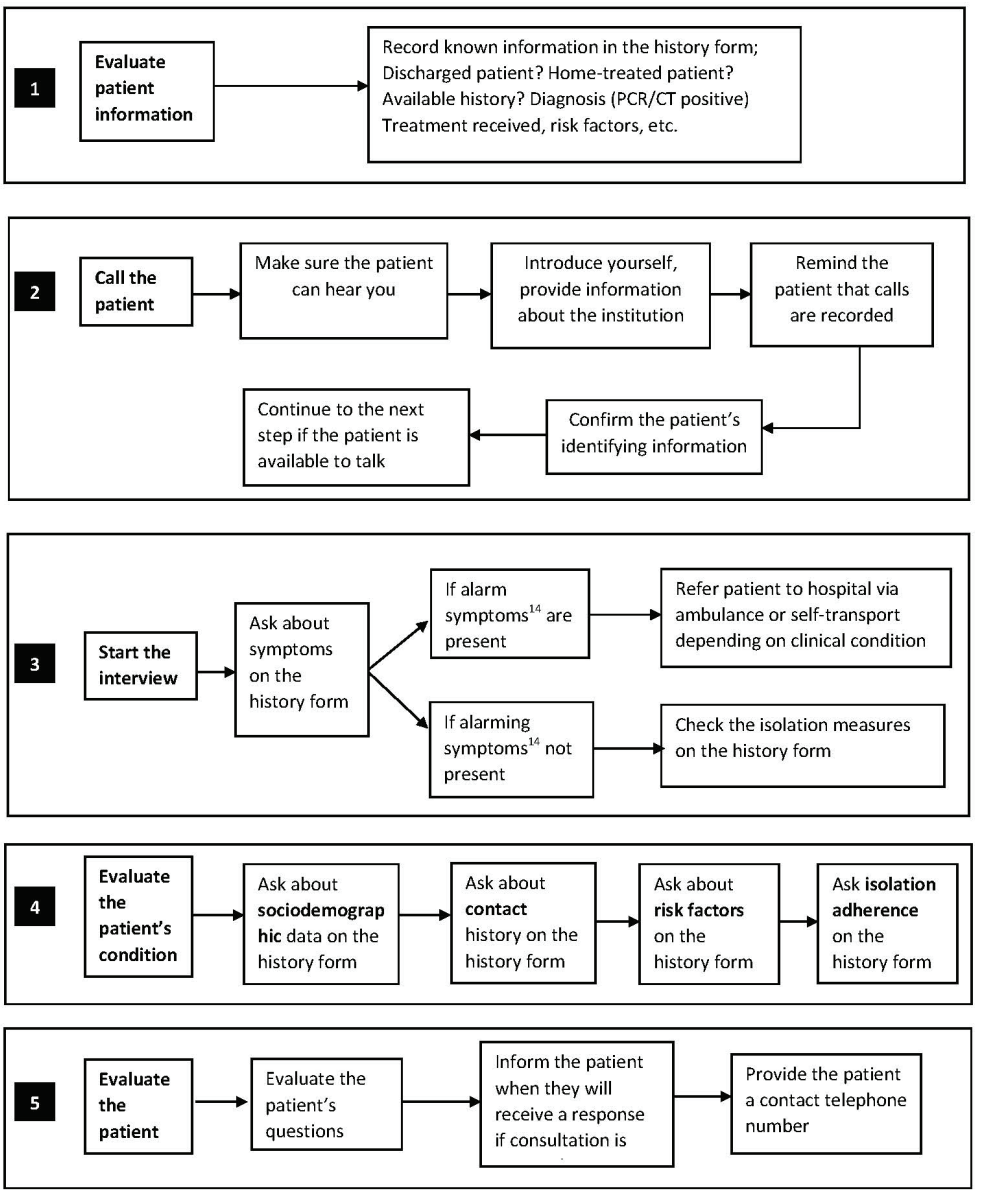

Figure 1: Telehealth patient follow-up algorithm

March 15 and July 1, 2020, a total of 1,207 individuals were enrolled in follow-up and 1,042 individuals were followed up at least once by the 26 physicians providing the telehealth service. Of the 165 individuals not followed up, 109 could not be reached by phone number they provided, 40 could not be followed for reasons such as hospitalization, and 16 declined to participate despite having initially given verbal consent. Of these 1,042 patients, there were 860 patients who have been followed up for 21 days or more. Of the 182 patients who were followed up for less than 21 days 36 were hospitalized, 32 declined to continue the follow-up, 4 died, and 110 left the follow-up early due to other reasons related to the patient.

A total of 11,736 calls were made by the physicians and 7,342 of those calls were answered. The number of calls per patient was 4 (1-23). The median duration of the completed calls was 2.8 min (<1–50 min). In addition, the patients were also able to call the physician, and a total of 1,086 such calls were made by 302 patients.

The scope of the telehealth service included medical care, diagnosis, consultation, and treatment, as well as health education and providing patients with medical information they wanted to learn about. In this regard, in addition to recording the patients' histories and monitoring their symptoms and isolation, the patients were also educated about the drugs they were using to treat COVID-19. When required, coordination was established between the patient and primary care physician. To address social needs, communication was established between the patients and teams volunteering in their areas. Patients requiring psychological support were referred to a free psychological counselling service provided by Provincial Directorate of Health. During these follow-ups, the patients asked questions such as when their isolation would end and how they would understand if they had recovered, and they asked for help learning their PCR test results. In particular, patients were informed about the importance of isolation and what precautions to take in crowded families. Most of the patients expressed their satisfaction with these follow-ups by thanking the calling physician. For instance, a physician made the following report about a patient with mild symptoms who was scheduled for less frequent calls: *"...they were very happy to be called, they said they wanted to be called every day, as if they were bored and overwhelmed. I am planning to call them tomorrow, too, and ask how they are doing."*

DISCUSSION

During a pandemic, rapid increases in patient numbers and emergency admissions are a threat to health systems and, most importantly, to healthcare providers. The guidance provided remotely by professionals in telehealth services is important because it prevents unnecessary emergency admissions and thereby reduces the patient burden. On the other hand, it will reduce the infection risk to healthcare professionals as well as their patient load (3, 15, 16). Thus, in situations such as the COVID-19 pandemic, it can be used successfully in hospital and home-based service delivery models.

The fact that the telehealth service provided by our hospital was free of charge was an advantage that increased patient adherence. No payment was made to the service providers. This decreased the motivation of the participating resident physicians during the process. However, in many countries, healthcare delivered by telehealth services has been or is being integrated into remuneration systems using different approaches (17, 18). In our country and many other countries without this integration, including telehealth services in the health insurance reimbursement system may be a solution to this problem (3, 15).

In the telehealth system, the patient's active participation in the process is important. Health data obtained from patients are recorded solely on the basis of self-report. Ensuring that measurements such as blood glucose, temperature, and blood pressure made by the patients are seen by the physician via an integrated system will facilitate objective decision-making (3, 15). Disease duration is long in chronic conditions. Therefore, patients can self-monitor via simple measurements such as blood pressure and blood glucose levels, and this information can be used in telehealth. In acute diseases, however, it is not always possible for patients to reach the necessary knowledge level in a short amount of time and be able to perform critical measurements. In such acute cases, management depends heavily on the person's age, education, health literacy, and level of technology use. Especially for individuals able to use smartphones and applications, communication has become easier. Those who do not use such technologies are able to describe some of their symptoms as better or worse than the day before.

There may occasionally be problems ensuring that patients trust the system. Such problems were also encountered in this study and were overcome by informing the patients before they left the hospital that they would be called for follow-up and ensuring that the patients were called from an institutional line and by the same physician each time.

In a pandemic such as COVID-19, expecting telehealth services to completely replace face-to-face care is not reasonable in terms of the patient–physician communication and ethical considerations. However, it can be said to increase adherence to treatment and isolation precautions among patients with diseases that require follow-up without hospitalization after diagnosis. Telehealth will

also enable critical patients to receive the care they need by preventing unnecessary hospital admissions, and therefore this approach should be more widely adopted.

Ethics Committee Approval: This study was approved by the Clinical Ethical Committee of the Istanbul University, Istanbul Faculty of Medicine (Date: 14.08.2020, No: 135872).

Informed Consent: Written consent was obtained from the participants.

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