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# Implementation of Telemedicine in Hospitals: Opportunities and Barriers

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ABSTRACT

Society 5.0 promotes the integration of technology across various sectors, including healthcare. One notable example of technological application in healthcare is the implementation of telemedicine to expand access to medical services. This study aims to identify the opportunities and barriers of telemedicine as a foundation for policy-making in Indonesian hospitals. The research employs a systematic literature review (SLR) guided by the PRISMA 2020 framework, encompassing the stages of identification, screening, eligibility, and inclusion of studies. A comprehensive search was conducted using the EBSCO and ScienceDirect databases, complemented by hand searching through Google Scholar to identify relevant studies. The findings reveal that the opportunities of telemedicine include improving patient access to healthcare services, reducing exposure to infectious diseases, lowering healthcare costs from both patient and provider perspectives, saving patient service time, enhancing patient convenience, and enabling the integration of digital services with hospital medical records. Meanwhile, the barriers of telemedicine encompass limited access and infrastructure for its implementation, the quality and safety of services for patients, trust and data privacy concerns, sociodemographic factors, healthcare workers' readiness to adopt new technologies, economic barriers in low- and middle-income countries, and regulatory frameworks set by the government. Based on these findings, the study recommends hospitals to strengthen telemedicine infrastructure, establish robust data security certifications, provide training for healthcare professionals, and develop standard operating procedures and service guidelines for telemedicine implementation.

## 1. Introduction

The world is currently entering a new era of civilization known as Society 5.0. This concept was first introduced by Japan in 2019. Unlike previous paradigms that focused primarily on the manufacturing sector, Society 5.0 emphasizes the integration of virtual and physical spaces as a solution to social challenges. The core objective of Society 5.0 is to improve human quality of life through the utilization of industrial potential, with impacts across multiple sectors such as education, social welfare, daily life, and healthcare (Arianesya & Wibawa, 2022). One notable application of Society 5.0 in the healthcare sector is the implementation of telemedicine as a technological medium to expand access to health services.

Telemedicine has been adopted in various countries, influenced by diverse contextual factors. In the United States, for example, telemedicine adoption among military veterans has been driven by increased access for those living in rural areas, improved treatment effectiveness, and more affordable healthcare costs. In Iran, particularly at Tehran Medical University, organizational and cultural aspects, financial support, provision of infrastructure, and managerial as well as clinical endorsement from hospital directors and

physicians have been identified as key determinants of telemedicine adoption (Arianesya & Wibawa, 2022).

In Indonesia, telemedicine use increased significantly during the COVID-19 pandemic. The current trend has shifted toward mental health services (Rifqi Atsani & Anjari, 2023). Fulfilling the needs of patients who cannot attend in-person consultations. Other applications include homecare services and marine ambulance initiatives to expand access in archipelagic regions, despite challenges related to service quality and limited medical equipment (Ibrahim, 2021).

The most tangible impact of telemedicine for society lies in reducing geographical barriers. Digital platforms enable patients to consult physicians without the need to travel or endure long waiting times. Patients who are fatigued or reluctant to visit hospitals can conveniently access telemedicine for consultations and medication prescriptions. For healthcare providers and physicians, telemedicine offers opportunities to serve more patients without extending working hours or requiring additional clinic locations. These advantages are particularly significant given the limitations of physical space and healthcare workforce capacity in hospitals (Ntinga et al., 2022; Wu & Ho, 2023a). Consequently, telemedicine has demonstrated substantial benefits, yet its implementation also presents new challenges.

From the patients' perspective, challenges include a lack of trust due to the absence of face-to-face interactions and concerns regarding the privacy of personal data shared online. Physicians, on the other hand, may experience difficulties in diagnosing patients accurately without direct observation, potentially leading to misunderstandings between doctors and patients (Ntinga et al., 2022; Wissawaswaengsuk et al., 2025a). These dualities highlight both the positive and negative aspects of telemedicine adoption. Therefore, this literature review aims to explore the opportunities and challenges of telemedicine implementation in hospitals. The findings are expected to provide an evidence-based foundation for policy-making to strengthen telemedicine services in Indonesian hospitals.

Globally, extensive literature on telemedicine has focused on developed countries with supporting infrastructure and technology. This is evidenced by innovations emerging from the development of telemedicine in the United States. Several telemedicine applications in the US provide 24/7 video communication services. Furthermore, such a platform called Virtual Tumor Board allows patients to consult with multiple doctors to reach the best medical decisions for cancer treatment (Furlepa 2023). Solutions to healthcare challenges provided in developed countries appear to differ from those in developing countries. The implementation of telemedicine in developing countries, particularly Indonesia, has not been widely studied and would be dissimilar from developed countries due to differences in the health environment, socioeconomic conditions, and existing regulations. This research aims to address this gap by specifically identifying the conditions in Indonesia's hospitals when implementing telemedicine. The aim of this study to provide insights into health policy development and provide evidence-based solutions to challenges facing healthcare delivery in Indonesia.

## 2. Theory

### *2.1. Definition of Hospitals*

According to the Republic of Indonesia Law No. 17 of 2023 on Health, a hospital is defined as a healthcare facility that provides comprehensive individual health services. These services encompass promotive, preventive, curative, and rehabilitative care, delivered through inpatient, outpatient, and emergency services. This definition underscores that hospitals function not only as centers for treatment but also as institutions for improving public health, emphasizing quality, patient safety, and the principles of equity in service delivery (RI, 2023).

The law further affirms that hospitals hold an essential role within the healthcare system. Their functions include the provision of medical treatment and recovery services in accordance with established standards, the maintenance and enhancement of individual health, the implementation of education and training for healthcare professionals, as well as the conduct of research and development in the health sector. Thus, hospitals serve not only as clinical service providers but also as centers for education, innovation, and scientific advancement in support of improving healthcare quality (RI, 2023).

The administration of hospitals is also guided by fundamental principles, namely Pancasila, along with values of humanity, ethics, professionalism, utility, justice, equality of rights, non-discrimination, equity, patient protection and safety, and social responsibility. The regulatory purpose is to facilitate public access to healthcare services, protect the safety of both patients and healthcare providers, enhance service quality and standards, and provide legal certainty for all stakeholders involved. This highlights the dual mandate of hospitals: as medical institutions and as social institutions committed to upholding justice and the protection of human rights in the health sector (RI, 2023).

### *2.2. Definition of Telemedicine*

Telemedicine is defined as the provision of healthcare services at a distance by professional healthcare providers through the utilization of information and communication technology. Its scope encompasses the exchange of diagnostic information, treatment, disease and injury prevention, research, evaluation, and continuing education for healthcare providers, with the aim of improving both individual and public health outcomes (Brahmana & Karo, 2022). This

definition emphasizes that telemedicine is not merely online consultation but rather a modern healthcare system that integrates clinical, educational, and research dimensions through digital media as the primary medium.

The regulation of telemedicine in Indonesia is supported by a clear legal framework, including the Ministry of Health Regulation No. 20 of 2019 on the Implementation of Telemedicine Services between Healthcare Facilities, and the Decree of the Minister of Health No. HK.01.07/MENKES/4829/2021 on Guidelines for the Provision of Healthcare Services through Telemedicine during the COVID-19 Pandemic (Menteri Kesehatan Republik Indonesia, 2021). These regulations stipulate the types of services that can be delivered through telemedicine, such as clinical consultations, diagnostic examinations, electronic prescriptions, and telepharmacy services. Under this legal umbrella, telemedicine is expected to ensure legal certainty, patient protection, and professional accountability of healthcare providers in delivering remote healthcare services (Brahmana & Karo, 2022).

### *2.3. Implementation of Telemedicine in Foreign Hospitals*

The implementation of telemedicine in foreign countries has demonstrated significant outcomes in improving access to and quality of healthcare services. A systematic review and meta-analysis revealed that telemedicine interventions focusing on diet and exercise successfully reduced body weight, body mass index (BMI), waist circumference, and HbA1c levels among individuals at high risk of type 2 diabetes. Examples can be observed in Australia, the United States, and Europe, where tele-education, telemonitoring, and telementoring have been employed to support patients in lifestyle management across various settings, including homes, clinics, and workplaces (Suhlrie et al., 2025).

In Eastern Europe, Romania serves as a notable example of integrating telemedicine into its healthcare system through regulatory reforms and medical education. Medical universities in Bucharest, Timisoara, and Cluj-Napoca have incorporated telemedicine curricula, while hospitals have adopted teleconsultation, teleradiology, and telerehabilitation services, particularly during the COVID-19 pandemic. Continuous education programs and cross-European collaborations, such as the Erasmus+ "TEAM" project, have further strengthened the preparedness of healthcare professionals to operate telemedicine as an integral component of daily clinical practice (Focsa et al., 2025).

### *2.4. Implementation of Telemedicine in Domestic Hospitals*

The implementation of telemedicine in Indonesia has grown rapidly, particularly since the COVID-19 pandemic, as an effort to expand healthcare access and reduce barriers to direct visits to medical facilities. A quantitative study by(Alexandra et al., 2021) demonstrated that the acceptance of telemedicine in Indonesian hospitals is strongly influenced by user behavior and technological dimensions, including perceived ease of use, system reliability, medical professionalism, and information quality. Several major hospitals have developed teleconsultation applications, such as SiapDok by Cipto Mangunkusumo Hospital,AIDO by the Siloam Hospital Group, and MAUDOK by YARSI Hospital.

Research conducted in Padang highlighted the importance of telemedicine in geriatric services to address physical limitations, financial constraints, and transportation barriers faced by elderly patients. The findings emphasized the necessity of integrating technological, organizational, and human factors (HOT-FIT framework) to ensure effective telemedicine implementation in geriatric hospital clinics, including virtual consultations, e-prescriptions, and medication delivery (Sari et al., 2025). This implementation illustrates that telemedicine is not merely a short-term solution during the pandemic but also a sustainable strategy to enhance the accessibility, quality, and continuity of healthcare services in Indonesia.

### *2.5. Technology Acceptance Model (TAM)*

The Technology Acceptance Model (TAM), developed by Davis (1989), is widely used to understand and predict user acceptance of technology. TAM posits that two key factors perceived ease of use and perceived usefulness influence a user's intention to adopt new technology. Perceived ease of use refers to the degree to which a person believes that using a technology will require minimal effort, while perceived usefulness refers to the degree to which a person believes that using the technology will enhance their job performance.

In the context of telemedicine, TAM can be applied to understand the factors that influence healthcare providers' and patients' acceptance of digital health services. For instance, telemedicine is likely to be adopted more quickly if users perceive it as easy to use and believe it improves the quality and efficiency of healthcare services. Extending TAM to include other constructs such as trust, social influence, facilitating conditions, and privacy concerns has proven useful in telemedicine adoption studies. This allows for a more comprehensive understanding of user behavior and adoption patterns, particularly in developing countries (Kamal et al., 2020)

For example, research conducted by Kamal et al. (2020) found that factors such as technological anxiety and social influence were important determinants of

telemedicine adoption, suggesting that beyond ease of use and usefulness, social and psychological factors play a significant role in technology acceptance.

## 3. Research Method

This study was conducted by reviewing the research literature on the opportunities and barriers of telemedicine implementation in hospitals through searches across several databases, including EBSCO (Medline) and ScienceDirect, complemented by hand searching via Google Scholar. The keywords used in the article search were "Barriers" AND "Opportunities" AND "Telemedicine" AND "Hospital." The inclusion criteria for this study comprised scientific articles in the form of qualitative and quantitative research, published in English or Indonesian, within the period of 2015–2025, and discussing the opportunities and barriers of telemedicine implementation in hospitals. The exclusion criteria applied include: non-peer-reviewed articles, abstract publications lacking full scholarly texts, literature that does not address the research question, and literature that is inaccessible in full. The quality assessment of the literature studies is based on the reputation of the journal. The data synthesis method used in this study is content analysis, which involves quantifying the frequency of themes that emerge within each piece of literature, subsequently used as data for the literature review. Bias or quality assessment of the literature is carried out using the Critical Appraisal Skills Programmed (CASP). The CASP assessment process involves evaluating the quality of study methods through inclusion and exclusion criteria, assessing measurement and reporting biases within the literature, examining bias in the interpretation of results and conclusions, and considering reporting and contextual biases. Literature selection followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) procedure. The PRISMA diagram is presented in Figure 1.

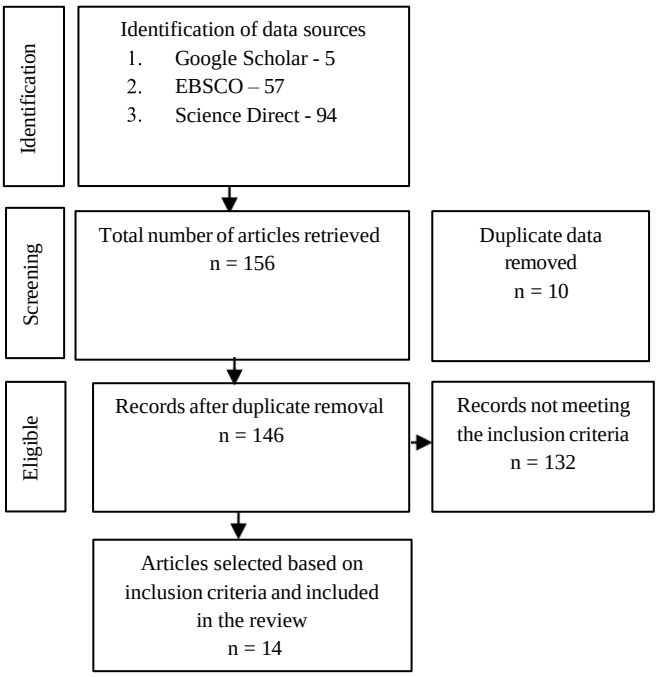


Figure. 1 PRISMA Diagram

## 4. Results

Based on the analysis using the PRISMA diagram, the results of the literature review regarding the opportunities and barriers of telemedicine implementation in hospitals are as follows:

Table 1. Opportunities of Telemedicine Implementation in Hospitals

| No. | Opportunities | Researchers |
|---|---|---|
| 1. | Enhancing Patient Access to Healthcare Services | Ruda-Santolaria et al., (2023) Singhal et al. (2023), Alami et al. (2017), Baim-Lance et al. (2022), Lagarde et al. (2024), Muehlensiepen et al. (2021), Wissawaswaengsuk et al., (2025). |
| 2. | Reducing Exposure to Infectious Diseases | Wissawaswaengsuk et al., (2025), Ruda-Santolaria et al. (2023), Alexandra et al. (2021b). |
| 3 | Cost Savings in Patient Care | Ruda-Santolaria et al., (2023), Wahab et al. (2021), Muehlensiepen et al. (2021), Alami et al. (2017). |
| 4 | Time Savings in Patient Care | Ruda-Santolaria et al., (2023), Wahab et al. (2021), Muehlensiepen et al. (2021), Singhal et al. (2023), Parahyanti et al. (2024). |
| 5 | Enhancing Patient Comfort in Healthcare Services | Singhal et al. (2023). |
| 6 | Opportunities for Digital Service Integration | Muehlensiepen et al. (2021), Alami et al. (2017). |

Based on the literature review presented in Table 1, it is evident that telemedicine holds considerable potential for improving patient access to healthcare services, particularly for individuals with physical limitations, such as those residing in remote or rural areas (Ruda-Santolaria et al., 2023; Wissawaswaengsuk et al., 2025; Singhal et al., 2023; Muehlensiepen et al., 2021). Telemedicine presents a significant opportunity to extend healthcare access to patients in isolated regions with limited healthcare infrastructure, thereby reducing the need for patient travel and facilitating easier access to essential healthcare services (Alami et al., 2017; Baim-Lance et al., 2022; Lagarde et al., 2024).

Furthermore, the literature indicates that telemedicine can reduce the risk of exposure to contagious diseases by minimizing in-person interactions between patients and healthcare providers (Wissawaswaengsuk et al., 2025; Ruda-Santolaria et al., 2023; Alexandra et al., 2021). The findings also suggest that telemedicine can significantly reduce accommodation costs for patients traveling to healthcare facilities, particularly those residing in remote areas (Ruda-Santolaria et al., 2023; Wahab et al., 2021; Alami et al., 2017). Additionally, telemedicine services result in cost savings for healthcare providers by alleviating the burden of in-person consultations (Muehlensiepen et al., 2021).

Moreover, the literature highlights that telemedicine contributes to reducing patient waiting times, thereby enhancing service efficiency and offering greater flexibility in scheduling (Ruda-Santolaria et al., 2023; Wahab et al., 2021; Singhal et al., 2023; Parahyanti et al., 2024). The use of telemedicine also allows patients to seek immediate consultation with healthcare providers when health concerns arise unexpectedly (Muehlensiepen et al., 2021).

In addition, the literature emphasizes that telemedicine enhances patient comfort, as patients can await consultations from the convenience of their homes (Singhal et al., 2023). Telemedicine further presents opportunities for digital service integration with other digital health services, such as health applications and electronic health record systems (Muehlensiepen et al., 2021). Furthermore, telemedicine plays a crucial role in national e-health strategies, facilitating the integration of electronic health records and other national healthcare networks (Alami et al., 2017).

Table 2. Barriers of Telemedicine Implementation in Hospitals

| No. | Barriers | Researchers |
|---|---|---|
| 1. | Access and Infrastructure | Wu dan Ho (2023), Ruda-Santolaria et al. (2024), Baim-Lance et al. (2022), Lagarde et al. (2024), Worster dan Swartz (2017), Baldemor *et al.* (2025). |
| 2. | Quality and Safety of Services | Wu dan Ho (2023), Baim-Lance et al. (2022), Lagarde et al. (2024. |
| 3 | Trust and Privacy | Wu dan Ho (2023), Ruda-Santolaria et al. (2024), Wissawaswaengsuk *et al.* (2025). |
| 4 | Socio-Demographic Factors | Wu dan Ho (2023), Ruda-Santolaria et al. (2024), Baim-Lance et al. (2022). |
| 5 | Barriers among Medical and Healthcare Personnel | Baldemor *et al.* (2025), Zhong *et al.* (2024). |
| 6 | Economic Aspects | Wu dan Ho (2023), Lagarde et al. (2024). |
| 7 | Organizational and Regulatory Aspects | Baldemor *et al.* (2025), Zhong *et al.* (2024), Worster dan Swartz (2017), Lagarde et al. (2024). |

Based on Table 2 above, several challenges in the implementation of telemedicine in hospitals are evident, particularly regarding access and infrastructure. The identified issues include technological challenges, such as internet connectivity, inadequate devices, limited knowledge of electronic usage, and service costs (Wu dan Ho, 2023; Ruda-Santolaria et al., 2024; Baim-Lance et al., 2022; Lagarde et al., 2024; Worster dan Swartz, 2017; Baldemor *et al.*, 2025). Additionally, the literature highlights concerns about quality and safety of services, particularly the limited interpersonal interactions involved in telemedicine (Wu dan Ho, 2023; Baim-Lance et al., 2022; Lagarde et al., 2024). Trust and privacy issues also pose significant challenges for telemedicine services in society, particularly as patients may lack privacy at home (Wu dan Ho; 2023, Ruda-Santolaria et al., 2024, Wissawaswaengsuk *et al.* 2025).

Moreover, socio-demographic factors, such as age, education level, and income, are recognized as contributing to the challenges in implementing telemedicine (Wu dan Ho, 2023; Ruda-Santolaria et al., 2024; Baim-Lance et al., 2022). Barriers are also evident in the capacity of healthcare providers to effectively utilize technology for delivering telemedicine services (Baldemor *et al.*, 2025; Zhong *et al.*, 2024). Furthermore, economic barriers, such as patients' willingness to pay consultation fees, are noted as significant challenges (Wu dan Ho, 2023), Lagarde et al., 2024). In addition to the factors mentioned above, organizational and regulatory issues may hinder telemedicine services, including the lack of regulations on competence development and budget constraints (Baldemor *et al.*, 2025; Zhong *et al.*, 2024; Worster dan Swartz, 2017; Lagarde et al., 2024).

Table 3. Comparative Analysis of Telemedicine Implementation Across Countries

| No. | Country | Opportunities | Barriers | Key Insights |
|---|---|---|---|---|
| 1. | United States | Widespread access, reduction in wait times, cost-saving for veterans | Technological risks, access to devices, privacy concerns | Strong focus on rural areas and veterans' healthcare, high adoption in urban centers |
| 2. | Germany | Integration of digital health records, improved accessibility for chronic disease management | Regulatory constraints, lack of integration with some health systems | High regulation and government support for healthcare innovations |
| 3 | India | Cost-efficient services for rural populations, expanded healthcare access | Infrastructure gaps, high cost of technology, training requirements | Strong government push, but major infrastructural limitations |
| 4 | Romania | Incorporation into medical curricula, widespread use in rural areas | Limited technology literacy, challenges with rural healthcare adaptation | Strong government reforms and educational initiatives in telemedicine |
| 5 | Indonesia | Expanding access in archipelagic regions, mental health services, and homecare | Limited infrastructure, trust and privacy concerns, healthcare personnel readiness | Significant growth during the COVID-19 pandemic with regional disparities in access |

Table 3 provides a comparative analysis of telemedicine implementation in five countries: United States, Germany, India, Indonesia, and Romania. In the United States, telemedicine offers widespread access, reduced wait times, and cost savings for veterans, but faces barriers related to technological risks, device access, and privacy concerns. The main focus is on rural areas and veterans, with high adoption in urban centers. Germany utilizes digital health record integration to improve chronic disease management, although it is hindered by regulatory constraints and a lack of integration between health systems. India leverages telemedicine for cost-effective services in rural populations, but faces challenges with limited infrastructure, high technology costs, and the need for training. In Indonesia, telemedicine has grown significantly during the COVID-19 pandemic, expanding access in remote areas and providing mental health services, though it is constrained by infrastructure limitations, privacy issues, and healthcare personnel readiness. Romania has successfully integrated telemedicine into medical curricula and expanded its use in rural areas, although challenges remain with technology literacy and adaptation in rural healthcare settings. Overall, this comparison highlights how regulation, infrastructure, and government support play key roles in the success of telemedicine implementation in each country.

## 5. Discussion and conclusion

### *5.1. Opportunities of Telemedicine Implementation in Hospitals*

Based on the findings of the literature review, several opportunities for the implementation of telemedicine in hospitals have been identified as follows:

**Enhancing Patient Access to Healthcare Services**

A study conducted by Ruda-Santolaria et al., (2023) on telemedicine users in Latin America, the United States, and Spain reported that 64.2% of respondents agreed that telemedicine benefits patient access to healthcare services. Specifically, the study showed that 66.9% of patients with physical limitations had improved access to care. Moreover, 55.4% of patients living in remote areas also reported better access through telemedicine services (Ruda-Santolaria et al., 2023a). These findings are consistent with the views of Wissawaswaengsuk et al. (2025b) who asserted that telemedicine facilitates access to healthcare services for patients residing in rural areas (Wissawaswaengsuk et al., 2025b).

Qualitative research by Singhal et al. (2023) also highlighted that telemedicine improves access for patients with physical disabilities or those living far from healthcare facilities, allowing them to continue receiving regular care. Similarly, Muehlensiepen et al. (2021) noted that telemedicine enables patients to consult with physicians without the need for long-distance travel to hospitals, thereby supporting those living in rural or underserved regions. Further, Alami et al. (2017) demonstrated that telemedicine provides substantial opportunities for reaching patients in isolated, sparsely populated areas with limited healthcare services.

Another study by Baim-Lance et al. (2022) revealed that the use of telemedicine has the potential to expand healthcare access by reducing the burden of patient mobilization for routine care. In addition, may be most suitable for simple services such as routine follow-up consultations or basic patient requests, especially for patients confident that such services can adequately meet their needs. (Lagarde et al., 2024a).

Collectively, these studies demonstrate that telemedicine enhances patient access to healthcare services. Patients with physical limitations or those

residing in rural areas can benefit significantly from telemedicine as a means of obtaining medical care. Nonetheless, telemedicine appears to be particularly well-suited for routine follow-up or simple consultations.




*Figure 1 Conceptual Diagram Summarizing the Relationship between Opportunities, Barriers, and Policy Recommendations*

**Time Savings in Patient Care**

The study conducted by Ruda-Santolaria et al. (2023) reported that 32.4% of physicians experienced improved adherence to appointment schedules and 48.6% noted greater scheduling flexibility. Moreover, the use of telemedicine contributed to time efficiency by reducing patient waiting times (Ruda-Santolaria et al., 2023). Wahab et al. (2021) found that telemedicine services shortened patient waiting times for specialist consultations and diagnostic assessments.

Research by Parahyanti et al. (2024) on Generations Y and Z revealed that most young adults reported positive experiences with telemedicine, citing its efficiency and flexibility. A qualitative study by Singhal et al. (2023) terhadap layanan *telemedicine* further demonstrated that telemedicine enhances patient time efficiency by eliminating the need for long-distance travel to hospitals, thereby saving considerable time. Additionally, Muehlensiepen et al. (2021) found that patients valued telemedicine as a convenient medium for consulting physicians when sudden symptoms occurred, such as shoulder pain or joint swelling.

Collectively, these studies indicate that telemedicine effectively reduces patient service time. This is attributed to its flexible nature, allowing consultations to be conducted anytime and anywhere without the need for travel or waiting in hospital queues. Furthermore, telemedicine improves adherence to scheduled appointments between physicians and patients.

**Enhancing Patient Comfort in Healthcare Services**

A qualitative study conducted by Singhal et al. (2023) on telemedicine services revealed that telemedicine provides patients with greater comfort and flexibility. Patients reported feeling more at ease waiting for healthcare services at home rather than in hospital waiting rooms. Moreover, telemedicine allows patients to engage in other activities while waiting for their scheduled consultations or physician responses through the application. The study further highlighted that telemedicine enhances patient comfort by offering flexible consultation times and eliminating the need to queue in hospital waiting areas. Consequently, patients can utilize their waiting time more effectively by performing other activities while awaiting their telemedicine appointments.

**Opportunities for Digital Service Integration**

A study by Muehlensiepen et al. (2021) found that both patients and physicians acknowledged telemedicine as an entry point for the utilization of other digital services, such as health applications and electronic documentation systems. This, in turn, supports modernization in healthcare delivery. Similarly, research conducted by Alami et al. (2017) on the use of telemedicine in Norway demonstrated that telemedicine holds potential to become part of routine healthcare services nationwide, supported by the national e-health strategy, electronic medical records, and a national health network. Furthermore, healthcare coordination reforms have created opportunities to employ telemedicine as a medium for strengthening collaboration between primary care services and hospitals (Alami et al., 2017).

Collectively, these studies indicate that telemedicine represents an opportunity for the integration of digital healthcare services across various aspects. Telemedicine can be linked with health applications, electronic documentation systems, electronic medical records, and national health networks. Thus, healthcare services delivered through telemedicine can be systematically documented within hospital medical records.

### *5.2. Barriers of Telemedicine Implementation in Hospitals*

Based on the findings of the literature review, several barriers in the implementation of telemedicine in hospitals have been identified as follows:

**Access and Infrastructure**

Limited access and infrastructure remain major barriers to the implementation of telemedicine across diverse global contexts. A study in Taiwan highlighted that performance risk was the most dominant barrier, followed by psychological risk, technological risk, and physical risk (Wu & Ho, 2023b). These findings indicate that technological issues, such as limited internet connectivity and inadequate devices, are primary factors hindering the adoption of telemedicine services. Consistently, research conducted on cancer patients in Latin America revealed that 60.5% of respondents experienced difficulties related to internet speed and connectivity, while a significant proportion of respondents reported insufficient knowledge of using electronic devices (43.2%) and the internet (45.4%) (Ruda-santolaria et al., 2024).

In elderly populations living with HIV in New York, (Baim-Lance et al., 2022) reported that access to and utilization of telemedicine were influenced by multiple interrelated factors, including device availability, connectivity, technological literacy, and user comfort particularly concerns about privacy. Similarly, a study in South Africa found that only 36% of respondents were willing to pay the market rate for telemedicine consultations, reflecting challenges related to device availability and service costs (Lagarde, Papanicolas dan Stacey, 2024).

Collectively, these studies demonstrate that the primary barriers to telemedicine implementation in terms of access and infrastructure are unstable internet connectivity and inadequate technological devices. Unreliable internet connections hinder the optimization of telemedicine services, while the lack of sufficient

electronic devices also impedes its effective implementation.

**Quality and Safety of Services**

Service quality issues represent a significant barrier to the adoption of telemedicine. Concerns about reduced clinical quality are often associated with limitations in physical examinations and the risk of misdiagnosis. (Lagarde, Papanicolas dan Stacey, 2024) reported that the absence of face-to-face interactions in physical and ancillary examinations, as well as referral cases, contributed to increased service costs. Moreover, limited interpersonal interaction remains a challenge. For example, a study on elderly HIV patients in New York revealed that most respondents perceived telemedicine services as less interpersonal and resulting in poorer diagnoses compared to in-person visits (Baim-Lance et al., 2022b). Privacy concerns also pose a barrier, with Wu and Ho (2023) identifying privacy risk as one of nine risk factors that significantly reduced the intention to adopt telemedicine in Taiwan.

Collectively, these studies indicate that service quality within telemedicine presents a serious challenge, particularly in the diagnostic process. Telemedicine, delivered through online platforms, limits physicians' ability to perform physical examinations, thereby increasing the risk of misdiagnosis. Furthermore, data security concerns may reduce public willingness to adopt telemedicine services.

**Trust and Privacy**

Trust is a key determinant of the successful adoption of telemedicine. Research of (Wissawaswaengsuk et al., 2025) explained that trust serves as a facilitator in the utilization of telemedicine, and a lack of trust significantly reduces the intention to use such services, even when perceived ease of use and usefulness are high.

(Ruda-santolaria et al., 2024) further reported that 66% of respondents did not have a private space at home to conduct telemedicine consultations. This limitation affected patients' openness in communicating with healthcare providers. Similar concerns were observed in Taiwan, where privacy risk was identified as a major barrier to telemedicine adoption ((Wu dan Ho, 2023).

Collectively, these studies highlight that trust and privacy concerns may hinder the implementation of telemedicine. Patients' lack of trust in telemedicine can reduce their willingness to adopt the service. In addition, privacy-related factors, such as the absence of private spaces at home for telemedicine consultations, may limit patients' openness in disclosing sensitive health conditions.

**Socio-Demographic Factors**

The adoption of telemedicine is strongly influenced by socio-demographic factors, particularly advanced age, educational attainment, and socioeconomic status. Among elderly HIV patients in New York, respondents with lower levels of formal education perceived telemedicine as having poorer quality (Baim-Lance et al., 2022b). A study in Taiwan similarly demonstrated that older adults, individuals with lower education, and those with lower income faced higher financial, psychological, and technological risks ((Wu dan Ho, 2023). In addition, (Ruda-santolaria et al., 2024) found that limited technological literacy was more pronounced among individuals with lower educational backgrounds and immigrant populations.

Collectively, these studies suggest that socio-demographic factors such as advanced age, low educational attainment, and limited economic resources can hinder the implementation of telemedicine. Elderly patients and those with lower education levels are more likely to perceive telemedicine as low quality, largely because they are unable to operate telemedicine platforms effectively. This is often attributed to insufficient technological literacy within lower-educated groups.

**Barriers Among Medical and Healthcare Personnel**

In addition to patient-related factors, barriers on the part of healthcare professionals also play a crucial role in the successful implementation of telemedicine. A study of nurses in the Philippines reported that 47.9% of respondents stated that integrating telemedicine requires substantial mental effort as well as advanced information and communication technology skills (Baldemor et al., 2025). In hospitals in China, physicians expressed concerns that patients' expectations for 24-hour service access could blur professional responsibility boundaries and increase stress due to excessive workloads (Zhong et al., 2024).

Collectively, these studies suggest that barriers faced by medical and healthcare personnel are primarily associated with psychological conditions and information and communication technology skills. The psychological well-being of healthcare providers may be compromised if telemedicine services are expected to provide continuous 24-hour access, potentially resulting in stress and burnout from excessive workloads. Furthermore, adequate information and communication technology competencies are essential for healthcare professionals, given that the delivery of telemedicine services is highly dependent on technological proficiency.

**Economic Aspects**

Affordability is one of the major barriers to telemedicine in low- and middle-income countries. A study conducted in South Africa found that only 36% of respondents were willing to pay the standard consultation fee for telemedicine services (Lagarde, Papanicolas dan Stacey, 2024). Similarly, research in Taiwan identified financial risk as a factor that reduces the intention to adopt telemedicine ((Wu dan Ho, 2023). These findings indicate that countries with low- and middle-income populations face significant challenges

in implementing telemedicine because many individuals cannot afford consultation fees. This limitation may result in low utilization and financial non-viability of telemedicine services, despite hospitals having to allocate budgets for maintaining telemedicine infrastructure and facilities.

**Organizational and Regulatory Aspects**

In addition to technological, patient-related, and healthcare workforce factors, organizational and regulatory issues also present challenges in the implementation of telemedicine. In the context of palliative care, (Worster dan Swartz, 2017) emphasized that the integration of telemedicine into hospital workflows and financing systems remains inconsistent, creating barriers to hospital services. Similarly, in China, the absence of standardized procedures for internet hospitals such as informed consent and misalignment with local hospital services were reported to reduce the effectiveness of care coordination (Zhong et al., 2024).

Regulatory barriers also extend to financing issues. A study in the Philippines highlighted that telemedicine services are not always reimbursed at the same rate as face-to-face visits (Baldemor et al., 2025). Meanwhile, in South Africa, regulations initially served as a barrier but were later relaxed in 2020 when health professional authorities permitted the provision of telemedicine services between healthcare providers and patients (Lagarde, Papanicolas dan Stacey, 2024).

Collectively, these studies demonstrate that organizational and regulatory challenges in telemedicine primarily stem from inconsistent hospital workflows and financing systems. Poorly structured workflows can undermine the effectiveness of care coordination. Therefore, clear regulations and standardized procedures are needed to support the implementation of telemedicine in hospitals. In addition, inconsistent financing mechanisms often result in telemedicine services not being reimbursed at levels commensurate with the costs incurred. Hence, appropriate cost management and standardized financial calculations are required to ensure that the expenses invested in telemedicine programs remain lower than the revenue generated from these services.

### *5.3. The Relationship Between Opportunities and Barriers to Telemedicine Utilization and the Technology Acceptance Model (TAM)*

The Technology Acceptance Model (TAM) developed by Davis (1989) has been widely employed to understand and predict users' acceptance of technology. TAM posits that two primary factors influence an individual's intention to adopt new technology: perceived ease of use and perceived usefulness. A study conducted by Kamal et al. (2020), which developed a theoretical model of technology acceptance to determine the intention to use telemedicine services among rural patients, revealed that factors such as perceived usefulness, social influence, trust, perceived ease of use, and facilitating conditions significantly influence the intention to use telemedicine. The findings indicate that a higher level of perceived ease of use of telemedicine technology increases users' motivation to adopt and utilize telemedicine services (Kamal et al., 2020)

Within the TAM framework, findings from the literature on the potential of telemedicine to improve patient access to healthcare services can be viewed as key drivers of telemedicine adoption. Conversely, challenges such as limited access and inadequate infrastructure may act as barriers that hinder adoption. Individuals who perceive telemedicine as a means of improving access to healthcare are more likely to adopt such technology. Furthermore, sufficient infrastructure and accessibility are essential in shaping individuals' decisions to use telemedicine services. Previous studies have also demonstrated that trust remains a critical barrier to telemedicine implementation, as it reflects users' confidence in the reliability and quality of telemedicine services. According to the TAM framework, once patients develop trust in the dependability and effectiveness of telemedicine, they are more likely to adopt and continuously use these services (Kamal et al., 2020).

The implementation of telemedicine in hospitals presents both challenges and opportunities. The challenges of telemedicine adoption in hospitals include limited access and infrastructure, issues of service quality and patient safety, concerns about trust and data privacy, socio-demographic barriers, the readiness of healthcare professionals to adopt new technologies, economic constraints in low- and middle-income countries, and organizational as well as regulatory challenges from governing authorities. On the other hand, the opportunities of telemedicine implementation in hospitals lie in improving patient access to healthcare services, reducing exposure to infectious diseases, lowering patient care costs from both patient and provider perspectives, saving patient service time, enhancing patient comfort in healthcare delivery, and enabling the integration of digital services with hospital medical records.

Based on the findings of this literature review, several recommendations are proposed: preparing hospital infrastructure and facilities to support telemedicine services; establishing hospital data security certifications to address privacy and patient data protection issues; providing training for medical and healthcare professionals to enhance their knowledge and skills in using telemedicine technologies; and developing standard operating procedures and service guidelines for telemedicine implementation in hospitals. Strengthening hospital infrastructure is necessary to overcome access and

connectivity barriers. Establishing data security certifications ensures patient trust and safeguards sensitive information. Training programs for healthcare personnel are essential to improve technological competence and service delivery. Finally, clear procedures and guidelines are required as regulatory frameworks to ensure effective and standardized telemedicine practices within hospitals.

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