Dilemmas in Scaling up Telemedical Services

Carl Erik Moe[1, 3], Elin Thygesen[1, 2], Margunn Aanestad [1, 3]

[1] Centre for e-health, University of Agder, Grimstad, Norway

[2]Department of Health and Nursing Science, University of Agder, Kristiansand, Norway

[3]Department of Information studies, University of Agder, Kristiansand, Norway

Abstract
There is a strong drive for implementing technology in public health care to cope with the growing number of elderly. This paper studies the challenges in scaling up telemedical services and reports from the case of a large telemedical project, with cooperation between municipalities and hospitals, in Agder, Norway. The study applies dialectics as an analytical lens to make sense of the findings and discusses these dialectics and how the challenges may be solved.

Keywords
Scaling, telemedicine, sustainability, dialectics.

1 INTRODUCTION

There is a need for delivering health services in new ways in Norway and large parts of the Western world, due to demographic changes, increased expectations in the population, and cuts in public spending. In Norway, this has materialised in a strong drive for delivering services remotely through telecare and telemedicine. Telecare is an umbrella concept comprising several technologies to promote safety and security in patients' homes [1], whereas telemedicine (TM) implies the use of information, communication, and monitoring technologies for health care providers to remotely evaluate health status, provide educational intervention, or deliver health and social care to patients in their homes [2]. Our focus in this paper is on telemedicine and telemedical services.

There is a long history of telemedicine projects in different application areas in Norway and in several other countries (Denmark, Scotland, Canada, etc.). The project 'United4Health' (U4H) was one of the larger projects, running from 2013–2015 and involving 33 partners across Europe, including the Agder region and Tromsø in Norway [3-5]. From May 2014 to April 2016, a total of 94 patients with COPD were recruited and followed up by nurses employed at two telemedicine centrals (TMC) in Agder over a limited period of 30 days [4]. The purpose of U4H was to scale up the use of telemedicine. However, U4H showed some challenges in going from a pilot project to full operations [5] and in establishing telemedical services as part of the municipal health and care services. The recruitment of patients was one of the main challenges, despite the systematic work of the hospital in the project. Therefore, at the end of the project period, the service was terminated. However, a new project called TELMA started up in 2017, establishing TMCs in three municipalities (A, B, and C) to serve the 30 municipalities in the region. The goal of this project was to design a full service for chronic patients (COPD, diabetes, heart failure, and mental health issues), which

would be integrated into the existing service portfolios. This project has been run as a pilot in Agder but should be ready for full implementation as an ordinary service once the project period is completed.

Despite the strong drive and large investments in telemedicine, sustainability and scaling up has been difficult. Previous research shows that scaling up telemedicine projects often has been difficult [6-7], and this remains a challenge [8]. We therefore need to understand the challenges scaling involves and find measures to cope with these. This is the focus of our study. Hence, the research question is: What are the challenges in scaling up telemedical services?

2 METHOD

2.1 Design

To gain a deeper understanding of the challenges in scaling up telemedical services, a qualitative case study approach was used. According to Yin, 'A case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomenon and context may not be clearly evident' [8]. A case study is limited in terms of generalisability; hence, our results cannot be generalised but give an indication of the possible general challenges faced. Managers and employees at the TMCs were included to develop a rich dataset. Individual interviews and observation studies were conducted to facilitate a holistic understanding of the phenomenon and to enhance data credibility.

2.2 Research context

The main goal of TELMA is to establish a common telemedicine solution for the remote follow-up of patients with chronic disorders and comorbidity in the Agder region, which can provide good health services with less use of health care resources.

In TELMA, telemedicine (distance follow-up) is defined as the use of technological solutions that allow patients to be followed up by the health and care services in their own homes. Patients perform their own measurements and answer simple questions about their health using a tablet. The results are transferred to the TMC (response or follow-up service), which then contacts the patient around signs of deterioration or if the measurements are outside the normal values. The TMC provides medical professional support and guidance based on the patient's needs and assesses if there is a need for contact with a GP or emergency services. The TMCs are open on weekdays during the daytime and are staffed with one nurse each. Patients are assigned to the service by the health administration in their home municipality and are given equipment and training by the staff at the TMC.

The TMC provides services to patients with chronic diseases such as COPD, heart failure, diabetes mellitus type 2, and mental illness. The follow-up consists of either a telephone or a video call. Some messages and questions and answers are also conveyed through text messages. Patients with mental illnesses answer an online questionnaire. Based on the patients' responses, the nurse at the TMC provides contact with a municipal follow-up service, which in turn contacts the patients.

The nurses have access to the electronic health records (EHRs) for the patients from the municipalities where the TMCs are located. All information exchanges with other municipalities, GPs, and the hospital are transferred via electronic messages. During the intervention period, various models for follow-up have been tested, including different frequencies of contact and duration of the follow-up period, but also different types of interactions. To monitor and assess the patients' clinical data, a computerised decision support system (CDSS) is used.

The goal of TELMA is to recruit a total of 200 patients during the project period 2017–2019. In total, as of August 2019, approximately 150 patients have been followed up during the project period, of which 94 were followed up simultaneously at the three centrals as of August 2019. The majority of patients have COPD, as this group of patients was included in the first phase of the project (based on experience from U4H). During the past year, patients with diabetes mellitus type 2 and heart failure have also been included, as well as some patients with mental health problems.

In many ways, this project has been successful in that new patient pathways have been developed, interviews show that the patients are satisfied with the quality of care, and algorithms for comorbidity and machine learning for decision support have been developed. However, scaling up has been challenging, and our focus is on its particular challenges.

2.3 Participants and data collection

This study is based on interviews with various stakeholders throughout the project period, and it involved employees from municipalities, the hospital, GP offices, and TMCs. Patients were also interviewed, but these interviews are not included in this study. In addition, data were collected through observations of work practices and attendance in meetings from 2017 to August 2019. Table

1 below shows an overview of the participants in the interviews.

Semi-structured interviews were conducted during 2017 and 2018. The questions focused on general experiences, beyond the research questions. The interviews were audio-recorded and transcribed before deleting the recording.

In addition to the interviews, we conducted four observations in June–October 2019, one at the TMC in municipality A, two at the TMC in municipality B, and one at the TMC in municipality C. The first observation at the TMC in municipality B was done with a nurse following up patients with COPD and diabetes, whereas the second was done with a social worker specialised in mental health, who followed up patients with mental illnesses. The third observation was done in municipality C, also with a nurse following up patients with COPD and diabetes.

During the observations, we took field notes and asked questions. We also took formal minutes from most of the project meetings that were held every second week over Skype, and informal notes from some meetings. Table 1 shows the work roles of our informants.

N	TCM	Admin	Hospital	GP office
1		A		
2		A		
3		A		
4	A			
5		B		
6		B		
7	B			
8	B			
9	B			
10			X	
11				X

Table 1 Overview of participants in interviews. A denotes employee in municipality A; B denotes employee in municipality B, X employees from other institutions.

2.4 Data analysis

Data were analysed using a thematic analysis [10], with a focus on scaling and on the dilemmas encountered in the pilot project period related to implementation of a full service. Two of the authors collaborated on the analyses to ensure validity. The theory of dialectics guided the analytical process, which followed the six phases of thematic analysis: familiarisation with the data, generating initial codes, searching for themes, reviewing themes, naming themes, and, finally, building the construct [10].

In this process, we applied dialectics as our analytical lens. Dialectics has been applied previously in research to understand the dilemmas involved in the public procurement of information systems [11] and the resistance towards implementation of information systems [12, 13] and change processes in general [14]. The term 'dialectics' originated in ancient Greece, referring to a discourse between two or more people holding opposite

views, and dialectical thinking can be explained as a way of thinking that considers the contradictions between irreconcilable goals, or thesis and antithesis. The result of pondering these opposites could be that either one of the two goals (the thesis or the antithesis) dominates and wins out, or that elements from the two are combined in a synthesis.

Applying dialectical analysis has the advantage of raising awareness of the inherent challenges or dilemmas between incompatible goals and the need to choose either one or the other, or to find a synthesis. There is also the possibility of choosing differently over time [11].

2.5 Ethical considerations

This study was approved by the Norwegian Centre for Research Data (NSD, project number 50421). The participants were given written and verbal information about the study. They were also guaranteed confidentiality and the opportunity to withdraw at any time, and patients were ensured that withdrawal would not affect the health care services they received. Employees in the municipalities, hospitals, and TMCs were first contacted by the project manager for TELMA.

3 FINDINGS

The study shows that several dilemmas arise when integrating telemedicine services into the regular service portfolio. Some of the dilemmas are related to the actual transition from a pilot project to ordinary operations, while others are of a more general nature and are related to the kind of service to be offered.

The study shows that in the transition between a project's pilot phase and ordinary operations, a dilemma may occur related to developing an effective pilot project and preparing for large-scale operations. In our case, this dilemma became evident within three areas.

3.1 Development of routines versus anchoring

One of the goals in this project was to prepare for implementation a full telemedical service later. Hence, the development of routines for the municipal health care services was a focus.

A consequence of this focus was neglecting the need for the anchoring and enrolment of stakeholders from the start. The involvement of people outside the project team who were needed for scaling up was neglected until quite late. Poor anchoring among key partners in the first phase of the project made it difficult to recruit enough users to take it into operation, as the following comments show:

'I am somewhat doubtful about how much the hospital knows about this service ... so there are many nurses in hospitals who do not know our services ...' (informant no. 5)

'The inhabitants of municipality ... do not know that there is such a service.' (informant no. 5)

'I think you have to go to the GPs again, and I don't think patients will come from the hospital, so I think you have to go to them [the GPs] a bit more, too, because they are the ones who recruit.' (informant no. 6)

Another consequence was that considerable time was spent developing templates and routines instead of

scaling, for example, by ordering equipment, establishing all the TMCs, and hiring and training staff.

During one of the observations, we understood from the answers to our questions that the employee at the TMS had 'spent a lot of time developing new routines and forms' (social worker at TMC B). In a similar manner, the vendor of the measurement equipment spent considerable time developing routines handling logistics, routines that are helpful if the number of users increases, but this does not in themselves increase the number of users.

However, the project group decided to shift focus, and, in March 2019, a nurse responsible for recruiting was appointed (from the meetings minutes in the project group and steering group). Hence, in this project, there was a transition from focusing on one goal only (or on the thesis) to also including a goal which was somehow conflicting (an antithesis).

3.2 Results orientation for the pilot period versus developing a full service

Another dilemma in this project concerned the goal of achieving good outcomes during the pilot period to convince decision-makers, as opposed to developing a service that could be implemented directly after the project period.

As a consequence, there was disagreement on the choice of target groups and whether the service should primarily be provided to patients who were already recipients of health services (COPD patients), so that TM could replace other services and save money, or offered as a preventive service to diabetes patients who had not previously received health care. By choosing to provide TM as a preventive service in the pilot phase, financial savings were hard to identify during the project period. However, previous research [15] shows that individual counselling programs can reduce risk factors significantly for diabetes patients. The following citations illustrate this dilemma:

'Now we provide an extra service to most, so this is ... more expensive for the municipality.' (informant no 6)

'If it turns out that this has had a good effect five years from now, …., then we may receive fewer admissions and fewer medical consultations.' (informant no 6)

'For those who get preventive care [from TMC], it is years before they would have received our services [from the municipality]. [Disease] development needs to slow down a lot ... for this preventive care to be profitable.' (informant no 6)

The project group in TELMA chose both goals at the same time. This resulted in spending a lot of resources on developing routines for diabetes patients, and since the patient pathway was developed fairly late in the project, there was little time for recruiting patients; hence, only a few were recruited.

The project further shows that establishing new telemedical services, with the required quality and routines, is resource intensive; therefore, it is hard to achieve benefits during the project period.

Another consequence of this dilemma was disagreement about the frequency and duration of the follow-up of patients. In the first part of the project period, an evaluation of patients' progress and needs was conducted

after three months, and the service was planned to last for a maximum of six months. However, there was a disagreement concerning the resources needed to promote lifestyle changes for some of the patients, as well as the need to watch the resource use. One nurse was concerned that long-term follow-up was required to achieve lifestyle changes. The same concern applies to patients with mental disorders. For many patients, it may therefore be problematic to offer the service for only a short period.

The discussion related to this dilemma also concerned the amount of service, the frequency of measurements, and the duration of follow-up conversations. For example, when scaling up the service, it may be necessary to reduce the amount of follow-up each patient receives. A relevant question was how much the service could be downscaled without reducing the quality significantly:

'.. it is a luxury edition [of the service] they receive; if we could cut down the follow-up, it would still be good enough.' (informant no 6).

In the TELMA project, choices made were to increase the duration of the service each patient received to more than three months and to include diabetes patients. These two choices were in line with the goal of developing a full service but in conflict with the goal of results orientation. At the same time, the project group reduced the frequency and duration of each interaction, in line with a goal of results orientation. Hence, a synthesis was reached.

3.3 Introducing new services vs. further development of well-proven existing services

As part of the TELMA project, a new service was established. However, the telemedical service was not the only possible service for the patient groups, as there were other well-proven existing services. In all three municipalities, the GPs were still responsible for the follow-up of their patients. In addition, several COPD patients with severe symptoms (grade 3 or 4) received visits from the home care services independent of the telemedical service.

In municipality B, there was a 'Frisklivssentral' offering advice, guidance, and various activities for persons with chronic diseases. A possible choice could have been to develop these services further. Hence, in some cases, the development of the telemedical service competed with existing services, and this was a recurring topic of discussion, especially among GPs, as the following comment indicates.

'And the thing about telemedicine is that some GPs are sceptical, because they want some of them [the patients] themselves.' (informant no 6)

As a consequence, there was opposition to the project, which was energy-intensive for the organisation. In this context, it was discussed whether TM would be competing with the existing services and become an unnecessary and expensive service for the municipalities. There were a number of discussions on this issue. This made anchoring and scaling more difficult, especially as the GPs have access to the patients and are important for recruiting.

In the TELMA project, the choice was from the start to introduce a new service, hence; to choose an 'antithesis' (a new service). However, for mental illness patients, the

service was planned to be integrated with the existing services, so the project could be said to be moving towards a synthesis.

4 DISCUSSION

A possible consequence of dilemmas involving two opposing goals is that neither goal is chosen and therefore neither is met. How can this challenge be solved?

One way to deal with this is to select one of the goals, either the thesis or the antithesis; however, this requires awareness of the contradiction between the two goals, and, anchoring a decision in both a project group and among important or salient stakeholders [16]. One other way is to develop a synthesis, or a reconciliation, of the conflicting goals over time (i.e. one goal is chosen for part of the project and the opposing goal for other parts).

The first finding, the dilemma between the development of new routines and anchoring is a difficult one, even more so because scalability may depend on routinisation. Without clear and efficient routines, it is hard to scale up the usage. However, if the focus is solely on development of new routines, then scaling is hampered. This became evident in the project, as there were only 40 patients by the start of January 2019. When this was observed, the project switched to the goal of anchoring and enrolment of stakeholders; however, this was late in the project.

A consequence was that the project did not meet the goals of recruiting 200 patients and enough patients with diabetes, heart failure, and especially mental illness. Due to this there will be too little experience with these groups to achieve the learning from treating patients over time, as well as valid results regarding the outcomes of the service. Another implication is that operations has not been tested at full capacity, and the project owners therefore do not know how many they can operate simultaneously.

If the project group had switched to the goal of the anchoring and enrolment of stakeholders earlier, more patients would likely have been recruited. Would this have harmed the development? If the focus had shifted back to development again later in the project, then the end service could have been of the same quality. Enrolment of stakeholders could have benefitted the development, as input from different stakeholders (GPs, patient groups) could have been useful.

The second dialectic concerned results orientation for the pilot period versus developing a full service. The project partly tried to meet both goals by including patients that most likely would not show any effect during the project period, and, at the same time, by tailoring the resource usage in terms of the length of intervention and the duration and frequency of interaction with each patient.

As a consequence, the benefits of the project may be hard to identify, making a decision towards full implementation difficult. At the same time, the service may not be ready for full implementation.

The third dialectic concerned whether to develop a new service in competition with existing services, or to further develop services that are well-proven.

Faulkner [17] shows the difficulty in doing this, as '"measuring" success is a crucial element of the policy

shift towards health technology assessment and so has a potent "politics" of its own.' Moreover, the study shows how different sets of players operationalised diverse sets of reflexive practices that contested the authority of the other(s) in the project.

In all three municipalities, the focus was on the development of a new service, and, as a consequence, the GPs were sceptical and felt this as a competition, which made it more difficult to recruit more patients and scale up. However, in municipality B, the plan was to run the service for the mental illness patients as an add-on to an existing service, hence as a further development.

5 CONCLUSION

In this study, we identified three challenges related to the scaling up of telemedical services: the dialectics of 'development of routines versus anchoring', 'results orientation for the pilot period versus developing a full service', and 'introducing new services vs. further development of well-proven existing services'. There are definitely more challenges than these; however, through applying dialectics as an analytical lens, we see that these are dilemmas that require careful consideration, and that selecting one of the goals without adhering to the conflicting goal can limit scaling.

The development of efficient routines is needed for scaling; however, as there is a danger of neglecting anchoring in this process, both goals need to be focused on (synthesis). Furthermore, the discussion shows that it may be possible to shift the focus over time from one goal to the other. We found that a synthesis was applied for the second dialectic, the patients received the service for a longer duration, while, at the same time, the frequency of interactions and length of each interaction were reduced.

However, our findings have certain limitations. The dialectics may be context-specific and therefore need to be validated both through structured interviews with the project participants and through following the process of scaling up the service once the project phase is terminated. Other telemedical projects should also be studied with the same analytical lens to see if the results are generalisable and if the dialectics are generic. Our findings do not show whether shifting goals over time, as in dialectic 1, or synthesis, as in dialectic 2, lead to better outcomes. Further research should therefore try to answer this question. However, these findings on dialectics and the way TELMA attempted to solve them carry important implications for practice.

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