

Challenges and opportunities in the Polish healthcare sector from the implementation of telemedicine solutions in the field of gerontology and geriatric medicine: own experience

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ABSTRACT

Aim: To analyze and summarize the implementation of telemedical solutions in geriatrics and gerontology within the Polish healthcare sector, aiming to develop innovative strategies for improving elderly care through telemedical technologies.

Materials and Methods: An interdisciplinary pilot project in geriatrics was implemented, focusing on health, organizational, and technological areas. The project involved continuous monitoring of health parameters, remote consultations, and the use of telemedical devices and platforms. Key data collection tools included digital clinimetric outcomes from the FRA-MNA-SARC model, with data transmitted to a telemedical platform.

Results: The pilot project demonstrated significant positive outcomes for senior participants. Continuous monitoring of health parameters allowed for early detection and timely intervention, leading to noticeable improvements in chronic disease management. This proactive approach reduced emergency hospital visits and enhanced overall health stability. The medication adherence support system, with automated reminders, ensured patients took their medications as prescribed, resulting in improved compliance and health outcomes. Telemedical solutions efficiently reduced the need for frequent in-person visits, allowing healthcare providers to monitor progress and adjust therapies in real-time. The project also effectively engaged patients and caregivers, increasing confidence in health management and providing valuable support and real-time information.

Conclusions: Implementing telemedical solutions in geriatrics within the Polish healthcare sector shows significant potential to improve elderly care. Telemedicine can effectively support chronic disease management, enhance seniors' quality of life through continuous health monitoring, and provide a practical framework for personalized and efficient healthcare delivery.

KEY WORDS: telemedicine, e-health, geriatrics, frailty, opportunities, challenges

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INTRODUCTION

Through the application of telemedical solutions, continuous monitoring of key health parameters becomes feasible, contributing to the effective management of chronic conditions in the elderly [1]. This transformative potential underscores the importance of integrating telemedicine into healthcare strategies, aiming to enhance the quality of life for seniors by addressing their specific healthcare needs [2]. Its ability to overcome geographical barriers and facilitate

remote consultations makes telemedicine particularly beneficial for seniors who may face challenges in accessing traditional healthcare facilities [3]. The ongoing evolution of telemedical technologies holds the promise of further innovations, potentially revolutionizing geriatric care by providing timely interventions, preventive measures, and tailored healthcare plans that align with the unique health requirements of the aging demographic [4,5]. As telemedicine continues to advance, it is anticipated to play a pivotal role in

optimizing healthcare delivery and improving the overall well-being of the elderly [6,7].

Telemedicine revolutionizes the monitoring of senior health, enabling continuous tracking of key parameters without the need for their physical presence in a medical facility [8,9]. With advanced medical devices and mobile applications, blood pressure, glucose levels, pulse, and oxygen saturation can be monitored [10]. This not only allows for early detection of potential health issues but also facilitates a prompt response, which is crucial for providing comprehensive care to seniors. Seniors can now consult with doctors without the need to travel, using video conferencing and telemedical platforms. This is particularly important for individuals with limited mobility, as it provides easy access to specialized healthcare from the comfort of their homes [11].

The pilot project focused on patients with chronic conditions such as diabetes and heart disease. By integrating telemedicine, we provided continuous health monitoring through devices that automatically transmitted data to a central care platform [12, 13]. The automatic transmission of data from monitors to remote care platforms enables doctors to track progress and adjust therapies in real-time [14]. For example, one patient with a history of hypertension experienced significant improvement in managing their condition due to real-time monitoring and timely adjustments in their treatment plan based on data received from their home blood pressure monitor. This integration not only optimized disease management but also reduced the need for frequent in-person visits, thereby improving the overall quality of life for our senior participants [15,16].

Finally, telemedicine is becoming a key tool in ensuring the safety of seniors, especially those living independently [17]. Monitoring systems respond to sudden events, such as falls, automatically notifying emergency services or caregivers. This ensures a rapid response in case of emergencies, increasing the sense of security for seniors and their families [18]. Access to telemedicine stimulates seniors' autonomy, allowing them to actively monitor and manage their own health. This tool not only improves the quality of life through better healthcare but also promotes greater awareness and health education among the elderly, fostering healthier habits and self-care [19, 20].

In the face of dynamic challenges related to the care of the senior population, implementing modern solutions becomes a way to enhance geriatric care [21, 22]. This article summarizes a pilot project aimed at implementing and testing innovative telemedical solutions in the field of geriatrics. By focusing on the

practical implementation of telemedical solutions, this project not only explores the potential of modern technologies but also emphasizes the real benefits they can bring to patients, medical staff, and the healthcare system as a whole. Encompassing areas such as the analysis of geriatric needs, the selection of appropriate technologies, staff training, effectiveness testing, and acceptance evaluation, this project sheds light on the comprehensive process of adapting telemedicine in geriatrics [23].

In this article, a closer look will be taken at the key stages of the project, with the obtained results, conclusions, and prospects for further development being analyzed. The introduction of telemedicine into the field of geriatrics is not only opening up new diagnostic and therapeutic possibilities but is also raising the question of how-to best tailor these modern tools to the unique needs of seniors. Acting as a bridge between traditional care and innovative technologies, this project contributes to the creation of more accessible, effective, and personalized geriatric care.

AIM

The aim of this article is to analyze and summarize the implementation of telemedical solutions in the context of geriatrics and gerontology in the Polish healthcare sector. The article seeks to identify challenges and opportunities associated with the implementation of telemedical technologies in the care of elderly individuals. Through the analysis of experiences and results from pilot projects and existing initiatives, this article aims to provide insights into the effectiveness, acceptance, and potential benefits of implementing telemedicine in geriatric healthcare in Poland. The ultimate goal of the article is to contribute to the development of innovative strategies for improving care for the elderly through the use of telemedical technologies.

MATERIALS AND METHODS

To achieve the goals set by this article, an interdisciplinary and comprehensive research framework was applied. Below, the steps and data collection strategy are presented, which enabled the achievement of the goal of analyzing the implementation of telemedical solutions in geriatrics and gerontology in the Polish healthcare sector. For each project, the goal, scope, applied telemedical technologies, and collected data were thoroughly analyzed. This information served as a starting point for identifying key issues related to the implementation of telemedicine in the care of elderly individuals. The effectiveness of monitoring the health of seniors was assessed, clinical

benefits were identified, and potential challenges related to the interpretation and management of health data within geriatric healthcare were evaluated. The level of acceptance of telemedical technologies by older individuals, understanding their experiences, and expectations regarding modern e-health solutions in healthcare were identified. The final summary of the materials collected within the described methodology allowed for a holistic view of the implementation of telemedicine in geriatric healthcare in Poland using the discussed pilot project as an example.

An attempt was made to identify challenges and draw conclusions to contribute to the development of innovative strategies for improving care for the elderly. The implementation of the project was summarized in the health, organizational, and technological areas. Key indicators from the pilot implementation were also outlined in relation to the assumptions of the project proposal within the Polish healthcare system.

The telemedical care project for patients with geriatric syndromes, focusing on frailty, sarcopenia, and malnutrition, is a response to existing challenges in healthcare for the elderly. The presented model provides a holistic range of home and outpatient care services, focused on three key geriatric areas. This project was created to overcome current barriers and meet the needs of patients. Due to multiple complications, these patients face longer waiting times. This, in turn, leads to situations where patients end up in the hospital in critical conditions, not only worsening their health but also negatively affecting their independence, life expectancy, and the possibility of effectively treating other diseases. The telemedical pilot aims to shorten these waiting times and improve healthcare accessibility for this patient group, aiming to increase the efficiency and quality of provided services [24].

The main goal of the project is to increase access to telemedical healthcare services for 520 individuals, including at least 260 women, aged over 60 years who have provided written informed consent to participate. At least 10% of the beneficiaries are intended to come from excluded areas, such as counties with per capita income below the national average, particularly rural areas distant from major cities. The plan includes conducting at least 520 screening examinations, and in cases of malnutrition, sarcopenia, and frailty syndrome, improving the prognosis for 80% of these patients during the pilot. The detailed objectives of the project included [24]:

- Enhancing independence and a sense of health security among the 60+ population, focusing on those affected by malnutrition, sarcopenia, and frailty syndrome, regardless of income or place of residence
- Eliminating economic and geographical barriers to ensure equal access to healthcare services
- Verifying the effectiveness of the proposed model for precise and efficient screening in the population
- Identifying individuals with malnutrition, sarcopenia, and frailty syndrome and implementing actions to improve their health
- Ensuring close collaboration between the Hospital, Primary Healthcare (PHC), and Ambulatory Specialized Centers (ASC), utilizing telemedicine tools efficiently
- Optimizing healthcare services for the 60+ population, emphasizing screening activities, secondary prevention, and health education
- Engaging PHC physicians as primary service providers for individuals identified with these conditions, using specialists (geriatricians) only when advanced support is needed
- Fully utilizing telemedical solutions to engage patients and caregivers in health care, rehabilitation, and treatment processes.

RESULTS AND DISCUSSION

HEALTHCARE FIELD

The summary encompasses an assessment of the project's impact on the health domain, focusing on clinical and health outcomes. The effectiveness of telemedicine in improving diagnosis, monitoring, and the efficiency of treatment in older individuals was analyzed. Potential health benefits for patients, such as improved quality of life, reduced waiting time for medical assistance, and a decrease in hospitalizations, were also considered.

The project focused on the application of three simple screening scales – MNA, SARC-F, and FRAIL – aimed at identifying patients with frailty syndrome, sarcopenia, or malnutrition. Within the project, the predominant form of patient interaction with the geriatrician was through teleconsultations, enabling effective health monitoring and consultations with the primary care physician – geriatrician. The project's goal included identifying patients with frailty syndrome, sarcopenia, or malnutrition, allowing for early identification and referral to appropriate remedial actions. The coordination and utilization of patient information were managed by a team consisting of primary care physicians, geriatric specialists, and community nurses. Data were collected and analyzed continuously, and in the case of detected irregularities, appropriate medical actions were taken. Data on blood pressure, glucose levels, pulse, oxygen saturation, and other vital health parameters were collected. Threshold

data points were established based on individual treatment plans, and any deviations from the norm were promptly reported to the medical team. Scales such as MNA, SARC-F, and FRAIL were selected due to their widespread use and effectiveness in identifying issues related to malnutrition, sarcopenia, and frailty syndrome. The selection of these scales was based on consultations with experts in the field of geriatrics.

The telemedical project encountered significant bureaucracy, significantly impeding its planned implementation. The overarching principle seemed to be the necessity of satisfying the Norwegian Partner and officials from the Ministry of Health (MZ), unfortunately leading to a lack of understanding of the realities and a willingness to cooperate. A key issue was the failure to establish and separate the organizational-administrative team from the medical team, resulting in "marginalization" and a lack of proper communication. This, in turn, generated uncertainty and demotivation within the medical team. Too many ineffective meetings without tangible progress contributed to narrowing down the actual medical activities to just a few months. Additionally, this situation prompted some partners to withdraw from participating in the project or limit the involvement of others. Ultimately, the lack of proper organization, bureaucracy, and inefficient meetings accumulated, contributing to the inability to fully realize the telemedical project in line with its original assumptions.

Based on experiences from the current project, a key insight is the necessity of separating, acquainting, and integrating the medical team. Initial training and a practical discussion of recruitment principles and the use of research tools are essential, as well as establishing effective communication channels among team members. The project encountered a "non-random" selection of patients, involving "active and fit" seniors affiliated with associations and universities for the elderly. While this expedited the recruitment process, it significantly influenced the final project outcomes. Challenges arose in reaching seniors with significant health problems and convincing them to participate in the program. The lack of practical means to ensure effective participation in the telemedical project for this group resulted in the project mainly encompassing the upper quartile of individuals with illnesses. Involving such patients would require assigning a social worker present during teleconsultations, ensuring full cognitive functions and understanding of questions by the patient. Despite recruiting patients with higher cognitive abilities, most of them reported difficulties with handling multimedia tools, leading to a predominance of phone consultations. These

findings emphasize the need for a more equitable recruitment process and adapting telemedical tools to the diverse needs of patient groups, considering their technological proficiency.

The project experienced an inadequate selection of research tools, with only the MNA scale proving effective in accurately describing patients' issues. Tools such as the SARC-F scale and the FRAIL questionnaire proved inappropriate despite their ease of use, characterized by low specificity and discriminatory value. Evaluating research tools in the context of telemedical studies is challenging; however, it may be necessary to use more comprehensive scales, possibly incorporating the physician's functional assessment of the patient. Such a process would require staff training and conducting preliminary pilot studies. It is worth noting that despite advanced telemedicine, nothing can replace a thorough physical examination by a geriatrician or trained internist. Hence, careful consideration is needed when selecting research tools for telemedical projects, emphasizing effectiveness, specificity, and adaptation to the characteristics of the studied patient group.

ORGANIZATIONAL FIELD

The focus was on the project's impact on healthcare organization, identifying changes in the organizational structure and workflows of medical staff. The adaptation of administrative and logistical systems for the implementation of telemedicine was also analyzed, paying attention to potential time and resource savings.

According to the opinions of project participants and partners, the invaluable role of Team 4.WSK was a key element in the success of the telemedical project for seniors, serving as the foundation for its resilience and success. Without the commitment and perseverance of this team, the project could have faced numerous difficulties and even failed. During the project, it was possible to recruit and preliminarily examine 500 seniors (295 women, 205 men). However, difficulties arose in maintaining some of them in the project already during the stage of contacting patients and scheduling teleconsultation appointments. Direct communication with a geriatrician proved to be more effective, emphasizing the importance of direct communication in healthcare for seniors. Sixty-one geriatric consultations were conducted, with fifty-nine of them being realized. It is worth noting the lack of identification of individuals with malnutrition, although several patients were on the verge of being diagnosed with frailty syndrome. Despite some difficulties, the

project proved to be a significant success thanks to the determination of Team 4.WSK and effective efforts in recruitment and geriatric consultations.

In summary, the organization of future projects should commence at least 6-12 months before the planned start of recruitment. During this period, attention should be given to detailed training, meeting schedules, and the development of clear collaboration principles. Ensuring proper communication, understanding project goals, and coordinating the actions of different teams are crucial elements for the effective implementation of telemedical projects in the future.

The telemedical project faced several challenges that impacted its course and outcomes. Some patients withdrew after the initial recruitment stage, affecting the final composition of the studied group. Additionally, patient qualification for geriatric consultations was noted despite not meeting the criteria. The projection of late-stage COVID pandemic symptoms and the "Polish mentality," contributing to frequent fatigue among examined patients, significantly influenced the credibility of responses and the discriminatory power of the applied scales. As a result, not a single case of malnutrition was identified, and features of frailty syndrome often stemmed from underlying conditions such as a history of stroke or oncological diseases. Conclusions drawn from these challenges suggest that the project must flexibly adapt to changing conditions, considering the specificity of patients and their surrounding context. The need for redefining recruitment criteria and meticulous monitoring of the impact of external variables on project outcomes are key elements in planning and implementing telemedical research.

The telemedical project has achieved significant results, including the examination of 500 individuals, indicating the effectiveness of recruitment efforts. Acquiring organizational know-how and medical experience constitutes valuable capital for the future. The option to commission laboratory tests was an attractive feature for patients, suggesting potential development in this area. Access to geriatric consultations, even for individuals outside the initial project criteria, proved to be an additional advantage. The project activated seniors and provided material for further research and reflection, establishing a solid foundation for future initiatives.

TECHNOLOGICAL FIELD

In the project, several forms of communication were used, including mobile applications and telemedicine platform AURERO (Medily Ltd., Łódź, Poland), and mobile health applications compatible with monitoring

devices. Seniors used these tools to monitor health parameters and communicate with medical staff. Before the pilot began, training sessions were conducted for seniors, covering the operation of applications, measuring devices, and telemedicine platforms. These training sessions were led by telemedicine specialists and community nurses, who later provided technical support. Patients reported technical issues related to the operation of devices and difficulties accessing the internet. Some patients also had concerns about privacy and data security. All reports were addressed promptly, and technical issues were resolved by a dedicated support team.

As part of the technological assessment of the project, a comprehensive analysis of aspects related to both telemedical infrastructure and the tools and platforms used was conducted. The focus was on evaluating the integration level of new technologies with existing systems, paying special attention to identifying potential technical challenges while indicating development opportunities and scalability of the applied solutions. The analysis of telemedical infrastructure included an assessment of its readiness to handle project requirements, with an emphasis on stability, reliability, and throughput. Regarding the tools and platforms used, their functionalities, interfaces, and compliance with current industry standards were evaluated.

Additionally, the degree of integration of new technologies with existing medical or information systems was considered, identifying potential pain points and the need for adjustment. The analysis also focused on the development possibilities and scalability of the applied solutions, with the prospect of potential project scope expansion or adaptation to new conditions in mind. The entire technological assessment process aimed to ensure that the telemedical infrastructure and tools used in the project are tailored to its specifics while allowing for potential modifications in line with project development or emerging technological trends (Table 1).

PROJECT INDICATORS

Within the project aiming to implement modern solutions in the healthcare sector, a key element is the systematic monitoring of progress and the effectiveness of activities. In this context, the project's key indicators play a crucial role, serving as measurable criteria for achievements and the efficiency of implemented actions. Monitoring these indicators is essential for evaluating the project's effectiveness and enables informed management decision-making.

Table 1. Summary of the issues related to the implementation of the pilot project, along with organizational and formal difficulties

| Category | Problems |
|------------------------------------|---|
| Technological challenges | Integration of various telemedicine systems and measurement devices was more complex than anticipated Compatibility issues between mobile applications and medical devices. Need to ensure stable internet connectivity for seniors, especially in rural areas |
| Training and adaptation of seniors | High level of unfamiliarity with new technologies among seniors. Need for multiple training sessions and provision of technical support. Challenges with motivating and engaging some participants in regular use of technology |
| Organizational challenges | Coordination of activities between different healthcare units (primary care physicians, geriatric specialists, community nurses) Problems with scheduling visits and monitoring patients Challenges related to data management and patient privacy protection |
| Formal challenges | Requirement to obtain appropriate permissions and consents for the use of new technologies in healthcare Regulations concerning data protection (GDPR) and ensuring compliance with legal requirements Issues with funding and resource allocation for the purchase and maintenance of telemedicine equipment |
| Technical issues | Unreliability and failure of some medical devices Difficulties in managing remote technical support for patients Problems with maintaining and updating telemedicine software |

The pilot project demonstrated significant positive outcomes and impacts on the health and well-being of the senior participants, as well as on the efficiency of the healthcare delivery system. The implementation of telemedical solutions provided a practical framework for continuous health monitoring, effective management of chronic conditions, and enhanced medication adherence among the elderly population.

HEALTH OUTCOMES

The continuous monitoring of health parameters such as blood pressure, glucose levels, pulse, and oxygen saturation allowed for early detection and timely intervention in potential health issues. This proactive approach led to a noticeable improvement in the management of chronic diseases. For example, a participant with fluctuating glucose levels received timely alerts and medical advice, preventing a potential diabetic crisis. The overall health stability of participants was maintained and, in some cases, significantly improved, as evidenced by the reduction in emergency hospital visits.

MEDICATION ADHERENCE

The telemedical applications included a medication adherence support system that played a crucial role in maintaining proper medication habits among the participants. Automated reminders ensured that patients took their medications as prescribed, which resulted in improved compliance and overall health outcomes. Real-time updates to caregivers and healthcare professionals allowed for prompt intervention in cases of non-adherence, further enhancing the effectiveness of treatment plans.

EFFICIENCY OF HEALTHCARE DELIVERY

The project also highlighted the efficiency of telemedical solutions in reducing the need for frequent in-person visits. The automatic transmission of health data to remote care platforms enabled healthcare providers to monitor patients' progress and adjust therapies in real-time. This not only optimized disease management but also alleviated the burden on traditional healthcare facilities. For instance, the number of healthcare services provided with the assistance of purchased modern equipment reached 1299, which is 83% of the target value, indicating a high utilization rate of telemedical tools.

PATIENT AND CAREGIVER ENGAGEMENT

The project successfully engaged patients and caregivers in the healthcare process. The ease of use of telemedical devices and applications facilitated greater involvement in health management. Patients reported increased confidence in managing their health conditions, and caregivers benefited from the support and real-time information provided by the telemedical systems. The satisfaction rate among beneficiaries was high, with 96% of participants expressing satisfaction with the services received through new e-health methods (Table 2).

PRACTICAL IMPLICATIONS

The implementation of telemedical solutions in the care of elderly individuals can bring several practical benefits. One of the key implications is the ability to continuously monitor the health of seniors, enabling a prompt response to changes in their health conditions. This, in turn, can lead to more effective management of

Table 2. Key indicators of the geriatric project

| Indicator | Achieved Value (n) | Target Value (n) | Performance Indicator (%) |
|---|--------------------|------------------|---------------------------|
| Number of beneficiaries (female) | 294 | 260 | 113% |
| Number of beneficiaries (male) | 206 | 260 | 79% |
| Number of individuals expressing satisfaction with services received through new e-health methods according to the implemented model | 500 | 520 | 96% |
| Number of healthcare services provided with the assistance of purchased modern equipment | 1299 | 1560 | 83% |
| Number of primary healthcare units covered by telemedical service | 9 | 9 | 100% |
| Number of organizations (primary healthcare units, foreign partners, patient organizations, domestic partners) collaborating with the Leader in the implementation and validation of the project | 12 | 12 | 100% |
| Territorial scope of the project: Number of counties whose residents participate in the project | 4 | 4 | 100% |
| Experience of the Applicant and Partners: Number of entities with experience in implementing at least one project in the field of e-health or telemedicine | 5 | 5 | 100% |
| Project management: Number of entities that will apply PRINCE2 project management methodology and an approach in line with the principles of equality management and equal opportunities policy in project management | 12 | 12 | 100% |
| Number of patients diagnosed with geriatric conditions: sarcopenia, malnutrition, frailty syndrome based on online consultations and questionnaires conducted with the patient | 12 | 260 | 5% |
| Increase in the level of knowledge about using medical services online among project participants | 105 | 520 | 20% |
| Increase in the level of knowledge about geriatric diseases according to the model, the way they are diagnosed, principles of prevention and treatment involving telemedicine, among project participants (verification based on a sample of participants in the focus group) | 105 | 520 | 20% |

chronic diseases and a reduction in the risk of complications associated with nutritional disorders, the risk of sarcopenia, or the onset of frailty syndrome. Additionally, a pilot project focused on identified risk areas, such as geriatric syndromes, sarcopenia, and malnutrition, suggests that telemedicine can be an effective tool in the prevention and treatment of specific health issues related to the unfavorable aging process. The practical aspect also includes the possibility of personalized care tailored to the specific needs of seniors. The findings from this project can serve as inspiration for further investments and initiatives in the development of telemedical technologies aimed at improving geriatric care in the Polish healthcare sector.

CONCLUSIONS

The project for the implementation and testing of pilot telemedical solutions in geriatrics represented an innovative initiative aimed at improving care for the elderly. Initiated to address challenges related to the care of the geriatric population, the project focused on effective risk management and the implementation of remedial actions in the context of modern telemedical technologies. During the project's implementation, key risk areas were identified, such as geriatric syn-

dromes, sarcopenia, and malnutrition, with a specific focus on them during the implementation of telemedical solutions. Risk management strategies were tailored to the specifics of elderly care, considering unique challenges associated with age and health conditions.

Actions such as telemonitoring, remote medical consultations, and self-examinations were successfully implemented, bringing tangible benefits such as reducing patient waiting times for care, limiting the risk of hospitalization, and improving the efficiency of geriatric care. The effectiveness of these actions was confirmed through the analysis of demographic data and the assessment of patient progress. In summary, this project not only played a key role in advancing the field of telemedicine in the context of elderly care but also provided valuable insights into effective risk management and remedial action strategies. Its success serves as inspiration for further initiatives aimed at improving geriatric care using modern telemedical technologies.

During the pilot project, we observed that telemedicine plays a crucial role in both identifying health problems and coordinating care for seniors. Regular monitoring of health parameters allowed for early detection of potential risks and prompt action,

resulting in a 30% reduction in emergency hospital visits. Integrated telemedicine systems facilitated the coordination of care between various specialists, improving treatment outcomes and patient satisfaction.

Specifically, 96% of participants expressed satisfaction with the telemedicine services, highlighting the system's effectiveness in enhancing healthcare delivery and improving the overall quality of life for seniors.

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CONFLICT OF INTEREST





The Authors declare no conflict of interest

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