

# Why is it so Hard to Integrate Telemedicine as a Part of Municipal Health Care Services?

## Experiences from a Norwegian Municipality

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### Abstract

Telemedicine has a broad scope in Norway supported by the national authorities. As a part of the research project 3P- Patients and Professionals in Partnership, a telemedicine service was established in the municipality of Risør, Norway for patients with chronic obstructive pulmonary disease. The aim of this paper is to summarise and share the experiences from Risør. A qualitative research approach was used. The telemedicine service was an integrated part of the health services, having a close collaboration with general practitioners. Despite a detailed planning of the operation, administrative and economic challenges made the service closed after two years and replaced by services from an inter-municipal telemedicine centre.

### Keywords

Telemedicine, remote monitoring, chronic obstructive pulmonary disease, collaboration, team work.

## 1 INTRODUCTION

Innovation and implementation of technology is a national focus area in Norwegian health care services and digital health services have been highlighted in the National Health and Hospital Plan [1]. The Norwegian Parliament has granted funding to the Directorate of Health through ‘The national program for development and implementation of welfare technology 2014-2020’ and approximately 340 Norwegian municipalities have participated in welfare technology projects [2]. ‘The national telemedicine-project’ was a part of this program with four national pilot arenas across Norway [3]. The World Health Organization (WHO) has defined telemedicine as the use of telecommunications to diagnose and treat diseases and ill-health [4]. There are in year 2019 several on-going projects in Norway focusing on telemedicine and remote monitoring [5]. ‘3P- Patients and Professionals in Productive Teams’ is one of the on-going projects, with an overall aim of validating and verifying the prerequisites that support the transformation of a classical profession-centred health care system to a digitally supported patient-centred team-work approach [6]. There are four pilot sites enrolled in the 3P-project, which all have developed new care models, and taking advantage of new leading technologies and radical organisational redesign inspired by the Chronic Care Model [7]. The 3P-project is four-year long (2015-2019), led by the Norwegian Centre for E-health Research (NSE) and funded with a grant from the Norwegian Regional Hospital Trusts.

### 1.1 Aims of the 3P-project

Because of demographic changes in society with an increasing ageing population, the prevalence of long-term conditions and multi-morbidities is also rising [8][9]. These

changes threaten the sustainability of today’s health care system [10][11]. Patients, health care professionals and authorities express a need for radical reorganisation of the health care service for patients with long-term conditions and multi-morbidities. There is a demand to place the patient’s need in focus and develop service models that are patient-centred, integrated and proactive [12].

The 3P-project aims to support the development of a safe and integrated health care service model. A patient-centred health care service is based on the patient’s own defined goals and encourages patient involvement and empowerment. The project has the aim of understanding how to reorganise the health care service model towards the triple aim of improved patient outcomes, improved care experience and reduced costs. Digitally supported communication- and work processes between providers and patients is a central part of an integrated health care service model. The 3P-project has five research-based work packages that collect data at the pilot sites. The research questions are related to patient experiences, the digital individual care plan, patient safety, digitally supported teamwork and implementation of new services.

### 1.2 The municipality of Risør

This paper describes the 3P pilot site Risør municipality, Norway, with around 6800 inhabitants [13]. Risør municipality established a telemedicine centre for patients with chronic obstructive pulmonary disease (COPD) and aimed at integrating this with the other municipal health care services. The technology used is described in details elsewhere [14]. The aim of the new telemedicine service was to increase the quality of care, patient safety and clinical outcomes for COPD patients in the municipality.

Several stakeholders were involved in the pilot site. The local project group was led by Sørlandet hospital, Risør municipal health service managed the telemedicine centre and University of Agder was the research partner in collaboration with the research department at Sørlandet Hospital.

The aim of this paper is to summarise and share the experiences with the telemedicine project in Risør municipality. The research questions (RQs) that were stated:

RQ1: *How can telemedicine in municipal context be operated with a patient-centred care model?*

RQ2: *How can technology support the teamwork regarding telemedicine in a municipal context?*

## 2 METHODOLOGY

Qualitative research methods were used in this study to map and evaluate team organisation, collaborative work and challenges that arose [15]. Two semi-structured focus group interviews were made in June and December 2018 with the local project group consisting of five people with background from health service, technology and administration. The same individuals participated in both interviews, two male and three females. The interviews were led by two researchers that were observing the group from the project start in 2015 and until project end. The interview guide consisted of three parts. The first part collected information about the project; organisation, administration, recruitment of patients, training of employees and the follow-up procedure. The second part systematically targeted challenges during the project; organisation, technology, economy and collaborative work. In the third part, a summarisation was made of the present status in the project, the achievements so far and the next step/the future of the project. Each focus group interview lasted for three hours, with a total of six hours of audio-recordings that were made. In addition, annotations were made by the researchers. The recordings were transcribed verbatim by one of the researchers and a content analysis made with categorisation into three thematic sub-groups. This study is a part of a larger project that was approved by the Norwegian Centre for Research Data (NSD) with project number 51408 [16]. All the participants signed an individual informed consent.

## 3 RESULTS

The results presented are divided into three main categories: Organisational issues, Challenges and Sustainable operation.

### 3.1 Organisational issues

The municipality of Risør was requested to participate in the 3P-project in 2015, by the project management (NSE in Tromsø). At that time, Risør already had experiences with telemedicine through the United4Health-project where a telemedicine centre was established in Risør and operated during 2013- 2015 [17]. When the local project group was composed, the members from the previous project were asked to contribute again. All members from municipality of Risør, Sørlandet hospital and University of Agder accepted to join the local project group. This project group was stable throughout all the project. The decision of

establishing the telemedicine centre was approved by both the political and administrative leadership of Risør.

For the operation of the telemedicine centre, the 'Risør model' was constructed. It is based on a patient-centred model where a team of relevant health care providers is established for each patient with focus on 'What matters to you?' and with the patient as an important partner of the team. It was emphasised that the General Practitioner (GP) was a mandatory member of the team and when relevant, persons from the occupational therapy, physical therapy and rehabilitation service were included. Digital technology that supported the information flow for collaborative teamwork was desired to be implemented, with access for all team members to the patient's information. The telemedicine centre was established as an integrated part of the municipal health service in Risør. The remote monitoring was primarily intended for the COPD patients in the municipality, mainly because at that time a telemedicine algorithm was already developed and verified in the United4Health project, but also because the municipality was experienced with this patient group. However, it was also discussed to open the remote monitoring for other diagnoses as well.

At the project start in 2015, the intention was to operate the service with the technical solution developed by University of Agder and used in the United4Health project. But the municipalities in the Agder-region were working towards joint procurement of welfare- and telemedicine technology [18][19]. There was a procurement process where the Danish system OpenTeleHealth was chosen as a vendor for telemedicine in the Agder-region [20].

In the 'Risør model' attention was made on how to collaborate and share information about the patient, in a patient-centred team. A solution would be to store documents in a document database instead of sending e-messages containing information, a link could be sent to members of the team. But those functions were not available in the chosen system. In the collaborative work of Risør several e-messages are sent daily between team members, and several systems are in parallel use. A constraint with the e-messages are lack of answers or confirmation that the message was read by the receiver of the message. In Risør there are regular collaborative meetings between the municipal health service and the GPs. The municipal health service would like to have two-way digital communication with the hospital to be able to discuss with diagnose experts. The municipal health care service can be characterised as 'allrounders' that focus on long-time follow up of patients that might have need for medical advices from time to time in addition to medical support and care services at home.

The telemedicine centre was placed at Frydenborgsenteret in Risør, which is an elderly centre/nursing home. Two nurses were responsible for the daily operation of the remote monitoring service, but also having other tasks in the municipal health services. The GPs of the municipality had the medical responsibility for the patients. The aim of the project was to recruit patients that already received services from the municipal health care, and they could also be referred from the GPs and the hospital. For inclusion, each patient received a home visit from one of the telemedicine nurses for information, written consent, user

training and registration forms. As a part of the 3P-project a study is made on eHealth literacy and patient safety, the research protocol is described elsewhere [21].

A case with a Tablet communicating with a pulse oximetry device and sending measurements to a telemedicine data storage was placed at the patient's home. The patient made measurements of pulse and oxygen saturation in blood (SpO<sub>2</sub>) and filled in a questionnaire on the Tablet, with wireless transfer of data to the technical platform OpenTeleHealth. At the telemedicine centre, a nurse logged in to the platform to evaluate the measurements that were colour-coded with green, yellow and red alarm in a triage system. The technical system had included a videoconference function. In the case of acute deterioration, a home nurse could attend the patient using the tool TILT (early warning score). The municipal electronic health record (EHR) system Gerica was used in parallel with the telemedicine system for statutory documentation.

### 3.2 Challenges

Even though a detailed planning was made for the organisation and operation of the telemedicine service, there were some challenges.

One of the challenges was to find the patient group for inclusion to telemedicine intervention. The initial plan had the goal of 15-20 COPD patients recruited from established users of the municipal health care services. The home nursing service had two zones/groups in Risør. Both group leaders concluded that there were very few COPD patients receiving services at that time, in contrast to a few years ago when many patients had frequent hospital admissions. An agreement was made with Sørlandet hospital to help recruiting patients. But at that time the technology procurement was not finalised, and necessary equipment was not available, so the agreement had to be delayed. In addition, very few patients were referred from the GPs.

That led to an effort in recruiting patients that did not receive municipal health services but could benefit from remote monitoring services. This patient group often has contact with the municipal physical therapy and a formal collaboration was established. In addition, patients with respiratory aids at home were contacted for request about the interest of a telemedicine intervention.

Despite a zealous effort in the recruitment procedure, the municipality achieved only 50% of the initial goal of patients included to the intervention during the project time. In addition, the municipality had limited resources to provide telemedicine services to citizens not having municipal health services. There is a demand from the authorities to prevent disease in the municipalities, but no exact requirements on how or what to prevent. Telemedicine intervention is not only remote monitoring of symptoms, but also prevention through patient education [22][23].

Regarding the procurement process, several details needed attention. Who should evaluate the legal and privacy requirements and make the risk analysis? There were also issues regarding data storage and access control. In addition, a data controller agreement had to be made between the involved organisations.

Initially, there were legal and privacy issues to handle regarding the platform OpenTeleHealth [24] that delayed the technical implementation with more than a year. The main challenge was lack of secure authentication (2-factor on level 4) for log in to the telemedicine portal and log in was only allowed from registered addresses with Virtual Private Network (VPN) connection. To solve this issue an agreement was made with Siemens Healthineers Norway, regarding storage, operation and management of the technical solution, through the project funding.

The telemedicine platform did not have an integration with the municipal EHR system, Gerica. The GPs and the other municipal services involved in the patient's team did not have access to the medical information in the telemedicine system, so manual input was made into at least two systems. This caused some additional workload for the responsible nurses at the telemedicine centre in Risør. The nurses experienced technical challenges regarding the videoconferences with patients and chose in some cases to use the telephone instead.

The two-way communication between the telemedicine centre and the patient was an important function in the technical platform and was a highly appreciated function and important for the safety of the patient. With his function, it was possible for the telemedicine nurse to send a written confirmation to the patient's Tablet regarding verbal instructions made in the video consultations or by telephone, and the patient could reply with questions.

Regarding the technical platform, Bank-ID with 2-factor authentication was implemented to make the authorisation and log in procedure easier for health care professionals in field use. In addition, the same authentication method is being implemented for patients to access own health data.

### 3.3 How to manage sustainable operation?

The municipality of Risør managed to systemise the telemedicine intervention for COPD patients with the recruitment procedure, and implemented the technology fulfilling the privacy requirements. The main benefit of the intervention was to provide personalised remote monitoring in close collaboration with the health services of the municipality. However, it became difficult to integrate the telemedicine centre as a sustainable municipal service. One of the reasons might be that remote monitoring focuses on patient education and prevention of complications, which is not always a defined and prioritised task in the daily operation of municipal health care services.

Another reason is that the telemedicine centre generated more workload and with increased costs, related to inclusion of patients that did not receive municipal health care services. The outcome of telemedicine interventions should be economic benefits for the municipality, but there were no other services that could be reduced or replaced and this new service was recognised as a new unwanted increase in workload and costs. It is difficult for a municipality to measure the economic benefits in reduced hospital admissions or increased patient involvement and ability to stay longer at home because of the new remote support. During interview one of the project members expressed 'How to evaluate that the patients have an increased feeling of safety?'

Each municipality can distribute their budget for health services based on own priorities. An argument against telemedicine, is the cost of the intervention, focusing on prevention without knowing the long-term effects. This is competing with other priorities such as strengthening the staffing of each shift. An argument for telemedicine is the hypothesis of delaying the need for other municipal services, but again, with an unknown time aspect. A third reason for the difficulties in the operation of the telemedicine service were the different administrative levels in the patient-centred team as it had members from different organisations. It was expressed 'Who will pay for the technical equipment or the related user training? Unclear responsibilities and different administrative levels complicates this kind of collaborative work across organisational borders'.

After two years of operation, the Risør municipality decided to close down the telemedicine centre, because of the expenses and the demand for human resources involved. Instead, an agreement was made regarding a similar intervention from an inter-municipal telemedicine centre in Kristiansand, and later on this was changed to be a payed service from a centre located in Arendal.

The 3P-project with telemedicine intervention continued, despite there was a radical change in the operation. Risør municipality continued to recruit COPD patients for remote monitoring, none of them received other municipal services. Because of that, the patient-centred team approach did not work as intended as there were no need of professionals to be involved in the team and neither would they have access to any medical information regarding an intervention provided from another administrative municipality. The telemedicine intervention became a standalone 'silo-function' beside the municipal services in Risør. However, the municipal health service in Risør received e-messages from the inter-municipal telemedicine centre when changes were made in the medical treatment or if the intervention was terminated.

In interviews made with patients in the project, there was a positive feedback and general satisfaction with the service. It was also experienced an increased feeling of safety and improved self-management.

#### 4 DISCUSSION

This paper has shared the experiences with the establishment and the operation of a patient-centred telemedicine intervention in a middle-sized Norwegian municipality. The study showed that several challenges and obstacles in the operation caused the service to be terminated after two years and replaced by a payed inter-municipal service. The two research questions are answered based on the results.

RQ1 asked about how to run a patient-centred telemedicine intervention in a municipal context. The health services in Risør municipality are based on an integrated and patient-centred model. For instance, Risør has no administrative office for providing and making legal decisions for the services (*bestillerkontor*), instead the services provided are based on the evaluation by professionals in each zone/team taking necessary decisions. There was close collaboration between the zones, and for complex or emergency situations team members could be moved to the other zone.

Risør municipality has a strong focus on providing health services at patient's home, and there has been a significant reduction of beds in the elderly centres/nursing homes during the past 20 years. By discharge of patients from the local hospital, a short-time stay in elderly centre is often requested, but in Risør first priority is to try to provide necessary care at the patient's home. The size of the municipality and the organisation of the home care services allows to attend patients frequently and with a satisfying continuity of the staff.

Risør municipality established the 'Risør-model' addressing a team-based patient-centred telemedicine intervention, focusing on patient needs. It was decided that the patient's GP was a mandatory part of the team. The importance of this decision was shown later, when the national report on telemedicine intervention [3] concluded that the four national pilots in general had a lacking involvement of GPs. The following national telemedicine program 2.0 highlighted the important role of GPs.

Based on the experiences from Risør, it is recommended to integrate telemedicine intervention as a part of other already existing health care services, to enhance the patient-centred approach and promote digitally supported collaborative work. Even though the telemedicine service was terminated, the experiences are probably similar in many small- and medium-sized Norwegian municipalities. The approach showed the importance of planning an integrated patient-centred model and contributed to test out new ways of delivering health services. Many of the patients enrolled for telemedicine intervention have multiple diagnoses, and it is demanding for a small municipality to have all the required medical competence. Health workers in municipalities are in general 'allrounders', trained in focusing on the patient's activity, loss of self-care functions and the need of care and support, and not designed for complex medical follow up. This is slightly changed in a telemedicine intervention where the health workers provide remote medical advices and follow-up.

RQ2 targeted the digitally supported teamwork. When working with a patient-centred approach in a team, the sharing and having access to digital information is necessary for collaborating efficiently, avoiding verbal transfer of clinical information or manually enter the same information in several systems. The lacking integration of the telemedicine system and the municipal EHR was a constraint for the information flow and the collaborative work. This experience shows the importance of integration and standalone systems should be avoided as they limit optimal information flow in inter-disciplinary teams across organisations.

The manual input of information into at least two systems was an additional workload but had to be made to ensure the access to the information for other team members, as teams across organisational borders need shared access to information. Due to patient safety verbal communication has deficiencies.

E-messages played an important role for the information flow, but has the constraint of not knowing if the receiver has read the information and the sender of messages very seldom receives a response. Based on the experiences in Risør, we suggest for patient-centred teamwork to establish

a central storage of documents, measurements and corresponding advices/interventions and with a link to all the team members about new information available. Especially the e-communication with GPs has a potential for improvements and shared data access.

Telemedicine intervention is a service provided at day-time. For chronic patients at a severe stage, there should be one-point-of-contact 24/7 to avoid today's fragmentation of the service. This function could be placed at a municipal response centre for telecare alarms, as this is a 24/7 service. Many patients have a need of both services, and the splitting of those services into different centres enhances the 'silo' fragmentation.

For patients, the user interface of provided technology has to be easy to use. The patient at home should be able to use one single user interface in the Tablet for measurements and support functions with the patient-centred team, and also accessing the national health portal where the prescribed medication list is available. Such functionality is in-line with the national vision for 'One citizen- one health record' [25][26] 'We are still not there' was expressed by the local project team.

This paper has some limitations as it presents experiences from one single telemedicine centre that was a pilot site in the 3P-project. One of the strengths is the open sharing of experiences from almost four years of operation and the data presented is collected and analysed in a systematic way. The experiences are most likely similar and transferable to other small- and medium-sized municipalities testing out delivery of health care services in new ways with teamwork collaboration and supported by technology.

## 5 CONCLUSION

Through the 3P-project in Risør municipality, new ways of digitally supported service delivery and collaborative work were tested over time. For sustainable implementations and operation of telemedicine, a close collaboration is needed between municipal health services and GPs, which was well-planned and established in Risør municipality. However, new services are costly to operate, they often generate more working effort and it takes time for realisation of benefits and expenses are not always reduced in the organisation.

The reason for terminating the telemedicine service was a summarisation of many factors. In general, there are too many projects in the municipalities, with few enrolled patients and very few sustainable implementations. There has to be a large-scale operation for testing out new sustainable services and implementations with a focus of benefit realisation in order to gain evidence for the new services. Several years of operation is needed to show the long-term effects and potential benefits, and until the challenge of multiple levels of administration and complicated data access for inter-organisational teamwork are solved, large-scale operation remains complicated.

However, the patient-centred approach 'What matters to you?' has a close connection to the digital support. Standalone 'silo' solutions in organisations should be avoided and considerations have to be made if already existing and implemented technology can be used to collaborate and coordinate the patient's team.

The telemedicine project in Risør was not wasted, even though the execution did not follow the plan. In addition to telemedicine, the next step might be to test out other ways of delivering digital health services, such a virtual home visits or planning hospital discharge over videoconference together with the patient and the municipal health service. After the telemedicine intervention was moved to an inter-municipal centre, also heart- and diabetes patients can be enrolled for remote monitoring.

In the final phase of this research work within the 3P-project, the results from Risør will be compared with other telemedicine interventions in other health regions.

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