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# Analysis of the Use of Telemedicine Technology in Emergency Services

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**ABSTRACT**

One of the technological developments in the world of health is Telemedicine technology. Telemedicine technology has become an innovative solution in providing medical services, including in the emergency department. Telemedicine technology is a concept that combines information and communication technology with healthcare, enabling remote interactions between healthcare providers and patients. This study aims to analyze the use of telemedicine technology in emergency services, identify its benefits, and evaluate its impact on the efficiency and quality of patient care. The research method used is a literature study that analyzes scientific articles, research reports, and official documents related to the implementation of telemedicine in the context of emergency services. The research results show that the use of telemedicine technology in emergency services has increased the accessibility of care, accelerated diagnosis and medical intervention, and reduced response time to emergency cases. Telemedicine also facilitates inter-spatial consultations between doctors and medical personnel, enabling faster and more precise decision-making. In some cases, telemedicine has been successful in reducing the number of visits to brick-and-mortar emergency departments, reducing the burden on the health system, and improving the patient experience by providing easier and faster access to medical services. However, challenges faced include the security of patient data, the required technological infrastructure, and unequal access to technology across regions. In conclusion, the use of telemedicine technology in emergency services has great potential to improve the efficiency and quality of patient care, but efforts are needed to overcome technical, regulatory and data security challenges for its implementation to be successful and sustainable.

**Keywords:** *Emergency, Technology, Telemedicine*

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## INTRODUCTION

Telemedicine technology has become an integral part of the transformation of the world of health in this modern era (Universitatea de Medicină, Farmacie, Ştiinţe şi Tehnologie „George Emil Palade“, Tg. Mureș, România et al., 2020). In facing the global challenge of providing quality and affordable healthcare to everyone, telemedicine has emerged as a promising solution (Kaplan, 2020). Along with advances in information and communication technology, telemedicine has changed the traditional paradigm in health care by expanding accessibility, increasing efficiency, and improving the quality of care worldwide (Miller et al., 2016). The development of telemedicine technology has resulted in a transformation in the way health care is delivered, changing the way doctors and patients interact and collaborate and presenting new opportunities in diagnosis, treatment, and disease management (Vidal-Alaball et al., 2020). By leveraging increasingly sophisticated network infrastructure and increasingly affordable technological devices, telemedicine enables healthcare providers to deliver remote care effectively, enabling medical consultations, patient condition monitoring, and remote treatment.

Emergency Services abbreviated as PUGD) is a health service system provided to handle medical cases that are urgent and require immediate intervention (Smith et al., 2020). Emergency Services aims to provide fast and effective care for individuals who experience life-threatening medical conditions or require immediate treatment to prevent more serious complications (Prawestiningtyas et al., 2023). Emergency services are usually available at hospitals, health centres, or other medical facilities and are equipped with trained medical personnel and adequate medical equipment to treat a wide range of emergencies, from traumatic injuries to life-threatening medical conditions such as heart attack or stroke (Khurana et al., 2022). By using telemedicine technology, patients can access medical consultations remotely with doctors or trained medical personnel, send vital data such as blood pressure or heart rate via applications or connected medical devices, and receive appropriate treatment directions or recommendations in a short time (McKay et al., 2018). This not only allows patients to receive treatment without having to travel to a healthcare facility but also speeds up the process of diagnosis and medical intervention, which is crucial in emergency cases (“Corrigendum to Telemedicine Homecare Among the Hypertension and Diabetes Mellitus Risk Elderly Group in Indonesian Primary Healthcare,” 2023). In addition, telemedicine technology also enables collaboration between specialist doctors and medical personnel in various locations, facilitating more comprehensive assessments and more informed decision-making in emergency situations (Lin et al., 2019).

One of the most exciting aspects of telemedicine is its ability to expand the accessibility of healthcare services, especially for those who live in remote areas or do not have easy access to traditional healthcare facilities (Haggerty, 2017). With telemedicine, patients can receive medical consultations from doctors or specialists located far away just by using telecommunications devices such as smartphones or

computers (Ashu & Sharma, 2021). This not only allows healthcare providers to reach a wider population but also reduces the travel burden and costs associated with visits to brick-and-mortar healthcare facilities (De Oliveira Andrade et al., 2022). In addition to expanding accessibility, telemedicine technology also enables increased efficiency in healthcare delivery (Le Bras et al., 2023). By leveraging features such as teletriage and telemonitoring, telemedicine allows healthcare providers to conduct initial assessment and monitoring of patients remotely, allowing appropriate prioritization of care to be provided according to the level of need (Mitek, 2022b). This helps reduce patient wait times, optimize the use of healthcare resources, and increase provider productivity.

The application of Telemedicine Technology in Emergency Services opens up great opportunities to increase the efficiency, accessibility and quality of medical care in emergency situations (Mitek, 2022a). One of the key opportunities is to increase responsiveness to emergency cases by speeding response times and medical interventions (Kostin et al., 2023). Through telemedicine technology, patients can contact emergency services and start a medical consultation directly with a doctor or trained medical personnel without having to wait long in the waiting room (Adunlin et al., 2015). This reduces patient waiting times and allows for rapid initial assessment, which is especially important in emergency cases such as heart attacks, strokes or traumatic injuries (Shen et al., 2021). In addition, telemedicine technology also provides opportunities to increase the accessibility of emergency services, especially for those who live in remote areas or do not have easy access to physical health facilities (Gingele et al., 2023). By using a telemedicine platform, patients can receive medical consultations and treatment directions without having to travel long distances to the emergency room, which is often difficult or impossible in emergency situations. This allows healthcare providers to reach a wider population and provide timely care, even in remote or isolated areas.

Telemedicine technology also opens up opportunities to improve coordination and collaboration between health service providers in handling emergency cases (Mohseni et al., 2020). By enabling direct, real-time communication between specialist doctors, medical personnel, and paramedics in various locations, telemedicine enables rapid exchange of information and better coordination of care. This can help in more accurate assessment and diagnosis, more informed decision-making, and organizing efficient patient transfers between health facilities (Taha et al., 2022). Telemedicine technology can also be used to facilitate training and education for medical personnel working in emergency departments (Lopez, 2019). Through remote training sessions and online education platforms, medical personnel can gain the knowledge and skills necessary to handle emergency cases effectively and efficiently (Chan et al., 2022). This helps improve the competency and professionalism of medical personnel and ensures that they are ready to face the challenges of providing emergency medical care.

Despite its tremendous potential, the adoption of telemedicine still faces a number of challenges that need to be overcome (Universitatea de Medicină, Farmacie, Ştiinţe şi Tehnologie „George Emil Palade“, Tg. Mureş, România et al., 2020). One of them is the issue of security and privacy of patient data in a digital environment that is vulnerable to cyber threats. Additionally, immature policies and regulations often pose barriers to the development and use of telemedicine, leading to legal and administrative uncertainties that burden healthcare providers (Chen et al., 2022). In addition, infrastructure challenges may also hinder the adoption of telemedicine in some areas, especially in developing countries or rural areas that may not have adequate access to the internet or necessary communications technologies (Ratna Wulan et al., 2023). Social and cultural factors may also influence telemedicine adoption, including levels of digital literacy, cultural beliefs related to health care, and public perceptions of the safety and reliability of the technology.

There are several previous research opinions. The first research, according to (Aloini et al., 2023), with the research titled Open Innovation and Technology Adoption During Emergency. Lessons from a case study in telemedicine in time of COVID-19. The results of his research stated that an interwoven relationship between the OI approach adopted in the development of the telemedicine platform and the acceptance of the technology itself, paving the way to a new role for OI: not only an enabler supporting knowledge exchanges but also an enabler of Technology Acceptance. The second research, according to (Salman et al., 2021), with the research title A Review on Utilizing machine Learning Technology in the Fields of Electronic emergency triage and patient Priority Systems in telemedicine: Coherent Taxonomy, motivations, Open Research challenges and recommendations for intelligent Future work. The results of his research stated that a list of machine learning algorithms, a list of performance metrics, a list of input data, and output results are presented. Moreover, open research challenges, the benefits of utilizing machine learning and the recommendations for new research opportunities that need to be addressed for the synergistic integration of multidisciplinary works are organized and presented accordingly. The third research, according to (Salman et al., 2020), with the research title Reducing waiting time for remote patients in telemedicine by considering treated patients in the emergency department based on body sensors technologies and hybrid computational algorithms Toward scalable and efficient real-time healthcare monitoring system. The results of his research stated the superiority of the proposed model (TPM) in accommodating large numbers of patients and reducing their waiting time for services compared with relevant benchmark studies.

Considering these challenges, it is important for stakeholders in the health sector to work together to overcome these barriers and promote broader and sustainable adoption of telemedicine (Kühlein et al., 2023). Thus, telemedicine technology has great potential to continue to change the healthcare landscape, improving accessibility, efficiency, and quality of care and providing real benefits for society as a whole. In an era where digital connectivity is increasingly important,

telemedicine offers innovative solutions to meet growing healthcare needs worldwide. The aim of this study is to analyze the use of telemedicine technology in emergency services with the aim of identifying the benefits, challenges and practice implications associated with the adoption of this technology and to provide a better understanding of how telemedicine technology impacts the way emergency services are delivered, as well as its impact on the efficiency, accessibility and quality of medical care in emergency situations.

## METHOD

The research method used is a literature study that analyzes scientific articles, research reports, and official documents related to the implementation of telemedicine in the context of emergency services. This study aims to conduct an in-depth analysis of the use of telemedicine technology in the context of emergency services. By gaining a comprehensive understanding of the implementation of telemedicine in emergency situations, this research is expected to identify the benefits, challenges, and impact on the efficiency and quality of patient care. The literature review in this research will first collect information about the use of telemedicine technology in emergency services. This review will involve searching scientific articles, research reports, books, and related official documents published in academic databases such as PubMed, Google Scholar, and Scopus. Keywords to use in the search include 'telemedicine', 'emergency care', 'emergency telehealth', 'teleconsultation', and similar. Relevant articles will be critically analyzed to explore various aspects of the use of telemedicine technology in emergency situations, including its benefits, implementation challenges, and impact on efficiency and quality of care.

Next, the research will conduct a document analysis to gain insight into policies, guidelines and initiatives related to the implementation of telemedicine in emergency services. This analysis will involve official documents such as clinical guidelines, program evaluation reports, and government policies related to the use of telemedicine in the emergency department context (The Federal State Budget Educational Institution of Higher Education “The F. F. Ushakov State Maritime University”, 353924, Novorossiysk, Russia & Tonkonog, 2023). These documents will be thoroughly analyzed to identify emerging patterns, trends and challenges in the implementation of telemedicine in emergency services. Then, do data analysis. Data collected from literature reviews, document analysis, and interviews will be analyzed thematically. Qualitative data from interviews will be analyzed using a content analysis approach to identify emerging patterns, themes and conclusions. Meanwhile, quantitative data from the literature review and document analysis will be compiled and interpreted to provide a comprehensive picture of key trends and findings regarding the use of telemedicine in emergency services.

Next are validity and reliability. The validity and reliability of the research will be carefully considered throughout the entire research process. Steps that will be taken to ensure validity and reliability include data triangulation, the use of varied data

sources, and transparency in reporting research findings. Lastly, make a conclusion. Conclusions will be drawn based on research findings and discussions that have been carried out. This will include a summary of the main findings, their practical implications, as well as suggestions for future developments in the use of telemedicine in emergency services. The conclusion will also highlight areas of research that still need to be further explored and challenges that need to be overcome in optimizing the use of telemedicine in the context of emergency department. This research will also provide recommendations for policy and practice related to the use of telemedicine technology in emergency services. These recommendations will be based on research findings and will highlight steps that can be taken to increase the adoption of telemedicine, overcome challenges, and maximize its benefits in providing effective, quality emergency care. By applying these methodological steps, it is hoped that this research can contribute to the understanding of the use of telemedicine technology in emergency services.

## RESULTS AND DISCUSSION

The use of telemedicine technology in emergency services has brought significant benefits to patients, medical personnel, and the health system as a whole. One of the main benefits is expanding accessibility to emergency services. Before telemedicine, patients in remote areas or with limited mobility often faced difficulties in receiving timely and effective emergency care. However, with advances in technology, patients can now easily access medical consultations via telemedicine without having to travel long distances to physical healthcare facilities (Popova et al., 2021). This allows patients to receive timely care, even in urgent emergency situations, without having to delay travel that may be difficult or impossible.

Another benefit of telemedicine technology is its ability to speed up the process of medical diagnosis and intervention. In emergency situations, time is a key factor that can determine patient safety and well-being. With telemedicine, doctors and medical personnel can consult directly with patients via video conferencing or other telemedicine applications, allowing them to carry out initial evaluations and provide advice or necessary medical action quickly (Al-Khaled et al., 2021). This is especially important in situations such as heart attacks, strokes, or traumatic injuries, where every second counts and affects the final outcome of treatment. Telemedicine also brings benefits in terms of optimizing resource use and efficiency of emergency services. By connecting patients with medical personnel via a telemedicine platform, the triage process can be carried out more effectively. Patients with less pressing or less urgent health problems may receive advice or referral to more appropriate services, while more urgent cases may be treated with higher priority. This helps reduce patient wait times in physical emergency departments and allows medical services to focus more on cases that require immediate attention.

In addition to direct benefits for patients, telemedicine technology also brings benefits to medical personnel and health service providers. Telemedicine enables cross-regional consultations between specialist doctors and medical personnel in various locations,

facilitating more efficient team collaboration in handling complex emergency cases. This allows providers to draw on broader clinical knowledge and expertise, thereby enhancing their ability to make accurate diagnoses and provide appropriate care. Apart from clinical benefits, the use of telemedicine technology in emergency services also has economic benefits (Loh et al., 2023). By reducing the number of unnecessary visits to physical emergency departments, telemedicine helps optimize the use of limited healthcare resources. This can reduce operational costs and improve overall health system efficiency. Additionally, patients who receive care via telemedicine often do not incur travel costs or lost time due to absence from work or other responsibilities, reducing the financial burden and stress associated with receiving medical care. In the long term, the use of telemedicine technology in emergency services can also bring benefits in encouraging innovation and further technological developments in the health sector. As demand for telemedicine services continues to increase, it is expected that there will be further investment in the development of telemedicine infrastructure, applications and connected medical devices. This could open the door to further advances in remote diagnosis and treatment, as well as provide opportunities for the application of new technologies such as artificial intelligence (AI) and virtual reality (VR) in emergency services.

The development of telemedicine technology in emergency services is influenced by a number of factors, including technical, policy, infrastructure, social and cultural aspects (Consultative and Diagnostic Polyclinic No. 121 of the Department of Healthcare of the City of Moscow, Moscow, 117042; Russia et al., 2021). First, technical factors include advances in communication and information technology that support the development of more sophisticated and effective telemedicine applications. Developments in network technology, internet speed, and device compatibility also play an important role in improving the quality and accessibility of telemedicine services. Second, policy and regulatory factors also influence the development of telemedicine in emergency services (Sapci & Sapci, 2019). Policies that support and facilitate the use of telemedicine, such as regulations on cross-border licensing of health practitioners, protection of medical data, and payment of telemedicine services by health insurance agencies, can stimulate the growth and adoption of this technology. On the other hand, ambiguity or the absence of clear regulations can be an obstacle to the development of telemedicine, as it results in legal and security uncertainty for service providers and patients.

Infrastructure factors also play an important role in the development of telemedicine in emergency services. A strong and reliable telecommunications infrastructure is needed to support smooth, long-distance communication between patients and medical personnel. In addition, investments in technology infrastructure in physical emergency departments are also needed to support the integration of telemedicine with existing clinical practices (Bokolo, 2021). Social and cultural aspects also have a significant impact on the development of telemedicine in emergency services. Various factors, including levels of digital literacy, confidence in data security and privacy, and cultural preferences and beliefs related to health services, can influence society's acceptance and adoption of this new technology. Therefore, efforts to increase public awareness about the benefits of

telemedicine, promote digital education, and build public trust in the safety and effectiveness of this technology can accelerate the adoption of telemedicine in emergency services.

Apart from these factors, it is also important to take into account the economic aspects of the development of telemedicine in emergency services. The initial investment costs in developing telemedicine infrastructure and training medical personnel can be a barrier to the adoption of this technology, especially in countries with limited resources. However, the long-term benefits in terms of optimizing resource use, reducing maintenance costs and increasing service efficiency may justify the investment. In addition, demographic and geographic factors can also influence the development of telemedicine in emergency services. Countries with widely dispersed populations or limited access to healthcare facilities may be more likely to adopt telemedicine as a way to increase the accessibility of emergency services. Likewise, countries facing demographic challenges, such as population ageing, may see telemedicine as a solution to improve efficient and affordable emergency care.

By carefully considering the above factors, effective strategies can be identified to promote and support the development of telemedicine in emergency services. This includes developing adequate technological infrastructure, formulating supportive policies, increasing public awareness and education, and adapting to relevant economic, demographic and cultural factors. With a holistic and coordinated approach, telemedicine technology can be a powerful tool in improving the accessibility, efficiency and quality of emergency care worldwide.

## CONCLUSIONS

Based on the results and discussion above, it can be concluded that the use of telemedicine technology in emergency services has great potential to improve the efficiency and quality of patient care. Telemedicine technology has become an important part of the transformation of health services, especially in the context of emergency services. With advances in communications technology, telemedicine allows healthcare providers to provide care remotely to patients who need immediate help without having to physically be in the same location. Analysis of the use of telemedicine technology in emergency services reveals a number of benefits. First, telemedicine shortens response times, reducing the risk of delays in providing critical medical attention. Second, telemedicine opens up access to quality medical care for populations living in remote or hard-to-reach areas.

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