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TELEMEDICINE PORTAL IN THE NEW NORMAL: A LITERATURE REVIEW PAPER

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Abstract

The global health crisis, COVID-19 brought paralysis on many aspects of human activities. This significant pause brought in a slew of new initiatives to address the pandemic's difficulties. The normalcy of orthodox practices becomes under scrutiny. Healthcare realm necessitates a revamp to address different challenges most especially doing face to face customary transactions. The review focused its emphasis on the findings and conclusions of the articles reviewed. This review tries to ponder the significance of telemedicine to address socioeconomic challenges exposed by the pandemic. The potency of telemedicine is seen as the panacea for this major quandary. This will lead to the revolution in delivering quality, affordable, and accessible health care services not bound by geographic limitations. It will likewise combat the scarcity of clinicians across the globe. However, the papers reviewed were insufficient to cover a more comprehensive and innovative telehealth portal where clinicians and patients conveniently meet.

Index Terms

COVID-19; internet; telehealth; telemedicine; e-health

I. INTRODUCTION

According to a paper written by researchers from Saint Louis University and Bentley University and published in the International Journal of Environmental Research and Public Health, telemedicine technology first became a form of healthcare delivery in the late 1960s due to the needs of the National Aeronautics and Space Administration and the Nebraska Psychology Institute.

Telemedicine employs information technology to transfer medical information to diagnose, treat and educate the patients (Okoroafor et al., 2016). It allows us to transcend geographic and socioeconomic boundaries to bring health care to remote and/or in-need patients (O'Shea J., 2015).

In 2013, there were approximately 350 thousand telemedicine patients globally. The forecast tells it will grow to 7 million (Stewart, 2021).

The affordability of technology and shortage of physician is palpable, telemedicine gets attention as a solution to health care delivery.

According to Degerli & Ozkan-Yildiri (2021), the prominence and potentials of telemedicine as an appropriate and efficient instrument for addressing, improving, and sustaining health becomes apparent in the current new normal.

Over the past decades, rapid emergence of technological advances has facilitated health-care delivery at a distance. Multiple forms of telemedicine enabled clinicians serve the patients need be it evaluation, follow-up check-ups, diagnostics and other necessary tests (Lanham et al., 2020).

In-person care around the globe was interrupted by the pandemic and telemedicine was deployed as the best substitute aimed to cater the influx of infected patients that requires isolation and urgent care, continue to medicate and address the health care needs of the non-COVID 19 patients and protect the welfare of the clinicians from infection. These functions were met and telemedicine became prominent (RL Bashshur et al., 2020).

II. RESULTS

Existing demand for telemedicine

Radical change in the medical world pave the way to contactless medication to help the health heroes slowed the spread of COVID-19. Keeping social distancing and stay-at-home policy are strictly followed in telemedicine giving priority to the urgent cases as well as maximizing the use of scarce medical supplies (J Vidal-Alaball et al. 2020). According to B. Klaassen et al. (2016) health services brought at homes lead to better healthcare with a minimal cost which created an increase in demand in telehealth.

Based on the case report conducted by DM Mann et al. (2020) throughout the months of March and April 2020 in- person visits reduced by more than 80% and adapt telemedicine. From 82 visits on March 4 to 1336 visits after just 15 days. When the outbreak ends, one-fifth of physicians using telemedicine tools expect to use them significantly (M Abdel-Wahab et al., 2020).

Telemedicine offers cheap healthcare. A certain administrative record showed a 233 percent and 342 percent increase in telemedicine calls and calls that resulted in medication respectively. Even after mobility restrictions were loosened it can be observed that the demand for telemedicine remained high giving room for policymakers to expand access to healthcare using advances in technology (Busso et al., 2021).

Since the outbreak, healthcare systems across the world are overcrowded with coronavirus disease patients. To keep up with the pandemic response, several hospitals have turned to virtual healthcare and telemedicine. Over time, Google™ has become the most commonly used search engine. Google Trends™ may be used to show popular interest in a certain issue. The Google Trends™ result is shown as relative search volume (RSV), which is the proportional search volume for a certain topic compared to the total search volume in a given period and region. The study's main goal was to see if there was a link between the daily reported number new cases and fatalities from COVID-19 and the equivalent changes in Google Trends™ RSV of telehealth over the course of six months. From January 21, 2020 to July 21, 2020, a retrospective research was undertaken. About 17 nations were chosen to participate in this study based on the total number of cases reported. The daily reported new cases and deaths were extracted from the World Health Organization (WHO) situation reports globally and in the selected countries. The keywords "telehealth," "telemedicine," "mHealth," and "eHealth" were used to acquire the RSV data using Google TrendsTM. These terms were entered into Google TrendsTM using the "+" function, with

a time range of "1/21/2020 to 7/21/2020," a category of "all categories," and a search type of "web search." The Google TrendsTM website was used to get the global RSV as well as the RSVs of the selected nations. The intensity of the link between new cases or fatalities and RSVs connected to telemedicine was determined using Spearman's correlation coefficient. As a result of the findings, a positive reasonable connection was discovered between global interest in telehealth and new cases and fatalities recorded throughout the world. In the United States of America (USA), India, and Bangladesh, there was a positive fair relationship between public interest of telehealth and the rise in new COVID-19 cases and fatalities. During the COVID-19 pandemic, public interest in telehealth has gradually increased, according to this survey.

Individual countries' ICT infrastructure profiles were retrieved from the World Economic Forum Report. When looking at connections between RSV and the ICT index, both the US and Canada have high RSVs and ICT scores. Several Latin American (Brazil, Chile, Colombia) and South Asian (India, Bangladesh, Pakistan) nations had higher RSVs but lower ICT index scores, implying that telehealth demand exceeds present ICT infrastructure (Wong et al., 2021).

According to McKinsey and Company in 2020 they projected hundreds of billions of dollars in US healthcare spending might be moved to virtual or virtual-enabled treatment. It would certainly need long-term consumer and practitioner acceptance, as well as a rapid restructuring of care pathways to include virtual modalities. In July 2021, they'll look back at the evolution of telehealth since the COVID-19 outbreak, as well as the implications for telehealth and virtual health in general. Some of their findings are as follows:

Telehealth usage is now 38 times greater than it was before the epidemic. Following an early increase in April 2020, when telehealth accounted for more than 32% of all office and outpatient visits, utilization levels have mostly steadied, ranging from 13 to 17% across all specialities. This use implies that virtualized visits account for more than two-thirds of all visits.

Similarly, consumer and provider attitudes about telehealth have improved since the pre-COVID-19 era. One example of regulatory improvements that have made telehealth more accessible is the Centers for Medicare & Medicaid Services increase of reimbursable telehealth codes for the 2021 physician fee schedule. Since June 2020, this usage has been pretty constant. According to their consumer study, consumers continue to see telehealth as a key modality for their future care requirements, although this perception differs greatly depending on the type of treatment. Overall, consumer perception closely matches our expectations for telehealth adoption by various specialities. Around 40% of customers polled anticipate they will continue to utilize telehealth in the future, up from 11% of consumers who used telehealth previous to COVID-19. Moreover, the research shows between 40 and 60 percent of consumers express interest in a set of broader virtual health solutions, such as a “digital front door” or lower-cost virtual-first health plan. However, there has been a mismatch in the past between consumer interest in digital health solutions and actual use. Maintaining and expanding consumer usage of virtual reality will need a continued focus on building a smooth consumer interface, breaking down barriers in care provision (across virtual and in-person) with enhanced data integration and analytics, and proactive customer involvement. On the provider side, 58 percent of doctors think telehealth is better now than it was before COVID-19, however their opinions have shifted significantly since September 2020 (64

percent of physicians). Virtual visits were used by 84 percent of physicians in April 2021, with 57 percent wanting to do so in the future. Those working in bed capacity limited contexts and value-based care arrangements want to know if there is scalable volume decanting or cost-cutting possibilities at comparable quality (Bestsennyy et al., 2021).

In recent years, North America, followed by Europe, has led the worldwide telemedicine industry. These regional markets are projected to exhibit similar patterns over the projection period, thanks to the rising use of cloud-based technologies in healthcare. (https://www.globenewswire.com)

According to Statista.com the worldwide telemedicine industry is estimated to be worth $50 billion in 2019. The market is likely to rise considerably in the future, with a value of about 460 billion dollars predicted by 2030 (Stewart, 2021).

Global Telemedicine Market: Segmentation

The worldwide telemedicine market is divided into several segments depending on a variety of criteria. Components, modalities, specialized areas, and end-users are all segmented in the market. The market is divided into product kinds and services based on the Component. The product sector is further divided into two categories: software and hardware. Tele-consulting, telemonitoring, tele-education, and tele-assistance make up the service section. It is divided into three types of modalities: real-time, store-and-forward, and others. Telemedicine is used in disciplines such as radiology, neurology, gynecology, orthopedics, cardiology, pathology, psychology, and dermatology, among others. Providers, payers, and patients are among the market's end-users. (https://www.globenewswire.com)

Acceptance in Telemedicine across the globe

Suzuki et al. conducted a multi-country study in 2016 to examine the feasibility of services provided through telemedicine in many developing Asian nations. Indicators such as the healthcare environment, national information technology progress, and the economy were used to assess the viability of internet-based medical services. Countries like Thailand, which have a physician shortage but strong internet and mobile phone usage, have a high chance of telemedicine deployment. Despite their high GDP, India and China have substantial differences in telemedicine adoption between urban and rural areas. Disparities between rural and urban regions must be bridged if national telemedicine is to be eemployed.

In terms of telemedicine acceptance and healthcare system efficiency, Singapore is a regional leader in Asia. The Singapore Ministry of Health established a regulatory sandbox in 2018 to encourage innovation and foster collaboration between the government and telehealth partners. Prior to 2020, telemedicine in India was controlled by the Information Technology Act of 2000, which had loopholes in terms of privacy, security, and patient confidentiality, placing patients and physicians at danger.

In Bangladesh, there is currently no national telemedicine framework, and existing systems are plagued by a lack of technology infrastructure, healthcare inequalities, and poor treatment quality. Consultations and training are offered between providers through video conferencing utilizing Skype in the present system, which is based on many hubs and spokes. Sub-district hospitals can

consult district hospitals, which can then link to specialist hospitals in the city. Gap assessments will help the system guarantee that different elements of telemedicine including infrastructure and privacy.

The National Health Commission and the National Administration of Traditional Chinese Medicine in China published new e-healthcare guidelines in September 2018, with the goal of expanding telehealth capabilities and developing the telehealth sector. This includes advice on commercial-hospital cooperation, telemedicine diagnosis, patient permission, and third-party collaborations, among other things.

In 2004, Kazakhstan established a nationwide telemedicine network. Its goal was to bridge the chasm exists between the urban and rural people in distant locations in terms of access to specialist medical treatment. This telehealth network brings together 199 healthcare items from districts, regions, and republican groups. Patients at regional and city-level hospitals in Kazakhstan benefit from teleconsultations with doctors from Almaty and Nur-regional Sultan's hospitals and republican clinics. Over the previous 15 years, video conferencing has facilitated over 500,000 telehealth consultations.

As program implementation grows, Sub-Saharan Africa is becoming a hotbed of telehealth growth, with smartphone penetration anticipated to reach 66 percent by 2025.

Latin America has one of the fastest-growing senior populations in the world, with a large healthcare access divide between rural and urban locations. A research published in 2019 looked at telemedicine expansion possibilities in nine Latin American countries. Peru, Colombia, Guatemala, Panama, Uruguay, Mexico, Costa Rica, Chile, and Argentina.

The Caribbean is still in the early stages of telehealth, with a paucity of well-coordinated telehealth plans and policies. The Bahamas' National Health Authority unveiled a new Electronic Health Record system at the end of 2019, which eliminates the need for paper data and enables for seamless patient care transfer, whereas the Dominican Republic still lacks a national EHR system. Two growing projects include the Jamaican Minister of Health in the West Indies' 2018 Telemedicine Pilot Project and the SickKids-Caribbean Initiative, which employs telemedicine to provide medical care for children with cancer and blood problems across the Caribbean area.

Since the COVID-19 epidemic, Australia has been working to make telehealth more accessible to clinicians. New Medicare Benefits Scheme items will give all Australians with a Medicare card access to telehealth services, as well as bulk billing for all concession card members.

New Zealand's Ministry of Health has issued an advice on accessible teleconsultation technology for health care practitioners as well as patient privacy best practices. They issued recommendations, focusing on prescription practice and the need of face-to-face consultation, whether in person or through teleconference, before writing any medication.

The danger of COVID-19 in Europe has forced the necessity for patient-accessible telehealth systems. Telehealth firms such as Doctolib and Qare in France, LIVI in Sweden, Push Doctor in the United Kingdom, and Compugroup Medical SE in Germany have all witnessed significant gains in European uptake.

Telecommunication firms in the United Kingdom, including as BT, Virgin Media, and Sky, have committed to help the National Health Service carry out telehealth for healthcare practitioners. Telehealth is quickly replacing primary care, clinical trials, counseling, and chronic disease reviews.

Many Italian hospitals, according to reports, lack the infrastructure for efficient telehealth platforms due to supply-chain issues and inadequate internet capabilities.

Prior to COVID-19, France's telemedicine laws allowed tertiary and primary care physicians to transfer scheduled in-person visits to teleconsultations on a case-by-case basis.

Spain, like Italy, has been ravaged by the current epidemic, forcing tertiary hospitals to quickly use innovative telemedicine methods. Spain's national health authority announced a health IT plan in 2012.

Medicare will finance eligible telehealth consultations in the United States throughout the COVID-19 period, and individual states will be encouraged to expand Medicaid coverage for similar services. Several commercial insurers have followed suit, compensating healthcare providers for telehealth services or offering direct telehealth access to members as part of their coverage. Prior rules are being relaxed, including the expansion of covered telehealth services and the ability to treat new patients via telemedicine rather than just those with a prior relationship.

Telehealth services are not available in every province in Canada. A specific difficulty has been that, in the past, telemedicine technology was largely dedicated to rural services, but today metropolitan centers have an unexpected demand for it. The government has promised to improve the telehealth capabilities of healthcare facilities. The Royal College of Clinicians and Surgeons of Canada has also compiled a handbook for physicians in each province, explaining when telemedicine should be used and any billing code modifications.

The health systems are seriously challenged by public health crises such as COVID-19. The report critically analyzed the present condition of telemedicine across geographies, as well as the different efforts made to promote and execute it during COVID-19 (Bhaskar et al., 2020).

According to a poll done by L. Cavagna et al. (2020), 78 percent of patients find telemedicine acceptable, and 61 percent prefer it. When comparing telemedicine to face-to-face appointments, the majority of people said appointment times (78 percent), clinic times (80 percent), and waiting times (89 percent) were similar or decreased. Initial appointments should be face-to-face, according to 53%, but follow-ups (71%) might be virtual (R Xiong et al., 2021)

Cost and benefits of Telemedicine

Telemedicine programs provide specialty health services to remote populations using telecommunications technology. For some years, this unique method to medical care delivery has been developing, and it now includes a variety of specialized areas such as cardiology, dermatology, and pediatrics. However, economic evaluations of telemedicine are rare, and few of those that have been performed have taken into consideration the vast variety of economic costs and benefits. Thorough benefit–cost assessments of telemedicine initiatives might offer verifiable

and comparable evidence of their economic feasibility, allowing the most successful systems to be adopted and/or expanded (Dávalos et al., 2009)

Telemedicine has gained popularity in recent years, owing to the projected ability to better distribute and regulate the usage of medical services, resulting in improvements in delivery timeliness and, as a result, overall health-care quality. Indeed, telemedicine will improve health service accessibility while also reducing travel time and associated opportunity costs in the process of receiving care (Bashshur, 1995). From war veterans to patients in rural areas, telehealth provides an alternative to traditional healthcare that lowers the time and cost of receiving service (Jacobs et al., 2019; Sabesan et al., 2012). In addition, there is evidence that telemedicine is successful in reducing the need for ambulance transport, which could provide relief to the overcrowded healthcare system (Langabeer et al., 2016). Telemedicine can also increase the diversity of care to which an individual has access. As an example, for indigenous groups, telemedicine provides an option that reduces the burden of travel and dislocation from community and family (Caffery et al., 2018).

The effectiveness of telemedicine depends greatly on where it is being deployed (Caffery et al., 2016; Roine et al., 2001). It is also important to recognize other practical costs that telemedicine presents. With the adoption of telehealth as a cheaper and more convenient alternative, there is the potential for excess health care utilization (Ashwood et al., 2017; Bavafa et al., 2018)

Opportunities and challenges

As stated by P. Kumar et al. (2020), Telemedicine can be used to forward triage before a patient reaches the hospital. Triage is done in two phases, firstly a telephone triage for potential COVID-19 cases or contacts followed by an in-office triage that identifies cases which were in the incubation period at the time of telephone triage and developed symptoms before the in-office visit. Telemedicine can be used to treat chronic stable conditions including diabetes, COPD, hypertension, and immunodeficiency disorders without increasing the risk of consequences or exposure. It lowers the cost of follow-up visits, and there has been no difference in the administration of chronic diseases between Telemedicine and in-person consultations.

Notwithstanding that it appears promising to make the most of telemedicine (through videoconference, telephone, e-mail, text, or apps) in responding to disasters and public health. Still many individuals encounter barriers to telemedicine due to low socioeconomic status (SES) and the limitation of infrastructure among the least developing countries. Nearly 3.6 billion people still remain offline, while 97% of the world population lives within reach of a cellular signal. Some low-income and homeless people, for example, cannot afford cellphones or access to the internet due to budgetary constraints. Low SES is also linked to a lack of flexibility to use technology when and when one wants, obstructing timely help-seeking behaviors and treatment delivery. Furthermore, internet connectivity is critical for accessing critical health care and helpful services.

In this pandemic, many boundaries have been pushed back and opportunities are constantly being explored. Telemedicine is being used in regions that were previously thought to be dangerous for its use in healthcare; nevertheless, the absence of consistent laws to incorporate Telemedicine into healthcare is a key barrier to its widespread usage in the present epidemic (P. Kumar et al., 2020).

III. SYNTHESIS

The preponderance of evidences showed from the articles reviewed thrust the exigency of Telemedicine portal to address the healthcare system predicaments unearthed by the pandemic. This leads to an opportunity to explore and innovate the existing e-health system in reshaping conventional health practices.

Existing Telehealth applications date back to 1879, when a Lancet paper discussed the use of the telephone to decrease needless trips to the doctor's office. A cover made by Science and Invention magazine showed a doctor diagnosing a patient using radio and a device that intends to screen the patient remotely. In 1906, an inventor published a paper on telegraphy and since then radio in 1920's has been used as a tool for medical advice

Numerous recommendations and discussions relative to telehealth development has been explored especially when the pandemic strikes. This illuminates the need for a more functional telehealth system that will benefit both clinicians and patients. With the advancement in digital technology, performance of Telemedicine becomes more effective and efficient though the use of portals such as Zoom, Google Meet, Microsoft Teams, Messenger and other videoconferencing tools. Though these tools are useful, there are some limitations when it comes to transmitting information necessary to facilitate efficient consultation process and keeping of records showing patients medical history which is vital in making diagnostics.

This review revealed the need to develop a more precise and flexible telemedicine portal that will cover the limitations presented above. Thus, the need to establish a utilitarian feature of technology-based application with a good data base management and austere data security.

Abbreviations:

COPD	Chronic Obstructive Pulmonary Disease
COVID 19	Novel Corona Virus Disease 2019
EHR	Electronic Health Record
E & M	Evaluation and Management
ICT	Information and Communications Technology
IJERPH	International Journal of Environmental Research and Public Health
NASA	National Aeronautics and Space Administration
NTMN	National Telemedicine Network
RSV	Relative Search Volume
SES	Socioeconomic Status
WHO	World Health Organization

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