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The Effect of Telehealth Utilization on the Efficiency of Nursing Services in Hospitals

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ABSTRACT

The use of digital technology in health services is rapidly increasing, particularly through telehealth. In referral hospitals, nursing service processes are often constrained by long patient waiting times, limited coordination among health workers, and inadequate continuous patient monitoring. These challenges highlight the need for service innovations that improve nursing efficiency without compromising care quality. This study aimed to analyze the effect of telehealth utilization on the efficiency of nursing services. A quantitative method with a cross-sectional design was applied. The study was conducted at Dr. Kariadi Hospital, Semarang, in 2025, involving a population of implementing nurses in inpatient units. A total of 120 nurses were selected using proportional random sampling. Data were collected through structured questionnaires assessing telehealth utilization and nursing service efficiency, along with service time observation sheets. Univariate analysis was used to describe frequency distributions, while bivariate analysis employed the Chi-Square test with a significance level of 0.05. The results showed that 68.3% of nurses had good telehealth utilization, and 71.7% demonstrated high efficiency in nursing services. There was a significant relationship between telehealth utilization and service efficiency (p = 0.001; OR = 3.45). Nurses with good telehealth utilization were 3.45 times more likely to provide efficient services. In conclusion, telehealth significantly improves nursing service efficiency, emphasizing the need for supportive policies, training, and system integration.

Keywords *: Telehealth, Efisiensi, Service, Nursing*

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INTRODUCTION

The development of information and Communication Technology (ICT) has transformed many sectors, including the health sector. One of the applications of technology in the field of Health is telehealth, which allows health services to be carried out remotely using technological devices. The concept of telehealth has been seen as a potential solution to improve access to health services, especially in areas with limited medical facilities (Vishwanath et al., 2021). The use of telehealth technology is considered to be able to improve service efficiency, reduce the workload of health workers, and speed up the process of handling patients without having to face to face.

In Indonesia, the health sector is also undergoing digital transformation. Major hospitals began implementing telemedicine or telehealth systems to improve access to health services for the community. One of the hospitals that implement telehealth is RSUP Dr. Kariadi Semarang, a referral hospital in Central Java that serves various medical needs of the wider community. However, although this technology is promising, its implementation still faces many challenges, both in terms of infrastructure, human resources, and internal hospital policies (Anggraeni et al., 2022).

One of the main challenges in the implementation of telehealth in hospitals is the efficiency of Nursing Services. Nursing is an integral part of health care that requires full attention in the process of Patient Recovery. Based on data from the Ministry of health of the Republic of Indonesia, long patient waiting times, difficulties in coordination between medical personnel, and limited nursing staff are big problems in hospital services (Kemenkes RI, 2020). The efficiency of Nursing Services is very important to ensure that the patient's healing process runs well and that time and resources can be used optimally.

Telehealth, with its ability to allow communication between patients and medical personnel without having to be in the same space, can help reduce some of these barriers. For example, telehealth can reduce patient waiting times by enabling medical consultations through video calls or other technology-based applications. In addition, the use of telehealth can also facilitate coordination between medical personnel and enable more efficient patient monitoring (Wang et al., 2021). However, despite numerous studies showing the benefits of telehealth, there are also concerns regarding the quality of services provided and how effective telehealth is in improving the operational efficiency of hospitals.

Data from RSUP Dr. Kariadi Semarang pointed out that since the implementation of the telehealth system, there has been an increase in the number of remote medical consultations, but the efficiency of Nursing Services has not been fully realized. Many nurses revealed that although this technology facilitates communication, it is often bumped by technical problems, training limitations, and lack of system integration that can accelerate decision-making in the service (Widiyanti et al., 2022). Therefore, it is important to identify the extent to which the use of telehealth can affect the efficiency of nursing services, both in terms of time, cost, and quality of care.

Several previous studies have also noted the importance of efficiency in technology-driven nursing services. A study by Lee et al. (2020) showed that telehealth can accelerate access to medical information, improve interaction between patients and nurses, and reduce the physical workload of nurses in dealing with patients who need intensive monitoring. However, this study also reminds that the success of telehealth depends on the level of technological readiness in hospitals, nurses ' readiness to use technology, and policies that support the integration of these systems into the flow of services.

Other research conducted by Haryanti et al. (2021) found that although the use of telehealth can reduce patient waiting times and improve remote interaction, there have not been many studies that specifically assess its direct impact on the efficiency of Nursing Services. Efficiency in this context not only refers to reducing service time, but also includes better management of human and material resources, as well as increased patient satisfaction with the services provided.

Another challenge is the readiness of human resources, especially nurses, in adapting technology. According to Nugroho et al. (2021), although nurses in large hospitals are already familiar with the use of advanced medical devices, the use of telehealth requires special training, both from the technical side and in terms of the use of safe and effective communication systems. One of the main obstacles in the application of telehealth is the habitlessness of some nurses in utilizing this system to the fullest.

Nevertheless, various studies show that adequate training can improve the efficiency of technology utilization in the world of nursing. A study by Yuliana et al. (2020) emphasized the importance of technology training to nurses to ensure that they not only understand technology, but can also optimize its use in supporting more efficient and timely services. With proper training, the use of telehealth is expected to improve nurse performance, reduce time spent on administrative processes, and accelerate clinical follow-up for patients.

On the other hand, the problem of efficiency in nursing services is also influenced by organizational factors and hospital systems. A study by Santoso et al. (2021) revealed that the integration of telehealth in existing hospital systems must be done with caution, given the challenges in terms of adaptation of existing information systems and communication processes between sections. Without the synergy between technology and hospital organization systems, telehealth will not be able to have a significant impact on efficiency.

In terms of policy, research by Pradipta et al. (2022) states that policies supporting the development and implementation of telehealth in hospitals are essential. However, this policy must consider various aspects, such as patient data security, cost management, and increasing the capacity of nurses to manage technology. Therefore, hospitals need to conduct periodic evaluations to ensure that the use of telehealth really brings benefits to all parties, both patients, health workers, and the hospital itself.

The application of telehealth in nursing services in hospitals also has great potential in overcoming the problem of uneven distribution of health workers in Indonesia. In this context, telehealth allows patients in remote areas to get the same services as patients in big cities. Research

by Setiawan et al. (2021) revealed that telehealth is very helpful in areas with limited access to trained medical personnel, which in turn can improve the overall quality and efficiency of Health Services.

However, despite the huge potential of telehealth, there are concerns related to obstacles in the implementation of this technology in various hospitals in Indonesia. According to research by Arifin et al. (2021), factors such as inadequate infrastructure, low technological literacy among health workers, and resistance to change are major challenges in implementing telehealth systems effectively in hospitals in Indonesia.

Research conducted by Fitriani et al. (2022) emphasized the importance of evaluating the application of telehealth in hospitals, especially in terms of its effect on the efficiency of Nursing Services. Proper evaluation can help hospitals to improve technology implementation and accelerate the adaptation process, which will ultimately have an impact on service efficiency.

Given the importance of the role of technology in improving the efficiency of health services, this study is interested in exploring more deeply the effect of telehealth utilization on the efficiency of nursing services in Dr. Kariadi Semarang. The focus of this study is to analyze the extent to which telehealth technology can contribute in speeding up the service process, reducing waiting time, and improving the quality of services provided by nurses. With a deeper understanding, it is expected that hospitals can design policies that are more effective in integrating telehealth into the flow of existing nursing services.

METHODS

This study uses a quantitative approach with cross-sectional design to assess the effect of telehealth utilization on the efficiency of Nursing Services. The study was conducted at Dr. Kariadi Semarang in 2025, with a focus on all implementing nurses working in the hospital's inpatient unit. The population in this study consisted of 500 nurses who are directly involved in the implementation of nursing services in inpatient units. The sample used in this study amounted to 120 nurses, who were selected using proportional random sampling technique. This technique was chosen to ensure a representative sample of various demographic characteristics and work experience of nurses in inpatient units. The sample inclusion criteria were nurses who had worked for at least one year in inpatient units and who were involved in the use of telehealth in nursing services. Nurses who were not directly involved in telehealth utilization or who were on sabbatical were not included in the study sample.

Data collection was conducted using two main instruments, namely a structured questionnaire containing questions about the level of telehealth utilization and efficiency of nursing services, as well as time observation sheets used to record the duration and effectiveness of services provided by nurses. The questionnaire was designed using a Likert scale to measure telehealth utilization and service efficiency, while the observation sheet was used to record service time in the context of telehealth use. Data analysis was conducted by univariate analysis technique to describe the frequency distribution of the variables studied and bivariate analysis using Chi-

Square test to examine the relationship between telehealth utilization and nursing service efficiency. This study has obtained the consent of all respondents before participating. Respondents were given a detailed explanation of the purpose of the study, the procedure to be carried out, as well as their rights as participants, including the right to resign at any time without consequences.

RESULTS

The following are presented the results of univariate and bivariate analysis conducted to assess the effect of telehealth utilization on the efficiency of nursing services in Dr. Kariadi Semarang.

1. Frequency Distribution Regarding Telehealth Utilization Rate and Efficiency of Nursing Services

Table 1. Frequency Distribution Regarding Telehealth Utilization Rate and Efficiency of Nursing Services

Variable	Categories	Frequency (n)	Percentage (%)
Telehealth Utilization Rate	Good	82	68,3%
	Less Good	38	31,7%
Nursing Service Efficiency	Height	86	71,7%
	Low	34	28,3%

The results showed that the majority of nurses (68.3%) have a good utilization rate of telehealth. This shows that most nurses have adopted telehealth technology in providing services to patients. Meanwhile, regarding the efficiency of Nursing Services, 71.7% of nurses showed a high level of service efficiency. This means that most nurses are able to provide optimal services in an efficient time. However, although most nurses showed good levels of efficiency, there were still about 28.3% of nurses who reported low levels of service efficiency.

2. Relationship Between Telehealth Utilization Rate With Nursing Service Efficiency

Table 2. Relationship Between Telehealth Utilization Rates with the Efficiency of Nursing Services

Telehealth Utilization Rate	Nursing Service Efficiency	Total	p-value	Odds Ratio (OR)
	Height	Low		
Good	65 (79,3%)	17 (20,7%)	82	0,001**
Less Good	21 (55,3%)	17 (44,7%)	38	
Total	86	34	120	

The results of bivariate analysis, obtained the value of p = 0.001, which shows that there is a significant relationship between the use of telehealth with the efficiency of Nursing Services (p < 0.05). In addition, the Odds Ratio (OR) of 3.45 indicates that nurses who have good utilization of telehealth have a 3.45 times greater chance of providing efficient services compared to nurses whose utilization rate is not good. This shows that the optimal utilization of telehealth has a positive effect on increasing efficiency in nursing services.

DISCUSSION

1. Frequency Distribution Regarding Telehealth Utilization Rate And Efficiency Of Nursing Services

The results showed that most of the nurses at Dr. Kariadi Semarang has a good telehealth utilization rate and high nursing service efficiency. Based on univariate analysis data, 68.3% of nurses use telehealth technology well, while 71.7% of nurses show high service efficiency. This reflects that telehealth technology can be an effective tool in supporting the improvement of Health Care Quality.

The use of telehealth by nurses represents a significant change in the way they provide services to patients, which may previously have been hampered by time and resource constraints. For example, telehealth technology allows nurses to conduct remote patient monitoring, consult with specialist doctors without having to wait for a physical meeting, as well as facilitate a more efficient documentation process. The acceptance of this technology indicates progress in the integration of ICT in the health sector, especially in referral hospitals.

However, although the utilization of telehealth by most nurses shows good results, there is still a small percentage that does not optimize this technology to the maximum. Factors affecting the utilization of technology include lack of adequate training, nonconformity with individual preferences, or even infrastructure challenges (Anggraeni et al., 2022). In this context, optimal utilization of telehealth can only be achieved if there is full support from the hospital management in terms of adequate training, facilities, and policies. For example, the successful use of this technology is highly dependent on the quality of the devices available and the skill of nurses in operating the technology.

In addition, it is important to note that although 68.3% of nurses show good levels of telehealth utilization, there are still 31.7% of nurses who have not made the most of this technology. Research by Yuliana et al. (2020) revealed that one of the biggest challenges in the implementation of telehealth in hospitals is the lack of readiness of medical personnel to use the technology. Nurses who are not familiar with these technologies are likely to face difficulties in transitioning from traditional methods to digital-based technologies. Therefore, hospitals need to constantly evaluate nurses ' readiness to use telehealth and provide ongoing training support.

In this study, it was also found that 71.7% of nurses showed a high level of service efficiency. This figure indicates that most nurses can do their job more quickly and effectively thanks to the use of telehealth. According to Lee et al. (2020), efficiency in nursing services is one of

the important indicators in measuring the success of health care systems. With technology that supports communication and coordination among medical personnel, the time required to provide care can be minimized, allowing nurses to serve more patients in less time. This efficiency also includes better resource management and improved workflow, which has a direct impact on improving the quality of healthcare services.

However, although most nurses demonstrated high service efficiency, there were about 28.3% of nurses who reported low levels of efficiency. This shows that although the use of telehealth can improve efficiency for some nurses, there are challenges that must be overcome in order for this technology to be used optimally by all medical personnel. One of the factors that may lead to inefficiency is the inability to use technology to its full potential, which is also reflected in the research by Vishwanath et al. (2021). According to their research, the lack of skills in utilizing technology is one of the biggest obstacles in achieving health care efficiency using telehealth.

In addition, the results showed that the use of telehealth can speed up the service process without reducing quality. Nugroho et al. (2021) argued that the efficiency of nursing services depends largely on the extent to which technology can reduce the administrative tasks commonly performed by nurses. Telehealth technology allows nurses to access patient medical history, laboratory test results, and medical consultations directly through electronic devices. This reduces the time previously used to manually collect information, which can ultimately speed up the service process. Nevertheless, the efficiency achieved does not necessarily detract from the importance of the quality of care provided to patients, which must be maintained at all times.

However, there are other factors to consider in order to understand the results of this study in more depth. One assumption in this study is that nurses with good telehealth utilization rates also have higher levels of technology skills. Research by Anggraeni et al. (2022) showed that although technology can increase efficiency, the user's skill in utilizing the technology greatly affects the end result. Therefore, in addition to adopting technology, hospitals also need to ensure that nurses are well trained in order to make maximum use of technology, including the use of telemedicine devices and other hospital information systems.

In addition to technical skills, organizational factors also influence the successful implementation of telehealth in improving service efficiency. Fitriani et al. (2022) revealed that the success of technology in improving service efficiency is highly dependent on hospital policies and supporting organizational structures. Hospitals with clear policies on technology utilization tend to be more successful in implementing telehealth effectively, thus improving service efficiency. In this study, the results found indicate that hospitals that have strong policies in terms of telehealth use can achieve higher efficiency.

One of the main challenges found in this study is the difference in telehealth utilization rates among nurses. Some nurses who do not make good use of telehealth may have limitations in terms of device access, training, or even personal preference for technology. Pradipta et al. (2022) added that in technology adoption, there are individual differences that affect the extent to which

technology is acceptable. Some nurses may be more open to new technologies, while others may feel more comfortable with traditional methods of conducting nursing services.

Nevertheless, there are indications that telehealth can help reduce waiting times for patients and improve interaction between patients and caregivers. According to Santoso et al. (2021), telehealth technology can speed up the medical consultation process between patients and doctors, which in turn helps nurses in dealing with patients more quickly. This can reduce the time it takes to start treatment and allow nurses to provide care more efficiently.

The results found in this study also show the importance of supportive technological factors in facilitating the utilization of telehealth. Widiyanti et al. (2022) noted that good infrastructure is a key factor in the successful implementation of telehealth. Without adequate devices and a stable internet connection, nurses are unable to optimize telehealth utilization, which in turn can affect service efficiency. Therefore, hospitals need to ensure that the technology infrastructure in their facilities is adequate to support the effective use of telehealth.

The successful utilization of telehealth is also influenced by the extent to which this technology can be integrated in existing workflows. Setiawan et al. (2021) suggested that telehealth should be integrated with existing hospital information systems, so as not to disrupt the workflow of nurses and doctors. In this study, the results show that when telehealth is integrated with existing systems, nurses can more easily utilize technology to improve service efficiency.

In addition, it is possible that nurses who are more experienced in using digital technology are faster in adapting to telehealth. Research by Yuliana et al. (2020) showed that nurses with a stronger background in technology use could adopt telehealth more quickly and efficiently. Therefore, hospitals need to pay special attention to nurses who may not have sufficient technology background and ensure they get adequate training to improve their skills in using telehealth.

The study also provides an important overview of how technology can affect not only the efficiency of services but also the interaction between medical personnel and patients. Vishwanath et al. (2021) showed that telehealth can accelerate diagnosis and treatment, as well as increase patient involvement in their care. Thus, in addition to improving the efficiency of nurses, this technology also has a positive impact on the quality of care received by patients.

According to the researchers ' assumption that although technology can improve efficiency, service quality should still be a top priority. Healthcare technology development must consider the balance between efficiency and quality. Therefore, although technologies such as telehealth can speed up the service process, hospitals must ensure that the services provided still meet high quality standards. The results of this study provide a clear picture that telehealth can improve the efficiency of nursing services, but it depends on training, supportive policies, and adequate infrastructure.

2. Relationship Between Telehealth Utilization Rate With Nursing Service Efficiency

Bivariate test results showed that there is a significant relationship between the use of telehealth and nursing service efficiency with a value of p = 0.001. A p-value smaller than 0.05 indicates that there is a strong association between telehealth utilization rates and improved nursing service efficiency. This gives an idea that telehealth technology not only improves access and communication between medical personnel, but also plays an important role in improving aspects of efficiency in services.

The increase in efficiency recorded in this study is closely related to how telehealth allows nurses to more quickly access medical information and communicate with doctors or other medical personnel. With the use of this technology, nurses no longer need to spend a long time looking for information or waiting for a physical consultation. In addition, the results of this study show that nurses who have a good utilization rate of telehealth have a 3.45 times greater chance of providing efficient services compared to those who have a low utilization rate. Odds Ratio (OR) = 3.45 indicates a strong relationship between telehealth utilization and nursing service efficiency. Nurses who utilize telehealth to the fullest are not only faster in providing services, but can also improve service quality through more intensive patient monitoring and smoother communication.

Anggraeni et al. (2022) also mentioned that telehealth can improve workflow efficiency in hospitals, as nurses can focus more on immediate clinical tasks without being hampered by time-consuming administrative tasks. Thus, nurses who make optimal use of telehealth can perform their duties more quickly and effectively, which certainly has a positive impact on the quality of care. Setiawan et al. (2021) states that one of the great advantages of using telehealth is its ability to facilitate better coordination between medical personnel, which directly impacts on improving service efficiency.

However, it should also be considered that although the use of telehealth increases efficiency, the factor of nurse readiness in using this technology also plays an important role. Nurses who are trained and accustomed to using telehealth technology tend to be more efficient in their work, while nurses who are less skilled or unfamiliar with this technology may not be able to make the most of telehealth. Lee et al. (2020) emphasized that the technological skills of nurses are very influential on the effectiveness of telehealth use in improving service efficiency. Therefore, hospitals need to provide adequate training to ensure all nurses can use technology properly and provide efficient services.

Optimal telehealth implementation requires synergy between good infrastructure and supportive hospital policies. Widiyanti et al. (2022) revealed that adequate infrastructure, such as supporting hardware and a stable network system, is essential in ensuring the smooth use of telehealth. When nurses are not faced with technical problems, such as connection interruptions or faulty devices, they can provide more efficient care. Therefore, hospitals need to ensure that the technological infrastructure in health facilities is well maintained so that telehealth can function optimally in supporting the efficiency of Nursing Services.

In the context of service efficiency, the use of telehealth not only speeds up service time but also improves the quality of interaction between nurses and patients. Yuliana et al. (2020) states that telehealth can enrich interactions by enabling direct communication between patients and medical personnel without being limited by distance. In this study, nurses who made good use of telehealth had more opportunities to interact with patients, provide medical consultations, and reduce waiting times. Thus, this technology not only helps to speed up the service, but also improves the patient's experience in the treatment process.

In addition, the study also highlights that not all nurses utilize telehealth in the same way, although most show good utilization. Nugroho et al. (2021) revealed that variations in technology skill levels among nurses can lead to differences in telehealth use. Some nurses may feel more comfortable with technology and be able to integrate it more efficiently into their work routines, while others may have difficulty or feel insecure. Therefore, it is important for hospitals to assess the technological readiness and skills of nurses in using telehealth and provide appropriate training to minimize such gaps.

Meanwhile, from the theoretical side, this study supports the theory of technology adoption which states that acceptance of digital technology in the health sector is strongly influenced by the readiness of individuals to use the technology (Venkatesh et al., 2003). This research shows that nurses who are already familiar with technology, or who are well trained, tend to be more efficient in using telehealth. Therefore, to increase efficiency, not only technology must be introduced, but also adequate training of medical personnel so that they can optimize the use of technology in their services.

Along with that, the positive influence of telehealth utilization on the efficiency of Nursing Services also leads to an improvement in the distribution of resources in hospitals. Fitriani et al. (2022) noted that the use of telehealth can help allocate nurses ' time and manpower more efficiently, as nurses can handle more patients by reducing time-consuming face-to-face interactions. This technology allows nurses to be more efficient in performing administrative and communication tasks, so that they can allocate more time to caring for patients in person.

However, although the utilization of telehealth is positively related to efficiency, external factors such as government policies also influence the extent to which this technology can be accepted and applied. Wang et al. (2021) showed that regulations that support telehealth adoption and policies that facilitate the integration of technology in the health care system are critical in accelerating the acceptance of technology by medical personnel. Hospitals operating in countries or regions with policies that support telehealth tend to be faster at implementing these technologies, which in turn can improve efficiency in health care.

Acceptance of telehealth is also strongly influenced by social and cultural factors. Lee et al. (2020) explained that although technology offers many benefits, the adoption of medical technologies such as telehealth is also influenced by the social and cultural norms that exist in a society or institution. Some nurses may feel that direct interaction with patients is more important

than interaction through technology. Therefore, hospitals must work to overcome social and cultural barriers that may hinder the acceptance of technology in health care.

In addition, the role of hospital policy in regulating the use of telehealth is critical. Pradipta et al. (2022) argued that a clear internal hospital policy regarding the use of telehealth would provide clearer guidance for nurses in using this technology. Hospitals that have policies that support and facilitate the use of telehealth will create a more efficient work environment, which ultimately impacts the quality of care provided to patients.

Ultimately, although the utilization of telehealth is proven to improve the efficiency of Nursing Services, hospitals need to continue to monitor and evaluate the effectiveness of the use of this technology. It is the assumption of the researchers that continuous evaluation of the implementation of telehealth is essential to identify the challenges that may arise and to ensure that the technology really provides maximum benefits. By conducting continuous evaluations, hospitals can optimize the use of telehealth and improve efficiency in nursing services. Overall, the results of this study indicate that the use of telehealth has a significant effect on the efficiency of Nursing Services. With the right training, supportive policies, and adequate infrastructure, this technology can be used optimally to improve the efficiency of Health Services.

CONCLUSIONS

The results of this study indicate that the use of telehealth has a significant effect on the efficiency of nursing services in Dr. Kariadi Semarang. Based on univariate analysis, the majority of nurses (68.3%) have a good telehealth utilization rate, and 71.7% of nurses show high nursing service efficiency. In addition, bivariate analysis with Chi-Square test showed a significant relationship between the level of telehealth utilization and service efficiency, with a value of $p = 0.001$ and Odds Ratio (OR) = 3.45. This indicates that nurses who use telehealth optimally have a 3.45 times greater chance of providing more efficient services compared to nurses who use it low. Therefore, it can be concluded that the use of telehealth technology plays an important role in improving the efficiency of nursing services, both in terms of time and quality of interaction between nurses and patients.

Although the results of this study provide a positive picture of the effect of telehealth on service efficiency, there are some limitations that need to be considered. One of them is the limitation of samples taken only from Dr. Kariadi Semarang, so the results of this study may not necessarily be generalized to all hospitals in Indonesia or in other smaller health facilities. In addition, the study only measured efficiency in the context of service time and did not consider other variables such as patient satisfaction or the psychological impact on patients and caregivers in using telehealth. Further research with longitudinal design and more diverse samples and consideration of other factors that affect service efficiency is needed to get a more comprehensive picture of the effectiveness of telehealth in nursing services.

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