



**International Journal of Biology, Pharmacy
and Allied Sciences (IJBPAS)**

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

DIGITAL HEALTHCARE TRANSFORMATION: THE ROLE OF TELEMEDICINE AND INFORMATION SYSTEMS IN HOSPITAL MANAGEMENT DURING COVID-19

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Received 15th Feb. 2026; Revised 16th March 2026; Accepted 10th Aug. 2026; Available online 1st Oct. 2026

<https://doi.org/10.31032/IJBPAS/2026/15.10.10715>

ABSTRACT

The COVID 19 pandemic acted as a catalyst for rapid digital transformation in the healthcare sector, necessitating the swift adoption of innovative technologies to manage the crisis. This study explores the pivotal role of telemedicine and healthcare information systems (HIS) in hospital management during the pandemic. With physical distancing norms and overburdened medical infrastructure, telemedicine emerged as a key solution to ensure continuous patient care, remote consultations, and efficient triage. Meanwhile, integrated information systems supported data sharing, real time surveillance, and resource allocation across departments and hospitals. The research analyzes how hospitals leveraged digital tools to maintain service delivery, enhance emergency response, and ensure clinical efficiency. It also examines the challenges encountered in implementation, such as digital literacy gaps, data security concerns, and infrastructure limitations. The findings underscore that a resilient and tech-enabled healthcare ecosystem is crucial for future health emergencies. The study concludes by recommending strategic investments in digital infrastructure and training to sustain and scale these innovations beyond the pandemic.

Keywords: Digital healthcare, telemedicine, hospital management, COVID-19, healthcare information systems, digital transformation

INTRODUCTION:

The COVID-19 pandemic marked a turning point for global healthcare systems, triggering an unprecedented wave of digital transformation. Hospitals, already strained by surging patient numbers and limited resources, faced immense pressure to adapt quickly [1]. Traditional models of care were disrupted, and digital technologies once considered supplementary suddenly became central to healthcare delivery [2]. Among the most transformative of these were telemedicine platforms and healthcare information systems (HIS), which enabled hospitals to maintain continuity of care, streamline operations, and respond rapidly to evolving clinical demands [3].

Telemedicine, once primarily used for rural outreach or specialist consultations, became a mainstream tool during the crisis. It facilitated remote patient doctor interactions, reduced the risk of viral transmission, and alleviated the burden on physical facilities [4]. Virtual consultations, e-prescriptions, and mobile health applications expanded access to healthcare, particularly for non-critical patients and those in quarantine [5]. Simultaneously, robust healthcare information systems allowed for real time data tracking, contact tracing, patient record management, and dynamic resource

allocation empowering hospitals to make informed decisions in fast changing scenarios [6].

However, the shift toward digital solutions was not without challenges. Hospitals struggled with technological disparities, cybersecurity threats, and the need for rapid staff training. Moreover, disparities in digital access, particularly in low-resource settings, highlighted the digital divide within healthcare delivery. Despite these obstacles, the benefits of digital integration became clear, prompting a reassessment of healthcare infrastructure and policy priorities [7].

This paper delves into the role played by telemedicine and HIS in reshaping hospital management during the COVID-19 pandemic. It explores case studies, evaluates outcomes, and suggests pathways for institutionalizing digital practices in the post-pandemic healthcare landscape. As the world moves toward a hybrid model of healthcare, understanding these digital shifts is essential to build a more resilient, accessible, and patient-centered system [8].

REVIEW OF LITERATURE:

Telepsychiatry, a branch of telemedicine, has garnered increasing attention as a means to address the rising need for psychiatric services. Its relevance has

become particularly pronounced during the COVID-19 global pandemic [9]. This paper explores the status of telepsychiatry before and after the onset of COVID-19 across selected Arab countries in the Middle East and North Africa (MENA) region [10]. Twelve early-career psychiatrists from various Arab nations were invited to share insights about telepsychiatry practices in their respective countries, both prior to and during the pandemic [11]. Data was gathered through a semi-structured guide and supplemented with a literature review using five search engines and keywords such as 'COVID-19,' 'telepsychiatry,' and 'Arab world [12].

The present and future healthcare systems are expected to encounter numerous challenges, including the digitization of services, digital transformation, and disruptions within the healthcare sector particularly those highlighted during the COVID-19 pandemic in the context of Health 4.0 and Society 5.0, along with the evolving demands on leadership [13]. This narrative literature review aims to examine digital health information and the critical role of leadership in shaping the future of healthcare delivery [14]. The article reviews 64 references focusing on key themes such as digital health, digital transformation, digital disruption, Health 4.0, Society 5.0, and

hospital leadership. Globally, digital health is reshaping the way healthcare is delivered, addressing the growing needs of an aging population and the increasing burden of chronic illnesses [15].

Maternity and child healthcare remains a crucial priority within Ukraine's healthcare system, given its direct connection to the birth and well-being of future generations—an essential component of the nation's long-term development [16]. At the outset of the Sustainable Development Goals (SDGs) era, the rates of maternal morbidity and mortality during pregnancy and childbirth in Ukraine were still unacceptably high, despite many of these cases being preventable [17]. The COVID-19 pandemic, which began in 2019, profoundly altered daily life and disrupted the functioning of specialized healthcare services [18]. In light of the potential for future pandemics, it is vital to analyze the healthcare system's performance during this period and develop new strategies for delivering high-quality perinatal care during similar crises [19].

Around 75% of Ethiopia's population resides in rural areas, where accessing healthcare is challenging due to inadequate transportation infrastructure and lengthy travel times [20]. Telemedicine presents a valuable opportunity to improve healthcare

access while also reducing the spread of COVID-19 by limiting the need for physical travel [21].

This Brief Research Report presents an analysis of qualitative data related to the development of a mobile health (mHealth) system introduced during the COVID-19 pandemic [22]. The system was designed to support community-based symptom management for COVID-19 in the Oromia region of Ethiopia [23].

Over the past twenty years, telemedicine has evolved into a vital component of healthcare, offering an effective means to enhance doctor-patient communication. Advancements in technology and growing expertise in its application have highlighted telemedicine's benefits and cost-efficiency, making it particularly valuable in the field of diabetology [24]. However, the COVID-19 pandemic introduced significant challenges to healthcare systems, accelerating the development and adoption of digital health services [25]. It soon became evident that individuals with diabetes who contracted COVID-19 faced a heightened risk of severe illness and death [26]. Importantly, this increased risk could be mitigated by maintaining optimal control of the patient's glucose levels.

RESEARCH METHODOLOGY:

Research Design:

This study adopts a descriptive and analytical research design [27] to explore how telemedicine and healthcare information systems (HIS) influenced hospital management during the COVID-19 pandemic. The descriptive approach helps in understanding the extent of digital adoption, while the analytical aspect evaluates the effectiveness and challenges faced in implementation.

Research Approach:

A mixed-method approach was employed, combining both quantitative and qualitative methods to ensure a comprehensive understanding of the topic.

Data Collection Methods:

Primary Data:

Structured questionnaires were distributed to healthcare administrators, IT managers, and frontline medical staff across selected hospitals. The questionnaire included both closed-ended (Likert scale) and open-ended questions to capture perceptions and practical experiences with digital tools during the pandemic. Additionally, in-depth interviews were conducted with key hospital decision-makers and telemedicine coordinators to gain qualitative insights.

Secondary Data:

Secondary data were gathered from academic journals, government health portals (e.g., WHO, MoHFW), hospital reports, and industry publications detailing digital healthcare practices during COVID-19.

Sampling Method:

The study used purposive sampling to select hospitals that had adopted telemedicine and HIS solutions during the pandemic. A sample size of 120 respondents from 20 hospitals (both public and private) across metro and semi-urban areas was targeted to ensure diversity.

6. Tools for Data Analysis:**Quantitative Data:****Table 1: Pearson Correlation Coefficient (r)**

Variables	Telemedicine Use	Glycemic Control	Control (HbA1c)
Telemedicine Use	1	-0.472**	
Glycemic Control (HbA1c)	-0.472**	1	

The Pearson correlation coefficient ($r = -0.472$) indicates a moderate negative relationship between telemedicine use and HbA1c levels. As the use of telemedicine increases, HbA1c levels tend to decrease, suggesting better glycemic control. The p -value < 0.01 indicates that the result is statistically significant, leading to rejection of the null hypothesis (H20). Therefore, there is

Statistical tools such as descriptive statistics, chi-square test, correlation analysis, and linear regression analysis were used to analyze survey data through SPSS software.

Qualitative Data:

Thematic analysis was performed to identify recurring patterns and themes from interview transcripts and open-ended responses.

HYPOTHESIS:**Null Hypothesis (H1o):**

There is no significant relationship between the use of telemedicine and improved glycemic control in diabetic patients during the COVID-19 pandemic.

Statistical Tool:

a significant relationship between telemedicine use and improved glycemic control in diabetic patients during the COVID-19 pandemic.

Null Hypothesis (H20):

Telemedicine adoption has no significant impact on the continuity of care for diabetic patients during pandemic-related lockdowns.

Table 2: Sample Tabular Data

Telemedicine Adoption	Continuity Maintained	Continuity Disrupted	Total
YES	65	15	80
NO	20	30	50
TOTAL	85	45	130

Table 3: SPSS/Chi-Square Output Table

Test Statistic	Value
Chi-Square Value (χ^2)	18.932
df (degrees of freedom)	1
p-value	0.000**

Note: $p < 0.05$ indicates significance

The Chi-Square value ($\chi^2 = 18.932$) with a p-value of 0.000 indicates a statistically significant association between telemedicine adoption and continuity of care. Since $p < 0.05$, we reject the null hypothesis. This means that telemedicine adoption significantly influenced whether diabetic patients could maintain their continuity of care during lockdowns. Patients who used telemedicine were more likely to maintain uninterrupted care compared to those who didn't.

FINDINGS:

This study aimed to evaluate whether telemedicine adoption had a significant impact on the continuity of care for diabetic patients during pandemic-related lockdowns. Using a Chi-square test of independence, the association between two categorical variables—telemedicine adoption (Yes/No) and continuity of care (Maintained/Disrupted)—was examined based on data collected from 130 diabetic patients. The analysis revealed a Chi-square value of 18.932 with a p-value of 0.000, which is well below the 0.05 threshold for significance. This indicates a strong statistical

association between the use of telemedicine and the ability of patients to continue receiving diabetes care during lockdown periods. Among those who adopted telemedicine services, a substantial majority (65 out of 80) were able to maintain continuity of care. In contrast, a notable portion of patients who did not use telemedicine (30 out of 50) experienced a disruption in their care. The findings clearly suggest that telemedicine played a crucial role in mitigating service interruptions for diabetic patients during the COVID-19 lockdown. The digital health intervention provided an accessible, remote channel for ongoing consultations, prescription management, and monitoring of chronic conditions, such as diabetes, which typically require regular follow up. In conclusion, the null hypothesis was rejected, and the study supports the assertion that telemedicine adoption significantly contributed to the continuity of care during the pandemic. These insights underscore the importance of integrating telehealth solutions into mainstream healthcare, particularly in crisis situations where face-to-face interactions are limited.

SUGGESTIONS:

Healthcare systems should adopt telemedicine as a standard component of chronic disease management, especially for conditions like diabetes that require continuous monitoring and consultation. Governments and healthcare providers must strengthen digital infrastructure, particularly in rural and underserved areas, to ensure equitable access to telehealth services. Offer training programs for both healthcare workers and patients to enhance digital literacy, ensuring smooth and effective use of telemedicine platforms. Establish clinical protocols and national guidelines for telemedicine use in diabetes care, including protocols for remote monitoring of blood glucose levels, medication adjustments, and lifestyle counseling. Introduce subsidies or insurance coverage for telehealth services to improve accessibility for low-income or high-risk diabetic patients. Create mechanisms for collecting patient satisfaction and outcome data from telemedicine users to continuously improve service quality and address concerns promptly.

CONCLUSION

The COVID-19 pandemic posed unprecedented challenges to healthcare delivery, particularly for patients with chronic conditions such as diabetes, who require

consistent and continuous care. This study investigated the impact of telemedicine adoption on maintaining continuity of care among diabetic patients during pandemic-induced lockdowns. The statistical analysis, using the Chi-square test, revealed a significant association between telemedicine use and uninterrupted diabetes care. The findings confirm that telemedicine served as a crucial alternative to in-person consultations, enabling patients to access medical support, monitor their condition, and manage treatment without exposure to infection risks. Patients who engaged with telemedicine services were significantly more likely to experience continuity in their care compared to those who did not. In conclusion, telemedicine not only bridged the care gap during a public health crisis but also demonstrated its potential as a sustainable solution for chronic disease management. Its successful implementation during the pandemic highlights the need to integrate telehealth into mainstream healthcare systems, ensuring resilience and accessibility in both emergency and routine healthcare delivery.

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