THE DIGITALIZATION OF HEALTH SERVICES FROM A PUBLIC POLICY PERSPECTIVE IN THE DIGITAL ERA

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ABSTRACT

Digitalization of health services from a public policy perspective means using digital technology to improve the efficiency, access, and quality of health services. Public policies that support digitalization aim to expand the reach of health services, especially in remote areas, and increase public satisfaction through easier and faster services. The aims of study were to examine regulations, implementation of health service digitalization policies, challenges and obstacles and strategies in optimizing health service digitalization. This study is a qualitative study with literature review analysis. The results showed that digitalization of health services as a policy is based on regulations such as laws and regulations government regulations; 2) Implementation of digitalization of health services in the SATUSEHAT platform and telemedicine aims to improve access, efficiency and quality of health services; 3) The challenges of implementing digitalization of health services are fragmentation of health information systems, inequality of access to infrastructure, concerns about patient data privacy and security, lack of technological skills; 4) Strategies for optimizing health service digitalization policies include increasing system interoperability through national standardization, preparing legal and ethical guidelines for telemedicine that protect patients and medical personnel, encouraging digital literacy training for health workers and ensuring equal access and technology infrastructure throughout the region.

Keywords: digitalization, health, policy, strategy and services

INTRODUCTION

The development of digital technology is growing rapidly and has a significant impact on various aspects of life, especially in the health sector (Yuniar *et al*., 2022). Health Digitalization is an innovation in optimizing health services. One form of digital in health services is the application of electronic medical records, as an effort to provide great opportunities to improve the quality of health services, accessibility, and quality of health services (Iskandar and Anjani, 2024). Digitalization

of health services includes various forms of innovation such as telemedicine, electronic medical records (EMR), hospital management information systems (SIMRS), and integration of national health data through platforms such as SATUSEHAT. This transformation has become increasingly relevant since the COVID-19 pandemic, where social restrictions have encouraged the use of digital technology in medical consultations, patient care, and health data reporting.

World Health Organization (WHO) explains that health digitalization is a health transformation to support health services in efforts to promote disease prevention through equal distribution of health education, and development of science through research in the health sector (Marpaung, 2021). The implementation of health digitalization aims to improve the quality of health services (Maryati and Utami, 2023). Health digitalization encourages service transformation as a form of equal distribution of health services. The success of the implementation of health digitalization is reviewed from the support of adequate infrastructure (Fauzi *et al*., 2024). The high digital literacy of existing Human Resources (HR) in receiving updates, and the implementation of optimal regulations in supporting the success of the program (Eprilianto *et al*., 2019).

The advancement of digital technology has enabled a transformation in the way we access information, communicate, and interact with the health system. The application of digital technology in public health services includes various innovations such as online platforms, telemedicine, mobile applications, big data analytics, artificial intelligence, and the Internet of Things (IoT). With the help of this technology, individuals can easily access health information, conduct remote consultations with medical personnel, manage electronic medical records, and monitor health conditions independently (Firdaus *et al*., 2021).

The use of digital technology in public health services also provides various significant benefits. First, digital technology enables health services more efficient and targeted, reducing the time and costs required to reach health services. Second, digital technology also allows for the active involvement of individuals in monitoring and managing their own health, thereby encouraging healthy living behaviors and disease prevention. Third, digital technology can strengthen disease monitoring and control systems, enabling rapid identification and response to disease outbreaks and real-time epidemiological monitoring (Usak *et al*., 2020).

However, the use of digital technology is also faced with various challenges and problems. One of them is the regulatory and policy aspects. In implementing digital technology in public health services, a clear and up-to-date regulatory

framework is needed to protect data privacy, maintain information security, and ensure the ethics of technology use. In addition, the gap in access to technology is also a challenge that needs to be overcome so that all levels of society can feel the benefits of digital technology in public health services (Ramli *et al*., 2021).

To appropriate policies need to be formulated to optimize the benefits of digital technology in public health services while maintaining personal data protection and equity of access. Collaborative efforts between the government, health institutions, the private sector, and civil society are key to formulating and implementing these policies. In addition, it is important to identify and address barriers to the implementation of digital technology, such as lack of digital skills, resistance to change, and infrastructure constraints (Brall *et al*., 2019).

In the context of public policy, health digitalization requires holistic regulations that are responsive to technological developments. The Indonesian government has begun to respond to this phenomenon by establishing various laws and regulations, including Law Number 17 of 2023 concerning Health and Minister of Health Regulation Number 24 of 2022 concerning EMR. However, the implementation of digital policies is not free from major challenges, including uneven ICT infrastructure, digital literacy gaps, and issues of personal data protection and ethics in digital services.

Based on several studies shows that industrial countries with high levels of digital awareness show better results in providing quality health services (Jayanthi and Dinaseviani, 2022). The technology gap is often found in regions that are predominantly less exposed to digitalization updates, so this is one of the main obstacles in the process of integrating digital systems with existing systems (Tsabita and Sugandi, 2022).

This study aims to analyze digitalization of health services from a public policy perspective in the digital era, with a literature review approach, in order to identify the benefits, problems that become obstacles in the implementation of digitalization, and map opportunities that can be pursued to optimize the implementation of digitalization, especially in the health sector.B ased on perspective a public policy analysis will explore policies that have been implemented in the use of digital technology in public health services, as well as the challenges and opportunities faced. This can develop more effective strategies and policy recommendations in encouraging the use of digital technology in public health services holistically and sustainably.

METHOD

The research method used a literature review, which means a systematic method in carrying out the process of analyzing science and theories that are the basis of research, by going through the stages of identification, evaluation, and synthesis of previous research (Yam, 2024). This study collected important information using secondary data obtained from scientific articles, especially those related to predetermined topics, namely regarding digitalization of health services from a public policy perspective in the digital era. The research stages included:

a. Preparing a literature review design begins with the process of identifying topics, formulating research questions and will be used as a guide in the process of selecting relevant literature.

b. Data collection (literature) relevant to the topic that has been taken, the acquisition of articles is obtained from literature sources obtained from Google Scholar, PubMed, Science Direct, and other databases, using the keywords "digitalization of health services", "public policy", "health technology". The inclusion criteria used in the selection of literature include research published in the last five years (2019-2024) with the hope that the development of the knowledge presented is relevant.

c. The relevance of literature with the relevance process by assessing each article obtained using various considerations including suitability to the predetermined research topic, details of the results obtained, and implications of findings generated from previous research so as to optimize the results obtained later.

d. The Literature analysis and synthesis are the keys to the literature study process, in the process the researcher will analyze the results of previous studies. In the ongoing analysis process, the researcher will identify patterns, analyze the presence or absence of gaps, and contraindications in the study. In contrast to the synthesis process, the researcher will group relevant literature based on the main themes that have been determined and that are in accordance with the objectives of the study

e. Identifying research gaps through the process of analyzing the literature obtained, by reviewing points that have not been further researched by researchers.

f. The compilation of conclusions in the final stage by compiling conclusions based on the literature synthesis process that has been carried out through the analysis

process. The success of digitalization cannot be separated from good collaboration between stakeholders and a sustainable approach to facing existing challenges.

The literature study method is effective in gaining a deep understanding of the research topic, analyzing current developments and findings, and developing a solid theoretical framework. This method can identify trends, challenges, benefits, and impacts of the digitalization of health services from a public policy perspective, as well as see the latest policy developments and practices in the field (Sari *et al*., 2022).

RESULTS AND DISCUSSION

Based on the literature review conducted, it can be analyzed about the digitalization of health services based on the perspective of public policy. This is measured by the implementation of policies and regulations on the digitalization of health services, challenges and obstacles to the implementation of digitalization of health services that are reviewed. Based on the data obtained, the results of the study can be explained as follows.

The Regulations and Public Policies Related to Digitalization of Health Services

The digitalization of health services in Indonesia, including telemedicine and electronic medical records, is regulated in several laws and regulations, including the Health Law, the Regulation of the Minister of Health, and the Electronic Information and Transactions Law (UU ITE). This digitalization brings benefits such as increased access and efficiency, but also raises challenges related to patient data protection, legal responsibility, and legal certainty in the provision of services.

Digitalization of health services, including telemedicine, has legal aspects that need to be considered. Some important aspects include the legality of the organizer, privacy and data security, informed consent, and legal responsibility in cases of malpractice involving technology. Regulations related to telemedicine in Indonesia are spread across the Health Law, the Medical Practice Law, the Information and Electronic Transactions Law, and the Regulation of the Minister of Health. Legislation Related to Digitalization of Health Services:

a. Health Law (Law No. 17 of 2023)

This law is the main legal basis for the provision of health services, including digital-based ones, and regulates the rights and obligations of patients and medical personnel. Law Number 17 of 2023 concerning Health is the main legal umbrella. The articles in this law mandate the integration of health data, digitalization of services,

and protection of personal data. Law No. 17 of 2023 concerning Health brings significant changes in health services, including digitalization. This law encourages digital transformation in the health sector, including the implementation of Electronic Medical Records (EMR) and Telehealth, to improve access, efficiency, and quality of services. Law Number 17 of 2023 concerning Health provides a number of new regulations, including those focused on the provision of digital health services. In an era of increasingly rapid digitalization, the presence of technology such as telemedicine, health applications, and online consultation platforms has changed the way people access medical services. Law Number 17 of 2023 seeks to adjust existing regulations to current developments in health services, in order to ensure that digital health services can run safely, efficiently, and be integrated with the national health system.

b. Electronic Information and Transactions Law (UU ITE)

The ITE Law regulates legal aspects related to electronic transactions, including in health services, and emphasizes the protection of users' personal data. The digitalization of health services, including telemedicine and electronic medical records, is closely related to the Electronic Information and Transactions Law (UU ITE). The ITE Law regulates various aspects of electronic transactions, including the protection of patients' personal data in the context of digital health services.

c. Minister of Health Regulation

Several Ministerial Regulations regulate technical details related to the digitalization of health services, such as:

1. Minister of Health Regulation No. 20 of 2019 concerning the Implementation of Telemedicine Services Between Health Service Facilities.

Digital health services such as telemedicine*Telemedicine*or remote health services are now increasingly prevalent in society. WHO defines telemedicine as health services, where distance is an important factor, carried out by health workers using information and communication technology to exchange valid information for diagnosis, treatment, prevention of disease and injury, research and evaluation, and continuing education for health service providers to advance public health. Based on a wide range of interests ranging from clinical, non-clinical, education to research services. In today's internet era, telemedicine is getting closer to the needs of health services for the community.

2. Minister of Health Regulation No. 24 of 2022 concerning Electronic

Medical Records

Minister of Health Regulation No. 24 of 2022 concerning Electronic Medical Records is the regulation that underlies thehe government continues to strive to improve access to affordable and quality health services for the community. One of them is through the use of digital technology by implementing Electronic Medical Records (EMR) in Health Facilities in Indonesia. EMR will standardize the exchange of health data, so that access to health services is available quickly, easily, and transparently.

The importance of regulation in the digitalization of health services lies in its ability to ensure the safety, effectiveness, and fairness of the use of technology in the health sector. Appropriate regulation can provide a clear framework for telemedicine practices, patient data protection, and digital service quality standards, thereby minimizing risks and maximizing the benefits of digitalization for society.

Implementation of Digitalization of Health Services in the SATUSEHAT and Telemedicine Platform

Globally, WHO is pushing for digital transformation as part of its 2020–2025 health strategy. Countries such as Estonia and South Korea have implemented comprehensive e-health systems. In Indonesia, digitalization efforts have begun to be directed through the SATUSEHAT platform and strengthening electronic medical records. Digitalization of health services is the process of transforming digital technology in the health care system to improve efficiency, accessibility, and quality of services. It covers various aspects, from electronic medical records to telemedicine, and aims to provide better and more affordable services to the community. The implementation of digitalization of health services in the SATUSEHAT platform and telemedicine is explained as follows.

a. *Platform* SATUSEHAT

The implementation of digitalization of health services in the SATUSEHAT platform aims to connect patient health data from various health service facilities (fasyankes) and integrate them into one system. This is expected to improve the efficiency, effectiveness, and quality of health services as a whole. SATUSEHATis a replacement platform for the PeduliLindungi platform that has been downloaded by more than one million users. This digital platform is beneficial for both health service providers and patients. The Minister of Health said that this platform will integrate patient health data from all health facilities such as hospitals, clinics, laboratories, and pharmacies into PeduliLindungi.

SATU SEHAT Platform is an integrated system that collects, stores, and manages health data from various sources, including hospitals, health centers, laboratories, and other health facilities. By using digital technology, this platform allows fast and easy access to health information, both by medical personnel, patients, and the government. Moreover, this platform has been integrated with individual health data between health facilities for the sake of standardization and interoperability of data towards the use of EMR or electronic medical records which have been carried out since 2023. The implementation of EMR itself has previously been regulated in the Regulation of the Minister of Health no. 24 of 2022 concerning mandatory medical records. So for those who do not implement it will receive administrative sanctions in the form of written warnings, revocation of accreditation status to the most fatal is the revocation of business licenses.

The implementation of the SATUSEHAT Platform is an effort to improve health services and the efficiency of the national health system. It should be noted that the Indonesian government through the Ministry of Health has launched the SATUSEHAT Platform. This is a strategic initiative that aims to integrate health data from various health care facilities throughout Indonesia.

The implementation of the SATUSEHAT Platform certainly has good goals and is no less important in general and specifically for the health sector, such as:

1. Health data integration is combining data from multiple sources to create a single, comprehensive national health database.

2. Improving the quality of health services allows medical personnel to access a patient's complete health history, so they can provide more appropriate diagnoses and treatments.

3. Operational efficiency reduces redundancies and speeds up administrative processes in healthcare facilities.

4. Data-driven decision making by helping governments and health institutions make more effective policies based on accurate and up-to-date data.

In terms of benefits, it is also quite profitable because the benefits themselves are:

1. Ease of access to information

Patients and healthcare professionals can easily access relevant health information through one integrated platform. This includes medical history, lab results,

prescriptions, and hospitalization records.

2. Coordination between health institutions

Enables better coordination between different healthcare facilities, so that patient care can be delivered in a more coordinated and efficient manner.

3. Better health surveillance

The government can monitor public health trends in real-time, which is very useful in handling disease outbreaks and implementing national health programs.

4. Save costs

The existence of this platform makes the manual process can be reduced significantly. The effect is that operational costs can automatically be cut and allocated to others to support better quality services.

With these good goals and benefits, it is no wonder that the implementation process of the platform is not only for certain regions but for all of Indonesia. However, this implementation process certainly cannot be done at once. In fact, there are many obstacles and challenges that will certainly arise. The SATUSEHAT Platform is expected to be the main solution in overcoming the challenges faced by the health sector, such as limited data access, service gaps, and coordination between health institutions. After the launch of the SATUSEHAT platform, regulations will be issued that require every health application and health service facility to follow the standards set by the Ministry of Health on the SATUSEHAT platform.

However, the SATUSEHAT Platform has drawn controversy among the public. The public believes that the SatuSehat Platform has taken a lot of personal data, both general personal data and sensitive personal data. General personal data includes name, gender, religion, date of birth, nationality, e-mail and telephone number, home address, date of birth, and occupation. Specific personal data includes health data, finances, family data, and so on. The SatuSehat Platform also includes a request for access to several sensitive data, such as IP Address, camera, location, and data storage on the user's personal device. Therefore, the government is taking steps to prevent the risks that can be experienced in using the SATUSEHAT Platform

b. *Telemedicine*

The implementation of digitalization of health services through telemedicine in Indonesia aims to improve access, efficiency, and quality of health services,

especially in remote areas and for people who have difficulty accessing health facilities. Telemedicine enables remote medical consultations, real-time health monitoring, and management of electronic medical records, all of which contribute to the transformation of a more modern and affordable health system. The need to develop telemedicine is also in line with the digital transformation in the health sector which is the vision of the Ministry of Health of the Republic of Indonesia. The digital transformation of health is a leap for Indonesia in realizing an increasingly advanced and equitable Indonesian health sector. This is mandated in the Regulation of the Minister of Health of the Republic of Indonesia Number 21 of 2020 concerning Guidelines for Health Transformation by indicating changes in health governance which include health research and development, as well as information system integration.

*Telemedicine*is a practice of providing virtual health services remotely using communication technology to connect patients with health care providers. The World Health Organization (WHO) states that telemedicine is a health service where distance is an important factor, carried out by health workers using information and communication technology to exchange valid information for diagnosis, treatment, prevention of disease and injury, research and evaluation, and continuing education for health care providers to advance public health. The provision of health services in telemedicine includes consultation, diagnosis, care, treatment, exchange of medical data, and scientific discussions remotely.

Patients and medical personnel do not need to meet in person in one place, but still communicate through an application (Chang and Boudier Revéret, 2020; Prabowo, 2020; Song *et al*., 2020). Telemedicine has the main objective of providing health facilities with a wide coverage by combining technology for health care. In previous studies, it was found that abroad telemedicine has been used in handling pulmonary, musculoskeletal, neurology cases (Chang and Boudier Revéret, 2020; Cottrell and Russell, 2020; Gonzalez-Gerez *et al*., 2020; Randelli and Compagnoni, 2020; Turolla *et al*., 2020). The results of the implementation of telemedicine are the same or even more satisfying than with face-to-face services in general. However, the sample of previous studies was small and there was no ongoing evaluation (Jiang *et al*., 2018).

The use of telemedicine in health services certainly has various positive impacts, both for health workers and for patients or users. Telemedicine can make health services more effective and efficient in various ways, both in terms of monitoring, evaluating, and educating. According to the World Health Organization (WHO), there are four elements related to telemedicine, namely being useful in

overcoming geographical and distance barriers, aiming to provide clinical support, aiming to improve public health, and involving the use of various types of information technology devices. The benefits of digitalizing health services in telemedicine include:

1. Improving accessibility

Telemedicine enables patients in remote areas or with limited mobility to obtain health services without having to come directly to a health facility.

2. Increase efficiency

Remote consultations can reduce waiting times and transportation costs, and allow medical personnel to serve more patients.

3. Improving service quality

With telemedicine, patients can monitor their health conditions more regularly, gain access to better health information, and consult with specialist doctors who may not be available in their area.

4. Cost Efficiency:

*Telemedicine*can reduce the operational costs of health facilities and the costs incurred by patients for transportation and accommodation.

Telemedicine technology is a solution to the limited infrastructure and Health Human Resources (HR) in Indonesia, especially for people in Remote Border Islands Areas (DTPK) and areas with limited doctors and difficulty in accessing health services for the community. In addition, telemedicine has also been proven to reduce the number of unnecessary referrals which will later improve the quality of local health services. In addition, there are at least five main reasons that can be considered in the use of telemedicine, namely easier and better access, cost-effective because the costs required are less, convenience in its use, demand from millennial generation users, and reducing the absence of medical personnel for the community.

Although various benefits or positive impacts can be obtained from its use, telemedicine still has various limitations. In telemedicine services, various examinations are carried out online, whereas physical examinations cannot be carried out only through online consultations, so that the diagnosis given is only a temporary diagnosis accompanied by other comparative diagnoses. If you want to make a precise diagnosis and accompanied by supporting examinations, a complete clinical

examination is needed which is still carried out with face-to-face meetings. Another challenge faced by telemedicine service providers is that internet access in Indonesia is still uneven, so that a number of regions in Indonesia have not been able to enjoy and access telemedicine services. In terms of its creation and development, telemedicine is more often built by start-ups than by hospitals, even though the level of public trust in digital health services from hospitals is higher.

The Challenges of Implementing Digitalization of Health Services

The challenges related to the implementation process of using the system, so that gradual maintenance is needed to optimize the benefits provided. One of the obstacles that is often encountered is the gap in accessing the technology that has been developed. Behind the advancement of available technology, there is an inequality related to the availability of devices and good internet networks, especially in remote areas in accessing the availability of digital media (Larasaty, 2019). Digital literacy of the Indonesian people is an important part of giving special attention, from previous research that has been conducted, showing the low literacy of the Indonesian people, especially for remote areas, where people are less exposed to the use of digital technology (Puspita *et al*., 2024). The low level of community literacy is a factor in the suboptimal implementation of digitalization, considering that there is no readiness in the community to accept existing updates (Astuti *et al*., 2024). The importance of providing education about health digitalization is the first step in increasing understanding and good acceptance from the community's perspective (Wulan *et al*., 2023).

Implementation digitalization of health services running without any challenges in various aspects. Some of the challenges that arise indigitalization of health servicesantaothers:

a. Fragmentation of health information systems at the service facility level
Fragmentation of health information systems at the health care facility level, such as hospitals or health centers, refers to a condition where various health units or programs use different and unintegrated information systems. As a result, data is not connected, reporting processes are duplicated, and decision-making becomes difficult because data is not available holistically. The causes of fragmentation are:

1. The use of different systems in each health unit or program may have its own information system that is not compatible with other systems.

2. Lack of integration with the absence of data standards and communication protocols between different systems causes difficulties in sharing information.

3. Focus on specific programs where information systems are often developed to support specific health programs, without considering the broader information needs of health facilities.

4. Lack of human and financial resources to develop and integrate more comprehensive information systems.

b. Inequality of access to infrastructure in the 3T (remote, frontier, outermost) regions

Implementationdigitalization of health servicesrequires adequate infrastructure and stable internet access. This challenge is especially experienced in rural or remote areas where the availability of infrastructure and connectivity may be limited.

c. Patient data privacy and security concerns

The use of digital technology in healthcare involves the exchange and storage of patient data. Data security and privacy are major concerns, especially with the increasing threat of cybersecurity. Adequate protection of patient data and compliance with privacy regulations are important challenges that must be addressed.

d. Lack of technological skills on the part of medical personnel

The use of digital technology in health services requires adequate technological understanding and skills from medical personnel. Lack of these skills can hinder the adoption and effective use of technology.

e. Lack of technological understanding from the general public

People also need to have adequate technological understanding and literacy to utilize digital health services. These challenges include a lack of understanding of health applications, telemedicine, and how to utilize them properly.

f. System integration and interoperability

In complex healthcare environments, system integration and interoperability challenges arise. Different systems and applications need to be able to communicate and share information effectively to achieve coordinated data management and integrated care.

g. Inequality of access and technology gap

The implementation of digital technology must take into account the gaps in access and technology gaps that exist in society. These challenges include limited access to digital devices and the internet, especially for vulnerable groups such as rural residents, the elderly, and the lower economic classes.

h. Acceptance and adoption by medical personnel

The success of implementing digital technology in health services also depends on the acceptance and adoption of technology by medical personnel. This challenge involves a change in mindset, adequate training support, and active involvement of medical personnel in the implementation process.

To face these challenges, there needs to be a collaborative effort between governments, health institutions, technology developers, and other stakeholders to identify innovative solutions and implement effective strategies.In the convenience and progress created by the digitalization of health services, there is a process flow where challenges are found which are none other than related to the implementation process of using the system, so that gradual maintenance is needed to optimize the benefits of the digitalization of health services provided.

Strategy for Optimizing Health Service Digitalization Policy

Digital-based services include the application of technology to facilitate interactions between patients and providers, which plays a role in improving patient experience while reducing waiting times. (Sanjaya *et al*., 2023). As explained by Aguslindawati *et al*., (2022) digital-based services are a form of service delivery through a digital platform that allows non-face-to-face interaction between providers and users.

Optimizing the digitalization of health services requires a comprehensive strategy. This includes digital transformation in data management, increasing accessibility of services, and utilizing technologies such as telemedicine and electronic medical records. The strategy for optimizing policies is explained below.

a. Improving system interoperability through national standardization.

Interoperability is the ability of multiple information systems, devices, and applications (systems) to access, exchange, integrate, and use data cooperatively in a coordinated manner, within and across organizational, regional, and national boundaries, to provide timely and seamless portability of information and optimize the health of individuals and populations globally. Interoperability refers to the

standards, protocols, technologies, and mechanisms that enable data to flow between diverse systems with minimal human intervention.Meanwhile, according to Article 1 Paragraph (1) of the Regulation of the Minister of Communication and Information Technology Number 1 of 2023 concerning Data Interoperability in the Implementation of Electronic-Based Government Systems and One Data Indonesia defines data interoperability as the ability of electronic systems with different characteristics to share data and information in an integrated manner in the implementation of SPBE.

Interoperability of public service sector data has dualism, on the one hand it does have a positive impact on the digital transformation process of Indonesian society through the implementation of national SPBE, on the other hand there are also several notes related to obstacles and potential maladministration in the form of conflicts of interest in the collaboration process between governments, both central and regional. Therefore, it is necessarynational standardization. Interoperable systems are critical in a digitally evolving environment where organizations seek insights from data to empower decisions and achieve operational success. Healthcare institutions increasingly rely on interconnected medical devices and healthcare systems to collect, share, and analyze healthcare data. These networked systems transfer electronic health records, medical outcomes, insurance claims, and other medical information across healthcare departments. Healthcare interoperability enables healthcare professionals to collaborate toward better patient outcomes with fast, reliable data.

Healthcare interoperability is an effort to balance information availability and patient privacy across medical institutions by reducing data silos. Healthcare providers are implementing health information systems that give diverse teams managed access to patient data and other electronic health information. For example, a physician treating a patient in the emergency room can quickly retrieve a recent blood sugar test result for a diabetic patient from an affiliated clinic. A healthcare professional can also find a cardiogram from a visit to a partner cardiologist. At the same time, healthcare providers must comply with privacy and security regulations that are put in place to protect the interests of patients. This is especially important when organizations share data with external third parties to advance medical research. The exchange of de- identified patient data, such as diagnostic information, genomic data, treatment regimens, and treatment outcomes.

Interoperability in healthcare is achieved through the implementation of several industry standards and measures. This encourages the secure exchange of medical data between different systems. Standardization includes:

1. Vocabulary standards

Vocabulary or terminology standards represent specific agreements on terms, code sets, or descriptive representations that support the interoperability of health data among medical software systems. For example, ICD-10 contains terminology that describes symptoms, diseases, and complications.

2. Content standards

Content standards provide a data content framework for medical systems to represent health data in a commonly agreed format. For example, HL7 is a messaging standard that defines the data structure and semantics of electronic health information. This means that all health software systems can interpret the data correctly.

3. Transportation standards

Transport standards are designed to enable healthcare information technology solutions to send and receive data reliably. Digital Imaging and Communications in Medicine (DICOM) enables different imaging machines to transmit imaging data to other systems within a healthcare facility.

4. Privacy and security standards

Privacy standards give patients authority over how health care organizations collect, store, and use personal health care information and patient records. This helps ensure patient safety.

5. Identifier standards

An identifier standard is a unique code that allows a networked computerized system to identify a patient, medical professional, or health care provider. For example, hospitals use a corporate master patient index (EMPI) to document patient care provided by different medical departments.

Traditionally, healthcare digitalization has required systems that run on customized protocols and data storage structures. Common industry standards are needed to enable systems to communicate at a high level of interoperability. Even if interoperability standards are implemented, organizations must modernize their machines, software, and data infrastructure to allow data exchange between two or more systems.

b. Preparation of legal and ethical guidelines for telemedicine that protect patients and medical personnel.

Telemedicine technology promises to improve the quality and access to health services. However, like other new breakthroughs, the implementation of Telemedicine will face ethical and legal issues that have not necessarily been faced before. Indonesia is relatively late in implementing Telemedicine technology, although the potential use of information and communication technology (ICT) has been recognized by WHO in 2005. Therefore, the ethical and legal impacts of telemedicine technology have not been widely studied by regulators.

Health service providers have an obligation to maintain the privacy of their patients' medical data. This includes communication between doctors and patients, as well as other data in the form of images, texts, videos related to maintaining this privacy and confidentiality is easier to do if health management is carried out entirely in health facilities (hospitals or clinics), but new problems arise when implementing Telemedicine technology. As forLegal and ethical guidelines for telemedicine that protect patients and medical personnel include:

1. Legality of Telemedicine technology providers

According to the Minister of Health Regulation No. 20 of 2019, Telemedicine services can only be provided by Health Facilities. In fact, it is not uncommon for Telemedicine services, such as teleconsultation, to be carried out through other platforms, such as e-Health applications (Halodoc, Alodokter). The Minister of Health Regulation also only explicitly regulates Telemedicine between Health Facilities (hospitals, clinics, health centers). The Indonesian Medical Council (KKI) Regulation No. 74/2020 permits doctors and dentists to provide medical services to patients using Telemedicine technology. However, this regulation only allows doctors to provide services through Health Facilities, and not directly. Based on the legal aspect, because of the public's need for health services, applications and websites like this may be more popular than official Telemedicine services in accordance with applicable regulations.

2. Implementation of telemedicine with better regulation

Other countries that provide Telemedicine such as Malaysia, India, and the United States haveregulate Telemedicine through law. This arrangement has been in place since the 1990s (Malaysia and the United States) and the early 2000s (India). The related laws in Indonesia regarding Telemedicine, namely Law No. 17 of 2023 concerning Health and Law No. 11 of 2008 concerning Information and Electronic Transactions, have not specifically regulated the use of Telemedicine.

3. Privacy and confidentiality

Healthcare providers have an obligation to maintain the privacy of their patients' medical data. This includes communication between doctors and patients, as well as other data in the form of images, texts, and related videos. Maintaining this privacy and confidentiality is easier if health management is carried out entirely at the Health Facilities (hospitals or clinics), but new problems arise when implementing Telemedicine technology. With Telemedicine technology, patients, doctors, and other healthcare workers may use third-party services, such as developers of Telemedicine applications or other applications, or Internet service providers. Because patient data is sent and stored using connections, servers or storage that are not directly controlled by the Health Facilities, concerns may arise about how the privacy and confidentiality of the data are protected.

4. Data security

The issue of patient medical data security is one of the risks that cannot be ignored when using Telemedicine services. Data leakage can occur during collection, delivery, and storage. Although application and device developers continue to strive to improve their security,in reality, security holes are still found.Hackers have also begun to look to health data as a target for attacks. Globally, the healthcare industry is the sector that suffers the most losses due todata leaks in 2020. If health facilities and developers of Telemedicine technology solutions do not consider data security aspects seriously, the ethical implementation of this technology can be questioned.

5. Informed consent

*Informed consent*is the process of granting permission for medical management actions towards patients. Doctors and medical personnel can only perform medical interventions after ensuring that the patient understands the facts, implications, and consequences. When applied to Telemedicine, this means that the patient must have given permission for actions such as sending the patient's medical information. This does not only include teleconsultation but also other Telemedicine actions such as Teleradiology or Tele-USG. For example, inUnited States of AmericaThis permission request must be made at the time of starting to use the Telemedicine service. Ethical and legal issues related to the practice of telehealth or telemedicine services still require standard and specific implementation rules to ensure fair access, quality of care, sustainable costs, professional responsibility and respect for patient privacy, and data protection and confidentiality. In fact, telemedicine services can only be used as a complement or supplement to traditional health services and not as a complete replacement. Nevertheless, telemedicine has the potential to have wide applications and health professionals play a fundamental role in following strict

indications when conducting telehealth visits and in helping to ensure that this technology respects the therapeutic relationship and the quality of care.

c. Promote digital literacy training for health workers.

The strategy in optimizing is carried out by holding socialization and training programs for health workers and administrative staff to ensure they understand and are able to use the platform effectively. Improving digital literacy for health workers is essential to support better and more efficient health services. Digital literacy training needs to be encouraged to equip health workers with the skills needed in the digital era, including the ability to search for information, use health applications, and maintain data security. Some reasons why digital literacy training is important for health workers:

1. Faster and broader access to medical information:

Digital literacy enables healthcare workers to access scientific journals, the latest research, and clinical guidelines online, ultimately improving the quality of care.

2. Utilization of technology in health services:

With good digital literacy, health workers can utilize various digital applications and platforms to support patient diagnosis, treatment, and monitoring.

3. Improved patient data security:

Digital literacy helps healthcare professionals understand cybersecurity risks and protect patient data from threats such as identity theft and hacking.

4. Efficiency in health administration:

Digital literacy enables healthcare workers to manage electronic medical records, appointment scheduling, and health data reporting more efficiently.

5. Improved communication with patients:

Digital literacy enables the use of digital communication platforms to provide information, education and support to patients.

Some efforts that can be made to encourage digital literacy training for health workers include:

1. Provision of continuing education and training:

Improving the competence of health workers through structured and ongoing training in the field of digital literacy.

2. Access to trusted digital resources:

Health workers have access to quality and trusted sources of information and digital tools.

3. Digital communication skills development:

There is training for health workers in communicating effectively through various digital platforms.

4. Provision of guidance and regulations:

The existence of clear guidelines and regulations regarding the use of technology and data security in the health care environment.

5. Inter-agency collaboration:

There is collaboration between the government, health professional organizations, and educational institutions to support digital literacy training programs. Encouraging digital literacy training, health workers can become agents of change in the digital transformation of the health sector, providing better, more efficient, and safer services to the community.

d. Ensure equal access and technology infrastructure throughout the region Infrastructure development by building and developing the technological

infrastructure needed to support the operational digitalization of services throughout Indonesia. The guarantee of access and technological infrastructure evenly throughout the region, or equal digital access, is an effort to ensure that everyone, wherever they are, has the same opportunity to benefit from technology. This includes the provision of infrastructure such as internet networks, as well as increasing digital literacy and access to technological devices. The goal is to reduce the digital divide and ensure that no one is left behind in this digital era. Guarantee access and infrastructure of health service technology evenly throughout the region is an effort to ensure that everyone, regardless of geographic location, has an equal opportunity to obtain quality health services. This includes the provision of adequate health facilities, trained medical personnel, and access to innovative health technology throughout the region, including remote areas.

The problem of accessibility in rural or remote areas in reaching quality health facilities is still a reality. Limited infrastructure, minimal medical personnel available, and the scarcity of adequate medical facilities continue to be the main obstacles that need to be overcome. In facing the complexity of this challenge, a holistic approach is needed that can accommodate various aspects. The development of community health centers can be a solution by bringing medical services closer to the community, while the use of telemedicine services can overcome distance barriers and expand the scope of services. Through synergy between infrastructure development, increasing human resources in the medical field, and innovation in the use of technology, it is hoped that accessibility to health services can increase significantly, even in areas that were previously difficult to reach.

e. Establish a special regulatory body for digital health services.

There is no specific supervisory body for digital health services in Indonesia. However, supervision of digital health services is carried out by several institutions, such as the Food and Drug Supervisory Agency (BPOM) which oversees pharmaceutical products and medical devices, and the Ministry of Health which seeks to improve the quality of digital health services through various regulations and programs. In addition, there are also collaborative efforts between BPOM and the Ministry of Communication and Informatics (Kominfo) to supervise illegal content in the digital health sector. The government, including the KPK, is encouraging digital transformation in the health sector to improve the effectiveness and efficiency of services. This includes improving work culture, innovation, and increasing superior services.

Based on the description of the strategies that can be implemented, optimizing the digitalization policy of health services requires a comprehensive strategy that includes infrastructure development, increasing access, improving service quality, and strengthening data security. This involves collaboration between the government, health service providers, and the community. With the right strategy and strong collaboration, digitalization of health services can provide significant benefits to the community and the health system as a whole. The right digitalization policy of health services needs to be formulated to optimize the benefits of digital technology in public health services while maintaining personal data protection and fair access. Collaborative efforts between the government, health institutions, the private sector, and civil society are key to formulating and implementing these policies.

These various government policies have a significant influence in encouraging and regulating the use of digital technology in health services. Government policies

related to the digitalization of health data are very important in optimizing the use of digital technology. With policies that encourage the digitalization of health data, patient medical information can be easily accessed, managed, and shared between health care providers. This improves coordination and continuity of care, and allows for more effective data analysis for research and health policy development.

The government policies on digitalization of health services can also influence the extent to which the adoption of digital technologies in health services achieves equity and safety. Policies that promote inclusivity, such as accessibility of technology for people with disabilities or residents in remote areas, can ensure that the benefits of digital technologies can be felt by all individuals. In addition, policies that protect the privacy and security of patient data are also key factors in building public trust in the use of digital technologies in health services.

Health digitalization presents opportunities to increase accessibility of health services. The development of t is one of the treatment options that can be developed in areas that are still difficult to reach with access to health services (Ismawati and Subhiyakto, 2024). There will be many developments in digital technology as an effort to optimize the distribution of health services facilitated by the digitalization of government health services, in order to monitor public health graphs. As a preventive measure, the development of mobile-based health applications provides convenience for health stakeholders in providing health education to the public. The development of the digital world provides great opportunities for the world of health in developing health service needs for the community.

CONCLUSION

Based on the research results, it can be concluded that 1) Digitalization of health services as a policy is based on regulations such as Law No. 17 of 2023, Electronic Information and Transactions Law (UU ITE), government regulations such as Permenkes No. 20 of 2019 concerning the Implementation of Telemedicine Services Between Health Service Facilities and Permenkes No. 24 of 2022 concerning Electronic Medical Records; 2) The implementation of digitalization of health services in the SATUSEHAT platform aims to connect patient health data from various health service facilities (fasyankes) and integrate them into one system. This is expected to improve the efficiency, effectiveness, and quality of health services as a whole. Implementation of digitalization of health services through*telemedicine*in Indonesia aims to improve access, efficiency, and quality of health services, especially in remote areas and for those who have difficulty accessing health facilities; 3) The challenges of implementing digitalization of health services are a)fragmentation of health

information systems at the service facility level; b) inequality of access to infrastructure in the 3t (remote, frontier, outermost) regions; c) concerns about patient data privacy and security, d) lack of technological skills among medical personnel; e) lack of understanding of technology among the general public; f) system integration and interoperability; g) inequality of access and technological gaps and h) acceptance and adoption by medical personnel; 3) Strategies for optimizing health service digitalization policies include increasing system interoperability through national standardization, preparing legal and ethical guidelines for telemedicine that protect patients and medical personnel, encouraging digital literacy training for health workers and ensuring equal access and technology infrastructure throughout the region.

Suggestions that can be submitted include policy makers to be able to pay more attention in seeking the availability of adequate infrastructure, both in terms of devices and adequate internet networks to provide more support in the sustainability of the digitalization process. Innovation that continues to be carried out for the development of better technology, is expected to be balanced with all efforts to address existing limitations and provide more comprehensive regulations, considering the great potential provided by technology in increasing the accessibility of health services in Indonesia. Subsequent research was conducted by strengthening primary data so that the results were more comprehensive conceptually.

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