

Examining practices for remote care in in different infrastructural configurations

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Abstract. In this paper, we report from ongoing research on two cases on the use of telecare solutions for remote patient monitoring in Norway. Our analytical focus is on the practices of the nurses working in the remote care services and how the practices relate to the infrastructural configurations in which they are situated. By infrastructural configuration we refer to the organizational structure, service design, and technological solution. Specifically, we focus on three aspects emerging from the analysis of nurses' practices: the interrelation of care and coordination of work, the fragmentation of information and the constitution of patients.

Introduction

In the last decade, telecare systems - information and communications technologies linking people at home to health care services - have been promoted as a technological solution for problems of access to care and increasing health expenditures. Telecare solutions allow people with chronic illnesses to be remotely monitored at home, enabling the identification of early signs of health deterioration, and allowing the prevention of hospitalization. However, this approach to care has challenged traditional health services, which predominately target acute and episodic care, creating uncertainties in adoption and integration to existing care services, and leading to slow and uneven implementations (May et al. 2011). Moser and Tygesen (2014) argue that such processes are demanding and conditioned by dialogue, involvement and negotiation as well as flexible and

adjustable solutions. They propose to understand them as a longitudinal, multilinear and learning processes. In addition, Pols and Willems (2011) point out that telecare technologies “cannot be regarded as a finite ‘intervention’” and technologies should not be expected to work in a pre-defined way. Thus, this literature emphasizes the complex and open arrangements in which telecare solutions are situated. In this study we want to build on this line of research to examine the implementation of telecare technologies for remote care in relation to their *infrastructural configuration*. By infrastructural configuration we mean the relation between service design, organizational structure and technological solution in which telecare is situated. Previous research on telecare technologies for remote care has to a large extent focused on how specific interactions and relations have changed, for instance relations between patient and devices, patient and health personnel, and patient and service. These relations, however, do not exist in isolation, but are part of larger arrangements and nexuses of health-related practices.

In this study, we address the following research question: *how are remote care practices shaped by different infrastructural configurations?* We address this question based on the empirical study of two telecare projects. In Norway, telecare solutions in the homes are currently being implemented according to a new service model where remote monitoring centers are created in municipal care. We have examined the novel monitoring practices of nurses working in the remote monitoring centers. In the center, nurses monitor and analyze data and take follow up actions as appropriate. In this context, the use of remote care technologies proposes a proactive approach - a model where health professionals (i.e. nurses in the remote care centers) rather than being in control of the patient’s situation and telling patients ‘what to do’, guide patients in understanding their own conditions and enabling them to take actions themselves. This model entails the need to develop practices and systems that support nurses in knowing when and how to guide patients. However, there are still many uncertainties and challenges related to the use of telecare technologies in proactive care and remote care, and our intention is to contribute to an improved understanding of these novel services.

In the following section we briefly present the case background and research methodology. We then describe the two cases (as city 1 and city 2) where we focus on the two different infrastructural configurations (organizational structure, service design and information technology). Our preliminary analysis is organized around three aspects that emerged from cross-analysing the nurses’ practices in the two centers: the interrelation of care and coordination of work, the fragmentation of information and the constitution of patients. We conclude the paper by pointing to directions for further analysis and discussion of the cases.

Case background and method

In Norway, there are several ongoing governmentally sponsored pilot projects for remote care. In this research, we have conducted two case studies (Yin 2013) on two of the pilots in the national pilot program. Our research is designed as an interpretive in-depth case study because it is explorative and we aim to study an emerging phenomenon (Walsham 1995). The cases have been selected because they implemented the same information system for collecting and analyzing measurements from medical devices in the homes, and because they have a different organizational structure (public vs private center). The study started in September 2016 and is ongoing at the time of writing (May 2017). Data collection is based on interviews, observation and document analysis. Specifically, we have interviewed project leaders, nurses working in the remote care centers, and the management team of the vendor (HealthTech) of the information system. We have also conducted observation of work practices in the remote care centers, where nurses explained their work practices both in relation to the interaction with patients at home (via phone or using the remote care information system), and in relation to the coordination and cooperation in the center and across the other municipal care services.

Remote monitoring practices

Configuration 1. In city 1, remote care is organized in a new unit in municipal care, called remote care center, where two or three nurses work in shifts Monday to Friday. Patients are recruited to the program by the municipal care service, based on referrals from local hospital or municipal care assessments. When enrolled in the service, patients are usually visited in their homes by a nurse from the remote care center or by a member of a designated training team. During the visit, the patient is taught how to use the tablet and to take measurements with the devices by himself, and the devices are set up. While operating the center, the nurse sits at a desk in front of a computer and by the phone. To access and manage patient data, the nurse uses two systems: ProAct and the electronic patient record (EPR) system of the municipality. ProAct receives the data from the home devices of the patients in form of alerts, and the messages they send from their tablets. Each patient has a record in ProAct, and ProAct shows a dashboard where all recent measurements are displayed ordered chronology and by criticality (color coded according to personally set values). The second system is the EPR which is the medical record system used by all the health services in the municipality. It is a documentation system, but also a communication system. One of the functionalities offered is electronic messages (called PLO messages) between municipal care and GPs, and hospitals. For

instance, when a patient is discharged from the hospital, a PLO message is sent to municipal care to inform about the patient's follow-up care. Most communication between nurse and patient happens per telephone.

Configuration 2. In City 2, remote care is offered as a private service by HealthTech to the municipality. The nurses employed by the company operate the response center from the company premises. They keep approximately the same opening hours as in City 1. Patients are selected and recruited to the program by the municipal care services. Once recruited, patients receive two home visits. The first is from a municipal care worker, who does an initial assessment of the patient health and informs him about what to expect from the service (for instance by explaining that it is not a service for emergency care). This initial assessment is reported in ProAct. The second visit is from a nurse from the remote care center, who sets up the devices in the home and teaches patients how the devices should be used for taking measurements, and how to use the tablet for reading measurements and reading and writing messages. After this initial phase, the HealthTech nurses and the municipal health services coordinate via weekly phone calls but not during the day to day care of each patient. As the service is operated privately by HealthTech, the nurses are not required to document patient information in the municipal EPR and do not have access to it. Consequently, they do not receive any PLO messages coming from doctors or hospitals. This decoupling from other health services means that they rely on the patient himself to convey relevant information to and from such parties. ProAct is central in the communication with patients, and most communication takes place in the form of textual messages (which patient receive and respond to by using the tablet).

Preliminary analysis

In our preliminary analysis we focus on the differences in the practices of remote care in the two centers. Specifically, we point to three aspects.

First, **interrelation of care and coordination work**. We have observed that in the first case the work of the nurses when monitoring and caring for patient is interrelated to the work of coordinating the novel services of remote monitoring with the existing care services in the municipality. This work has many aspects, for instance it includes 'finding' patients in existing services that may benefit from remote care, or checking if actions from other services have taken place (for instance a visit of the home nurses). A concrete example of this type of work, as explained by a nurses, is the monitoring of patients' weights. While a weight loss might be overlooked in the tight schedule of the home nurses, this type of measurement is coded automatically by the system and therefore made visible to the remote care nurse. She can use this information in her communication with the home care nurse and direct his attention to the potential problem. This type of

coordination work does not have the same role in the second case, given their organizational and infrastructural decoupling from the home care nurses and other care services.

Second, **fragmentation of information**. The nurses in the two centers have different practices in order to make sense of how patient's conditions are developing. For instance, in the first case, the nurse deals with various pieces of information across a variety of artefacts: alerts, alert history, messages, patient record entries, calendar reminders, PLO messages. In the second case the nurse uses ProAct as the main information source. The nurses use ProAct for multiple purposes: to document their care interaction, to monitor the measurements from home devices, to communicate via messages with the patient, to set reminders and coordinate their work in the center and to plan the work in advance. They do not need to cross check information from other systems or services. As a consequence, the practices in the first case are less streamlined than in the second case. In the first, the nurses use substantial amounts of time – up to 1.5 hours a day – to manually copy data from one system into the other. In addition, in order to coordinate their work in the office and across services, they print out most data on paper (e.g. patient list) and keep track of patients manually on the office large whiteboard. These nurses, supported also by the project leaders, underscore the need for a technical integration between the systems as a necessary step to effectively coordinate with the other municipal services. Differently, in the second case, technical integration is not seen as an issue, and nurses' work is focused on monitoring incoming patient data and on exchanging messages with patients in ProAct.

Third, **constituting patients**. Patients have different roles in the two centers. While in the first one, the patient receives a care service that is integrated across the different health services, in the second case the patient is expected to work as service 'integrator' – this means for instance that he is expected to contact the GP in case of need. Another example is about hospitalizations. In case 1 when a patient is hospitalized, the remote care center receives a PLO messages from the hospital. Thus the nurse would know that the patient is in the hospital and that no measurements will be received for certain period of time. They receive another PLO message at discharge. In this PLO message the hospital would also specify the patient health condition and what kind of treatment and care the patient needs once at home. This differs from case 2, where the nurse does not receive PLO messages. Often, if a patient is hospitalized, the patient himself or a family member would send a message to the center.

Conclusion

We are at an early stage of data analysis and our data collection is still ongoing. However, we believe that our study on the practices in the remote care

centers raises some important questions about the implementation and use of remote care services. The infrastructure configurations in which the nurses operate shape their practices in several ways. When the center is decoupled from the other services as in the second case, the nurses' work is focused on the interaction with patients via ProAct, while at the same time patients have to take an 'integrator role' while receiving care from different services (GP, hospital, home nurses). Differently, when the center is integrated in the existing municipal care services as in the first case, the nurses' work includes coordinating and communicating with the other actors and dealing with different systems and communication modes. We acknowledge that the use of remote care technology in our cases is still at the stage of 'domestication' both in the homes of patients and in the centers, and that nurses' practices of dealing with alerts and caring for patients are 'in the making'. However, we think that it is important to reflect further on the implications of the infrastructural configurations on both patients' and nurses' role and practices.

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