

REVIEW

The theory behind and factors influencing the use of telemedicine during the COVID-19 pandemic: A systematic review

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Abstract. A paradigm change in patient health care toward telemedicine services was necessary in 2020 due to the COVID-19 pandemic, which broke out at the end of 2019. Theories used in determining the determinants of telemedicine utilization are various theories. Research conducted on the use of telemedicine still has doubts about the basic theory used in analyzing the factors that influence telemedicine, especially during the Covid-19 pandemic. The goal of this study is to outline the fundamental principles of telemedicine utilization during the Covid-19 outbreak and the variables that affect it. This Literature Review uses the scoping review method with the tool procedure, namely PRISMA. Based on the conducted literature review, there are 12 scholarly papers addressing the variables that affect the utilization of telemedicine services. During the Covid 19 epidemic, more individuals in many nations used telemedicine services. Anderson's theory of health care use and the idea of technology adoption or acceptance serve as the foundational theories for forecasting the variables that affect the use of telemedicine. The utilization of telemedicine is influenced by 29 different factors that come from different theories. The desire for health, exposure to COVID 19, co-morbidities, social media usage, avoiding contamination, time efficiency, ease of use of services, social impact, and hedonic incentive are among the factors associated to the COVID 19 pandemic.

Introduction

In 2020, the COVID-19 epidemic that began at the end of 2019 spread more widely, requiring a paradigm shift regarding health care for patients. There has been a change in the health care system that started with traditional face-to-face medical visits, due to social restrictions, then health service

providers have switched to telemedicine, especially in chronic diseases (1,2).

Telemedicine offers medical services over the internet so that patients, physicians, and other healthcare professionals may engage and communicate while preserving the physical distance required to stop the spread of the Covid-19 illness. Telemedicine improves patient care, delivers high-quality healthcare and emergency service performance, cuts down on the amount of time it takes to visit patients and make diagnoses, increases access to remote care, particularly for patients living in rural areas, and reduces costs for both doctors and patients by streamlining clinical procedures, lowering the expense of hospital travel, and lowering the risk of potential virus exposure (3,4). Telemedicine is proven to provide care that improves the quality of life for vulnerable patients and families facing health problems (5,6).

The sorts of medical services provided by telemedicine must be thoroughly assessed, as must the minimal requirements for patients to be able to receive these medical services. Telemedicine can support improved disease preventive initiatives, track patients with ongoing illnesses, and fight malnutrition in at-risk groups including expectant mothers and young children (7).

As there is such a great need for health services and information, particularly during a pandemic, research indicates that the community responds favorably to the use of telemedicine, as seen by the extremely quick growth in the number of users. Using telemedicine services is a kind of health-seeking behavior, and it is impacted by information, attitudes, and beliefs; accessibility; the function of the environment; personal health evaluations; and anticipated advantages (8). The COVID 19 pandemic, which has prompted worry and panic about doing in-person consultations, is what drives a person to perform an online consultation, as well as the fact that the sickness being consulted is viewed by the patient as not being a serious illness (9).

There are several ideas that have been utilized to determine the factors that influence the adoption of telemedicine. The majority of the research journals examined in systematic reviews on the utilization of telehealth-based services during the COVID-19 epidemic employ the notion of technology acceptance and adoption theory (10,11). The use of health services as a behavioral model (behavioral model of health services use), the theory of mind as a process and its

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implications for health behavior, and the theory of health care model are some theories of health service utilization (12,13). This shows that there are still doubts about the basic theory used in analyzing the factors that influence telemedicine, and there are also no literature review studies and research on factors that influence telemedicine.

Materials and Methods

Type of study. This study falls under the category of a systematic review and follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyzes for Scoping Reviews (PRISMA-ScR) standards for scoping reviews.

Publication research strategy. The first step in the selection procedure is to perform a literature search in the Science Direct and PUBMED in the search period publish in journals for 2 years from January 2020 until December 2022. The strategy was developed using a combination of vocabulary. The search strategy was developed using the keyword Utilization influencing factor AND telemedicine AND Covid19 (Table I).

Quality of selected studies. Critical appraisal is the process of carefully and systematically examining research to assess its feasibility, and its value and relevance in a particular context (14). The study's quality was assessed using CASP as critical appraisal in this step, which has a scoring system that is divided into the following categories Critical assessment of studies involves examining the quality, reliability and relevance of the selected studies to help answer your review questions. The questions considered in the evaluation assessment are Has the research objective been clearly stated?, Does the sample accurately reflect the population?, Have sampling methods and measures been explained and justified?, Has an exception been declared?, Is the control group easy to identify?, Are absentees detailed?, Can the results be replicated?, Are there any confounding factors?, Is the conclusion logical?, Can the results be extrapolated to other populations?. Based on the score given to each item, the study is classified into high-quality paper: score 9-10, moderate-quality paper: score 7.5-8.5, low-quality paper: less 7-6.5, exclude: less than 6.

Data collection. The review was carried out from April to October of 2022, and the data retrieval was done by the same impartial investigators. Two grids were created for this work; the first comprises a description of the article, and the second is a summary of the data that was collected according to the established variables.

Results

A search on the Science Direct database obtained 384 articles, on the PUBMED database obtained 450 articles. The identification process was carried out to eliminate duplication that existed both in one database and between databases, in this identification process a total of 721 articles were obtained without duplication. Following that, articles were chosen using a screening process that took into account the inclusion criteria (recent literature during the COVID-19 pandemic, in English, quantitative research, and related to research topics) and

Table I. Search Terminology with Medical Subject Heading (MeSH) and Boolean Operators.

Utilization Influencing Factor	<i>patient utilization OR personal utilization</i>
AND	
Telemedicine	<i>Telemedicine OR teleheath OR mobile health OR m-health OR telecare</i>
AND	
COVID-19	<i>COVID-19 OR coronavirus OR novel coronavirus OR 2019-nCoV OR SARS-CoV-2</i>

exclusion criteria (qualitative research and literature reviews, articles paid, not available in the form of full text), which has been determined for 36 articles, and articles not related to the research topic) (608 articles).

Complete articles and in accordance with the inclusion criteria totaling 34 articles. The feasibility criteria analysis in this study used critical appraisal tools in the form of Critical Appraisal Skills Program (CASP) checklists to reduce bias in the selection of articles and the synthesis of the literature reviewed in this study, with the following results: high quality paper (4), moderate quality paper (8), low quality paper (8), and exclude (18). Articles that fall into the categories of high quality paper and moderate quality paper as many as 12 articles will enter the inclusion stage and a synthesis of the implications or findings will be carried out. 18 articles were in the exclusion category and 4 were in the low quality category, and 12 articles that were not included in the exclusion stage.

The entire selection process is summarized and presented in the PRISMA flow diagram below (Fig. 1).

Summary of selected article results can be seen in Table II.

Discussion

According to the study's findings in Table II, the Unified Theory of Acceptance and Use of Technology (UTUAT2) Model (2 research article), the Technology Acceptance Model (TAM) (2 research article), the Delone and Mclean/IS Model theory in the use of technology (1 research article), and Anderson's theory of utilization of health services (8 research articles) are the theoretical concepts used in research on factors that influence the use of health telemedicine services.

According to the study's findings and Anderson's theory of health service utilization, factors influencing the use of telemedicine during the Covid-19 pandemic include gender (15,17,19,21,25) patients who use telemedicine are more likely to be female than male, age (15,17,19,21,23-25) the results of the literature review show that telemedicine services are more widely used by patients under the age of 45 years, residence (15,21) telemedicine services are utilized by hospital patients who reside outside of the city, ownership of health insurance (15,17,23,25) patients with social insurance utilize telemedicine services more frequently than those with public insurance, patient status (15,19,25) long-term outpatients who require follow-up use telemedicine services more, race (17) telemedicine services are used more frequently by white races, Language used (23) during Covid 19, English-speaking patients are more likely to use

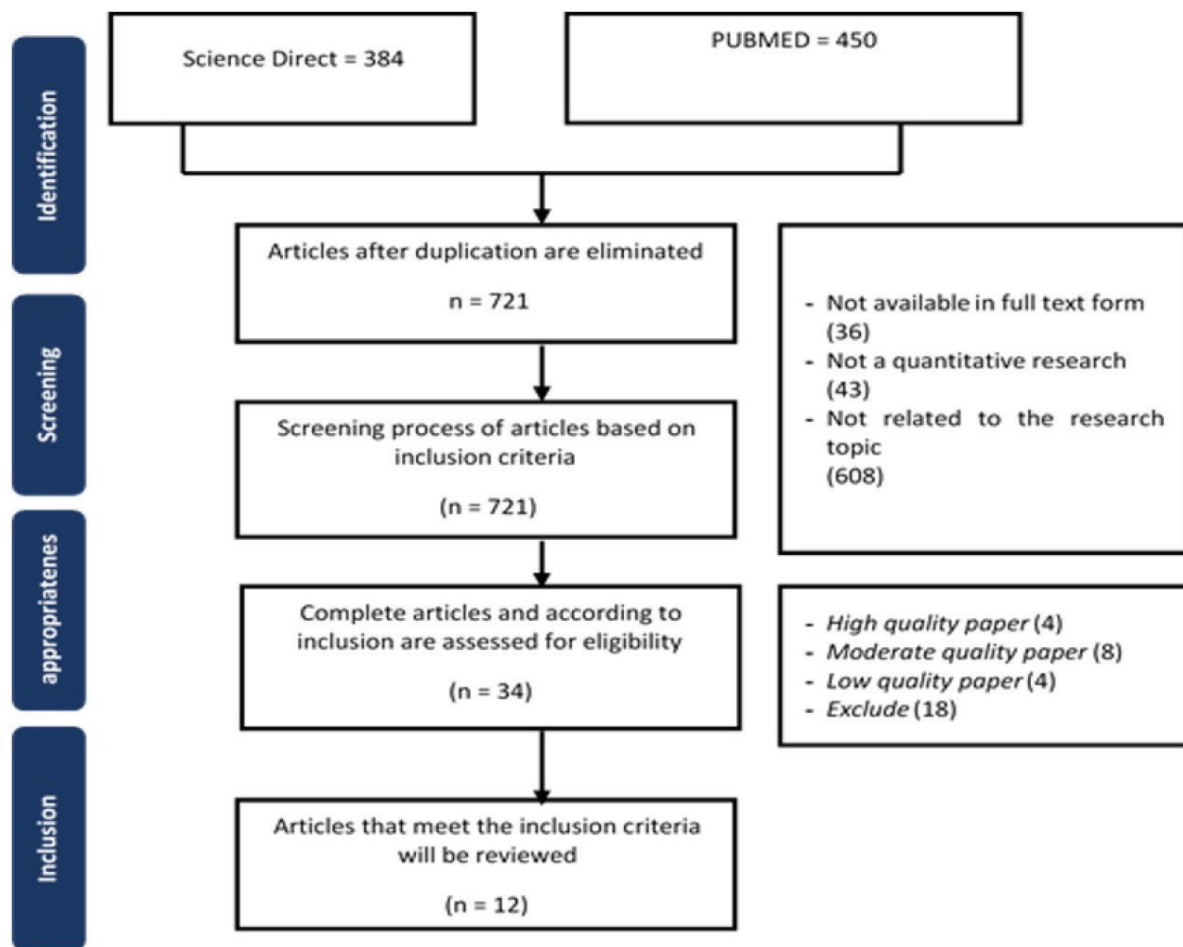


Figure 1. PRISMA flow diagram showing the entire selection process.

telemedicine services., level of education (25) patients who have higher education tend to take advantage of telemedicine services, income (23,24) patients who have high incomes utilize telemedicine services compared to those who have low incomes, social media activity (25) patients with high social media activity tend to utilize telemedicine services, need for health (24) patients who have chronic illnesses choose telemedicine services, co-morbidities (19,23,24) patients with comorbid illnesses tend to utilize telemedicine services, covid 19 infection (25) Covid-infected patients choose telemedicine services.

The intriguing aspect of this study is that co-morbidities, COVID-19 infections, the demand for health, and social media usage are the factors that affect the use of telemedicine during the COVID-19 pandemic. The findings of the literature review study indicate that the usage of telemedicine is influenced by comorbidities. Telemedicine services are used by patients with comorbid illnesses and chronic illnesses more frequently than individuals without such illnesses (15,27). According to the findings of the literature research, Covid-19 infection has an impact on the utilization of telemedicine services. During the COVID-19 pandemic, more patients use telemedicine services for their ailments or are conducting self-quarantine owing to exposure (18,25). The utilization of telemedicine services during the COVID-19 pandemic was influenced by the need for patient health, according to the findings of a literature

review research. Patients who understand their demands for health care usage telemedicine services more (18). Using telemedicine services during the COVID-19 pandemic has been influenced by social media activity, according to the findings of the literature study. Use of telemedicine services is more common among patients who are active on social media often (25,28) This is consistent with Claire's research (2020), which shows that the digital divide has an impact on the utilization of telemedicine and the efficacy of telemedicine services, especially in locations with weak internet connectivity (29).

According to the study's findings, variables impacting the usage of telemedicine during the Covid-19 epidemic include system quality (22), time efficiency (22), and information quality (22). These criteria are based on Delone and Mclean's theory of technology use models. The findings of this literature study demonstrate that individuals who utilize telemedicine during the Covid-19 outbreak select health services without lines in order to maximize time efficiency. The study's findings demonstrate that, because telemedicine services are thought to offer services without waits, the quality of the telemedicine service delivery system affects the adoption of telemedicine services during the COVID-19 pandemic (22). The study's findings indicate that telemedicine services are time-effective (28).

The study's findings demonstrate that the factors affecting the use of telemedicine during the COVID-19 pandemic are

Table II. Summary of Selected Article Results.

No	Author, Year	Title	Results	Theory Used
1	Hye Sun Kim <i>et al.</i> 2022[15]	COVID-19 Case and Surge and Telemedicine Utilization in a Tertiary Hospital in Korea	Some of the elements that affect the application of telemedicine include: Gender (OR: 2.08, $p < 0.0001$). Age (OR: 4.64, $p < 0.0001$). Domicile, (OR: 4.33, $p < 0.0001$). Health Insurance, (OR: 0.83, $p < 0.0001$). Patient Status (OR: 1.91, $p < 0.0001$)."	Anderson's Health Service Utilization Theory
2	Kristin N Gmunder <i>et al.</i> 2021[16]	Demographics associated with US healthcare disparities are exacerbated by the telemedicine surge during the COVID-19 pandemic	Several factors that influence the behavior of using telemedicine are Contamination Avoidance ($p = 0.01$), Safety ($p = 0.002$), Professionalism ($p = 0.021$), Perceived Ease of Use ($p = 0.003$), Perceived Usefulness ($p = 0.039$), Information Quality ($p = 0.044$), and Reliability ($p = 0.004$).	Unified Theory of Acceptance and Use of Technology (UTUAT2) model.
3	Richard A. <i>et al.</i> 2022[17]	Disparities in Telemedicine Utilization During COVID-19 Pandemic: Analysis of Demographic Data from a Large Academic Orthopaedic Practice	Several factors that influenced the increased utilization of this service were: Ras ($p < 0.001$), gender (OR = 0.911, $p < 0.001$), Age (OR = 0.992, $p < 0.001$), Type of health insurance, (OR = 0.321, $p < 0.001$, followed by Medicaid (OR = 0.346, $p < 0.001$), Medicare (OR = 0.635, $p < 0.001$), and out of pocket (0.407, $p < 0.001$)."	Anderson's Health Service Utilization Theory
4	Mirza Mohammad Didarul Alam <i>et al.</i> 2021 [18]	Factors influencing mHealth adoption and its impact on mental well-being during COVID-19 pandemic: A SEM-ANN approach	Performance Expectancy ($p < 0.001$), Effort Expectancy ($p < 0.001$), Social Influence ($p < 0.05$), Enabling Circumstances ($p < 0.001$), Hedonic Motivation ($p < 0.001$), Health Awareness ($p < 0.001$), and Self-Quarantine ($p < 0.001$) are a few aspects that are connected to the behavior of utilizing telemedicine.	Unified Theory of Acceptance and Use of Technology (UTUAT2) model
5	Matthew B. Mackwood <i>et al.</i> 2022 [19]	Factors Influencing Telemedicine Use at a Northern New England Cancer Center During the COVID-19 Pandemic	Some of the determinants that influence the use of telemedicine are female sex ($p < 0.001$), aged less than 45 years over age 84 years and older; ($p < 0.001$), rural communities ($p < 0.001$), had cancer surgery the previous year ($p < 0.001$), length of stay more than 1 day a year before ($p < 0.001$), chemotherapy a year before ($p < 0.001$), low Charlson Comorbidity Index ($p < 0.001$) associated with higher use of telemedicine."	Anderson's Health Service Utilization Theory
6	Steffi Alexandra <i>et al.</i> 2021[20]	Indonesian hospital telemedicine acceptance model: the influence of user	Contamination Avoidance ($p = 0.01$), Safety ($p = 0.002$), Professionalism ($p = 0.021$), Perceived Ease of Use ($p = 0.003$), Perceived Usefulness ($p = 0.039$),	Technology Acceptance Model (TAM).

based on the technology acceptance model (TAM) theory, and they include avoiding contamination (20), safety data and information (20,26), professionalism (20,26), perceived ease of use (20,26), perceived usefulness (20,26) information quality (20,26), and reliability (20). According to the findings of

this literature study, the main reasons motivating individuals to utilize telemedicine services during the COVID-19 pandemic are perceived ease of use of telemedicine services and changeable contamination avoidance. The findings demonstrate that during the COVID-19 pandemic, the perceived ease of use had

Table II. Continued.

		behavior and technological dimensions	Information Quality ($p = 0.044$), and Reliability ($p = 0.004$) are a few characteristics that affect behavior when utilizing telemedicine.		
7	Oliver T <i>et al.</i> 2022 [21]	Patient-Level Factors Associated with Utilization of Telemedicine Services from a Free Clinic During COVID-19	Factors that influence the use of telemedicine are distance, patient age, gender, and patient status	Anderson's Health Service Utilization Theory	
8	Arriel Benis <i>et al.</i> 2021[22]	Reasons for Utilizing Telemedicine during and after the COVID-19 Pandemic: An Internet-Based International Study	Several factors were predictors of the use of telemedicine in this population, namely the frequency of using social media ($p < 0.001$), service without queuing ($p < 0.001$), environmental influences (family, friends, etc.) ($p < 0.001$), time efficiency ($p < 0.001$), technology quality ($p < 0.001$), and communication quality ($p < 0.001$)."	Delone's theory & McLean is the IS model in use Technology	
9	Kemar J. Brown <i>et al.</i> 2021[23]	Social determinants of telemedicine utilization in ambulatory cardiovascular patients during the COVID-19 pandemic	Several predictors of the use of telemedicine in this study were race, age, language use, health insurance, patient income, co-morbidities.	Anderson's Health Service Utilization Theory	
10	Namkee G. Choi <i>et al.</i> 2022 [24]	Telehealth Use Among Older Adults During COVID-19: Associations With Sociodemographic and Health Characteristics, Technology Device Ownership, and Technology Learning	Several factors related to the utilization of telemedicine are: age, income, and health needs	Anderson's Health Service Utilization Theory	
11	Ahmad Z. Al Meslamani <i>et al.</i> 2022 [25]	The Patterns and Determinants of Telemedicine Use during the COVID-19 Crisis: A Nationwide Study	Several factors related to the use of telemedicine are Age (OR: 1.56, $p = 0.015$), Gender (OR: 1.67, $p = 0.001$), Education level, (OR: 2.32, $p = 0.001$), Health insurance coverage, (OR: 1.35, $p = 0.035$), Patients on monthly prescriptions, patients requiring follow-up (OR: 1.59, $p = 0.021$), COVID-19 infection (OR: 1.78, $p = 0.017$), Social media activity (OR: 0.54, $p = 0.001$)."	Anderson's Health Service Utilization Theory	

an impact on the adoption of telemedicine services (20,26). This is consistent with Chen's research (2019), which found that perceived ease of use affects the frequency with which telemedicine services are used in Taiwan (30).

According to the study's findings and the unified theory of adoption and use of technology, performance expectations (16,18), effort expectancy (18), and social influence (18) are the main elements driving the usage of telemedicine during

the Covid-19 epidemic. Hedonistic Motives (18) a factor that surfaced during the Covid-19 outbreak and encouraged people to seek telemedicine services is social influence and hedonic incentive. The study's findings demonstrate that social impact affects how telemedicine services are used during the COVID-19 epidemic (31). According to Alam's research from 2020, social influence has a favorable impact on behavioral intentions to adopt mHealth in Bangladesh (32). This is consistent with Almegbel's

research (2021), which found that the Covid-1 pandemic in Saudi Arabia had an impact on the usage of telemedicine services (33).

Conclusions

- 1' According to the literature research that was done, there are 12 scholarly studies concerning the variables that affect the utilization of telemedicine services.
2. People in many countries used telemedicine services more often during the Covid 19 epidemic.
3. Anderson's theory of health care use and the theory of technology adoption or acceptance are the fundamental theories employed in forecasting the elements that impact the use of telemedicine.
4. There are 29 variables that influence the use of telemedicine from various theories used. The desire for health, exposure to COVID 19, co-morbidities, social media usage, avoiding contamination, time efficiency, ease of use of services, social impact, and hedonic incentive are among the factors associated to the COVID 19 pandemic.

Availability of data and material

Data and materials are available by the authors.

Informed consent

The manuscript does not contain any individual person's data in any form.

Conflict of interest

The authors declare no potential conflict of interest.

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References

1. Majmudar N, Ducruet AF, Wilkinson AD, Catapano JS, Patel J, Baranoski JF, Cole TS and Albuquerque FC: Telemedicine for endovascular neurosurgery consultation during the COVID-19 Era: Patient satisfaction survey. *World Neurosurg* 158: e577-e582, 2021.
2. Ramanathan K, *et al.*: Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-research that is available on the COVID-19 resource centre-including this for unrestricted research re-use a, no. January, pp19-21, 2020.
3. Parimbelli E, Bottalico B, Losiouk E, Tomasi M, Santosuosso A, Lanzola G, Quaglini S and Bellazzi R: Trusting telemedicine: A discussion on risks, safety, legal implications and liability of involved stakeholders. *Int J Med Inform* 112: 90-98, 2018.
4. Haleem A, Javaid M, Singh RP and Suman R: Telemedicine for healthcare: Capabilities, features, barriers, and applications. *Sens Int* 2: 100117, 2021.
5. Calton B, Abedini N and Fratkan M: Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information, no. January, 2020.
6. Reiss AB, De Leon J, Dapkins IP, Shahin G, Peltier MR and Goldberg ER: A telemedicine approach to covid-19 assessment and triage. *Medicina (Kaunas)* 56: 461, 2020.
7. Alvarez-Risco A, Del-Aguila-Arcenales S and Yáñez JA: Telemedicine in Peru as a Result of the COVID-19 pandemic: Perspective from a country with limited internet access. *Am J Trop Med Hyg* 105: 6-11, 2021.
8. Siboro MD, Surjoputro A and Budiyantri T: Faktor-faktor Yang mempengaruhi penggunaan layanan telemedicine pada masa pandemi Covid-19 Di Pulau Jawa. *J Kesehat Masy* 3: 58-66, 2019.
9. Sari GG and Wirman W: Telemedicine sebagai Media Konsultasi Kesehatan di Masa Pandemi COVID 19 di Indonesia. *J Komun* 15: 43-54, 2021.
10. Khoshrounejad F, Hamednia M, Mehrjerd A, Pichaghsaz S, Jamalirad H, Sargolzaei M, Hoseini B and Aalaei S: Telehealth-Based services during the COVID-19 pandemic: A systematic review of features and challenges. *Front Public Health* 9: 711762, 2021.
11. Mishra V: Factors affecting the adoption of telemedicine during COVID-19. *Indian J Public Health* 64 (Suppl): S234-S236, 2020.
12. Travers JL, Hirschman KB and Naylor MD: Adapting Andersen's expanded behavioral model of health services use to include older adults receiving long-term services and supports. *BMC Geriatr* 20: 58, 2020.
13. Rejeski WJ and Fanning J: Models and theories of health behavior and clinical interventions in aging: A contemporary, integrative approach. *Clin Interv Aging* 14: 1007-1019, 2019.
14. Burls A: What is critical appraisal? *MMW-Fortschritte der Medizin* 154: 71-73, 2009.
15. Kim HS, Kim B, Lee SG, Jang SY and Kim TH: COVID-19 Case Surge and Telemedicine Utilization in a Tertiary Hospital in Korea. *Telemed J E Health* 28: 666-674, 2022.
16. Gmunder KN, Ruiz JW, Franceschi D and Suarez MM: Demographics associated with US healthcare disparities are exacerbated by the telemedicine surge during the COVID-19 pandemic. *J Telemed Telecare* 30: 64-71, 2024.
17. Ruberto RA, Schweppe EA, Ahmed R, Swindell HW, Cordero CA, Lanham NS and Jobin CM: Disparities in telemedicine utilization during Covid-19 pandemic analysis of demographic data from a large academic orthopaedic practice. *JB JS Open Access* 7: e21.00116, 2022.
18. Alam MMD, Alam MZ, Rahman SA and Taghizadeh SK: Factors influencing mHealth adoption and its impact on mental well-being during COVID-19 pandemic : A SEM-ANN approach. *J Biomed Inform* 116: 103722, 2021.
19. Mackwood MB, Tosteson TD, Alford-Teaster JA, Curtis KM, Lowry ML, Snide JA, Zhao W and Tosteson ANA: Factors influencing telemedicine use at a northern New England Cancer Center during the COVID-19 pandemic. *JCO Oncol Pract* 18: e1141-e1153, 2022.
20. Alexandra S, Handayani PW and Azzahro F: Indonesian hospital telemedicine acceptance model: The influence of user behavior and technological dimensions. *Heliyon* 7: e08599, 2021.
21. Nguyen OT, Watson AK, Motwani K, Warpinski C, McDilda K, Leon C, Khanna N, Nall RW and Turner K: Patient-Level factors associated with utilization of telemedicine services from a free clinic during COVID-19. *Telemed J E Health* 28: 526-534, 2022.
22. Benis A, Banker M, Pinkasovich D, Kirin M, Yoshai BE, Benchoam-Ravid R, Ashkenazi S and Seidmann A: Reasons for utilizing telemedicine during and after the covid-19 pandemic: An internet-based international study. *J Clin Med* 10: 5519, 2021.
23. Brown KJ, Mathenge N, Crousillat D, Pagliaro J, Grady C, Katz N, Singh JP and Bhatt AB: Social determinants of telemedicine utilization in ambulatory cardiovascular patients during the COVID-19 pandemic. *Eur Heart J Digit Health* 2: 244-253, 2021.
24. Choi NG, DiNitto DM, Marti CN and Choi BY: Telehealth use among older adults during COVID-19: Associations with sociodemographic and health characteristics, technology device ownership, and technology learning. *J Appl Gerontol* 41: 600-609, 2022.
25. Al Meslamani AZ, Aldulaymi R, El Sharu H, Alwarawrah Z, Ibrahim OM and Al Mazrouei N: The patterns and determinants of telemedicine use during the COVID-19 crisis: A nationwide study. *J Am Pharm Assoc* (2003) 62: 1778-1785, 2022.
26. Kato-Lin YC and Thelen ST: Telemedicine for Acute Conditions during COVID-19: A Nationwide Survey Using Crowdsourcing. *Telemed J E Health* 27: 714-723, 2021.
27. Choi JS, Kim JH, Park S, Lin M, Abdur-Rahman F, Mack WJ and Volker CCJ: Telemedicine in Otolaryngology during COVID-19: Patient and physician satisfaction. *Otolaryngol Head Neck Surg* 167: 56-64, 2022.
28. Shin TM, Ortega P and Hardin K: Educating clinicians to improve telemedicine access for patients with limited english proficiency. *Challenges* 12: 34, 2021.
29. Clare CA: Telehealth and the digital divide as a social determinant of health during the COVID-19 pandemic. *Netw Model Anal Health Inform Bioinform* 10: 26, 2021.

30. Lu W, Hou H, Ma R, Chen H, Zhang R, Cui F, Zhang Q, Gao Y, Wang X, Bu C, *et al*: Influencing factors of patient satisfaction in teleconsultation: A cross-sectional study. *Technol Forecast Soc Change* 168: 120775, 2021.
31. Alam MZ, Hoque R, Hu W and Barua Z: Factors influencing the adoption of mHealth services in a developing country: A patient-centric study. *Int J Inf Manage* 50: 128-143, 2020.
32. Arize I and Onwujekwe O: Acceptability and willingness to pay for telemedicine services in Enugu state, southeast Nigeria. *Digit Heal* 3: 2055207617715524, 2017.
33. Almegbel H and Aloud M: Factors influencing the adoption of mHealth services in Saudi Arabia: A Patient-centered Study. *Int J Comput Sci Netw Secur* 21: 313-324, 2021.