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ORIGINAL ARTICLE

The impact of remote consultation on mortality rate of Covid-19 patients admitted to intensive care units

Fatemeh Amiri, Fatemeh Hayati, Asieh Aref, Saghar Babadi, Fereshte Amini, Zahra Ababzadeh, Atena Golabi, and Homeira Rashidi*

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* ***Correspondence to***: *Diabetes Research Center, Health Research Institute, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran Email:* hrashidi2002@gmail.com

About the authors:

Fatemeh Amiri; Assistant Professor, Diabetes Research Center, Health Research Institute, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.
Fatemeh Hayati; Assistant Professor in Nephrology, Chronic Renal Failure Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.
Asieh Aref; Assistant Professor in Nephrology, Chronic Renal Failure Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.
Saghar babadi; General practitioner(MD),Diabetes Research Center, Health Research Institute, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.
Fereshte amini; General practitioner(MD),Diabetes Research Center, Health Research Institute, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.
Zahra Ababzadeh; General practitioner(MD),Diabetes Research Center, Health Research Institute, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.
Atena golabi; General practitioner(MD),Diabetes Research Center, Health Research Institute, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.
Homeira Rashidi; Professor in Endocrinology, Diabetes Research Center, Health Research Institute, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

ABSTRACT

During critical situations like the Covid-19 pandemic, a shortage of medical staff not only impacts the mortality of coronavirus patients but also contributes to delayed diagnoses of other life-threatening disorders like cancer. This study aimed to compare death rates and outcomes in patients with COVID-19 admitted to Intensive Care Units through remote and in-person consultations, and Conducted at Razi Hospital in Ahvaz, the cross-sectional study analyzed patient records from ICU admissions in August and September 2020, dividing them into case and control groups. Internal medicine residents provided remote consultations based on requests from attending specialists in other hospitals. Of the 58 patients included, the Remote Consultation group had significantly shorter wait times for clinical consultation (2.6 vs. 4 hours, p=0.002). There were no differences in waiting times for writing orders or death rates between the groups (p=0.9 and p=0.7, respectively). Medication usage also showed no significant variance. Remote healthcare offers benefits like long-term cost-effectiveness, reduced healthcare facility strain, shorter outpatient clinic wait times, and minimized exposure risks during pandemics like Covid-19.

Keywords: Telemedicine, Covid-19, Intensive Care Units, Mortality

INTRODUCTION

On March 11, 2020, the World Health Organization declared COVID-19 as a global pandemic. Healthcare systems worldwide were strained due to the influx of critically ill patients. In emergency situations and pandemics, the demand for healthcare services grows significantly, leading to decreased efficiency and resources (1).

Remote consultation in medicine is defined as "providing healthcare from a distance through telecommunications technologies with the aim of benefiting patients or populations." Remote consultation not only improves patient health but can also reduce healthcare costs, which is why its utilization has significantly increased in the past decade. Access to medical information, providing care that was previously inaccessible, enhancing clinical education, quality control of screening programs, and reducing healthcare costs all highlight the importance of utilizing remote consultation in prevention and treatment (2). The Agency for Healthcare Research and Quality divides remote consultation into three subgroups based on its usage:

1. Video communication between physician and patient,
2. Maintenance and transmission of patient medical documents, and
3. Home patient monitoring to ensure necessary medical care, also known as remote patient monitoring (RPM).

This system is extremely beneficial in treating rare diseases and critical conditions such as the COVID-19 pandemic. In rare diseases, where fewer clinical experiences are available, remote consultation facilitates maximum treatment efficiency for these patients through collaboration and consultation with specialists worldwide (3).

In the COVID-19 pandemic, due to increased contagion following close patient and healthcare worker contact, virus spreading in non-hospital environments, patient fatigue from waiting for suitable treatment protocols, and the increased workload of healthcare staff leading to decreased quantity and quality of COVID-19 patient treatments, remote consultation significantly aids in improving these conditions (4,5). A study conducted in Japan showed that even in areas with minimal COVID-19 infection rates, emergency services for other diseases were significantly affected at the minimum level possible. This demonstrates the importance of fundamental changes in treatment strategies, not only for COVID-19 but also for other diseases (6).

The effectiveness and efficiency of remote consultation is influenced by factors such as cost, the population under investigation, the patient's adherence to this type of treatment method, and the type of medical expertise used is undeniable. In a study conducted in Indonesia in order to investigate the effectiveness of the remote consultation program, the increase in the workload of specialists, the disruption of the Internet network, the need for more infrastructure, the need for sufficient information and the training of personnel in relation to the system used and The defects that have arisen, the lack of timely access to patient information, and the unwillingness of a number of specialists in this program have been among the stated disadvantages of this system in terms of personnel (7).

In this regard, the unprecedented disruption caused by the arrival of the Covid-19 pandemic as a catalyst for the adoption of new technologies that have so far experienced poor reception, the rapid shift towards mostly virtual consultations as an essential tool to continue to provide services and support Patients and vulnerable staff caused. This was a valuable opportunity to analyze the effectiveness of virtual counseling.

The study examined how death rates and various outcomes differed between patients with COVID-19 admitted to Intensive Care Units based on whether they received remote or face-to-face consultations.

METHODS

The present study is based on a research design with ethical code IR.AJUMS.REC.1399.726 at the School of Medicine, Ahvaz Jundishapur University of Medical Sciences, and informed consent was obtained from all patients at the beginning of hospitalization. This cross-sectional study aimed to compare remote consultation with in-person consultation in terms of mortality rates among COVID-19 patients hospitalized in intensive care units (ICU). The study was conducted at Razi Hospital in Ahvaz, a prominent center for treating COVID-19 patients in the city. All patients' record files who were hospitalized in the ICU during August and September 2020 were divided into two groups: the case group and the control group. In the case group, internal medicine residents provided necessary consultations through visual and auditory messaging based on requests from attending specialists in other hospitals. In contrast, the control group received all consultations in person. Relevant information was recorded for analysis.

Study Population

The study included patients diagnosed with COVID-19 infection through PCR or CT scan in the intensive care units at Razi Hospital who required consultation with internal medicine sub-specialties for various reasons. Exclusions comprised patients who did not necessitate internal medicine consultation, deceased patients, individuals with incomplete information, and those unwilling to participate. Consultations with internal medicine subspecialties (rheumatology,

endocrinology, nephrology, hematology, and gastroenterology) requested for inpatients were conducted remotely in the case group using visual and auditory messaging platforms.

Primary Outcomes

The primary outcomes of the study included the waiting time to respond to consultation requests, waiting time to write orders in the patient file post-consultation, and the mortality rate. Descriptive statistics presenting mean ± standard deviation for quantitative data and percentages for qualitative variables will be displayed through tables and figures. The chi-square test will be employed to compare frequency distributions in the two groups, the t-test for comparing means, and the odds ratio calculated to compare the frequency of genotypes between the case and control groups. A significance level of $p < 0.05$ will be used for all analyses. Data analysis will be performed using SPSS software (V22).

RESULTS

In this study, 58 eligible patients were enrolled and divided into two groups: case (31 patients) and control (27 patients). Demographic information of the patients is presented in Table 1.

TABLE I. DEMOGRAPHICS AND CLINICAL CHARACTRISTIC OF STUDY PATIENTS WITH COVID-19 INFECTION

variables		Case N=31	Control N=27
Gender	Female	16 (59.2%)	17 (54.8%)
	Male	11 (40.8%)	14 (45.2%)
Age(mean±SD)	Female	57.1 ±14.3	61.2 ±13.7
	Male	65.4 ±13.6	68.2 ±11.5
Comorbidities	Hypertension	6 (22.2%)	21 (56.7%)
	Diabetes mellitus	12 (44.4%)	13 (41.9%)
	Chronic Kidney Disease	3 (11.1%)	7 (22.5%)
	Chronic Hepatitis	1 (3.7%)	-
	Hypothyroidism	3 (11.1%)	1 (3.2%)
	Rheumatoid Arthritis	1(3.7%)	

After comparing the two groups, it was found that in the remote consultation group, the waiting time for clinical consultation was significantly shorter (4 hours vs. 26 hours) in comparison to the control group (P-Value = 0.02). However, no significant difference was observed in the time from consultation to recording in the patient file between the two groups (P-Value = 0.7) (Table 2). Lastly, the two groups were compared in terms of mortality rates, and no significant difference was observed in the mortality rate between the two groups (P-Value = 0.7) (Table 2).

TABLE II. OUTCOMES OF REMOTE VS IN PERSON CONSULTATIONS

variables	Case N=31	Control N=27	P value
Waiting time to respond to consultation requests (Hours) Mean ±SD	2.6 ± 1.1	4 ± 1.1	0.002
Waiting time to write orders in the patient file after completing the consultation (Hours) Mean ±SD	1.1 ±0.85	0.99 ±0.7	0.920
Mortality Rate	17 (63.5%)	21(67.7%)	0.786

Furthermore, the two groups were compared in terms of medications usage during hospitalization. Results showed no significant difference in the types of medications used between the two groups (Table 3).

TABLE III. COMPARE TWO GROUPS IN TERM OF TYPES OF MEDICATIONS USAGE DURING HOSPITALIZATION

Medications	Case	Control	P value
Insulin	13 (48.1%)	21(67.7%)	0.131
Anticoagulants	14 (51.9%)	19 (61.3%)	0.469
Antibiotic	14 (51.9%)	16 (54.6%)	0.1
Antihypertensive	4 (14.8%)	9 (29%)	0.195
Antiviral	1 (3.2%)	5 (18.5%)	0.087
Glucocorticoid	14 (51.9%)	20 (64.5%)	0.329

DISCUSSION

The results of the current study showed that remote counseling had the expected maximum efficiency and the mortality rate with this treatment strategy was similar to routine practices.

In critical situations such as the COVID-19 pandemic, not only the mortality of COVID-19 patients but also delayed diagnosis of other life-threatening conditions like cancer is impacted by the lack of specialized healthcare personnel, leading to increased mortality rates for both COVID-19 and non-COVID-19 patients.(8,9,10) Strategies such as remote counseling have been implemented in various countries to better manage critical situation.(11)

Additionally, the waiting time for clinical consultations in the remote counseling group was significantly shorter than in the control group. This valuable finding indicates the effectiveness of remote counseling, especially in critical situations.

A study conducted in Indonesia to address the challenges hindering the efficiency of remote counseling gathered the opinions of physicians from 39 different clinics using structured questionnaires and interviews. The most reported dissatisfaction was related to internet network disruptions affecting data transmission, increased workload, lack of budget allocation for the system, and using remote counseling to address the reported issues. To mitigate intervening

factors, healthcare professionals in the current study communicated with each other through social and national networks to prevent excessive workload and facilitate early diagnosis efficiently without incurring high costs.(7)

Similar to any system, concerns exist regarding remote counseling that require special attention, such as patient data security and accidental data transmission errors between two patients. To address this issue, GUO and colleagues proposed a Blockchain-Based ABE plan to minimize errors in patient data transmission and maximize patient data confidentiality.(12)

While most societies support the enhancement of healthcare systems through remote counseling, South Korea stands as an opponent in this area. Researchers in South Korea argue that the high ratio of specialized physicians to the country's geographical area leads to easy access to healthcare specialists for citizens, making them inclined against remote counseling methods. With 73% of Korean physicians being specialists, exceeding the standard of 65% set by other countries, it is not surprising that South Korea is a principal opponent of remote counseling practices in global health policies.(13)

Similar to the findings of the present study, they also reported in China that the use of remote consultation had a very positive effect on providing medical services to all types of patients, so that even a dedicated phone line without any cost, the possibility of consultations provided free consultations by specialists to patients so that on March 23, 2020, 9085 patients received telephone consultations . In this system, the applicants first consulted with personnel other than doctors, and were referred to specialists by phone if needed and diagnosed with the possibility of disease. In this method, 293 patients with Covid-19 were identified by 137 specialists (14).

CONCLUSION

The findings of the current study showed that the mortality rate in patients with Covid-19 hospitalized in intensive care units who underwent remote consultation was similar to those who had face-to-face consultation.The benefits of remote healthcare, such as cost-effectiveness in the long run, reduced pressure on healthcare facilities due to unnecessary face to face consultations, decreased wait times in outpatient clinics for patient follow-ups, and minimizing unnecessary patient and staff exposure during a pandemic like COVID-19, are more pronounced. Further studies with larger sample sizes and an evaluation of remote consultation efficiency in systems where patients are actively involved in providing information are highly recommended.

CONTRIBUTORSHIP STATEMENT

Study concept and design: H. R., F. H., F.A,and A.A; analysis and interpretation of data: S. B., F. Am., Z.A., and A.G; drafting of the manuscript: H.R.; critical revision of the manuscript for important intellectual content: F. H.,F.A, and A.A.; statistical analysis:H.R. All authors reviewed and commented on the manuscript, as well as all are responsible for the content of the manuscript.

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Ahvaz Jundishapur University of Medical Sciences.

DECLARATION OF CONFLICTING INTERESTS

The authors declared no conflicts of interest regarding the research, authorship, and publication of this article.

DATA AVAILABILITY STATEMENTS

The dataset presented in the study is available on request from the corresponding author during submission or after publication. The data is not publicly available due to confidentiality.

REFERENCES

1. Jumreornvong O, Yang E, Race J, Appel J. Telemedicine and medical education in the age of COVID-19. Academic Medicine. 2020.
2. Hong Z, Li N, Li D, Li J, Li B, Xiong W, et al. Telemedicine During the COVID-19 Pandemic: Experiences From Western China. J Med Internet Res. 2020 May;22(5):e19577.
3. Bahl S, Singh RP, Javaid M, Khan IH, Vaishya R, Suman R. Telemedicine technologies for confronting COVID-19 pandemic: A review. Journal of Industrial Integration and Management. 2020;5(04):547–61.
4. Bashshur R, Doarn CR, Frenk JM, Kvedar JC, Woolliscroft JO. Telemedicine and the COVID-19 pandemic, lessons for the future. Vol. 26, Telemedicine and e-Health. 2020.
5. Galiero R, Pafundi PC, Nevola R, Rinaldi L, Acierno C, Caturano A, et al. The Importance of Telemedicine during COVID-19 Pandemic: A Focus on Diabetic Retinopathy. Vol. 2020, Journal of Diabetes Research. 2020.
6. Kohei Agetaa HN, Tsuyoshi Nojimaa TY. Delay in Emergency Medical Service Transportation Responsiveness during the COVID-19 Pandemic in a Minimally Affected Region - OKAYAMA UNIVERSITY SCIENTIFIC ACHIEVEMENT REPOSITORY. Acta Med Okayama [Internet]. 2020 [cited 2022 Jul 24];74(6):513–20. Available from: https://ousar.lib.okayama-u.ac.jp/en/61210
7. Indria D, Alajlani M, Sf. Fraser H. Clinicians perceptions of a telemedicine system: a mixed method study of Makassar City, Indonesia. BMC Med Inform Decis Mak [Internet]. 2020 Sep 17 [cited 2022 Jul 24];20(1):1–8. Available from: https://link.springer.com/articles/10.1186/s12911-020-01234-7
8. Hamilton W. Cancer diagnostic delay in the COVID-19 era: what happens next? Lancet Oncol [Internet]. 2020 Aug 1 [cited 2022 Jul 25];21(8):1000–2. Available from: http://www.thelancet.com/article/S1470204520303910/fulltext
9. Ding YY, Ramakrishna S, Long AH, Phillips CA, Montiel-Esparza R, Diorio CJ, et al. Delayed cancer diagnoses and high mortality in children during the COVID-19 pandemic. Pediatr Blood Cancer [Internet]. 2020 Sep 1 [cited 2022 Jul 25];67(9). Available from: /pmc/articles/PMC7361231/
10. Alkatout I, Biebl M, Momenimovahed Z, Giovannucci E, Hadavandsiri F, Salehiniya H, et al. Has COVID-19 Affected Cancer Screening Programs? A Systematic Review. Front Oncol. 2021 May 17;11:1540.
11. Cobre A de F, Böger B, Fachi MM, Vilhena R de O, Domingos EL, Tonin FS, et al. Risk factors associated with delay in diagnosis and mortality in patients with COVID-19 in the city of Rio de Janeiro, Brazil. Cien Saude Colet [Internet]. 2020 Sep 30 [cited 2022 Jul 25];25:4131–40. Available from: http://www.scielo.br/j/csc/a/8ZkCwsPy9WdjY9P5Jkyr46v/abstract/?lang=en
12. Guo R, Shi H, Zheng D, Jing C, Zhuang C, Wang Z. Flexible and Efficient Blockchain-Based ABE Scheme with Multi-Authority for Medical on Demand in Telemedicine System. IEEE Access. 2019;7:88012–25.
13. Kim AY, Choi WS. Considerations on the Implementation of the Telemedicine System Encountered with Stakeholders' Resistance in COVID-19 Pandemic. Telemedicine and e-Health [Internet]. 2021 May 1 [cited 2022 Jul 28]; 27(5):475–80. Available from: https://www.liebertpub.com/doi/10.1089/.2020.0293
14. Hong Z, Li N, Li D, Li J, Li B, Xiong W, et al. Telemedicine During the COVID-19 Pandemic: Experiences From Western China. J Med Internet Res 2020;22(5):e19577 https://www.jmir.org/2020/5/e19577 [Internet]. 2020 May 8 [cited 2022 Jul 28]; 22(5):e19577. Available from: https://www.jmir.org/2020/5/e19577