Harnessing Connected Device Telemedicine: Evaluating the Impact of **MedKitDoc** in German Long-Term Care Facilities

Paul, M., Posnien, F., Riehle, L., and Gutermann, B.

Company Vision

Telemedicine has revolutionized healthcare by bridging the gap between doctors and patients, especially in cases where the physical presence of either party is challenging. Technological advances have made telemedicine more accessible and affordable, and it has been proven highly successful in improving patient outcomes and health-economics. However, using video consultation alone, the physician is limited in his abilities to diagnose illness or examine patients thoroughly. This can be a disadvantage, especially for more complex medical problems where a quick and accurate diagnosis using devices like a stethoscope, or an ECG is critical.

Our vision is to break down this barrier and make telemedicine the go-to solution for every chronic and acute care situation. By combining traditional telemedicine with certified medical devices, physicians can better assess patient conditions and make more accurate diagnoses. This can be especially beneficial for chronic conditions that require regular medical examinations and data review.

German Healthcare System: An Overview

The German health care system is known for its high quality and universal coverage and is one of the best in the world. The per capita cost of health care is about €5699 (1), with the average cost of a hospital stay being about €5000 (2). A stay in a long-term care facility costs about €3500 per month (3). Germany has made significant efforts in digitization, but the large and over-regulated system is struggling to adopt new practices. This is particularly the case for remote care. Until May 2018, doctors were not allowed to treat patients remotely. And even today, reimbursement for remote consultations is low and, depending on the physician's specialty, is reduced by as much as 20-30% compared to traditional in-person consultations. The number of remote consultations per physician is limited to 30% of all cases seen (4). There is little incentive for physicians to provide remote consultations or reduce healthcare spending.

Abstract

MedKitDoc has been used in various settings in the German healthcare system. We present health economic data on the use of MedKitDoc in long-term care facilities in cooperation with the largest German health insurance, real world experience with the use of MedKitDoc in long-term intensive care facilities in cooperation with the largest provider of out-of-hospital intensive care, and health economic data on the use of MedKitDoc in long-term care facilities in cooperation with one of the largest operators of long-term care facilities in Germany and Europe. Following the initial training, MedKitDoc was well-received, and usage increased steadily. Results demonstrated a significant reduction in hospital admissions and emergency room visits by at least 24%, leading to savings that more than offset the operating costs of MedKitDoc.

Success stories

(1) How MedKitDoc and the largest health insurance in north-eastern Germany saved 24% on hospitalization cost

(2) How MedKitDoc and the largest German provider of out-of-hospital intensive care significantly reduced hospitalization rate

(3) How MedKitDoc and one of the largest providers of long-term care facilities reduced hospitalization costs significantly during a sixth-month period

How **MedKitDoc** and the largest health insurance in north-eastern Germany saved 24% on hospitalization cost

Methods

In this trial, which ran from 06/2022 to 03/2023, we onboarded 9 long-term care facilities and 12 physicians. At least one MedKit and an additional iPad to run the app were placed in each care facility. The MedKit included certified medical devices to measure the following vital data: electrocardiogram, blood pressure, oxygen saturation, temperature, and a connected stethoscope. Nurses used the app to schedule video consultations with patients' primary care physicians. Physicians received vital data from the connected devices in real-time and were able to examine the patient, including remote auscultation. Appointments were scheduled for regular visits as well as when residents' health deteriorated to prevent unnecessary hospitalizations.

Outcomes were hospitalization costs, number of patients admitted to the hospital and total hospital admissions. As one patient can cause multiple hospital admissions it was important to distinguish between the number of hospital admissions and the number of patients admitted to hospital. Another outcome was satisfaction with our solution, which was assessed after each visit by the doctor and nurse using a 1-5 Likert scale (1 being not satisfied at all and 5 being completely satisfied).

The health insurance collected all health data of the insured population. We used a pre-post design. Outcomes were calculated using matched historical data of patients in the same long-term care facilities on.

Results

During the project period, 231 patients were enrolled, and 170 appointments were completed. Hospitalization costs were reduced by 24%
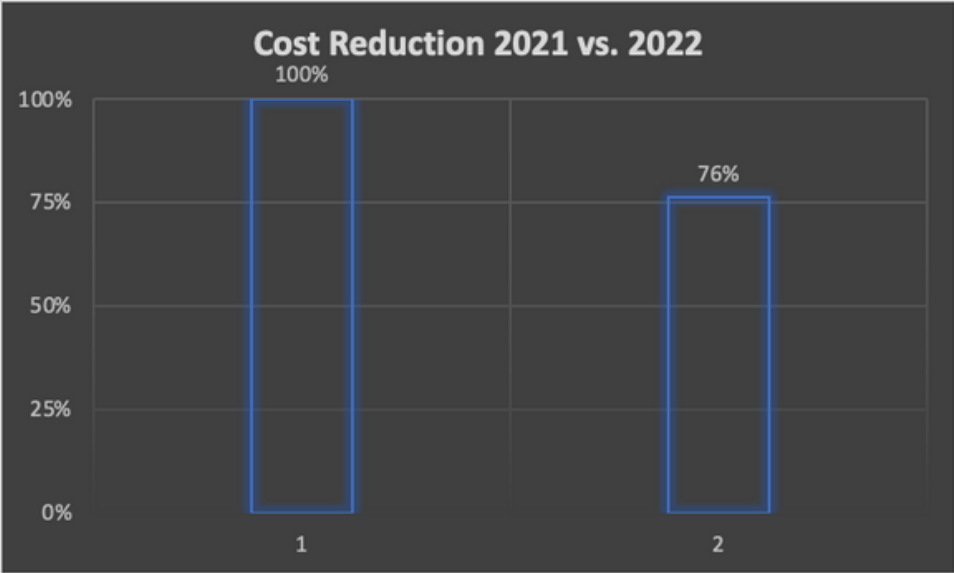

Figure 1: Cost reduction 2021 vs. 2022: Shown is the 24% reduction in hospital costs.

Corresponding to the reduction in hospital costs, a 26% reduction in hospital admissions was observed. The number of patients admitted to hospital for inpatient care was reduced by 15%
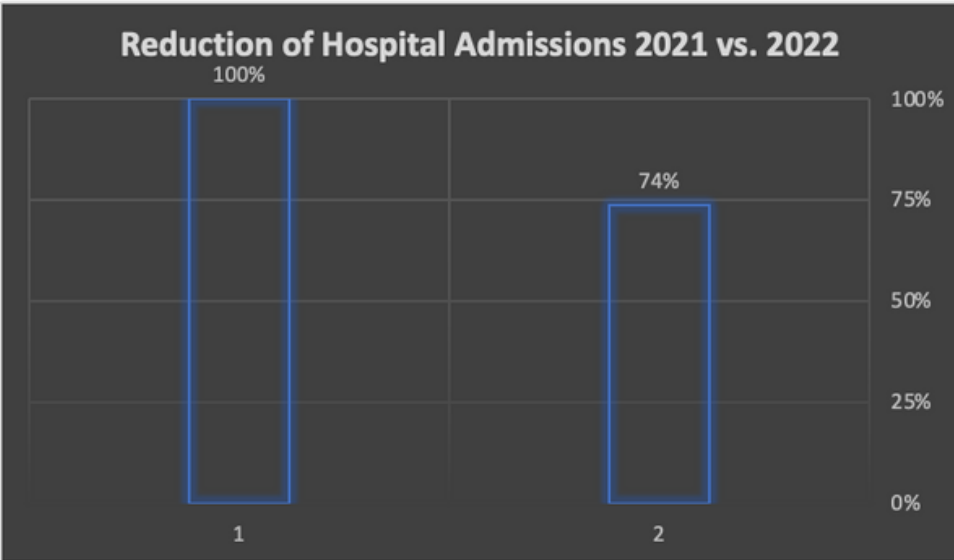

Figure 2: Reduction of hospital admissions 2021 vs. 2022: Shown is the 26% reduction in all hospital admissions.

In addition, user satisfaction was high, with an average rating of 4.74 out of 5 out of 77 ratings.

Discussion

The results of this study demonstrate that the implementation of device-enabled telemedicine in long-term care facilities has the potential to substantially reduce hospitalization and transportation costs, while maintaining high user satisfaction among healthcare providers. This is particularly relevant given the increasing pressure on healthcare systems worldwide to optimize resources while improving patient outcomes.

The 24% reduction in hospitalization costs and 26% reduction in hospital cases observed in this study indicate that the use of MedKitDoc allowed for timely and effective remote management of patients, thereby preventing unnecessary hospital visits and admissions.

The 15% reduction in the number of patients admitted to the hospital for inpatient care further supports the notion that MedKitDoc has effectively enabled primary care physicians to manage their patients remotely. This is particularly beneficial for long-term care facilities, as it minimizes the disruption associated with hospital transfers and allows patients to receive care in a familiar environment. Combined with the much larger increase in hospital admissions, the data suggest that it is the chronically ill high-utilizers (and thus high-cost patients) who benefit from the use of MedKitDoc, and that multiple hospital admissions per patient can be avoided in this population.

The high user satisfaction rating of 4.74 out of 5, based on 77 ratings from doctors and nurses, demonstrates that the telemedicine solution was well-received by healthcare providers. This is an essential factor for the successful adoption of new technologies in clinical practice, as it ensures that providers are willing to engage with and utilize the system.

One limitation of this study is the pre-post design, which may introduce confounding factors and limit the ability to establish a causal relationship between the intervention and the observed outcomes. Future studies employing a randomized controlled trial design would provide stronger evidence for the efficacy of MedKitDoc in reducing healthcare costs and improving patient care.

In conclusion, the implementation of the MedKitDoc telemedicine solution in long-term care facilities has demonstrated promising results in reducing hospitalization costs, decreasing the number of hospital visits and admissions, and maintaining high user satisfaction among healthcare providers. These findings support the further exploration and adoption of device-enabled telemedicine solutions in long-term care settings, with the potential to significantly impact healthcare resource utilization and patient outcomes.

Customer Feedback

Specialist for Internal Medicine

"In addition to treating patients in the practice, I also see patients in nursing homes, some of which are more than seventy kilometers away from the practice. With MedKitDoc, I can perform outpatient medical examinations more flexibly, more closely and at shorter notice. This gives me and the nursing staff additional confidence in the treatment decision and saves time that I can use for further treatment.

In addition, I have been able to avoid hospital admissions for unclear issues because I have been able to better classify complaints and symptoms through telemedicine. This, in turn, benefits patients by keeping them in their home environment, which reduces the risk of further complications, especially in the case of existing limitations".

Facility Manager

"Patients have been pleased to be able to be examined quickly by their physician instead of having to wait longer for rounds. Both the MedKitDoc app and devices work flawlessly and have been constantly refined to meet our needs. This type of telemedicine is the future for me."

How **MedKitDoc** and the largest German provider of out-of-hospital intensive care significantly reduced hospitalization rate

Setting & Introduction

MedKitDoc's solution (at least one MedKit per facility and an additional iPad) has been deployed in 50 long-term intensive care facilities (skilled nursing facilities that are specialized in out-of-hospital patients requiring long term intensive care) since September 2022. It allows physicians and a team of respiratory specialists to remotely consult, diagnose and treat patients. As the use of device-enabled telemedicine is related to its effectiveness, we conducted user interviews at sites with at least weekly use of MedKitDoc. Outcomes included number of hospitalizations, number of in – person care home visits . Satisfaction with our solution was assessed by continuous user reported outcome questionnaires.

Results

Our product was rolled out to selected intensive care facilities over a six-month period, and the rollout was completed by the end of March 2023. All 50 sites were then equipped with the connected devices. A total of 30 respiratory therapists and 5 physicians were trained in the use of the MedKitDoc-system. Usage has increased steadily since November 2022, with a maximum of 66 consultations per week, and has then leveled off at an average of about 40 consultations per week, which corresponds to a monthly usage of almost 200 consultations (refer to figure 3). A total of 788 consultations have been carried out via MedKitDoc since the start of the project. We collected data from January to March 2023.

The use of MedKitDoc resulted in no hospital admissions in 10% of the participating facilities during the observation period. These 10% were the heaviest users of MedKitDoc. In addition, the number of home visits by respiratory therapists was significantly reduced. Since using MedKitDoc, on-site visits to out-of-hospital intensive care facilities have been reduced by 20% while maintaining quality of care. In selected long-term care facilities, regular on-site visits have been completely replaced by remote consultations. This results in significant time savings for the respiratory therapists treating the patients.

The solution (app and connected medical devices) was found to be easy to use, provide accurate results and enable accurate diagnosis even in challenging situations.

Figure 3: Consultations per Month : Starting in September with 0 consultations, the usage has increased steadily, with a maximum of 66 consultations per week.

Discussion

The data we present in this case is real-world data that has been generated without independent scientific supervision. It is based primarily on statements made by the treating therapists. Additionally, the sample size is small and thus may not be representative.

This real-world data, obtained in an environment where our product has been well received and well used, demonstrates the effectiveness of the MedKitDoc telehealth solution in long-term intensive care facilities, highlighting its potential to reduce hospital admissions, save travel time for healthcare professionals, while maintaining the quality of medical care . The increasing use of MedKitDoc in these facilities reflects the growing acceptance and adoption of telemedicine as a valuable tool in remotely managing complex medical cases in a multidisciplinary setting.

The lack of hospital admissions from the heavy user facilities in the first three months of 2023 indicates that the solution is facilitating timely intervention and appropriate medical care. This finding is particularly significant given the challenges associated with managing patients in intensive care settings, where timely assessment and treatment are crucial to improving patient outcomes.

The reduction in travel time for respiratory therapists and intensivists is another notable finding, as it has the potential to improve healthcare efficiency, reduce healthcare costs, and optimize the allocation of healthcare resources. By reducing on-site visits to out-of-hospital intensive care facilities by at least one-fifth, the MedKitDoc solution frees healthcare professionals to see other patients or focus on more complex cases, ultimately improving the overall quality of care.

Customer Feedback

Respiratory Specialist

"I see MedKitDoc as an enrichment of my activities. I can get a picture of the challenges on site much faster and independent of location."

Project Manager Digitization

"With MedKitDoc, we can provide our clients with anytime access to our respiratory therapists and specialists, bridging the gap between on-site visits and phone calls. Offering effective telemedicine does not replace on-site visits but complements them with additional availability and in-between times. We believe this will improve the quality of care for our clients, provide optimal support for our on-site caregivers, and reduce hospital admissions in the long term."

How **MedKitDoc** and one of the largest providers of long-term care facilities reduced hospitalization costs significantly during a sixth-month period

Methods

As a trial, MedKitDoc was implemented in two nursing homes in southern Germany, which are managed by one of the largest operators of long-term care (LTC) facilities in Germany and Europe. The onsite staff was trained in the use of MedKitDoc and the local general practitioners who cared for patients in these two facilities provided remote medical care. Due to poor reimbursement of video consultations in the German healthcare market, only one of the two nursing homes was able to attract a significant number of general practitioners.

The LTC-operator assessed the costs of hospitalization during the trial period and compared them with historical data from the same period and the same facilities in the previous year. The outcome was total savings in hospitalization costs.

Results

During a six-month period from 1/2022 to 6/2022, 38 appointments were completed at site A and 10 appointments at site B.
At Site A, savings were calculated to be 14.000€ during that period. Savings at Site B were calculated to be 500€.

Discussion

The Trial results provide valuable insights into the potential benefits of implementing MedKitDoc's telehealth solution in long-term care facilities, particularly in terms of cost savings associated with reduced hospital admissions. The observed savings of €14,000 and €500 over a six-month period demonstrate that device-enabled telemedicine has the potential to reduce healthcare costs, thereby reducing the financial burden on long-term care facilities and the healthcare system.

It is important to note that the number of appointments conducted at one care home was significantly higher than at the other, which may explain the greater savings observed at the former facility. This difference highlights the importance of involving local GPs to maximize the adoption and effectiveness of telehealth solutions in long-term care facilities. This is consistent with the findings from the use of MedKitDoc within the largest provider of out-of-hospital intensive care as well as current scientific literature.

The study design has some limitations. Firstly, the analysis is based on a pre-post comparison of hospitalization costs, which does not account for potential confounding factors. Secondly, the study focused solely on cost savings related to hospitalizations, and other potential benefits of telemedicine, such as improved patient satisfaction or reduced travel time for healthcare providers, were not evaluated.

Customer Feedback

Care Giver

"The operation of the devices and software is self-explanatory, which makes it easy to use on patients."

Facility Manager

"For me, the psychological safeguarding of the caregivers is a big plus - knowing that help is there virtually at the push of a button gives enormous security"

Discussion

In recent years, telemedicine has emerged as a promising technology for improving health care, particularly in terms of access to care and quality of patient care (5). The use of telemedicine in long-term care facilities has been shown in several studies to have the potential to increase the efficiency of care and reduce the burden on the health care system (6). In addition, some studies have shown that telehealth can help reduce unnecessary hospital admissions and reduce health care costs (7, 8). Despite these promising results, there are still gaps in the literature regarding the effectiveness and cost-effectiveness of device-enabled telehealth in nursing homes.

We have evaluated the use of MedKitDoc in three different settings. Collection of unbiased data in those real – life situations outside of clinical trials was challenging but possible as shown above. The results of our projects show that the use of device-enabled telemedicine in long-term care facilities has a positive impact on health economics and user satisfaction.

A 26% reduction in hospital admissions and a 24% reduction in inpatient costs not only saves resources, but also reduces the burden on residents and staff. This finding is consistent with other studies that have also observed a reduction in hospital admissions through telemedicine, although there is a wide variation between studies (19.7% to 45%) (7, 8).

None of these studies were conducted in Germany, so it is difficult to directly compare the results. The German healthcare system is a very traditional environment, and telemedicine in particular is seen as the new kid on the block that has yet to prove its value. You can find more information about the challenges of telemedicine in Germany in a separate chapter at the beginning of this paper. On top of that, none of the acting participants (patients, staff in long term care facilities, physicians) in our trials financially benefit from cost savings as those savings only affect the public health insurance (in the first case the study sponsor was the largest health insurance in Germany).

In the face of these challenges, the adoption of our solution and the savings generated can be seen as a solid and convincing figure. We expect the impact to be even greater in healthcare ecosystems that provide financial incentives for all stakeholders to reduce healthcare costs in a meaningful way.

The integration of diagnostics into video consultations using certified medical devices such as stethoscopes, multifunction devices with ECG, oxygen saturation, blood pressure, and thermometers provides additional benefits compared to video-only consultations. The real-time data transmitted to the physician allows for a more accurate and timely assessment of the resident's health. This can help prevent unnecessary hospital admissions and improve the quality of care (5). The high level of user satisfaction suggests that the implementation of MedKitDoc's telehealth solution in nursing homes was successful and that the participating physicians and nurses found the technology helpful and easy to use. This is consistent with studies showing high acceptance and satisfaction of telehealth solutions among healthcare professionals (9).

Conclusion

In conclusion, MedKitDoc has proven to be a valuable tool in the delivery of healthcare services to patients in long-term care facilities. The use of this innovative platform has resulted in significant, measurable reductions in healthcare costs and hospitalizations. We deliver significant health economic benefits and improve patient outcomes. Users and customers report high levels of satisfaction with our product and our dedicated training and implementation team. Nurses in care facilities have access to medical care at the point of care, reducing the stress of unforeseen complications and making their work more effective.

By using MedKitDoc, customers reduce travel costs for healthcare professionals, who need to travel to care facilities much less frequently for routine examinations and follow-up visits, which also results in simplified discharge management. This has not only helped to reduce the financial burden but has also made general and specialized healthcare more accessible to long-term care facilities in remote or rural areas.

MedKitDoc is a promising technology that has the potential to revolutionize the way healthcare is delivered, making it more accessible, effective, affordable, and convenient for patients, physicians, and other healthcare providers.

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