Tinkering with (in)visibilities

Caring for older people with surveillance technologies

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ORIGINAL ARTICLE

Tinkering with (in)visibilities: Caring for older people with surveillance technologies

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Abstract
New surveillance technologies have in later years been introduced in care for older people as part of a broader policy agenda of 'sustainable' welfare state retrenchment, promoting ideals of self-sufficiency and empowerment of older people 'ageing in place'. Drawing on newer approaches to surveillance studies, this article explores care workers' active labour in creating (in)visibility in a complex and ongoing process of tinkering, while negotiating political rationales of empowerment and professional accountability. Hence, visibilities are conceived as coded, reflecting different ideals and rationales. Based on extensive fieldwork in Danish eldercare, we analyse two forms of surveillance: virtual homecare and sensor-flooring, where clients are involved and positioned in different ways in accomplishing surveillance. We illuminate how the process of accomplishing (in)visibility does not only involve tinkering with technology, but also with spatial arrangements in the client's home, and with clients' behaviour. Consequently, we underscore how tinkering may turn out to be a difficult and even conflictual task of negotiating professional authority and accountability in ways that resonate with clients' sense of autonomy and policy

ideals of empowerment. Our studies underline how the power dynamics of surveillance in care should not be overlooked, even though they are continuously negotiated in care practices.

INTRODUCTION

New surveillance technologies currently play an important role in ongoing reforms of the eldercare sector in Denmark. Various alarm systems, GPS trackers, sensor systems, and tele-care technologies are employed to promote policy goals of ageing in place, empowerment, and increased autonomy for older persons in need of care. With these technologies, care workers may increasingly physically withdraw from older clients' private spheres while maintaining access to monitoring and assessing clients' needs and wellbeing and performing care at a distance (Kamp et al., 2019; Mort et al., 2013; Pols, 2012). In this article, we show how new forms of (in)visibility are enabled when care workers[1] practice surveillance with two such surveillance technologies: sensor-flooring and virtual homecare visits, and we show how a continuous negotiation of some-times conflicting rationales of empowerment and professional accountability arises.

The increased use of new surveillance technologies in the Danish eldercare sector forms part of a broader policy agenda concerned with welfare state sustainability and retrenchment, in view of an ageing population and labour shortages in the sector (Ministry of Finance et al., 2018; Walker, 2009). In the Danish context, this agenda has taken the form of what Dahl (2005) has labelled 'a different form of retrenchment', where care services largely remain publicly provided and reduction and rationalisation of welfare state services are not only sought through spending cuts, but also through a changed ideal of care. This changed ideal of care relies on discourses of active ageing and neoliberal conceptions of empowerment (Katz, 2000; Rose, 1999), and is pursued through strategies of ageing in place and 'reablement' (Bødker et al., 2019; Hansen, 2016). In this context, empowerment is articulated as efforts that support clients in obtaining the highest possible level of self-sufficiency, autonomy and freedom from reliance on care services; and care workers are to withdraw as much as possible from physical care and presence in clients' homes (Hansen & Kamp, 2018). Receiving care and the presence of care workers in one's home tend to be thought of as unwelcome intrusions and obstacles to leading a dignified life (Hansen, 2021).

New surveillance technologies play an important role in this pursuit of empowerment when applied to many clients who do not become completely independent of care services. Use of surveillance technologies is thought to support autonomy-enhancing, less 'intruding' and less costly care practices, as care workers may obtain access to information on clients' needs and wellbeing at a distance. This access is crucial for care workers, who in addition to the expectation of empowering clients through withdrawal from their private sphere, are met with increasing demands for monitoring and documentation of clients' needs and wellbeing (Kamp et al., 2019). A strong public focus on care failures and iconic cases of 'care scandals', which are covered extensively in the media, only reinforces such demands (Jönson, 2016).

Surveilling or 'watching over' the needs and wellbeing of clients, has always been an important part of the responsibility of care organisations and workers—with or without new technologies. Care workers are responsible for observing and detecting problems or risks related to their clients'

needs and wellbeing and to adapt their work in order to address them (Kamp, 2012). For example, homecare workers may use cues, signs or symbols such as smell or level of tidiness in the home of a client in order to detect risks, such as signs of dementia (Hout et al., 2015), or they may monitor clients through standardised measurements, such as stool-records (la Cour, 2011), intake of liquid, intake of medicine, insulin level etc. Often, this kind of monitoring is an integrated part of the quality assurance system of care organisations. Surveillance technologies may be used as a new means of lifting this well-known task of surveillance, when care work is to become more withdrawn; a means of managing quality and risks and ensuring professional accountability, while performing care at distance. In line with this rationale, many studies on surveillance technologies and care have so far been based on a technical-functionalist understanding, and aim to identify systems that 'work', that is, can detect and monitor risks satisfactorily (Mortensson et al., 2015).

We take a different perspective and show how new surveillance technologies do not simply supplement or replace well-known methods of surveillance and risk detection in a neutral manner but transform care practices. New technologies may take surveillance to another level, for example, allowing for more continuous monitoring, or making new aspects of client behaviour visible to care workers, while they may also complicate or obscure care workers' insight and abilities to assess clients' needs and wellbeing. Working with these new surveillance technologies thus poses demands on care workers, who must create and manage visibility in their work in new manners and continuously negotiate their needs for insight and professional accountability with sometimes conflicting rationales of empowerment. We explore this through case studies of the use of two quite different surveillance technologies in two different contexts. In our study of virtual homecare, video conversations replace physical visits to clients' homes to monitor, for example, wellbeing or medicine intake. In our study of sensor-flooring in a care home, clients' movements in their flats are logged, and care workers are alerted to events that require their attention (e.g. a fall), through signals sent from floor-sensors to their smartphones. We illustrate both the active labour of creating (in)visibility required by care workers with these new technologies, the remarkably different forms of surveillance created, and care workers' delicate negotiations of professional accountability and empowerment in these practices.

SURVEILLANCE AND CARE WORK

We approach surveillance as an accomplishment, negotiated in situated, complex processes that are marked by friction and even resistance. We take departure in newer discussions on surveillance, sparked by Shoshana Zuboff (2019), David Lyon (2006) and others. They point out how surveillance in the wake of the profound digitalisation of society, has become a widespread, complex and often multidirectional societal practice; a situation calling for new conceptions.

An important emphasis in this new turn in surveillance studies is to call attention to the invisibilities as well as the visibilities created with surveillance technologies (see e.g. Latour, 2005). Moreover, the micro processes and labour of practising surveillance are emphasised, directing our attention to agentiality, resistance and friction in surveillance practices (Ball, 2002, 2003; Lyon, 2006). Building on these insights, we focus on the (in)visibilities created in care practices with new surveillance technologies, and we take a special interest in those who practice surveillance as a professional activity (care workers), zooming in on the surveilling subject rather than those surveilled.

Research within post-structuralist and Science, Technology and Society (STS) traditions has both contributed to developing surveillance studies. While Foucault's iconic understanding

of panopticism previously dominated surveillance research (Lupton, 2013; Wood, 2003), later research, drawing on governmentality studies, has analysed the norms and moralities that surveillance practices aim to establish, as well as the knowledge domains and gazes that evolve (Katz & Marshall, 2018; Petersson, 2016), but they also implicate a focus on the dynamics of visibility, conceptualised as a management of visibilities (Flyverbom, 2019). However, as Haggerty (2006) points out, the practices of performing surveillance and the strategies that actors develop tend to escape the view of this governmentality analytics, just as the role and performativity of materiality receive little attention.

STS-inspired research contributes to understanding exactly these aspects of surveillance practices. Studies in this tradition emphasise the networked and negotiated aspects of surveillance processes, which rely on the participation and alignment of heterogeneous human and non-human actors in socio-material arrangements (Albrechtslund & Lauritsen, 2013; Latour, 2005). Contributions drawing on Deleuzian terminology emphasise the often ephemeral character of such alignments, conceptualising surveillance as accomplished through fluent, dynamic and temporary assemblages of human and non-human actors. Hence surveillance demands persistent maintenance and renewal work (Lupton, 2013; Schwennesen, 2019).

In line with this, we understand surveillance as dynamic and fluid practices, in which the participation of human and non-human actors is continuously negotiated and worked upon. However, as argued in Jasanoff's (2015) seminal work, the relationships between such networked and fluid processes and the political and normative dimensions of social life have been underprioritised in much STS research. As described in the introduction, ideals of care and political rationales of empowerment and accountability make-up a powerful discursive framework for the Danish eldercare sector. We see the day-to-day work of accomplishing certain forms of visibility in care as intimately related to these ideals and rationales and direct analytical attention towards how they inform and are negotiated in daily surveillance practices. In line with this, visibilities may be seen as always framed or coded (Gad & Lauritsen, 2009), as technology use is intertwined with political discourses, often assuming an optimistic view of digitalisation. Thus, the ways spaces of visibility are created in care work are never neutral, but reflect certain preferences, interests and values concerning what to make visible and how (Petersson, 2016).

There is no abundance of studies on care workers' use of new surveillance technologies and its consequences, but important contributions can be found in studies of telecare and telemedicine. These studies emphasise how technologies may not only make things visible at a distance but may also transform the professional gaze, bringing certain aspects of clients' health and wellbeing into focus while excluding others; and how they may alter care interactions and relationships between care workers and clients (Mort et al., 2003; Oudshoorn, 2008, 2009; Pols, 2011). Caring at a distance with new technologies leads to a transformation of roles and redistribution of responsibilities between different spaces, actors and technologies (Langstrup, 2013), often underpinning policy goals of increased client-involvement, responsibilisation and empowerment. Keeping in mind the simultaneous emphasis on professional responsibility and accountability in the care sector, studies have revealed how new insecurities and ambiguities in the professional-client relationship may be introduced (Järvinen, 2012; Kamp & Holen, 2018), and how care workers working with new technologies face a delicate task of negotiating professional authority in ways that resonate with the client's sense of autonomy and self-responsibility (Nicolini, 2007; Oudshoorn, 2008).

Introducing new surveillance technologies in care is thus a complex process, requiring careful navigation from care workers. Pointing out the friction and resistance such surveillance may meet, and the efforts involved in making it work, Gad and Lauritsen (2009) suggest that

surveillance should be studied situationally as an accomplishment. This resembles what Mol et al. (2010) have previously denoted 'tinkering' to describe continuous intuitive and experimental efforts to make technologies work in specific situations. However, the discussion above shows that this is not just a process of negotiating new visibilities and insecurities. When approaching visibilities as coded, tinkering involves negotiating different political rationales, and hence addressing power and care relations and possibly changing social relations and hierarchies in care in new and complex ways (Grosen & Hansen, 2020).

Building on these insights, our aim is to add to the scarce literature on care workers' use of new surveillance technologies in eldercare, focussing on how they tinker with coded visibilities in digital surveillance, and how they negotiate rationales of empowerment and professional accountability in this process.

METHODOLOGY

Case-selection

The article is based on two ethnographic case-studies carried out in a larger research project on new technologies in care work conducted from 2015 to 2019. Four case-studies were conducted in public sector homecare organisations and care homes in different regions of Denmark, focussing on virtual homecare, wash-and-dry toilets, telemedical wound care and sensor-flooring. In our case-selection, we prioritised studying new technologies, yet avoided pilot-projects and implementation processes. Instead, we chose workplaces where technologies were in daily use, allowing a focus on established care practices with new technologies rather than implementation difficulties and non-use.

For this article, we zoomed in on two cases: sensor-flooring in a care home and virtual homecare visits, as they directly address the surveillance aspects of care work, but in ways where clients and care workers are positioned quite differently. While sensor-flooring is primarily thought of as a technology used by care workers, requiring little (conscious) participation of clients, and, as we will show, may come to replace clients' own assessments of their condition; the use of virtual homecare visits relies much more on active client involvement and client self-assessments. This allows us to examine how different forms of tinkering are required and how rationales of empowerment and professional accountability are negotiated differently in differing surveillance practices.

Sensor-flooring is increasingly used in Danish care homes for disabled and older persons. It is described as ensuring clients' safety and privacy while also saving personnel resources, as care workers are less present in clients' homes but can still detect their needs at a distance (see e.g. Gaedt, 2017). We studied sensor-flooring in a care home, pioneering the use of this technology in Denmark. It has 104 flats and approximately 155 staff of which the majority are Social and Health-care Helpers and Assistants[2] (SSH/A) and Registered Nurses (RN). The floors have a hidden web of sensors installed, and their settings are adjusted for individual residents to trigger alarms for the staff in specific situations, for example, to detect when a resident gets out of bed or walks to the bathroom, the balcony or the entrance to the flat. The staff receives alarms from the floors as sounds and a short message on their phones. The floors record all movements on the floor, logging these in a database accessible to the staff. The floors thus make previously unavailable information on the residents' movements in their flats visible and available.

Video-based virtual homecare is increasingly being used in the care for older, chronically and terminally ill patients. It is considered a more cost-effective mode of homecare delivery than

physical visits, as it facilitates shorter visits and saves care workers' transportation time. Furthermore, it is viewed as offering empowerment and better quality for clients in terms of less intrusion of care workers into their homes and everyday lives (Local Government Denmark, 2019). We studied the use of virtual homecare in two homecare units in a Danish local authority that has pioneered the use of virtual homecare. At the time of the study, approximately 115 clients in the municipality were receiving virtual homecare visits. The homecare units are staffed by SSH/As and district nurses and all employees carry out both virtual and physical homecare visits. Clients are equipped with a tablet computer, through which video calls from homecare staff can be received. The visits are initiated by a call from the care worker at an agreed time of day. The conversations are short, sometimes only 2 min; the longer ones may last 6–8 min. Virtual homecare visits thus, partly or completely, replace the physical presence of care workers in clients' homes and establish a new mode of monitoring clients' activities and wellbeing through video-mediated conversations.

Methodological approach and analysis

The two case studies followed the same approach, combining shadow observations (Czarniawska, 2007) with semi-structured group and individual interviews, observation of seminars and collection of relevant documents from the studied workplaces. The study of sensor-flooring was conducted by author 2 and 3, and the study on virtual homecare by author 1 with another colleague. Table 1 gives an overview of the empirical material generated in the two case studies.

The shadow observations focussed on how sensor-flooring and virtual homecare visits became part of care routines and care relations with residents and homecare clients. How, when, with whom and for which purposes were the technologies used in everyday care interactions? The researchers were not directly involved in work during observations, but interacted and conversed with care workers, residents and clients when appropriate as partly participating observers (Fangen, 2010). Observations were documented through notes and quotes jotted down when appropriate during the shifts, and shortly thereafter elaborated from memory to fuller written accounts of events and interactions. Observational material presented in this article are excerpts from these accounts, which have been slightly edited and supplemented with explanations, to facilitate the reader's understanding of observed situations.

The individual interviews carried out during or after shifts allowed us to deepen our understanding of specific situations and events we observed. Furthermore, the interviews focussed on care workers' more general experiences working with sensor-flooring and virtual homecare and how these affected their interactions with residents and clients. The formal interviews followed a semi-structured interview guide adapted to the local context and technology and were recorded and transcribed verbatim. The interviews were conducted in Danish, and the quotes presented in this article have been translated to English by the authors. The informal interviews were, due to time pressure, conducted during breaks and documented in the same manner as the shadow observations.

The collected documents, observations from seminars and group interviews with various managers and staff representatives contributed to our general understanding of the rationales related to technology-use in the studied organisations, and to contextualising our observations and individual interviews.

All interviewed and observed employees and managers gave informed consent to participation in the study, which was conducted in accordance with approval procedures and ethical

TABLE 1 Empirical material.

Case	Timespan	Activities	Description and participants
Sensor-flooring	Sept. 2015 to Feb 2016.	12 days of shadowing	Approximately 62 h on day, evening and night shifts of SSHs/SSAs (11 persons) and a physio therapist.
		1 observation of a seminar	Seminar for 7 staff on 'activating' care
		12 individual interviews	Formal (8) and informal (4) interviews with the shadowed employees during or immediately after their shift.
		5 group interviews	The management of the care home (2 persons)
			Shop stewards and safety representatives (4 persons)
			RNs (2 persons)
			SSHs/SSAs (7 persons)
			Representatives the care home's 'technology committee' (2 persons)
		2 local documents	A report and a power point presentation on digital technologies and their use at the care home
Virtual homecare	Sept. 2015 to Sept. 2016	17 days of shadowing	Approximately 102 h of SSHs/SSAs and RNs on day and evening shifts.
		1 observation of a seminar	Network-meeting for 'ambassadors for virtual care' across the municipality
		25 individual interviews	Formal (4) and informal (17) interviews with the shadowed employees during or immediately after their shift.
			Shop steward
			Project manager for virtual homecare
			Welfare technology consultant
		5 group interviews	Strategic management of homecare (2 persons)
			Local managers of district nursing (2 persons)
			Local 'ambassadors for virtual care' (4 pers.)
			SSHs/SSAs (4 persons)
			District nurses (3 persons)
		7 local documents	Reports, process description, power point-presentations, information leaflets, home page

guidelines in The Danish Code of Conduct for Research Integrity (Ministry of Higher Education and Science, 2014). Data was securely processed and stored in accordance with the European Union General Data Protection Regulation (GDPR, 2016). All individuals represented in this article were given pseudonyms and their personal characteristics obscured. Furthermore, the care home and local authority are not named to ensure anonymity.

Our analysis of the empirical material has taken place both during and after the two case studies were conducted. The four researchers continuously discussed themes and findings with each other and with study participants during the studies and moved iteratively between data-gathering and analysis in this period (Timmermans & Tavory, 2012). In preparation for the analysis presented in this article, the authors conducted a systematic reading of the empirical material from the two case studies, focussing on how the technologies contributed to and transformed surveillance practices in care work. This reading resulted in various preliminary themes and findings. On this basis, quotes and observations that illustrate broader tendencies in the empirical material were selected for presentation in the analysis below. Here, we examine the different forms of tinkering that are required in first the case of sensor-flooring and then virtual homecare, and show how rationales of empowerment and professional accountability are negotiated in these differing surveillance practices.

SENSOR-FLOORING IN THE CARE HOME

Sensor-flooring represents a rather extensive form of surveillance where care home residents' movements on the floors of their flats are monitored 24/7. Yet, apart from an initial consent to having the sensor-floor turned on, the surveillance is performed in a quite inconspicuous manner, as the floor looks just like a normal floor and residents rarely relate to it.

Sensor-flooring is described as central to practical work and care relations at the care home; it is associated with an overall narrative of how care should be provided at the home. Both management and staff favour 'de-institutionalised' care, emphasising that the residents live in private flats and should not be subject to institutional routines as far as possible. This narrative includes a disassociation from 'doing rounds' to check-up on clients and their needs, which was perceived as an unnecessary exercise of institutional control. Instead, a more responsive form of care is favoured, emphasising flexibly meeting residents' needs as they arise. Care home staff strive to enact this narrative by managing visibilities as well as invisibilities enabled by sensor-flooring.

Tinkering with (in)visibilities: Making *just* the right settings

At the care home, sensor-flooring is used to transform detectable activities on the floors of residents' flats to visible care needs on the care workers' phones. The leading nurse, who had special responsibility for the care technologies, explains that sensor-flooring allows the staff to be:

> ...present with our care just when it's needed, via the technology. This means that, instead of having a plan of: "First I'll go there, then I'll go there, then I'll go there...", you have to modify that and think: "I'll go when the clients themselves let me

know"(...) when they themselves, via the technology, say: "I'm awake now, and I need help now".

(Elizabeth, leading nurse)

She articulates the sensor-flooring and its capability of surveilling the residents as a way of providing non-intrusive and timely care in an accountable way. Without having to enter all the residents' flats in turn, relevant care needs are made visible via the floors. Hence, even residents who are unable to call out for assistance are described as empowered to express their needs. In this way, the description of the care home's daily practice of performing surveillance reflects broader rationales of accountability and empowerment governing elderly care.

The settings of the floors were accentuated as pivotal to making individual needs visible and coordinating care work, as the leading nurse explained that "it is very much about making *just* the right settings for the floor". The settings are key to distinguishing between the vast amount of trivial information the floors can detect and communicate, and information that should be translated as needs to be met and made visible to care workers.

Beginning when a resident moves in, the right settings are obtained through continuous tinkering as part of everyday care practices:

We recommend to everyone to have the fall alarm activated, and then we take it from there and add on. Because we don't know them - we need about a week to get to know each resident's little habits and all kinds of things from their life history (...) and then we can see: what might work here? How might we use the technology here?

(Mary, SSA)

Tinkering with floor settings is thereby described as a central practice that actively adjusts what becomes visible to care workers as residents' needs. Importantly, 'what might work here' involves both ensuring that important activities are made visible (such as the resident getting out of bed), but also that other activities on the floor are made invisible (such as activities that the resident can self-sufficiently handle). Thus, some invisibilities are not the inevitable blind spots inherent in any surveillance technology (Latour, 2005), but an active additional choice coded by rationales of self-sufficiency and freedom from interference.

The practice of starting with only the fall alarm activated and then 'take it from there and add on', instead of starting with everything turned on and then removing unnecessary alarms, is based on experience with the floor alarms as part of the overall care routines. Although staff generally appreciated working with sensor-flooring, they also found the number of alarms and interruptions stressful. For example, care workers reported having to interrupt the bathing of a resident numerous times; every interruption required them to take off their latex gloves to check their phone, assess the message and the immediacy of another resident's needs, then put on fresh gloves and continue. They also told stories of how the phones' alarms and interruptions annoyed some residents. In one of our group interviews, the care workers explained:

Annie: You have to get your phone out and click it to see what it's about.
Marie: But one thing is that this can be stressful for us, another is that it's also stressful for the residents - really often. They tell us: "Answer that phone, please," or "Just answer it!" It just keeps on beeping, you know (other participants agree in the background). You know: "Get rid of that thing!" It's really stressful.

Alarms calling attention to one resident were described as disturbing care situations with other residents, sometimes negatively affecting ongoing care interactions. Floor alarms are intended to allow for individual care needs to be visible. However, large numbers of alarms are difficult to handle in the overall organisation of care work. To be able to handle multiple residents' needs, the number of alarms activated by the floors are therefore minimised when setting the floors. In this tinkering with floor settings, care workers negotiate the weight of rationales of empowerment and professional accountability, and the practical organisation of care work to decide what alarms are appropriate.

Choosing visibilities to document professional accountability

Sensor-flooring is not only used to make instant care needs visible by transforming selected activities on the floor to alarms. The 24/7 surveillance of activities on the floors is logged, and can be used for documentation, but also to assess needs by considering past activities.

The possibility of using the floor-log as documentation, sometimes comes into play as a reflection of a rationale of accountability:

> At one point we had a resident who had taken a fall, and the hospital called and said that he had been lying on the floor for several hours. Then you can go and find a log on him, and then we could see that he hadn't actually been lying there for very long. So you kind of know what you're dealing with, right? So, in that way it's also a tool for us––it's also for our sake as staff. There really isn't anything worse than having this feeling of: "Oh my, I left a man lying on the floor for five hours and he was totally helpless" (…) you can eliminate that now, by going in and checking.
>
> (Kirsten, SSH)

The floor-log as documentation illustrates how this feature of the sensor-floor is not just used for formal purposes but also to reassure staff that they have cared adequately for residents.

Also reflecting demands for accountability, an observation from our fieldwork in the care home illustrates the use of the floor-log to assess needs by handling them as visible and documentable.

One morning one of the authors accompanies Anne (SSA) to Jens' flat:

> Jens is an able-bodied man with a mild degree of dementia. In the conversation between Anne and Jens it arises that he has complained to the person on night shift about sleeping difficulties and asked for sleeping pills. Later, Anne decides to check the floor-log to see whether he has moved about on the floor in the last five nights. While opening the log she comments to the observer how this is a grey zone concerning the use of the floor. Fast-forwarding the recordings that are visualized as footprints on a model of the floor in Jens' flat, she finds no movements on the floor between 1 and 8 a.m. any of the nights. Considering that Jens has not been to the toilet or moved from the bed to the armchair he sits in when smoking, she concludes that he must have been sleeping and therefore has no need for sleeping pills. She briefly discusses her conclusion with a nurse and makes a note in the documentation system to inform her colleagues about the decision.
>
> (Shadowing, care home)

In her tinkering with the use of the floor-log, Anne negotiates different rationales. On the one hand, she indicates that this way of using the log is on the verge of legitimate use, which we

perceive to be related to the aforementioned rationale on empowerment that emphasise residents' privacy and autonomy. On the other hand, she is expected to ensure that decisions on additional medication for residents are well-founded in relation to the rationale for accountability; the floor-log is thereby used as documentation for the soundness of her decision.

Anne's assessment builds on the perceived visibilities mediated by the floor-log. As it is difficult to assess whether Jens' insight into the extent of his sleeping problem can be trusted, the floor is invited to participate in the decision of whether to give sleeping pills or not. Along with Anne's knowledge of his routines, the log comes to represent Jens' nightly state and needs instead of asking Jens for more details. Jens' experience of having a sleeping problem is overridden as Anne bases her decision on a seemingly objective, yet limited, technologically mediated surveillance of the resident. However, as situations that do not play out on the floor are an inherent blind spot for this surveillance technology, whether Jens lies awake in his bed is not directly detectable by the floor. The use of the floor-log to document a situation thereby enhances activities made visible, and thus accountable and documentable by the floor at the expense of invisibilities such as subjective assessments.

VIRTUAL CARE

Virtual care, in contrast to sensor-flooring represents a brief but quite intensive form of surveillance, where the client's general health and their ability to master different tasks, such as bathing, preparing food, taking medication or even managing their everyday lives may be monitored through video conversations. Hence, the clients play a vital role in accomplishing visibility.

Virtual care is generally considered a way of empowering the clients in terms of being self-sufficient and self-responsible. Moreover, many care workers consider this a smart rationalisation, as they avoid wasting time when driving long distances to pay home visits. Receiving virtual care is presented as a way to give the client freedom to dispose over her own time and not be dependent on home-visits. This is also the main point in the local authority's website informing the clients on virtual care. Here, a local client accounts for why she prefers virtual care to a physical visit:

> They cannot say, when they arrive when it's a physical visit. So I will have to stay at home e.g. from 8 to 12 o'clock. The good thing about the screen is that they call me between 7 and 7.30. I want to get something out of the day, so I want to leave early. With the screen I am not so dependent. I am free.
>
>   (Gerda, homecare client, quoted on the local authority's website)

I this statement, Gerda personalises the active older person, who does not just sit and wait for a homecare visit, but has plans she wants to realise, much in accordance with the ideals of active ageing (Katz, 2000).

Reinventing screen-supported surveillance.

Surveillance using screens and webcams is obtained through tinkering with complex socio-material arrangements, where the client is an important participant. The example below shows the complexity involved in making this work. A care worker proudly describes how she has succeeded in using a virtual visit to surveil the night-time routines of a client suffering from dementia:

We also have the client with dementia, I was talking about before. With her, we go through an entire process, when we call her. It's the last thing we do at night before she goes to bed. She has to check both the patio-door, and if she has brought the keys inside. We are with her on this whole tour around the flat, and she just talks. It [the screen] is strategically placed, so you can look down the hall and actually see her front door. The camera has a wide-angle, so you can see her patio-door and her sofa. And then she has to take a walk around, so when she activates the video-call, you tell her: and now you can walk over and check the patio-door, and then she walks over to the patio-door, and it is closed, and she walks to the front door. Then she needs to check the crosser and lock the front door, and then she has to take a break here and check that her foot drop stimulator is charging, there we can see if it's red. Then she has to come back to the screen and we need to see her take her medicine, and the last thing we talk about is if she has any candles lit, and if so, she has to blow them out over on the coffee table before she hangs up. We are with her through the whole night-time routine and she's super fast. It only takes 40 seconds or so, this run around [the flat], but she forgets if we aren't there.

(Interview with Tine, SSH)

In this case of a client suffering from dementia, virtual care is performed by using the video screen to direct the client through a conversation and to make her actions observable through the video screen, which is placed in order to allow the care worker to watch. Making this arrangement work is the result of careful tinkering. Each step of the night-time routine of the client is thoroughly planned and systematised, and the client is trained to participate, so that the coordination between technologies, client and care worker is secured and specific visibilities are established. This arrangement supports the ideal of ageing in place and—to a certain degree—being self-sufficient while retaining professional accountability.

However, as the next section illustrates these socio-material arrangements, where clients play an important role, may prove fragile.

New cues and (in)visibilities—New insecurities

The shift from home visits to virtual visits implies that care workers have to find new cues to monitor clients' activities. The main source of information is the dialogue, and one of the cues used is clients' statements, their responses, as representations of their actual behaviour. A recurrent problem, however, is how to assess answers from very short conversations, as illustrated by this excerpt from our field study:

Christian (SSA) finds it difficult to "look through the screen": "For example a client may answer that everything's fine, while in reality he's lying in bed all day long and everything's a mess." He tells me that on a physical visit he may use his senses, eyes, ears, nose and mouth, to assess the condition of the home and the client, e.g. to assess if the client may have a urinary tract infection. Using video he can ask how things are going, but he may only receive "fine" as the answer. "Asking: Did you take your pills and eat your supper? You have to take their yeses as true answers. So you have to trust them", he says, and continues: "It requires a great degree of trust. But in the countryside older clients are proud and have great respect for authorities. So

you cannot be sure that it's true when they tell you everything's fine, they won't tell you…It's not easy if you don't know people already".

(Shadowing, homecare)

As this quote underlines, new insecurities are introduced when dealing with this kind of surveillance of clients' behaviour through virtual visits. As clients are co-producers of visibility, assessing the liability of their responses becomes crucial. The care workers use different strategies to create an everyday conversation and a friendly atmosphere. However, they may face difficulties using the cues in the conversation or facial expressions on the screen, particularly if they have limited knowledge of and have not established a social relationship with the client. Consequently, questions of professional accountability are addressed both individually and collectively in discussions over lunch and at unit meetings. It should be noted that reliability does not refer to the client's moral qualities. The problem of assessing the answers often occurs with people with dementia or psychological problems or, as the interviewee mentions, it may be a question of the client's politeness and modesty. The visibility created by virtual care is limited to face-to-face encounters on screen, whereby new invisibilities arise as the availability of other cues is restricted.

Care workers have subsequently developed new ways of creating visibility, using the visual possibilities of the virtual home visit in another way. For checking medicine intake, clients are asked to take medicine during the video call while the care worker is watching. This arrangement, where the care worker is watching and correcting the client's behaviour, may also place the client in a subordinate position.

However, looking through a screen does not give direct access to 'reality'; it is still a cue. One of the cases that has become iconic in this homecare unit is the story of Anton:

> Anton is a client with an alcohol problem, whose daily intake of disulfiram is checked in a virtual visit every morning. Anita, his care worker, thought he was obediently taking his pill, but actually he was taking a headache tablet that resembled disulfiram. She had a feeling that something was wrong, but could not express what it was. Maybe it was because their conversations seemed to be a little too mechanical. One day after the video call, she felt that something was unusual. She drove out to visit him, arriving 10 minutes later. He was stinking drunk! He was very embarrassed, having been caught lying to her, and he also concluded that he actually could not cheat them, at least not in the long run. The care-workers discussed it and decided that they could no longer be responsible for paying virtual visits to Anton, and decided to go back to physical visits.
>
> (Field notes, conversations with Anita, SSA)

These cases show how practising surveillance involves tinkering (Mol et al., 2010) in a continuous effort to make the socio-material arrangement work in specific situations in order to produce visibility. Tinkering with the clients' participation seems crucial in order to secure the visibility of clients' behaviour and thus maintain professional accountability, while still adhering to the ideals of withdrawn care as a means of empowering the client. However, solving this problem may make power relations more tangible and may thus compromise another element of empowerment, namely the vision of equality in client relations. As the case above also illustrates, the effort to make the technology work does not necessarily succeed and may be abandoned in order to maintain professional responsibility.

Surveillance, friction and resistance

While managing (in)visibilities when performing surveillance may be challenging, the surveillance methods may also affect care relations and may result in clients resisting or being recalcitrant. The use of virtual visits requires active cooperation from both clients and care workers; consequently, different forms of opposition are possible. Checking on clients' behaviour through virtual meetings may render care workers' exertion of authority and discipline more explicit and cause friction in care relations.

Some of the clients react to this form of control and discipline by downplaying and transforming a seemingly unpleasant situation through jokes, as this short conversation with George illustrates:

> George is in the habit of sleeping during the day and staying awake at night. He suffers from sclerosis, so he needs to take his medicine at fixed times of the day. Susan (SSA) calls him to ensure that he takes his medicine before he goes to sleep. Susan gets through. George shows up on the screen; we can mostly see his face, which he holds very close to the screen, but in the background, an old-fashioned dark sideboard filled with trinkets and pictures is discernible.

> **S**: Hello George. How are you? You look fit.
> **G**: Well, things aren't that bad.
> **S**: Have you taken your medicine, George?
> **G**: No, but the one (pill) for tonight...
> **S**: (a bit taken aback) But you haven't taken that yet, have you?
> **G**: (now serious) I'm just joking a bit, but I have no reason not to take the pills, on the contrary.
> **S**: You look good too.
> **G**: (flirtingly) Wow, I cannot resist that.
> **S**: (changing the subject) So you're going to bed now?
> **G**: No, not right now.
> **S**: (a little puzzled) Have you changed it?
> **G**: No, no I wish I could.
> **S**: Have a nice day.
> (Shadow observation, Homecare)

This kind of call is very short and concentrated. Therefore, during the short conversation, Susan's questions concerning George's medicine intake come to dominate the interaction, and they seem to trigger his quite pleasant attempt to soften up a situation where authority clearly is at stake. George is not one of the clients that must demonstrate their intake of medicine in front of the screen, and he actually cooperates. Nevertheless, he uses jokes to avoid being positioned as a child that must obey orders, underlining his autonomy and reflexivity with a remark on his good reasons for taking his medicine.

But there are also cases where clients do not cooperate. Some clients might not engage in the conversation, delivering short and evasive answers. Others may simply not answer their calls. There may, of course, be many reasons for not answering a call, and this cannot always be taken as a sign of lack of cooperation. All the same, when a call is missed, the staff has to try to reach the client using a telephone, possibly through the client's relatives, or eventually have to drive out

and pay the client a visit in order to make sure that everything is OK. So, friction and resistance play an important role when tinkering with surveillance and may change care relations and reinforce tensions between professional accountability and empowerment.

CONCLUDING DISCUSSION

Surveillance has always been an important part of care work, understood as watching over, monitoring and detecting care needs, but currently, new technologies dramatically change the scope and level of surveillance in care work. Our studies of care workers' tinkering with coded visibilities, when working with sensor-flooring and virtual homecare illuminate how this process is entangled with neoliberal ideals of empowerment on the one hand and on the other rationales of professional accountability. Hence, care workers have to negotiate different and possibly conflicting rationales in their day-to-day practices of surveillance in care.

Our studies illustrate that the challenge for care workers is not simply accomplishing visibility at a distance, but the right forms of visibility. These must create enough insight into clients' homes, lives, wellbeing and needs to uphold professional accountability while maintaining the ideal of non-intrusion in the life of a self-reliant, empowered client. These processes encompass tinkering not only with technologies but also with spatial arrangements in the client's home and even with clients' behaviour, as the case of virtual homecare illustrates. Moreover, *in*visibility is central to the studied practices, not just as an inevitable result of surveillance practices as such (cf. Latour, 2005) but as something actively established. Invisibility is actively pursued with the new technologies through a narrowing of the professional gaze, temporally or spatially, as a way of responding to the ideal of empowerment and non-intrusion in clients' private spheres. But invisibility is also actively produced as a means of reducing complexity and demands in care work; as in the case of sensor-flooring, where the floor-settings are adjusted so as not to communicate too much. Or in the case of virtual homecare, where the care worker often sees only the client and not the state of his/her home. When care workers tinker with (in)visibilities in their work with new surveillance technologies, they are thus actively engaged in constructing what events and circumstances are to be 'coded' and seen through the technologies, as constituting needs for care and care worker intervention. Drawing on Pols (2011), this may be seen as a 'magnification' of some aspects of care and caring and, in turn, a reduction of others.

Furthermore, our case studies were selected to show how different technology-based surveillance practices position clients and professionals quite differently. At first glance, both practices position care workers as withdrawn professionals, caring at a distance and only intervening when called or at agreed upon times; and clients as empowered older people living independent lives with limited, yet timely support from care professionals. However, working with sensor-floors, the surveilling subject (the care worker) is largely invisible to the surveilled (the client) and little (conscious) participation in the surveillance practice is required of the latter. With virtual homecare, the surveilling subject is very visible, and the surveillance practice is completely dependent on the participation and cooperation of the surveilled. These differences highlight how care relations and power dynamics in care are affected differently in new surveillance practices.

Care relations and power-dynamics are most obviously affected by the new surveillance practices in the case of virtual homecare, where care workers' tinkering with clients' participation (e.g. demanding visible intake of medicine or choreographing a visible night-time routine) makes the professional's intervention into clients' private practices and routines very visible. Interventions such as these may compromise ideals of empowerment, and as we show, care relations may become marked by friction and resistance. This insight resonates with previous research in

telemedical care practices, which points out how negotiating professional authority in ways that resonate with clients' sense of autonomy is a delicate task (Nicolini, 2007). However, in the case of sensor-flooring, where the practice of surveillance is much less visible, we also observe how care relations and power dynamics change when a client's subjective accounts are overlooked while logs and digital accounts are considered more trustworthy. Parallelling insights from Ball (2003) and Haggerty (2006), our studies underline how the power dynamics of surveillance, even though they may be subtle and entangled with ideals of freedom and empowerment, should not be overlooked. Conversely, the potential for political governance must not be over-emphasised as policy rationales are continuously negotiated against other rationales, for example, professional and practical, in situated practices.

Highlighting how daily care practices negotiate care ideals and political rationales, our study thus underscores how tinkering with surveillance is a complex process of accomplishing (in)visibilities in a process where power and differing rationales are simultaneously negotiated. In line with Jasanoff's call to "reveal the topographies of power" (2015, p. 18), in networked practices, we contribute with a situated operationalisation of such an approach. Where research on surveillance informed primarily by STS, for example, Schwennesen (2019), foregrounds that fragile and dynamic socio-material arrangements need constant repair-work in order to make surveillance systems work, we suggest that the tensions causing these needs for 'repair' might not be resolved through this work and have to be continuously negotiated by clients and care workers, possibly with unintended consequences. This approach to understanding the use of surveillance technologies is clearly relevant in the case of eldercare, a sector marked by strong policy ideals of active ageing and empowerment, as well as strong rationales of professional accountability, but it may also have relevance in other formalised contexts of care, marked by other policy rationales.

AUTHOR CONTRIBUTIONS

Annette Kamp, Sidsel Lond Grosen and Agnete Meldgaard Hansen has equally contributed to conceptualization, analysis, review and editing of this paper. They are also equally responsible for the funding aquisition, the methodology and original analysis.

DATA AVAILABILITY STATEMENT

Research data are not shared.

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ENDNOTES

[1] We use the term care worker to refer collectively to the different groups of care professionals involved in our study, mainly Social and Health-care Helpers/Assistants and Registered Nurses.

[2] Care professionals trained in gerontology and elementary nursing for, respectively, 14 (SSH) and 26 months (SSA).

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