Health Care Professionals' Understanding and Perceptions of Telemedicine in Saudi Arabia: A systematic Review

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Abstract

Objective: To assess the health care professionals' understanding and perceptions of telemedicine in Saudi Arabia.

Methods: A systematic review was conducted among the studies 12 empirical studies conducted in Saudi Arabia within the last five years. The articles were sought from PubMed central, CINHAL before an additional search on general open-access database like Google Scholar. The search process of the articles was summarized in a PRISMA diagram, and the included articles were summarized in an abstraction table.

Results: The initial search for articles gave a result of 3503 articles, which were scrutinized and 12 articles were noted after excluding all the irrelevant articles. Two key thematic outcomes were noted; an overall positive perception of telemedicine and varying levels of knowledge and awareness among the among healthcare workers. Four factors were noted by the healthcare workers to affect perception on telemedicine; technology, costs, knowledge levels, location and coordination between healthcare staff and the information and communication technicians.

Conclusion: There is an increasing knowledge and awareness, and knowledge regarding telemedicine among the healthcare workers in Saudi Arabia. A continuous training of the healthcare workers may improve the positive outcomes of telemedicine application, especially in quality of patient care.

Keywords: *telemedicine, healthcare workers, knowledge, perceptions, barriers.*

Introduction

As technology blossoms in every sector of the economy, healthcare has not been left behind as recent practices seem to fully embrace the use of recent technological discoveries. Amidst the many technological achievements is the telemedicine, which Baker and Stanley (2018) describe as a branch of medicine that utilized electronic media, such as video conferencing and virtual patients' consolations for medical examination and even treatment. As such, telemedicine virtually connects and ensures a smooth and continuous flow of information among the healthcare professionals and patients (Ahmed et al., 2021). While the practice may appear new due to the recent advancements, Kruse et al. (2018) explain that it had been in place since the earlier days, dating to 1960s when military personnel could consult their healthcare service providers through telegram. With the subsequent improvements, telemedicine is currently used in many

countries around the globe for virtual healthcare service provision.

The World Health Organization (1997) provides a comprehensive definition of telemedicine as "the delivery of healthcare services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation and for the continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities." It was previously mainly used among the physically disadvantaged community members, such as the old, who could not easily travel to the healthcare centers – they had their sample withdrawn from the nearby facilities and taken for examination before receiving their prescriptions and other services (Vatnøy et al. 2017). This too has changed as many countries adopt the current technologies for better patient care, and with a tremendous improvement in the quality-of-service delivery (Haleem et al., 2021).

Saudi Arabia is among the many countries using telemedicine, and extensive research has been done to examine its adoption, usage, and perceptions among healthcare workers and even patients towards its usage. The benefits of its adoption have been reported to be diverse – convenient, cost effective and increases access to healthcare services (Riew et al., 2021). Studies conducted in the Middle East and Saudi Arabia provide evidence of a wide adoption and applications of telemedicine only after 2010 (El-Mahalli et al., 2012). More usage of telemedicine was witnessed during the time of Covid-19 when movement was restricted (Yamin & Alyoubi, 2020). Nevertheless, the awareness, attitudes and perceptions of the various aspects of telemedicine among patients and healthcare professionals has been established to be fluctuating with different factors (Talmesany et al., 2023; Al-rayes et al., 2020; Alsahali, 2021).

Studies show that the effective application of telemedicine in Saudi Arabia has been influenced diverse factors as perceived by patients and healthcare staff, including "performance expectancy, effort expectancy, social influence, hedonic motivation, and facilitating conditions have a positive influence on behavioral intention" (Alam et al., 2021). On the same noted, Al-Samarraie et al. (2021) also pointed out many factors influencing application of telemedicine, including "certain cultural, financial, organizational, individual, technological, legal, and regulatory challenges… doctor and patient resistance, poor infrastructure, lack of funding, poor system quality, and lack of information technology training were associated with the low adoption of telemedicine in the region." These factors collectively contribute the high variations in the perceptions of healthcare professionals about telemedicine usage in Saudi Arabia. With the high number of studies already conducted in Saudi Arabia, there is a need to provide a summarized overview of the most recent evidence about healthcare workers' perceptions on telemedicine to improve usage for better patient care.

Methods

A systematic review was applied as one of the approaches to exploring the established evidence under a given phenomenon in a more rigorous approach (Mallett et al. 2012). Accordingly, the peer review recent journal articles were sought from two online journal databases, including PubMed and CINHAL, and one general database – Google Scholar. However, additional search was also done on Google search engine and by checking the reference lists of the articles in order to identify elusive articles not obtained from the systematic search. Four keywords were used to guide the search process as described by Grames et al. (2019). These words include, (1) telemedicine and its related forms such as e-health, telehealth, mHealth and digital consultation, (2) healthcare workers and the related forms, such as nurses, physicians, doctors, pharmacists, and (3) perceptions, including attitude, and (4) knowledge reflecting understanding. The keywords and the related

forms, including the truncations, were separated with the search operators for a comprehensive search.

The articles' search target articles of specific features and qualities, which were clustered under the inclusion and exclusion criteria for faster assessments. Accordingly, the articles were included based on their years of publication, i.e., not older than five years, language (English), country (Saudi Arabia), and having empirical evidence. On the other hand, articles were excluded when older than five years, reviews, and published in other languages other than English. Subsequently, the initial search for the articles yielded 3503 articles, out of which 3303 articles were obtained from the non-systematic search, i.e., the nursing journal databases and the rest (200) were obtained from the manual search processes. Upon careful assessment and appraisal of the studies based on the inclusion and exclusion criteria and other features, a total of 12 articles were considered relevant for this review. A summary of the search process and the articles inclusion and exclusion considerations has been presented in the PRISMA diagram summary (Appendix 1).

Results

A total of twelve articles were included in the review for having met the inclusion considerations (Ahmed et al., 2021; Albarrak et al., 2021; Alghamdi et al., 2022; Aloyuni et al., 2020; Alqurashi et al., 2023; Bashir & Bastola, 2018; Bashir et al., 2023; Kaliyadan et al., 2020; Moussa et al., 2023; Ullah et al., 2021; Idriss et al., 2022; Ahmed et al., 2021). The articles conformed to two methodologies – one mixed research and the rest applied the quantitative design. According to the aim of this study, three themes were identified from the articles; healthcare workers' attitudes and perceptions towards telemedicine, knowledge and awareness towards the use of telemedicine, and barriers and other factors affecting healthcare workers' perceptions and knowledge towards telemedicine.

Healthcare workers' attitudes and perceptions towards telemedicine

The healthcare workers' attitude and perceptions were considered from a relative broad view, including the readiness of the healthcare staff. These articles reported positive attitude towards the use of telemedicine. Many researchers mostly reported overall positive scores in the general use of telemedicine (Ahmed et al., 2021; Bashir et al., 2023), nursing quality service delivery (Bashir & Bastola, 2018), and management of chronic diseases (Ahmed et al., 2021). The positive perception is linked to features such as cost effectiveness and convenience (Idriss et al., 2022; Albarrak et al., 2021).

However, there are inconsistent perceptions and attitude towards telemedicine and some studies reported only moderate perceptions. For instance, Alghamdi et al. (2022) indicated that only 44% considered telehealth to be a useful tool in enhancing the quality of healthcare service delivery, 43% of the participants expressed comfort with the technique, and 45.45% reported that the technology facilitated care delivery to patients who have difficulties in travelling. Comparatively, others reported positive regards to the use of telemedicine. In a study, 78% and 92% of the participants felt that telehealth in rehabilitation services helped in addressing patients' needs and improving the quality of healthcare services, respectively.

Healthcare workers' knowledge and awareness towards the use of telemedicine

Awareness of telemedicine by the healthcare staff is reported in one study, which indicated that "46% of the respondents were aware of telerehabilitation but did not apply the usage" (Ullah et al., 2021). The rest of the studies focused on knowledge levels, which was highly variant, ranging from good (Ahmed et al., 2021) through moderate (Albarrak et al., 2021) to advanced (Aloyuni et al., 2020). However, in some studies, such as Aloyuni et al. (2020), sufficient knowledge was only noted in 58.8% of the participants. In another study, Bashir et al. (2023) reported that 63.7%, had limited knowledge of telemedicine and only 25% had

extensive knowledge. A wide knowledge range was also reported in a study where 92% of the participants had either moderate or advanced knowledge about telemedicine (Ahmed et al., 2021).

Barriers and other factors affecting healthcare workers' perceptions and knowledge towards telemedicine

The perception and attitude towards the use of telemedicine depends on many factors noted in the literature articles, including age of the healthcare workers (Ahmed et al., 2021), gender and years of experience (Moussa et al., 2023). According to Ahmed et al. (2021), younger healthcare staff had better attitude compared to the senior colleagues.

Many barriers and adoption challenges were also noted in the literature, including high costs (Aloyuni et al., 2020; Ullah et al., 2021; Albarrak et al., 2021), inadequate knowledge among the healthcare workers (Ullah et al., 2021), and possible breach of patients' information (Ullah et al., 2021; Albarrak et al., 2021). Healthcare workers also perceive that lack f proper training on the systems and lack of consultation between information technology expert and clinicians also hinder the effective use of telemedicine in Saudi Arabia (Albarrak et al., 2021). Other also expressed a feeling that technological limitations, willingness among staff, location of the systems and diagnostic reliability hinder the effective use of telemedicine (Aloyuni et al., 2020).

Nevertheless, some studies also identified recommendations for better adoption and use among the healthcare staff, including continuous training the healthcare workers, continuous evaluation of the system, consideration of organizational culture and systems (Alqurashi et al., 2023).

Discussion

Telemedicine has gained a lot of attention in Saudi Arabia with the growing technology, and many studies have shown interest in examined its adoption, usefulness and receptivity among the healthcare workers. This review concentrated on the perceptions and knowledge of telemedicine among the healthcare workers in Saudi Arabia. Accordingly, the attitude and perceptions of healthcare workers were noted, their knowledge and awareness, as well as the factors that affect their perceptions and experience.

Healthcare workers' attitudes and perceptions towards telemedicine was noted to be mostly positive in the reviewed articles. The positive consideration of telemedicine was noted from different reasons; including the benefits in improving quality of healthcare services, cost effectiveness, convenience, and wide coverage where the hard-to-reach patients could be reached. However, these concepts are not new to Saudi Arabia, and many studies have noted the benefits of telemedicine in many other parts of the world (de la Torre-Díez et al., 2015). For instance, a study conducted by Agha, Schapira and Maker (2002) reported that cost-effectiveness of telemedicine is apparent; however, dependent on three factors – sharing medication costs among the many patients, effectiveness of the system and patients' ability to attend their regular work. According to Snoswell et al. (2020), telemedicine has the ability to reduce costs by improving productivity, reducing secondary care and providing a cheaper means of patients' follow-up through tele-mentoring.

Regarding the idea of convenience and ability to reach many patients, including those with travel difficulties, studies have noted that the technology helps provide healthcare services to those in remote areas, ensuring convenience to the healthcare staff and patients too (Gajarawala & Pelkowski, 2021). The use and convenience became even more apparent during the time of Covid-19 when healthcare workers could follow up their patients without the need for traveling (Haleem et al., 2021). Wootton, Bahaadinbeigy and Hailey (2011) stress that avoided travel was the pillar upon which the convenience of telemedicine stands.

An improvement in the quality of healthcare service delivery is another critical aspect of telemedicine noted among the healthcare staff.

Haleem et al. (2021) explain that telemedicine helps reach more patients at the right time, which ensures timely delivery of healthcare services for quality care. Quinton et al. (2022) also noted that telemedicine significantly improved the care for diabetes patients by ensuring regular checkups on the self-management practices. The improvement in the quality of healthcare services is apparent in the literature (Arias et al., 2022; Weiss et al., 2021; Rubeis et al., 2018; Gholamzadeh et al., 2022).

Regarding the healthcare workers' knowledge and awareness towards the use of telemedicine, this study noted that level of knowledge varies. While some healthcare professionals have efficient knowledge, some do not have reliable knowledge about telemedicine in Saudi Arabia. The variation in knowledge is natural and apparent in many other studies conducted in other places. For example, a study conducted in Iran by Ayatollahi, Sarabi and Langarizadeh (2015) noted that over 90% of the healthcare workers had inadequate knowledge about telemedicine. Inadequate knowledge among the healthcare workers could be linked to the low usage among the general population (Mustafa & Al-Mohaithef, 2023; Talmesany et al., 2023). Nevertheless, with the steady advancements in technology, there are likelihood that the levels of knowledge and awareness of telemedicine among the healthcare workers would increase.

Moreover, the support environment in Saudi Arabia regarding the use of healthcare technology, increased efficiencies, and more training programs about telehealth programs are more likely to provide a strong architecture for rapid knowledge development (El Kheir et al., 2023). At the same time, the increase in demand of the services among patients may influence the healthcare staff' knowledge about telemedicine (Kaliyadan et al., 2020). Cases of infectious diseases, such as the sudden outbreak of corona virus, which led to relocation of most services online also improved the awareness of telemedicine to a great extent.

Even though studies have reported diverse positive outcomes from telemedicine that makes it receive positive perception from the

healthcare workers, this review also noted that there are many barriers affecting the efficient adoption and usage of telemedicine services as perceived by the customers. One of the barriers is technological complications and compatibility issues. Some hospitals do not have the right infrastructure to support the telemedicine system (Ranganathan & Balaji, 2020; Harst, Lantzsch & Scheibe, 2019). AlQudah et al. (2021) explains that compatibility of telemedicine systems with the existing technology within the organization is among the key factors influencing its adoption and awareness among the staff. Additionally, the same study noted the level of usefulness as perceived by the healthcare staff and the technological experts also affect the health workers' view on usage (AlQudah et al., 2021).

However, it also noted that demographic factors, such as age of the healthcare staff had an influence on their perception of the healthcare workers about the usability of telemedicine. Similarly, Almathami et al. (2020) also noted that the age groups of individual users significantly affect their perceptions on the usage of telemedicine. The older members have been noted to exhibit comparatively more negative attitude towards telemedicine compared to the younger counterparts. However, not much have been done to explore other demographic factors and their role in influencing healthcare workers' perceptions towards telemedicine usage.

Risk of being breached by attackers is another critical feature that makes some healthcare staff develop negative attitude towards the telemedicine systems (Kim et al., 2020). Potential attack issues have been raised in the literature as some of the features that drive fear in the use of telemedicine; however, current advances are underway for improvements (Kim et al., 2020; Romanovs et al., 2021). Houser, Flite and Foster (2023) also highlight data security as a potential threat to telemedicine. Even though there are countable instances of actual attack, the fear of being attacked drive fear into some healthcare staff making them perceive the system is porous. Still, there are also cases of smooth operation, which have

imbued the healthcare staff with additional confidence in the system.

Conclusion

There are relatively many research studies done in Saudi Arabia to examine the healthcare workers' perceptions and views on the use of telemedicine. Most of the studies have reported positive perceptions among the healthcare workers, which may be attributed to quality of care, cost effectiveness and convenience. However, the healthcare workers' knowledge significantly varies in the healthcare settings. The healthcare workers' perceptions are mostly influenced by training, security concerns, usability, technology and knowledge levels. However, the application of telemedicine is dynamic and the knowledge levels as well as perceptions are expected to revolve over time with the emerging diseases and technologies.

Recommendations

The positive perception about telemedicine should be enhanced through continuous training of the healthcare workers to ensure better knowledge, ease in usage and smooth adoption. It was noted that the healthcare workers with adequate knowledge tend to show positive inclination towards telemedicine hence the essence of knowledge. Moreover, there is also a need for a continuous evaluation of the system, checking all the security loopholes for timely sealing before they lead to threats.

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