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Article

Digital Transformation in Healthcare During the COVID-19 Pandemic: Insights from Saudi Arabian Healthcare Managers

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Abstract

During COVID-19 pandemic, digital transformation was urgently necessary for the continuation of services and healthcare was no exception. The study aimed to explore the managers' experience with digitalization by investigating the current applications, the transformation outcomes, and the future expectations. Eleven 30 to 45 minutes interviews were conducted with a purposive sample of managers working in healthcare organizations in Riyadh. The analysis started by encoding the participants to protect their identities, then the transcripts were thematically analyzed. The findings indicated that the pandemic has played a major role in the use of digital services and accordingly, the digital platforms impacted the delivery of care. The time to perform tasks was shortened and the effectiveness of data management was increased; decision-making was accelerated, and medical errors were reduced. On the other hand, data entry mistakes caused a few incorrect diagnoses, and less time was available to serve patients due to being busy with data entry. In conclusion, the experience with digitalization in healthcare seemed promising although there were some problems. Medical personnel should receive thorough training in data utilization and digital skills, effective policies and systems to protect data privacy are needed and finally, more experts in information technology are needed.

Keywords

Digital transformation, Digitalization, Saudi Arabia, COVID-19, Healthcare management, Informatic management

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Introduction

Driven by exponential growth in computing power, digital technologies have successfully transformed most sectors of the economy ranging from finance to entertainment (Goldsack & Zanetti, 2020). Understanding the impacts of digitalization in the workplace requires an understanding of the effects of digital technology on the tasks we perform, and these effects are often not foreseeable.

The ideas of digital products and services were already well-understood in the 1990s and 2000s. The first public digital high-definition television (HDTV) broadcast was of the 1990 World Cup. The World Wide Web became publicly accessible in 1991, which had been available only to government and universities (Burton-Jones et al., 2020). In 1991, the 2G network was introduced and digital cell phones were sold commercially (Elsersy et al., 2021). By 1999, almost every country had a connection, and nearly half of the Americans and people in several other countries used the Internet on a regular basis. By 2000, most U.S. houses had at least one personal computer and internet access by the following year (Galetsi et al., 2020). From 2000 to 2015, the rise of smart devices and social media platforms led to changes in the methods customers used to communicate with businesses, and their expectations with regards to response times (Argaw et al., 2019).

Digital transformation is "an ongoing journey of using digital technology and digital strategy to fundamentally change an organization's customer experience, business and operating processes, and culture" (Alghamdi et al., 2021). Not having a clear idea about the nature and extent of these transformations may lead to regulatory, economic, political, and societal responses that are disproportionate to the nature of these changes and, therefore, may have a range of unintended effects (Agarwal et al., 2010). The greatest challenge of adopting digital transformation is the speed of change, and the need for ongoing re-education so that individuals can evolve with their jobs' evolvement. Another challenge is the poor technological foundations and cumbersome legacy systems that many countries have.

From the second half of the 20th century, there have been significant changes in the roles of physicians and patients, as well as their interrelationship. In this transformation, the patient is no longer a passive sufferer but an active participant in the treatment process (Abidi & Abidi, 2019). Expectations on digitalization impact on health care were indicated in The World Economic Forum, for instance the move to 'consumer-centric', where patients are more responsible for managing their own care (Haggerty, 2017). Large-system transformations in healthcare are interventions affecting multiple organizations and care providers, with the goal of significant improvements in the efficiency of service delivery, the quality of patient care, and the population-level outcomes (Jiang et al., 2017).

Digital transformation of healthcare services is seen as an important and influential process that has a substantial impact on current healthcare and healthcare systems and is expected to have a further fundamental impact in the future (Gopal et al., 2019). The success of the transformations requires a sound understanding of the two basic interacting components, 'the health service' and 'the digital', at all levels of the full process of development, production, funding, implementation, and evaluation (Gopal et al., 2019). Tools of digital transformation in healthcare have been proposed to improve access to healthcare services, enhance care coordination and integration, enable self-management, support decision-making, enable monitoring, perform risk analysis, and facilitate proactive interventions (Kraus et al., 2021).

In its *Draft global strategy on digital 2020–2025*, the WHO proposes to "place people at the center of digital health through the appropriate adoption and use of digital health technologies and development of appropriate literacy" (Lupton, 2014). Digital health "is a discipline that

includes digital car programs, technologies with health, healthcare, living, and society to enhance the efficiency of healthcare delivery" (Belliger & Krieger, 2018; Burton-Jones et al., 2020). Among the barriers of the adoption of digital health technologies 'digitalization', is dealing with huge amounts of data and overregulation. Digital health is more beneficial to patients than to their doctors, mostly due to financing, valid tools, evidence- based studies, data management, and accessibility issues (Abidi & Abidi, 2019).

COVID-19 has radically transformed many aspects of human life and global society both now and for many years to come. A key aspect of this was the increased digitalization and the accelerated implementation of previously predicted trends that have been discussed for many years (Mathews et al., 2019). During the pandemic, digitalization became urgently necessary for enterprises to secure the continuation of services. Healthcare management incorporated digital technology into their internal business models to guarantee effectiveness and quality of care. Several important avenues for the practice of information management were introduced, such as developing frameworks and applications to help control, monitor and trace individuals carrying viruses, e.g., using internet of things (IoT) sensors and mobile devices (Barnes, 2020). Information management research can contribute significantly to the development of models, frameworks, policies, and applications to create safer environment and practices (Barnes, 2020).

Like elsewhere around the world, Saudi Arabia is witnessing the digitalization. Not very long ago, it was limited to the world of business and security, but now Saudis are experiencing changes in the way they lead their lives. Digitalization is also a key goal of the Saudi Vision 2030 reform plan and since the announcement of its road map, huge changes have been witnessed.

The scarcity of empirical evidences and evaluations on the effectiveness and sustainability of digital health initiatives is an obstacle to policy making, development, and implementation of healthcare digitalization. This study is designed to explore the experience of healthcare managers with digitalization during COVID-19. It focused on examining the implementation of digitalization, identifying its current applications, investigating the outcomes witnessed, and discussing the management expectations on digitalization.

Methods

Study Design

The study is based on qualitative, semi-structured interviews. The setting was healthcare institutions in Riyadh city, the capital of Sadi Arabia.

Study Population

The study targeted healthcare managers and a purposive sampling method was used based on the following inclusion criteria: managers or IT managers working in healthcare organization and speak English.

Data Collection

Each participant received an invitation through their official email to participate in the study with an explanation of its purpose and an assurance of their confidentiality throughout the research process. They were informed that an acceptance reply to the invitation email will be their consent to participate in the study, and sharing their data on the attached demography list is their consent

to publish individual demographic data.

The first author conducted all the interviews in a semi-structured manner using the following thematic blocks: the conversation started by expressing appreciation for the acceptance of participation and assuring that it will provide valuable contribution to the research field and to the enhancement of the services through understanding their experience as managers. Then the interview dimensions were then discussed through open questions. All interviews were conducted individually via a zoom interview lasting between 30–45 minutes. The interviews were audio recorded and transcribed verbatim from the audio files by the interviewer.

Study Instrument

A semi-structured interview form was designed to serve the purpose of the study. Part one was a short questionnaire about personal characteristics (age, gender, nationality specialization, sector). Part two was open ended questions in four dimensions: The first was the implementation of digitalization; an example question is "COVID-19 has radically transformed many aspects of human life, a key aspect of the transformation has been the accelerated implementation of digital practices. How would you describe digitalization throughout the last two years?". The second dimension was the applications of digitalization; an example question is "What was the role of technology, namely digital health, on medical management practices?". The third dimension was the outcomes of digitalization; an example question is "Within digital transformation, have you sensed improvement in the service quality? Would you explain!". The fourth dimension was managers' expectations on digitalization; an example question is "Do we expect digital transformation to aid in overcoming the shortages of healthcare workers?".

Data Analysis

A total of 13 managers were interviewed, and their responses were thematically analyzed. Prior to discussing the codes with one another to agree on their adoption inside the analysis' framework, the researchers independently classified the content into codes then start discussing them until reaching an agreement on the categories and finally on the themes.

The participants were encoded to protect their identities into four digits code; the first letter represents the participants' position; 'M' is a healthcare manager, and 'I' is a health informatics officer. The second letter represents the participants' gender; 'M' is male, and 'F' is female. The third letter represents the participants' employment sector; 'G' indicates working in a governmental institution, and 'P' indicates working in a private institution. Finally, the fourth digit is a dash with a number that represents the participant's serial position in the interviews.

Ethical Consideration

The data was used only for the purposes of this scientific research. The confidentiality of the data was maintained throughout and only the researchers had access to the raw data. Anonymity of the participants was assured; their names were replaced by the generated codes. The approval was received from the Subcommittee on Human and Social Research Ethics in King Saud University at its 13th session on 23/11/2021.Ref No: KSU-HE-21-755.

Results

A total of 13 healthcare managers participated in this study: nine managers and four informatics officers. Seven participants were in their thirties, four in their forties, and two in their fifties whereas nine of them were males. Finally, nine managers were from governmental institutions and the remaining four were working in the private sector. Table 1.

The thematic analysis generated four themes: Digitalization in healthcare within COVID-19, Applications of digitalization in healthcare, Outcomes of digitalization, and Expectations within digitalization. Table 2.

Digitalization in Healthcare within COVID-19

The first discussed issue was implementing digitalization focusing on the transformation process in the first two years after the emergence of COVID-19. From the responses, it can be noted that digital transformation was present in various aspects of Saudi healthcare sector, which was geared toward the quality of the services.

Communication on A Managerial Level

Despite having digital technology before COVID-19, it has significantly improved afterward with the need for non-physical communication approaches. It was evident throughout the responses that the pandemic has significantly transformed the traditional communication processes due to the limitations on physical interactions.

Apparently, digitalization has changed the process of communication and enhanced efficiency in various aspects, such as enabling managers to hold meetings irrespective of their locations. Also, there was some emphasis on improving communication between the management and the patients.

Table 1. Characteristics of study participants (N=13)

Participants' code*	Age	Gender	Nationality	Specialization	Sector
MFP-1	36	Female	Saudi	Manager	Private
MMG-2	44	Male	Saudi	Manager	Government
MMG-3	42	Male	Saudi	Manager	Government
MFG-4	30	Female	Saudi	Manager	Government
MMG-5	53	Male	Saudi	Manager	Government
MMP-6	56	Male	Saudi	Manager	Private
IMG-7	32	Male	Saudi	Informatics	Government
IMG-8	30	Male	Saudi	Informatics	Government
IMG-9	37	Male	Saudi	Informatics	Government
IMG-10	35	Male	Saudi	Informatics	Government
MFP-11	43	Female	Saudi	Manager	Private
MFP-12	36	Female	Saudi	Manager	Private
MMG-13	44	Male	Saudi	Manager	Government

**Code=Position, Gender, Sector - Serial number*

Table 2. Thematic analysis of managers' experience with digitalization in healthcare

Themes	Sub-themes	Clusters
Digitalization in healthcare within COVID-19	1-Communication on managerial level 2-Communication on medical practice level 3-Decision-making strategies	Participants expressed their views on the process of healthcare digitalization in the last two years: (1) influenced decision making strategies, (2) promoted remote communication approaches like Zoom meetings, (3) enhanced decision processes, and (4) improved quality of care delivery
Applications of digitalization in healthcare	1-Role of HIS in decision making 2-Role of digital health in medical management; barriers and drawbacks	Participants noted that healthcare information systems are important in various ways (1) improve accessibility to patient, (2) enhance data sharing and team management, (3) improve planning and monitoring of organizational operations. They also identified barriers to HIS implementation, (1) user acceptance, (2) absence of a sound support system. The main drawback of HIS is to lessen the attention to customer needs.
Outcomes of digitalization	1-Improvement in the quality of medical care 2-Opportunities for fundamental changes in work design	Participants expressed their feelings on how digital health improve efficiency and service quality: (1) increased accessibility to patient data, (2) improved accuracy in diagnosis and treatment, (3) reduced medical errors, and (4) better workplace monitoring. Participants also expressed views on opportunities for work design.
Expectations within digitalization	1-Digital transformation in overcoming shortages in healthcare workers 2-Competencies in health informatics 3-Application of artificial intelligence in healthcare	Participants provided various views on their expectations of digital health: (1) improve patient data access, (2) integrate artificial intelligence in diagnosis and treatment, (3) mitigate healthcare workers problem

"(digitalization) …improved a lot due to the need of distance communication…although it was available before, …but it has improved tremendously." [MMP-6]

Communication on Medical Practice Level; Physician-Patient Interactions, Professional Peers' Interactions

Traditional approaches were replaced by electronic materials to speed up medical responses. Within digitalization, physicians were able to practice through virtual clinics: conduct diagnoses, transfer patient, and respond to their complaints. That led to reduced cycle time, eliminated risks associated with numerous hospital visits, reduced errors with electronic patients records and eventually enhancement of patients' outcomes.

The participants also believed that digitalization contributed to the process of comparison of medical practices between different locations and countries to gain better and broader understanding of the cases.

"…digitalization has improved our quality of service and our understanding of the profession...work from abroad, …Zoom meeting with our patient, …request some like lab work..." [MMG-3]

Decision-Making Strategies

The researcher further discussed how COVID-19 has impacted the strategies of decision-making and whether there were some forms of digital practices in managerial decisions. The responses revealed that decision strategies within the pandemic period have two-fold; some managers noted positive outcomes while others had some complications.

On the positive front, the pandemic has enhanced digital transformation introducing new forms of decision-making technologies that have improved decision processes, making them easier, faster, and with a high level of accuracy. Evidence suggested that most managers utilize digital practices in their decisions, and these include Google Zoom meetings, digital dashboard, and LTS that connect healthcare facilities to institutions.

> "…the speed of the decisions has changed; for example, joining many activities outside Saudi Arabia has improved...before, 1-2 years…we do it now within one month." [MMP-6]

On the other hand, the restrictions brought about by the pandemic have shifted work processes to home and thus created a challenge in providing in-person patient care as well as administering student clinical exams. Hence physicians had to modify their decision models to incorporate online platforms to attend to their patients and students and to administer their patients' medication remotely.

> "All of this sudden… shift life to online and you have to take like major decisions at the hospital level ... see the patient, reschedule appointments, which services to cut down,..." [MMG-2]

The traditional communication channels have been significantly disrupted, thus reducing workflows, influencing the quality of decisions, creating challenges in monitoring student lectures. The practitioners were required to adapt rapidly to the new changes, they were required to make faster decisions and with limited information than before due to limited physical interactions.

> "…you need to make a decision in a short period of time with limited information sometimes, and in a situation which you didn't face before..." [IMG-9]

Applications for Digitalization in Healthcare

Two primary topics were discussed under this thematic dimension: the role of health information system (HIS) in decision making, and the role of technology in medical management practices, including possible barriers and drawbacks to digital health.

Role of HIS in Decision Making

The analysis provided a uniform response on the role of information systems in healthcare. This relates to efficiency in data collection, time management, and improved patient outcomes.

It was noted that HIS had introduced an electronic patient profile that enabled practitioners to provide accurate diagnosis and treatment, hence reduced cycle times in hospitals. HIS has further introduced remote working capabilities where physicians and patients can access health records from their own homes, which was instrumental during the pandemic.

> "…with the technology patient database is highly accessible, making it easy to follow up on their medical history and treatment of our patients became more efficient and reliable. [MFP-1]

It was evident that HIS became an integral component of healthcare and played a critical part in enhancing the decision-making process. It enabled online team management and data sharing at the workplace, and it improved the medical planning process. Patient data could efficiently be shared with multiple users to help make an accurate decision on the best approach to offer medication.

> "…one of the most important aids of decisions is the presence of advanced health systems that give readings that reflect the reality. That is very important in making decisions in the planning stage and in the monitoring process... [IMG-8]

Incorporating HIS in healthcare provided accurate data that enabled the plan and monitor of organizational operations and the achievement of the desired outcome. It has improved clinical decision; Its application during the pandemic has enhanced the quality of care through efficient data management, and automated medical processes to reach better patient diagnosis.

> "…information systems play an important role during the pandemic by utilizing resources to reach locations inaccessible physically during the pandemic. [IMG-9]

Role of Digital Health in Medical Management; Barriers and Drawbacks

Information technology is a form of application of technology in healthcare, hence according to the respondents, the role of technology in medical management practices resonates with the application of HIS. The application of digital health often experiences various barriers and drawbacks that usually hinder its successful implementation.

One of the major barriers noted was user rejection; most of the patients were always skeptical in accepting new technology. This was emphasized by one of the respondents who stated that:

> "…most of the patients, might not be ready to use technology that focuses on bad health. So probably, they will not have the motivation to use many apps or learn how to use a new health app to achieve what they want…" [IMG-9]

Resistance of healthcare professionals to change was another barrier of successful implementation of digital health; they rarely focus on E-health, as they tend to prefer traditional approaches. Another perceived barrier was the absence of a sound support system that enables successful integration of E-health in the existing systems and the clinical workflow. Digital health also requires high development and maintenance costs like continuous system updates to correspond to changing customer needs. Finally, the lack of specialists to implement and operate the system could lead to inaccurate data input resulting in incorrect decision processes.

Numerous possible drawbacks to digital health were also noted from the analysis. Some of the major ones were technical need and the focus on the technology itself, which has reduced the attention to the customers' needs. Additionally, practitioners would spend less time with their patients since most services are offered online which has reduced the quality of care, especially among those who need personalized attention. One of the participants noted:

> "…social aspects of providing healthcare services have received less attention…the clinician now spends less time with the patients, which is not good." [IMG-9]

Moreover, the application is prone to cyber-attacks that threaten data security, and it often lacks customer privacy as any practitioner in the facility has easy access. Digital health could also

be time-consuming, and sometimes a practitioner might add incorrect data resulting in inaccurate patient diagnosis and treatment.

Outcomes of Digitalization

This theme focused on the outcomes of digital transformation in healthcare including the quality, the efficiency, and the possible opportunities for fundamental changes in work design.

Improvement in Quality of Medical Care

According to the perceptions of the respondents, digital transformation in healthcare has significantly improved medical services. Information applications have improved service quality by increasing accessibility to patient data including digital filing and imaging that enabled practitioners to provide accurate diagnosis and treatment. Electronic patient data can also be analyzed and used as base information for preventing future diseases. A participant noted:

> "…the quality is improved...the data we have, it is much bigger than before, and the retrieval of information has improved a lot." [MMP-6]

Moreover, healthcare efficiency within digital transformation has improved in various ways. These include reduced cycle times in the treatment processes since all medical data are easily retrievable through electronic systems. Improved workflow by introducing online services and better monitoring of patients' recovery process through E-health which would improve service quality and patient safety. Furthermore, medical errors were reduced.

> "…I think first of all is the process becomes very clear, very transparent to the patient...also time efficiency has improved, as well as resource utilization especially through digital prescription." [IMG-9]

Opportunities for Fundamental Changes in Work Design

Digital transformation in healthcare also created opportunities for restructuring the work design to ensure the system adaptation to changes in patient needs and digital health requirements. Considering the benefits of incorporating information technology in healthcare systems, most participants argued that their organizations would make it a fundamental component in their patient diagnosis and treatment systems.

Most healthcare facilities will improve their systems and redesign their business models to factor in digital technology. The healthcare sector is changing, and the global COVID pandemic has expanded the scope of most managers, and to remain competitive in the market, they must adopt new technologies.

> "…as I told you, we have to go with the flow of the digital. Otherwise, we will be behind; I hope that we go in this direction. [MFG-4]

Opportunities created for models such as telemedicine, telehealth, and homecare are significantly affecting the healthcare work process. Therefore, implementing digital technology will result in changes in healthcare management and business models. Additionally, from the results, it was noted that there are opportunities to include technology such as artificial intelligence in patient diagnosis due to their high level of accuracy.

Despite the positive outcome of opportunities resulting from digital transformation, some participants had a diverging opinion that digital implementation during COVID will quickly fade

in the post-COVID period since it lacked a strong foundation for implementation. Their argument is based on the fact that most healthcare facilities adopted digital technology due to the urgent need to curb COVID but did not have sufficient planning; hence the process is not sustainable.

Expectations within Digitalization

This theme focused on examining the expectations that healthcare managers have upon incorporating digital technology in their business models. Specifically, it explored how digital transformation will help reduce the shortages of health workers, the challenge of having the necessary competencies in health informatics, and the potential of adopting artificial intelligence solutions in healthcare.

Digital Transformation in Overcoming Shortages in Health Worker

It was a general feeling among the participants that digital transformation will significantly contribute to overcoming the shortages of health workers since technology will take over some of the duties originally performed by humans. For example, electronic systems will solve the challenge of manually collected patient data.

> "…I think digital transformation in this regard might help to improve some aspects of health care like improving access..." [MMG-2]

This participant, however, pointed out that despite enhancing efficiency, digital healthcare will not completely solve the health worker challenge but rather helps practitioners in attending to patients.

Various ways were identified on how digital transformation will mitigate the challenge of the supply of health workers. It will improve patient appointments thus reducing cycle times and enhance efficiency of medical care by reducing errors. It will also introduce automation of processes, improv management, and replace some specialties with technology. Nonetheless, based on the nature of the healthcare industry, digital transformation will not completely overcome health worker challenges as workers are still required to offer some essential services, and the demand for healthcare services often surpasses the supply of practitioners.

Competencies in Health Informatics

To ensure the successful implementation of healthcare informatics, the staff need to have a high level of competencies. In the initial stages of the process, it is evident that most healthcare facilities will experience challenges in getting the right skills to work with the systems. Most healthcare facilities adopted digital transformation during the COVID pandemic, hence they did not have good foundational planning for the process. In this regard, it will be a challenge to completely adapt to the new operational model in its initial stages and adequate training is required for the informatics personnel.

Application of Artificial Intelligence in Healthcare

With the rapid digital transformation in healthcare, there was a general feeling among the participants that artificial intelligence will be incorporated in healthcare. That incorporation will be in various aspects such as patient diagnosis, automating some non-critical human duties, collecting and maintaining patient electronic health records, and being incorporated in surgeries. Applying artificial intelligence in healthcare can enhance efficiency, improve quality of care, and ensure proper time management.

"…Artificial intelligence is a new scientific field that has many branches such as machine learning. So, everyone now around the world is focusing on artificial intelligence such as AI-powered chat boots. So yes, artificial intelligence is invading the medical industry, and it can provide many solutions." [IMG-10]

Discussion

This research examined healthcare managers' experience with various digital transformations. The data was categorized into four themes and each theme is then discussed independently in relation to the outcome of the qualitative analysis. The opinion of study participants was in accordance with most of the literature of COVID-19 pandemic such as (Burton-Jones et al., 2020), as it has created a significant disruption to both public and private sectors across the globe. Governments responded fast to implement preventive measures, including lockdown of various services to contain the virus's rapid spread. As a result, institutions were forced to quickly adapt and transfer their services online to ensure continued access.

The study outcome confirms the assertions by Haggerty (2017), that COVID-19 pandemic helped accelerate digital transformation, particularly in the healthcare sector. Organizations, as the only way to guarantee their continued existence, were forced to quickly implement digital platforms and applications for providing essential services to people at the convenience of their homes.

The current findings resonate with previous ones that emphasized the positive impact of digital transformation in healthcare environment. In 2019, Gopal and colleagues observed that expansive investment in modern technologies in healthcare had improved decision-making processes. In 2018, Belliger and Krieger noticed that digital transformation in healthcare introduced a paradigm shift in the thinking of close systems to the adoption of open systems.

Disruptive innovations and advanced communications systems are gradually becoming synonymous with healthcare best practices. The study outcome echoes the previous research assertions on the critical role of health information systems in supporting medical decision-making. In 2020, Galetsi and colleagues argued that in a society where data is increasingly becoming an institution's most invaluable resource, establishing an efficient HIS to manage it is indispensable.

The participants revealed that user resistance to change hindered effective implementation of digital health, which affirms by Inkster and colleagues in 2020, who maintained that the fear of change is one of the barriers that prevent effective integration and use of modern technologies.

The high risks inherent in the implementation of digital health justify the reluctance of healthcare professionals to adopt the emerging technologies in their systems. The current respondents observed one of the significant drawbacks to the adoption of digital health in accordance with a previous study (Argaw et al., 2019). Cyber-attacks on HIS may have life-threatening disruptions such as delay in necessary medical procedures and surgeries, inaccessibility of patient's medical records, and even misdirection of patients to different hospitals.

Digitalization of healthcare delivery resulted in significant improvement in managing and providing quality healthcare in Saudi Arabia. The study findings confirm previous studies' assertions that digital transformation has improved both quality of care and management of healthcare facilities. According to Alghamdi and colleagues in 2021, in Saudi Arabia the government and the private sector combined implemented approximately 19 applications and platforms to serve different public health functions and to provide essential healthcare services to

the population.

Technological innovation in healthcare enhances operational efficiency and minimizes wastage. The study outcome echoes the findings of previous research, which showed that the increased adoption of modern technologies in health care practice has enhanced operational efficiency. According to Kraus and colleagues (2021), there is a positive correlation between operational innovation and patients' safety and satisfaction levels. In their view, technology has helped eliminate waste, including waiting time and expenses and improve overall workflow within the healthcare facility. The current findings revealed that digitalization has positively impacted the quality of care and accordingly patients' satisfaction.

The study findings revealed that the adoption of digitalization would contribute towards overcoming the problem of shortages in workers in health facilities. In 2020, Goldsack and Zanetti observed that healthcare workers are inequitably distributed globally, with a severe imbalance between countries. The distribution is even worse within specific countries where the rural areas lack adequate healthcare workers than urban areas. However, digital transformation in the healthcare sector can help manage the shortage problem.

While digital technologies promise significant improvement in healthcare delivery, their adoption requires specific skills and competence. The study revealed that during the initial phases of digital transformation, health facilities are more likely to experience significant challenges getting the competent workforce to achieve the desired goals. According to Belliger and Krieger (2018), the benefits of modern technologies lie in their effective utilization. Institutions must exploit the potential inherent in digital technologies to achieve the desired quality and customer satisfaction. A lack of adequately trained staff would imply that the available technologies would not be put to their right use, and hence their full potential would not be realized.

Limitations: The study faced limitations such as health challenges occasioned by the Covid-19 pandemic. However, the researchers overcame this challenge by using Zoom meetings which reduced the need for face-to-face interviews and reduced the risk of spreading the disease. There were limitations on conducting literature review due to limited local studies on the topic.

Conclusion

The managers' experience was promising with some challenges. It is evident that technology has become an essential component of modern healthcare. Digital transformation, that has mainly been propelled by the global COVID pandemic, contributed to the restructuring of organizational decision-making approaches. Accordingly, organizations have shifted to remote communication channels and online work processes.

Regarding the applications of digitization in healthcare, HIS was reported as being widely applied by managers in various aspects. It helped in enhancing data management and improving the efficiency of patient outcomes. Therefore, digitization in healthcare has improved the processes of decision-making among the practitioners and the managers and accordingly ensure accurate diagnosis and treatment. The major barriers to implementing technology in healthcare were user acceptance, and lack of support systems.

Furthermore, the expectations on digital health included its ability to help overcome the shortage of healthcare workers, the need for competence in health informatics, and the application of artificial intelligence. The application of artificial intelligence in healthcare is inevitable and critical in various aspects, such as conducting patient diagnosis, collecting and recording patient medical history, assisting in surgeries, and offering prescriptions.

With the rapid technological advancement, digitalization will become part of Saudi's healthcare system for the unforeseeable future post-COVID. The benefits that accrue to healthcare organizations outweigh possible associated costs, thus making it an essential ingredient of enhancing service quality and outcomes. In addition, just like other industries, the medical sector is increasingly becoming competitive due to the integration of technology in its business models and decision strategies.

Recommendations: Digitalization is essential in healthcare to effectively respond to the changing customer dynamics and needs. Saudi's healthcare system must embrace digitalization in post-COVID period to remain competitive. That should be combined by providing proper personnel training to ensure individuals have the prerequisite skills to use healthcare informatics and digital health. Furthermore, integrating artificial intelligence would enhance patient diagnosis and limit errors in patient data.

Finally, further studies are recommended to explore the impact of digital healthcare systems on the quality of care, service, and patient outcomes.

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