The infrastructure of telecare: implications for nursing tasks and the nurse-doctor relationship

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Abstract Telecare can offer a unique experience of trust in patient-nurse relationships, embracing new standards for professional discretion among nurses, but also reflects an increasingly complicated relationship between nurses and doctors. The study uses ethnographic methodology in relation to a large 5 million euro project at four hospitals caring for 120 patients with COPD. Twenty screen-mediated conferences were observed and two workshops, centring on nurses' photo elucidation of the practice of telecare, were conducted with a focus on shifting tasks, professional discretion, responsibility and boundaries between nurses and doctors. Analytically, the study draws on Star's notion of 'infrastructure' and Mol, Moser and Pols's ideas of care as 'tinkering'. Infrastructure is understood as human and non-human conduct that is embedded into wider organisational conventions, sites and structures. The analysis demonstrates and proposes that, in telecare, greater accountability, discretion and responsibility are imposed on the nurse, but that they also have less access to the means of clinical decision-making, namely, doctors. The article explores how relational infrastructures ascribe the professions they constitute (nurses and doctors) functions of power and accountability and highlights the ethical problem of the nurse being given greater responsibility while simultaneously becoming more dependent on the doctor.

Keywords: ethnography, visual methods, interaction analysis, interviewing (qualitative)

Introduction

This paper explores how telecare affects nurses' tasks and nurse-doctor relationships. Public health care is increasingly dependent on welfare technology arrangements that affect the way care providers relate to patients and to each other (Aanestad and Olausson, 2010). Notions such as telehealth, telemedicine and telecare point to activities intended to support patients/citizens using a screen and/or phone. Typically, patients record measurements at home that professionals monitor elsewhere. 'Telehealth' is the most inclusive term, used to refer to all such activities, while 'telemedicine' implies treatment. Since rehabilitation is the primary goal in the studied case, however, this article focuses on 'telecare'. The majority of research on telecare focuses on the implications for patients. A substantial body of work has argued that telecare supports both the quality and efficiency of treatment and care (Cutler and McClellan 2001, Phanarath *et al.* 2014, Sorknaes 2013). There are also a number of studies focusing on how telecare transforms the working lives of care providers (Hansen *et al.* 2014, Nickelsen and

Elkjaer 2017, Oudshoorn 2008, 2009, 2011). The latter point towards discrepancies between political/managerial plans and care practices. Whilst technical designers ascribe a particular functionality to devices, health professionals incorporate the technology in their working lives in different ways (Akrich 2000, Suchmann 2007). Mol *et al.* (2010) argue that it is an over-simplification to regard telecare as a different and distinct kind of care. Rather, telecare leads to reconfigurations of general practices and understandings of care. It is such reconfigurations that I address in this paper and it is this body of research to which it contributes. Pols and Willems (2011) highlight how the screen-mediated contact between nurse and patient trans-forms the focus of the encounter by ignoring the patient's life in a broader perspective and privileging the patient's medical condition as represented by a few specific parameters. Contact via screen may thereby represent a barrier to a professionally satisfying work environment (see also Pols 2010). A number of studies point to new tasks arising as a result of telecare.These tasks concern issues such as providing patient training in self-measurement, but also the instal-lation and maintenance of IT equipment in private homes (Mort *et al.* 2003). Studies have pointed to the time-consuming challenge for care providers in creating relevant interaction between patient and technology (Nickelsen 2013). This kind of work is often not visible in the care providers' professional context and becomes 'invisible work'. From the perspective of the medical professionals, time spent on invisible work ties to issues concerning the allocation of resources and a lack of appreciation (Lampland and Star 2008, Langstrup 2014, Oudshoorn 2008). Some studies debate telecare with regard to care values and ethics. Astell (2006), for instance, argues that the effects are difficult to evaluate. Oudshoorn (2008) argues that telecare unfairly delegates complicated roles as 'diagnostic agents' to very sick patients and that the standards of the technologically mediated consultation alter the character of the observations made. In addition, the lack of validity of patients' self-measurements introduces an entirely new factor of uncertainty to health care (Oudshoorn 2009, 2011).

So far, this body of literature has focused on changes with regard to screen-mediated com-munication and manifestations of invisible work, but no research has explored changes in pro-fessional discretion. In a classical socio-technical text, Jaques (1964) argued for the concept of 'time-span of discretion' as a measure of how much responsibility an employee has. Jaques proposed that the higher a person's position in a hierarchy, the longer he/she could work to complete a task without supervision. In terms of this article's analysis of infrastructure, it is pivotal whether telecare leads to more or less professional discretion. According to Jaques, professional discretion relates to ability to improvise and base assessments on professionalism rather than organisationally defined regulations. Discretion and autonomy are closely related and, he proposes, adequate discretion is the result of good organisational design. In the occu-pational health literature, discretion and autonomy is associated with a healthy work environ-ment (see, for instance, Karasek and Theorell, 1990).

There are obvious differences between the presented literature on ethics, screen mediation and invisible work and literature focusing on organisational design. As I will demonstrate, the tele-care infrastructure comprises a not yet fully implemented organisational design. Therefore, it is crucial to explore what it does to professional tasks. Based on existing knowledge and empirical observations, I discuss the following questions: What does telecare imply for the professional practice of nurses? How does telecare affect tasks and boundaries in nurse-doctor relationships?

Analytical inspiration

The impetus for the following analysis of telecare, the professional discretion of nurses and the nurse-doctor relationship is provided by seminal studies of nursing practice (Clarke and

Star 2008, Büscher *et al.* 2010, Latimer 2000, 2003, Mol *et al.* Pols 2010). Latimer (2003) proposes situating nurses' 'conduct' not just in their relations with patients, but in all their relations. Nursing is found in the complex interplay between practice and cultural material. Therefore, when seeking to understand nursing as practice it is insufficient to focus only on the discursive dimension; it is also necessary to analyse how nurses organise their world through categorisations such as 'social', 'medical', 'acute' or 'chronic'. Mol *et al.* (2010) add that care practice is a matter of attentive experimentation and tinkering with arrangements of people and technical aids. Instead of casting care and technology as opposed, as respectively 'warm' and 'cold', Mol *et al.* (2010) intend to rethink and reframe them together. They want to disturb, complicate and contribute to the care-technology relation. What do care providers do with the technological infrastructure they face?

The notion of infrastructure relates to 'social worlds' a concept central to the American sociological tradition of symbolic interactionism. Symbolic interactionism embraces small regional studies that draw attention to meaning making, gestures and identities in professional groups. An 'arena' is composed of multiple worlds organised ecologically around issues of mutual concern and commitment to action (Clarke and Star 2008). Many interesting studies of the material basis of social worlds/arenas and relations between humans and non-humans have appeared the latest years. This has encouraged the exploration of infrastructure as a deeply rooted aspect of social world's analysis. Infrastructures (virtual, technical, material etc.) make up and is made up of the unique nature of each social world and can be seen as frozen discourses that form links between social worlds (Clarke and Star 2008). According to Star (1999) infrastructure is embedded into other structures, it is transparent in use; it has scope beyond the singular situation, it is learnt as part of membership, it is linked to conventions of practice, it becomes visible during breakdown and it is not global, but fixed in modular increments. In addition, there are two important difficulties in exploring infrastructure. Firstly, infrastructure means different things to different groups of people. Secondly, it is often mundane to the point of invisibility (figures, forms). Infrastructure includes a number of interfering social worlds. Star and Griesemer (1989) discuss collaboration among social worlds as a matter of how common standards at the same time bring social worlds together and allow a number of different performances across worlds. Star proposes explicit ethnographic exploration of the design of the infrastructure as well as the invisible work done to make it perform as intended. Infrastructure is not simply maintained order, but a human and non-human sociomaterial map of possibility that evolves as a practice of reconfiguration with respect to power relations (Butler *et al.* 2014, Hetherington 2011, Knoespel 2001, Munro 2000). Bowker and Star (1999) analysed how the application of computer and information science programs in nursing has standardised nursing work and, as such, has replaced certain areas of professional discretion with strict assessments of accountability. Based on this, I explore the sociomaterial organisation of telecare and the negotiation and restructuring of boundaries that facilitate certain forms of participation (Orlikowski 2012).

As such, this discussion of infrastructure and tasks ties into the debate on accountability. In short, accountability means that the care provider bases practice on the best knowledge from clinical research (a kind of gold standard) rather than on professional discretion and learnt routines/traditions. Based on a comprehensive ethnographic study, Wiener (2000) finds that there is not only a mismatch between the quality of care practice and its representations in accountability indicators; she argues that 'accountability work' diverts time, energy and resources otherwise used in care. Thus, she not only challenges the validity of accountability measures, she also suggests that care work is jeopardised by accountability. Mol (2006) also problematises the assumption of accountability as a kind of gold standard of care that is characterised by ambitions to define and measure care outside care practices. There is no singular, shared

form of health to strive for, she suggests. Instead, Mol proposes that we should try to understand 'multiple health' as it is practised in clinical work. In addition, Mol *et al.* (2010) argue that improvement of care practice, in general terms, is not something that has to pass an outside judgement or something that has to live up to a gold standard. Rather it is something that takes place as part of clinical ways of working. As a response to this, Jerak-Zuiderent (2015) argues that both Wiener's and Mol's perspectives have limitations because they divide care and qualification/improving into different worlds. In other words, they assume the practices of care and the qualification of care contrast. Inspired by Haraway's (1988) ideas on situated knowledge, Jerak-Zuiderent instead of a gold standard suggests a critique of the god trick of accountability from nowhere and for everyone. She proposes an approach to accountability that does not render connection between caring and accountability unthinkable (Jerak-Zuiderent 2015). Caring and accountability, Jerak-Zuiderent argues, relates closely in practice. They are mutually intertwined.

Taking an infrastructure perspective, this analysis focus on the intertwinement of standards, tasks and the nurse-doctor relationship (Carlile *et al.* 2013; Nicolini 2012). The notion of 'infrastructure' as 'human and non-human conduct that is embedded into wider conventions, sites and structures' helps approaching the professional discretion of nurses differently than, for instance, the notion of 'conduct of care' (Latimer 2000). Drawing on symbolic interactionism, Latimer's aim is to help nurses articulate their distinctions so that they can care for patients in ways that prevent hospitals from becoming inhuman spaces of indifference. As this is an important goal Mol *et al.* (2010) explore what nurses seek, foster or hope for; namely, what nurses perform as good. Rather than impartial judgements, care work demands attuned attentiveness. Since care takes place in a world full of complex ambivalence, they see nursing as a compromise between different ideas of what is good, not necessarily verbalised, but practised, and therefore as 'persistent tinkering'. Although there are indeed overlaps between my analysis and both these approaches, I focus less (than Latimer) on nurses' agency per se and more (than Mol *et al.*) on standards in order to understand how the tele-infrastructure distributes agencies. As such, the notion of infrastructure helps focus both on deeply rooted aspects of telecare and the tinkering to make standards and technology make sense and contribute in practice

In terms of the set-up and the strict standards of measurements, I see telecare as an infrastructure of accountability. This picture is however ambiguous because the nurses decide independently what to do with patients based on measurements as well as tinkering. I propose the notion 'paradoxical accountability' to describe the simultaneous gold standard of telecare-measurements (Mol 2006) and demand on professional discretion. The observed shifting tasks, that is, frequent patient-contact and more work on your own relates clearly to the infrastructure. To keep patients at home and save lung-doctor resources is part of the technological set-up and 'the unreachable doctor' is therefore not just coincident. When obtaining laboursaving potentials and keeping hospital expenses down is the central tenet in the pilot project, it is hardly surprising that nurses experience it as difficult to consult a doctor. I recognise however, that this observation to some extend may have to do with the start of a new practice. Telecare obviously needs further embedding in day-to-day care. Some of the struggles described may therefore be normal hindrance that comes with unfinished implementation of telecare.

Brief context for the empirical study

With a 5 million euro grant from the Welfare Foundation (Fonden for Velfærdsteknologi), the pilot project 'NetKol' was investigating the labour-saving potential of introducing telecare for

patients with chronic obstructive pulmonary disorder (COPD) as one of its central aims. The empirical material discussed stems from a qualitative study conducted late 2014 and early 2015 on the effects of on-screen care for patients in their own homes, with the participation of nurses at four hospitals in Copenhagen. When this study was done, 120 patients and a control group were enrolled in the project.

Research design

The following data are included in the study: document studies; two planning meetings with the project managers; two subsequent workshops with the 10 participating nurses from four hospitals; nine 3-hour participant observation sessions, 13 transcribed 30-minute semi-structured interviews; 52 photos; and 9 notebooks kept by nurses. In the role of participant observer, I attended 20 outpatient screen-mediated consultations between the nurse at the hospital and the patient at home. All observations occurred at the four hospitals. These combined observations and interviews were followed by a more formal interview with nurses based on the researcher's emerging questions, which was recorded and transcribed verbatim.

At the initial meeting with the group of participating nurses from all four hospitals and the two project managers, I gave the nurses the following instructions: take five photos with your mobile phone of situations that illustrate changes resulting from telecare to your tasks and collaboration with doctors. In the notebook, please record for each image: What does the photo show? When and why was it taken? What does the photo suggest in terms of this project?' I did so to establish an explorative atmosphere for the study of the telecare initiative. The method draws on Warren (2008), who uses visual approaches to scrutinise the 'small stories' about organisational life in order to understand people's work. In relation to the limited time and resources available for the nurses in the project, this gave them an easy and meaningful opportunity to present their views. The method relates to my overall argument about the relation between infrastructure and discretion by letting the nurses tell and visualise how they see this relation. We examined all the photos and notebooks during a three-hour long presentation and discussion. One by one, the nurses presented their five photos and read their notes on each image aloud. After each nurse's presentation, a discussion followed. Initially, I obtained access to NetKol to report on the psychosocial environment emerging among nurses as an effect of telecare. It was not evident from the beginning that doctors would be part of this. However, at the initial meeting we discussed the conditions of the study. Several nurses suggested that, if I wanted to say anything relevant about the nurses' psychosocial environment, doctors had to be involved. This was a key moment in determining this article's analytical focus. To the extent that doctors were involved, it was to gain insight into the broader professional view of the implications of telecare. In total, I interviewed four doctors, including two chief physicians. Further observation of doctors would have been fruitful in terms of the ambition to analyse interdisciplinary boundary effects; observing nurses and interviewing doctors does not reflect a traditional professional power divide. Rather, it reflects an emergent understanding of the crucial role of doctors in telecare. In addition, since I 'followed' nurses, I observed doctors when they met with nurses at different locations and in various contexts. The datacollection spanned a period of three months. I wrote and sent a 20-page report on the implications of telecare for the working environment to the NetKol board of directors, as well as to all participating hospitals. The observations and arguments presented in this report were further expanded based on feedback from participants.

Analysis

The organisation of the work site and the telecare tasks

Telecare worksites at each of the four hospitals comprise the same technological setup: Two large screens, a set of headphones with microphone, various checklists, medical devices for demonstration purposes and various directories for reference.

The two screens make it easier to flexibly switch back and forth between the four IT systems that the nurses use: (i) Open Tele is a platform for handling telehealth measurements from personal health devices. The platform comprises a server program and an app installed on a tablet located in the patient's home. Using this tablet, the patient can answer questionnaires, record measurements and communicate with the hospital staff; (ii) OPUS is a journal system that contains patient information, hospitalisation information and contains an app for writing journal notes; (iii) GS is the booking system; and (iv) the support provider's troubleshooting system (see Figure 1).

In connection with the NetKol application to the Welfare Foundation, a number of tasks were established to be applied at all participating hospitals in order to document a decrease in the re-hospitalisation rate across hospitals. The nurses' primary task is to monitor and respond to the patients' submitted weekly measurements of weight, oxygen saturation and heart rate, as well as their responses to four questions concerning shortness of breath, coughing, amount of slime and colour of slime. The patients record measurements at home and send them to the hospital via Open Tele. If the measurements are normal, green bells appear in the Open Tele interface at the hospital. Blue bells appear if the patient has failed to send measurements. If the measurements deviate from the norm, yellow bells appear. If the oxygen, heart rate or weight measurements deviate by more than 4 per cent, red bells are displayed on the Open Tele screen (see Figure 1(d)). In the event of a red bell, the nurse is required to call the patient. According to the nurses, this constitutes a meaningful routine for monitoring. This relates analytically to the notion of infrastructure. As mentioned, infrastructures comprise a kind of frozen discourse that forms links among social worlds (Star and Clarke 2008). Thus, when the nurses report on a meaningful connection between hospital and home provided by screen and measurements, they report on a useful 'infrastructure of monitoring'. This approach, of course, has consequences for what I include in this analysis. An infrastructure perspective excludes for instance life worlds, phenomenology and cognitivism.

The nurses have monthly individual video conferences with all patients. During these meetings, the nurse follows a checklist to obtain an overview of different parts of the conversation. She (all nurses are female) asks the patient about well-being, exercise, diet and use of
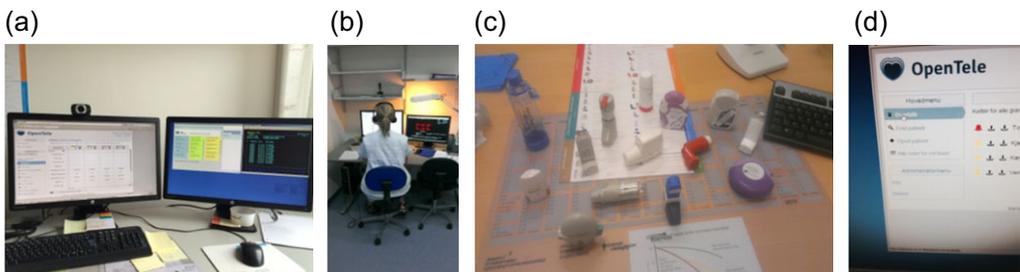
(a)	(b)	(c)	(d)

Figure 1 *(a) two screens with three open applications. (b) the nurse in a video conference with headphones and microphone. (c) medical devices for demonstration purposes. (d) illustration of the bell system in Open Tele.*

medicine. These meeting typically last between 15 and 25 minutes. Afterwards, she records proceedings: first in Open Tele, then in OPUS, then in GS and finally, if there have been any technical problems, in the troubleshooting system. If the patient reports a deterioration in condition, for instance, a saliva sample is sent to the laboratory. For this purpose, the patient has saliva supports and envelopes at home. In other cases, the nurse must consult a doctor to obtain a new prescription, a blood test, X-rays, etc. Once a year, all enrolled patients have a consultation with a doctor. This may involve physical attendance at the hospital or be conducted as a teleconsultation.

In telecare, there is a strong focus on managing uniform and highly standardised measurements. Another aspect is that a lot of invisible work and efforts to ensure the various technological tools function as intended becomes part of the job. This applies to both image and audio. There are many intricacies and tricks to be learnt in terms of solving various technical issues, such as problems logging on, a stuttering picture, screens suddenly going blank at the moment of submitting measurements. A lot of time is spent in contact with support technicians. Telecare operates via several platforms. This involves inputting more or less the same information into several applications, leading to a surfeit of documentation.

Location of the telework site complicates clinical decision making
I have now briefly described the general tasks of the telecare work site, but the actual practice differs from hospital to hospital. For instance, at one of the hospitals a small telecare office is located in the lung disease ward, which is several minutes walking distance from the outpatient clinic (OLC). This positional priority is officially justified by the fact that the most engaged nurse works here. The location of the office is particularly impractical for nurses because vital contact to doctors is limited by the distance. Due to general problems with lung doctor resources for most of the pilot project period, an alternative communication channel was established in the form of a direct SMS hotline between telecare nurses and the chief physician. This is interesting in an infrastructure perspective, where spatial distance immediately complicates collaboration among sites. However, although SMS may offer a viable connection, in this case, the arrangement left all tasks to the nurse.

Assumptions of professional effectivity

The question of professional effectiveness as a nurse is interesting in terms of telecare's implications for nurses' tasks, discretion and relationship to doctors. Several nurses state that it motivates them when telecare patients take responsibility for their own body. As one nurse puts it: 'What is promising in telecare is when the patient sends "Red" measurements or "Yellow", you just respond. You know the patient and you simply call and ask how they are. Later, we have a video meeting where I can observe how the patient is. You have a relationship to the patient. The patients take responsibility. There is an educational aspect to it'. According to another nurse, telecare constitutes an important incentive to apply technology. She says,'the fact that the technology is useful to the patients stimulates me to learn more about the technology and bring myself in a situation where I can do more with technology and thus become more effective as a nurse'. She continues, 'Telecare is about pedagogy. I will observe the patient and guide [him or her] and the patient has the opportunity to contact me. They cannot do that in OLC. The patients learn to observe themselves and their symptoms and how they are'. However, there are different understandings of being effective as a nurse. Those that find themselves less effective refer to invisible work and a lack of contact with colleagues. Some point to the technical problems as time-consuming and as causing them to

become less effective. Others refer to there not being enough to do. Some find they waste their time looking for doctors and some think poor image quality compromises their discretion and effectivity.

Virtual screen interaction impairs contact
Pols and Willems (2011) have argued that videoconferencing impairs immediate contact and oversimplifies the resources available for professional discretion to a few figures. However, discretion is also impaired because the nurse only sees some parts of the patient's body, typically the face and upper torso. The nurses tell stories about cameras in a patient's home pointing at the ceiling or about patients not being appropriately dressed during video conferences. Rather than being respectless, I sensed the nurses thus managed situations characterised by impaired contact. A nurse concisely states what is at risk, 'I do not feel I can use my clinical gaze in the same way when I see a patient behind a screen. You experience lower sound quality, and the colours are not always optimal. I can only really see their face … I am not able to listen to their breathing as I would if they were sitting across from me. It is impossible to notice if they have cold fingers when they put the oxygen meter on. You can only ask whether this is the case. I cannot observe whether they have blue lips and nails'. On this basis, she argues that the screen contact with the patient is worse than the physical encounter in OLC in a number of crucial ways. The argument is that the screen mediation impairs the ability to exercise a serious assessment as long as there is no opportunity to see the patient 'in real life'. This is not surprisingly considered a nuisance by nurses and regarded as a barrier to professional discretion and to assessing the patient's general condition.

Telecare implies longer sequences of continual contact
In telecare, nurses more independently prepare and follow up on measurements than they do in OLC. Due to the ongoing contact, nurses assume responsibility for responding to unforeseen health matters. One nurse states,'when we are in OLC, we pull the patients to the doctor. In telecare, we set things in motion. If they need a blood test, x-ray or saliva sample, I order it'. Another nurse states, 'we have a huge responsibility. We see measurements from the patient every week and this makes us discover far more than if we only see the patient twice a year. We have discovered a heart condition several times. In that case, you need to respond to symptoms that are not only lung-related and we have a responsibility since it is us who assess when to involve a doctor'. Thus, in telecare the nurses more independently follow up on measurements than they do in OLC, and since they attend telecare certain weekdays they also meet the patients in person more often.

   Whereas the nurse and doctor in OLC receive patients as a team, in telecare, the nurse is alone; she must rely on her professional discretion and cannot pass responsibility to the doctor. The telecare infrastructure affords that the nurse sees the patient much more while the doctor sees the patient less. The nurse sees the patient every month via screen whereas the doctor sees the patient every year. The continous follow-up on weekly measurements provides the nurses with a unique understanding of the patients' health condition. One nurse for instance explains 'the patients open up more, so it's easier to help them because you get a closer cooperation, than if you only see them every six months for 15 minutes' (as is often the case in OLC). Although invisible work (Star 1999) and oversimplification of resources available for professional discretion (Pols and Willems 2011) constitute trade-offs, I propose this formalisation of contact implies a noticeable change of professional delegation. Nurses have continuous contact with patients over long periods; they know the patient and constitute the primary contact. As such, telecare entails a portfolio of tasks evoking greater exercise of professional discretion.

   Another pivotal aspect in telecare that supports strong relationships is the fact that videoconferencing with patients is booked flexibly and one hour apart. In relation to normal controls in OLC, this means there is plenty of time to interpret measurements and evaluate the implications of the measurements in relation to the patient's everyday life. Typically, in OLC, a medical doctor is waiting and so are perhaps twenty patients. A nurse estimates 'to have time available gives you job satisfaction and it really makes a difference'. This is in opposition to what is often the case in OLC, where the nurse works under a constant time pressure. There are types of conversations with patients that the nurse never starts, because they know they do not have the time to finish them. 'Then you say, let's talk about that next time! And you know very well that there may be no next time'. Thus, in relation to the question of time, to work as a nurse in OLC and in telecare are different. In OLC, the nurse works under a constant time pressure. In telecare, the nurse has time to plan the conferences, to monitor measurements and to talk with patients. Therefore, the telecare infrastructure supports strong relationships among nurses and patients and changes delegation of tasks among nurses and doctors. This division of labour gives way for more responsibility and professional discretion for nurses

The nurse as case manager
The point is that the telecare infrastructure has important implications for the possibility to exercise professional discretion for the nurse. In spite of the problems pertaining to invisible work and impaired screen-interaction, the telecare infrastructure links patient and nurse together in mutually enriching relations. This is the case due to continual coherent meeting over a period allotting sufficient time, the weekly-submitted measurements, the bell-system and because the nurse enjoys the position as the patients' entry point to the hospital. This is the case, I propose despite the screen and the measurements, as mentioned, reduce the patient's situation and health into a few parametres (Pols and Willems 2011). This, of course comprises high costs on execution of discretion and may indeed impair the nurses possibility to do relevant assessments. For this reason several nurses emphasise that telecare cannot stand-alone. It has to be combined with regular physical meeting.
   Whereas, the doctor and nurse collaborate closely in OLC, in telecare, the nurse is alone and cannot rely on the doctor's decision. Here, the professional discretion and knowledge of the nurse stands alone and in this case, she must look for the doctor. Most nurses are satisfied with this more responsible position, however in front of an unexperienced nurse, I observed, the demands on knowledge and expertise lead to insecurity. Most nurses appreciate the calmness and expertise in telecare. A nurse states, 'I think it's amazing that you do not get disturbed. Normally, seven nurses sit together in one office. It disturbs. You are not interrupted here. It is nice'. Others miss colleagues and some simply state,'It can be too trivial' or 'it may be too silent'. Nursing in telecare, in relation to OLC, clearly demands more independent decision-making. It makes a mentionable difference in the delegation of tasks that in telecare, the nurse decides when to involve a doctor. In OLC, the doctor is always there and takes the clinical decisions

Collaboration, tensions and boundaries between doctors and nurses
The collaboration between doctors and nurses is a source of frustrations. Rather than to follow highly standardised and labour-intensive procedures, the doctors think telecare ought to be practised according to the patient's (not the nurses') goals. The doctors worry that the routines seize the patients time without clinical results. They doubt whether videoconferencing after all relieve treatment and care, but support that close telecare follow-up in relation to the very sick COPD patients provides security. They stress that research is not yet able to document decrease in re-hospitalisation rates. Hence, they are concerned that politicians oversell the benefits of telecare.

In relation to videoconferencing, a doctor says, 'I am able to hear in a telephone whether a patient's breathing is in a bad condition. I am not sure how much extra I get informed by looking at a patient on a screen'. This statement is interesting in relation to infrastructure analysis. It appears that both nurses and doctors doubt the fineness of screen-mediation. I have earlier referred to several incidences where nurses criticise the quality of the virtual screen image. This has serious implications concerning both nurses' and doctors' execution of their tasks in telecare. However, there are important differences concerning how nurses and doctors contribute to telecare. While nurses are professionally engaged with the patient and have sufficient time, the doctors have a full program in OLC. Therefore bad image quality does not affect doctors nearly as much as it affects nurses. When it comes to the nurse-doctor relationship there are easily identifiable tensions among them regarding conditions for contributing to telecare. The question repeatedly posed by nurses is 'How do we get faster and better contact with the doctors'. With regard to this, a nurse took a picture of the doctors' roster. The photo shows the telecare column in the doctors' roster and that this column is consistently uncompleted. This means telecare is not assigned to a specific doctor, despite such a task exists in clinical practice and as a column in the roster. This tells us that in spite of the strong need for lung doctors in telecare, their contribution are to some degree formally abandoned. Therefore, it is the day hospital doctor, who has to deal with telecare inquiries and since he/she has already recorded a full day program in OLC, he/she needs to be contacted in between other tasks. Not surprisingly, this means clinical decisions are postponed and that doctors act as bottlenecks. According to a nurse, 'You have to come crawling ... I've gone all day waiting for a response from a doctor ... when you want to get hold of a doctor you need to beg: could you just help me? ... some of them respond ... who has telecare today?' A doctor said, 'I think it's a shame for them when they run around and must have handed some information and need answers. Therefore, I help them. This is part of our treatment of our patients. The doctor should assist the nurses, but they are stressed'. Generally, the doctors are worried about adaptation of telecare to existing practice and that the routines take up time without clinical results. A doctor states, 'It is smart that the patient can submit measurements from home that they would otherwise have to go to the hospital to have done. What we do not know is for which patients this is most appropriate, how often to take measurements, and how it should be adapted to the individual patient. There are many unresolved issues ... we need to find out how to fit it into our work practice'.

The point is not that doctors are neglectful. Rather, I find it interesting that telecare slides out of the doctors' attention. After all, they received a grant. This interest was strengthened because I repeatedly observed that the nurses were dependent on the doctors' decision on medical questions in order to get on with the day's work. In one case, a nurse walks immediately after video conferencing into OLC in order to get a doctor to prescribe medication. She had received analytical results obtained through submitted sputum (mucus sample) from the laboratory. The nurse waited outside the office while the doctor talked on the phone with the door open. A porter arrived with a sick bed, with a seriously ill patient. All now queued up outside the doctor's door. After a few minutes, however the nurse succeeded in disposing the saliva sample. Subsequently, the nurse told the doctor that he had to call the patient to gain insight into the symptoms and prescribe proper medication. Shortly after, instead the doctor stuck his head in the door to the telecare office to return the saliva sample including prescription of antibiotics. Immediately after, the nurse called the patient to tell him that there was now a prescription online. This little exchange illustrates on one side the nurse's struggle to achieve contact with the coveted doctor and the more subtle and unspoken battle over who should assume the tasks. Instead of contacting the patient, the doctor quickly returns to delegate this task to the nurse. Many point to the possibility that because of the telecare infrastructure, tasks and

responsibility shifts from doctors to nurses. This has both to do with ambitions to obtain quality from the perspective of the patient (frequent contact) and savings of doctors' time.

During the 20 observed videoconferences, I only witnessed one doctor talking virtually on screen with a patient for a few minutes. This left the impression of a close-knit professional boundary between doctors and nurses. The doctor repeated many questions the nurse had just asked. This demonstrates adherence of the wellknown division of work as practiced in OLC: in OLC the patients always meet both nurse and doctor and they meet the nurse first. The doctor summarises and decides what to do. A nurse says, 'In telecare, the nurse summarises and decides what to do, unfortunately when this involves medication, which is often the case; the absent doctor must be involved, who then has to be found out there'. It may be summarised that at various hospitals there are different practices and routines with regard to how nurses and doctors collaborate. However, I observed that the telecare nurse repeatedly participates more in the position of an expert in clinical questions than is the case in OLC. While telecare embraces the potential for nurses to work more independently as experts and case managers, the doctors become more distant decision-makers on whom the nurses are still dependent.

The nurse as both accountable and autonomous
Because of the continuous contact and the strictly standardised system of accountability based on repeated follow-up on measurements, the nurses meet an array of complicated clinical questions. The weekly measurements that the patients submit often provide opportunity to identify symptoms that the nurse, or any other professional, would not otherwise discover. A nurse states, 'We have repeatedly discovered that the patient had a heart condition'. These situations point toward an infrastructure demanding clinical knowledge outside the lung medical specialty. It also points to demands in telecare of being able to improvise and intervene appropriately. Because of the infrastructure, the nurse has important responsibility as a case manager concerning the patient's overall course and treatment. Telecare reallocates the expertise because the nurse decides when to involve the doctor. This means for instance a new and important responsibility with regard to avoid re-hospitalisation of the patient. This makes them talk about the patients as 'our own patients'. It is clear that the feeling and experience in relation to this responsibility adds new dimensions to the nurses' portfolio of tasks. Thus, the reallocation of tasks due to the telecare infrastructure demand that the telecare nurses' knowledge encompasses a broad field of clinical expertise that makes it possible to act autonomously. In other words, the nurse must 'stand professionally on tiptoe'.

While, standards and measurements undoubtedly stand centrally in telecare, what agencies and values mobilise next to discretion and tinkering with measurements? So far, I have focused on the regular telecare practice of nurses and doctors. There is, undoubtedly, a notable change from seeing a patient every six months in the clinic to once a month by screen based on weekly-submitted measurements. From reading through my interviews and observations, nurses, it appears, account for and value issues related to patient-education. Carefully and persistently, they inquire into symptoms such as pain, fever and swelling both to build confidence in relation to patients, to understand more of patients' situation and to help patients learn about their disease. Much time during screen meetings concerns encouraging walks, training, etc. and since the patients often take the medicine incorrectly, the nurses persistently demonstrate and explain how the patients ought to take the medicine and what the expected effects are. Thus, telecare nurses, apart from measurements, account for the particular situation of the patient, their intake of medicine and the amount and quality of bodily movement. Moreover, they make sure not to call patients too often and in order to see them they plan screen meeting as flexibly as they can.

Conclusion

Based on Star's notion of infrastructure as a human and non-human map of relations embedded into other structures, this study takes a closer look at reconfigurations of tasks in telecare. Two questions are discussed: What does telecare imply for the professional practice of nurses? What does telecare do to tasks and boundaries in the relation between nurses and doctors? The analysis centres on shifting tasks and boundaries. Across hospitals, telecare comprises monitoring and following-up on the patients' weekly-submitted measurements in terms of weight, oxygen saturation and heart rate, as well as their responses to four questions. Patients send measurements from their home to the hospital via the Open Tele application, with regard to which nurses monitor and respond to patients.

I discuss material and virtual infrastructure as a kind of frozen discourse that form links between social worlds (Clarke and Star 2008). This helps focus both on deeply rooted aspects of telecare, on how nurses take up and tinker with standards and the nurse-doctor relationship. The analysis points at a number of implications of telecare. Firstly, nurses have plenty of time as well as more control over the workday. Secondly, telecare provides a mutually meaningful and long stretched contact between nurse and patient. Thirdly, the telecare infrastructure demands much professional knowledge and professional discretion due to the nurses' role as primary contact persons and case managers. However, telecare also implies impaired contact to the patient and worsened professional assessment due to sometimes-deteriorated screen image and sound. As such, the analysis shows that the telecare infrastructure embraces extension and nuancing of the existing service. Although, the weekly monitored measurements are not yet fully implemented in the formal division of labor, the telecare infrastructure re-performs nurses' tasks and the boundaries between nurses and doctors. On one side, the infrastructure comprises much focus on predefined standards and measurements, which to some extent exclude professional discretion. On the other side, telecare nurses work professionally alone, they have little contact with doctors, and are in continuous contact with patients. As such, telecare mobilises increased professional discretion and a focus on patient-education. Rather than standards and regulations, professional discretion relates to ability to improvise and base action on assessment and reflection. The notion of professional discretion relates closely to Mol *et al.*'s (2010) notion of care as tinkering with arrangements of people and technical aids. In the studied case, this means that the nurses actively re-perfom their practice with telecare standards and measurements. They re-perform their practice as paradoxically accountable experts. On one side, they are exposed to the strict system of accountability and standards on the other side they apply professional discretion, which means they tinker, improvise and assess what to do with received measurements and the patients. This conclusion points back to Jerak-Zuiderent's (2015) argument concerning caring and accountability. Despite accountability appear to come from nowhere to everyone, caring and accounting are after all closely related in practice.

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