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Caring by Telecare? A Hermeneutic Study of Experiences among Older Adults and Their Family Caregivers

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What does this paper contribute to the wider global clinical community?

- This study provides new insights into the longitudinal use of telecare in home care services from the perspectives of community-dwelling older adults and their family caregivers.
- Telecare *does* improve the care offered by home care services through increasing safety and security, and through allowing older adults' more independence, in a number of cases, if adjusted to the persons` needs.
- Family caregivers are important for the continual use of telecare; it benefits them but may also add responsibility to their care burden.

Aims and objectives: The purpose of this study was to obtain a deeper understanding of the persistent use of telecare for older adults and their family caregivers.

Background: Telecare is seen as part of the solution in home care services for ageing in place. Previous studies have shown that telecare is a complex intervention, and there is still a poor understanding of older adults' and their family caregivers' experience with the use of telecare.

Design: This study used a qualitative hermeneutic research approach.

Method: Interviews were conducted with 18 older adults and follow-up interviews were conducted with 15 participants after five to six months of use. In addition, interviews were conducted with seven close family caregivers. The COREQ checklist was used.

Results: The older adults expressed increased safety, security, and independence. Although some of them experienced challenges, they continued to use the services. Furthermore, the findings revealed needs that telecare could not cover. Family caregivers reported that telecare eased their concern for a time. However, they felt increased responsibility which led to ambivalent feelings between wanting to comply with the older adults' desire to live at home and the stress and concern this caused.

Conclusion: Telecare does improve care offered by home care services. However; it must be considered in the context of assistance and other measures and be provided in response to each individual's specific needs. Family caregivers may benefit from telecare, but telecare may also add to their care burden.

Relevance to clinical practice: There is a need for increased knowledge and information about telecare and for follow-up from home care services. Family caregivers are important for promoting sustainable use, but a support system and better cooperation with home care services is needed.

Keywords: aged, caregivers, independent living, home care services, hermeneutics, technology, telecare

1 Introduction

In Norway, there is a commitment to use technological support in care services due to the demographic challenges (Norwegian Ministry of Health and Care Services, 2011). The demographic challenges affect all countries worldwide (United Nations Department of Economic and Social Affairs, 2015). Due to this, there is a need for innovative ways of offering healthcare services that will provide more efficient care (Lynch, 2015). Telecare

services to promote ageing in place receive increasing attention (Mort, Roberts, Pols, Domenech, & Moser, 2015) and are important with respect to improved quality of life and active ageing (Norwegian Ministeries, 2017). Active ageing is seen as the process of optimizing opportunities for health, participation, and security in order to enhance quality of life as people age (World Health Organization, 2002). Ageing in place means living in one's own home in a community with some level of independence rather than in residential care (Wiles et al., 2009). Consequently, this may avoid the costly option of institutional care and can be a method of coping with a shortage of healthcare professionals in the future (Wiles et al., 2009). In addition, to include family caregivers in telecare services is seen as a necessity due to demographic changes (Norwegian Ministry of Health and Care Services, 2011). Introducing technology into healthcare comes at a time when older adults' expectations of home care services are increasing (Milligan, Roberts, & Mort, 2011). Home care services represent a large field of care activities and are defined as care provided by professionals to a person in his or her own home (Thomé, Dykes, & Hallberg, 2003).

Telecare is an umbrella concept comprising several technological solutions for promoting safety and security in people's homes (Barlow, Singh, Bayer, & Curry, 2007). It can be classified into three categories: first-generation devices are the simplest form of telecare and include a user-triggered alarm button (active alarms); second-generation telecare systems utilize a range of sensors that detect specific hazards and do not require the users to trigger them (passive alarms); and third-generation telecare systems have more complex capabilities that constitute "lifestyle monitoring," wherein data are sent to an Internet portal that can be assessed by caregivers who "keep an eye" on the user (Stowe & Harding, 2010).

2 Background

Previous studies have indicated a desire to age in place (Essén, 2008; Peek et al., 2016; van Hoof, Kort, Rutten, & Duijnstee, 2011). However, ageing in place may also lead to social isolation and extreme loneliness, since older adults' physical and social worlds shrink as they become more impaired (Greenhalgh et al., 2013). Older adults who are users of home care services, are often a vulnerable group with several health challenges and multiple diseases (Dyrstad & Storm, 2016). Therefore, the term *frail older adults* (Holroyd et al. 2016) is used in the present study The ageing process leads to decreased functionality and health status, and the physical aspects of living independently can create difficult barriers (Sixsmith & Sixsmith, 2008).

Telecare may contribute to increased safety and independence to community-dwelling older adults, as it can facilitate assistance in case of accidents (Karlsen, Ludvigsen, Moe, Haraldstad, & Thygesen, 2017). Moreover, a recent study by Rostill et al., (2018), shows promising results of testing an Internet of Things system for dementia care, a system that intends to identify changes in a person's health or routine, to prevent the development of more serious complications.

However, introducing telecare to older adults has been shown to be challenging, as the devices need to be adjusted to fragile people (López Gómez, 2015), and the technical devices themselves do not provide care (Mort, Roberts, & Callén, 2013). Evaluation of a Norwegian project demonstrated how differences in people's contexts influenced their reasoning about the benefits of telecare and how the context affected the outcome (Berge, 2017). Older adults will stop using telecare if the systems do not meet their needs, according to Berge (2017). Previous research have revealed barriers such as lack of information, lack of confidence and experience, stigma from using the systems, and difficulties in using telecare devices (Cook et al., 2016). Technical problems have also been common (Demiris, Oliver, Dickey, Skubic, &

Rantz, 2008; van Hoof et al., 2011). Previous studies also revealed that the two policy aims of "ageing in place" and "active ageing" may clash, for instance when the technology does not work outside of the person's home (Aceros, Pols, & Domènech, 2015).

Previous qualitative research on older adults and technology has mainly focused on the *intention to use* technology before the technology is implemented (Peek et al., 2014) and on pilot studies (Rantanen, Parkkari, Leikola, Airaksinen, & Lyles, 2017; Reder, Ambler, Philipose, & Hedrick, 2010). Studies that include experiences with *implemented* technology for community-dwelling older adults remain scarce (Blackman et al., 2016).

Family caregivers commonly help older adults with healthcare activities that can be related to emotional, physical, and financial difficulties (Wolff, Spillman, Freedman, & Kasper, 2016). A study by Berge (2017) showed that family caregivers' primary concern is safety, and the caregivers encourage use of telecare as they expect it to enhance safety. Previous research has shown that technology may help reduce family caregivers' perception of task-specific burdens (Mortenson et al., 2013) and provide increased feelings of relief (Holthe, Jentoft, Arntzen, & Thorsen, 2017), which is important in light of the stress the family caregivers may experience.

After years of trials and a policy of using telecare to promote active ageing and ageing in place, there is a need for a better understanding of persistent engagement with telecare (Cook et al., 2016; Karlsen et al., 2017; Lynch, 2015) from older adults and their family caregivers' perspectives (Holthe et al., 2017). The present study seeks to enrich insight into clinical practice and models of telecare service delivery, by exploring how telecare may meet the older adults' needs. Knowledge on how to meet challenges regarding telecare services will become essential. The overall aim of the present study is therefore to gain in-depth knowledge of continual use of telecare services for older adults and their family caregivers.

The research question was: How do community-dwelling older adults and their family caregivers experience use of telecare as part of home care services?

3 Methods

3.1 Design

A qualitative hermeneutic research method was chosen for this study (Fleming, Gaidys, & Robb, 2003), with repeated interviews of older adults and interviews of their family caregivers. The hermeneutic research method is grounded in Gadamerian philosophy (Gadamer, 1990). This approach was chosen to gain a deeper understanding of the participants' experiences with the use of telecare. Gadamer (1990) emphasized that understanding is possible through dialogue with participants, and understanding of the participants and the researcher will merge into new knowledge. Furthermore, according to Gadamer, understanding the subject matter and the preunderstanding of the researcher will change over time. It was therefore essential in this study to conduct follow-up interviews with the older adults. The researcher who conducted the data collection could clarify ambiguities and elaborate on topics during the second interview. Interviews with family caregivers in addition to the interviews with the older adults provided opportunities for a deeper understanding of the phenomenon. The study followed the consolidated criteria for reporting qualitative research (COREQ) checklist (Tong, Sainsbury & Craig, 2007). See Supplementary File 1.

3.2 Participants

The criteria for the inclusion of older adults were age above 60 years (World Health Organization, 2002), living in their own homes, and having recently received telecare service (within the last 0-3 months), in addition to home care services. They all had to speak and

understand Norwegian, and there were no limitations considering disease or chronic conditions. Background information was obtained during the first interview (see Table 1 for demographic characteristics). It was desirable to include participants with different needs and backgrounds to capture nuanced experiences. Only two participants had histories of substance abuse and psychiatry, and one was 58 years old, but he was not excluded despite his age. Thirteen participants lived in detached houses, and five had an adapted house or apartment. The older adults were provided with diverse types of technology due to their individual needs (see Table 2 for a description of telecare devices). The participants' needs for home care services differed due to various diseases and challenges. Two of the participants had only personal alarm and the possibility of contacting home care services if needed. Two received monthly visits from home care services, three received weekly visits, three received daily visits, and eight received visits more than two times each day. The participants' ability to consent were considered and discussed with home care nurses who knew them well. Three participants could not be interviewed at the time of the second interview, as two had moved to a nursing home and one had been admitted to a hospital.

Family caregivers were included in the study when they had an active role in the telecare service that the older adults discussed in the first interview. All seven family caregivers' participants lived close to the older adults.

Table 1. Demographic characteristics

Table 2. Description of telecare devices

3.3 Data collection

In-depth semi-structured interviews with 18 older adults were conducted by the first author. Follow-up interviews were conducted after five to six months of telecare use. In addition, interviews with seven close family caregivers were conducted between the first and second interviews with the older adults. The participants were recruited from six medium and smaller municipalities with approximately 1,750-15,500 inhabitants in southern Norway. The study was carried out from November 2016 to July 2017. Several of the municipalities had been through a period of pilot projects and hence had some experience with use of telecare and had established telecare as part of their ordinary operations, at the time of writing.

There are major barriers to the recruitment of older adults for research related to their health problems, to social and cultural barriers, and to potentially impaired capacity to provide informed consent (Mody et al., 2008). Our study was therefore based on careful planning of the recruitment, and on cooperation with home care services in potential municipalities. The researcher mailed information letters and consent forms to leaders in home care services in municipalities that recently had started to offer telecare services. Older adults were recruited among patients who had recently received telecare devices. Healthcare providers brought the letters to the older adults, informed them about the study, and asked if they wanted to participate. If they consented and signed the form, the researcher called them to supply more information and schedule interviews. The participants were allowed to determine the time and place that suited them. Close family caregivers were recruited after asking the older adults what role their family caregivers had regarding the telecare devices. In cases where family caregivers had active roles and the older adults consented, the caregivers were asked by the researcher to participate in the study.

The interviews were audio-recorded and lasted between 10-67 min (mean: first interview, 33 min; second interview, 31 min; interview with family caregivers, 47 min). Field notes were conducted after all of interviews from the interview situation and observations. All of the interviews were conducted face to face. The older adult participants were interviewed in their own homes. The interviews with the family caregivers were conducted at the place the participants thought most appropriate, either in their homes, in the older adults' homes, or at their workplaces. Interviews with two older adult participants were conducted at the same time as their family caregivers were interviewed. One had a hearing impairment and therefore wanted his daughter to assist. Another participant wanted her husband present during the interviews.

The interview guide was developed collaboratively by the research team and validated with members of a telecare forum. The telecare forum consisted of healthcare professionals who had experience and expertise using telecare in home care services. In addition, the interview guide was pilot tested by two older adults. Participants were asked about their needs and why they received telecare and their experiences so far. Finally, they were asked "What is important to you?" The follow-up interviews were conducted after five to six months of telecare use and included questions concerning experiences with the use of telecare, changes since the last interview, examples of how technology did not work as intended and examples of how technology had been helpful, things that might have been missing, and what they perceived as important for sustainable use. Questions for the family caregivers concerned their responsibilities, experiences with the use of telecare, things that might have been missing, what they perceived to be important for sustainable use, and what was important for them as family caregivers.

3.4 Data analysis

The data were analyzed using a Gadamerian-inspired research method (Fleming et al., 2003). Analysis of the interviews followed the hermeneutic rule of movement from the whole to the part and back to the whole (Gadamer, 1990). To facilitate the process of understanding, the researcher started to analyze the first series of interviews before proceeding with the next sequence. In this way, it was possible to adjust the interview guide and offer a summary of the initial analysis to the participants during the second interview. This provided opportunities for feedback and further discussion to reach a shared understanding between the researcher and the participants (Fleming et al., 2003).

According to Gadamer (1990), we are all part of history and everyone has a preunderstanding of the topic in question. As noted by Van Manen (Van Manen, 1997), the stage of gaining understanding through dialogue with participants should not be delegated to others, as the researcher uses oneself as a research instrument. The first author who conducted the interviews had a background in nursing and health informatics. In addition, with four years of work experience in previous telecare projects, this required reflection to identify her preunderstanding of the theme. This was discussed with the co-authors throughout the entire analysis process. All interviews were transcribed word for word while listening to the tapes. The analysis to gain understanding was a systematic process following the cycle of four steps by Fleming et al. (2003). The data management software program NVivo 11 was used to organize the transcribed data (International Q, 2017).

In the first step, the transcribed interviews were read carefully to develop a thorough understanding of the meaning of the whole text (Fleming et al., 2003). Meaning units were coded in NVivo 11. This provided new insight and understanding about older adults and the family caregivers' perception of the use of telecare. In the second step, each sentence and/or

section was investigated and sub-themes and themes were identified (Fleming et al., 2003). All of the codes were investigated to identify sub-themes. This analytical process covered the movement from parts to the whole that provided a deeper understanding of the phenomena that gradually was interpreted to the themes. This third step of using the hermeneutic circle is essential for gaining understanding, according Gadamer (Gadamer, 1990). Each sentence and/or section was related to the meaning of the whole text and the sense of the whole text was expanded (Fleming et al., 2003). Non-verbal expressions and field notes from the interviews also influenced understanding throughout the entire analysis. The final step involved the identification of passages that represented the shared understanding between the researcher and the participants (Fleming et al., 2003). These interpreted passages are presented in the results section. The entire cycle was repeated several times, as the authors' preunderstanding constantly evolved, and this facilitated an increased understanding of the text and the phenomena of using telecare in home care services. Table 3 provides an illustration of the analytic procedure.

Table 3. Illustration of the analytic procedure

3.5 Ethical considerations

This study was approved by the Norwegian Center for Research Data (NSD, project number 50421). All of the participants were given written and verbal information about the study. They were also guaranteed confidentiality and the opportunity to withdraw at any time, and that withdrawal would not affect the healthcare services they received. As the interviews were conducted with frail older adults, it was important to take into account their current health status. Due to this, some interviews were short for the sake of the participant. In one case, the healthcare providers were contacted by the researcher when one participant

expressed that she felt lonely and depressed. Two of the participants were moved to a nursing home and one to a hospital before the second interview visit. It was considered unethical to interview the older adults admitted to hospitals and nursing homes at the second interview.

4 Results

During the first interview, the older adults narrated the experience of being old and frail due to composite needs and diseases. Hence, they experienced telecare as a welcome addition to home care services. The participants expressed a need for new solutions and help in addition to the home care services they received. All the interviewed older adults still used the telecare devices at the time of the second interview. Five of the participants had even more devices installed. Majority of devices were experienced as easy to use and worked as intended. Four of the older adults had replaced visits from nurses with telecare. The family caregivers were found to be an important driving force for the use of telecare devices and for following up the service.

Quotes have been used to illustrate and add to the transparency of the results, but names of participants have been changed to ensure anonymity.

4.1 Older adults' experiences using telecare

Two themes emerged when interpreting the older adults' experiences using telecare over time:

- *Increased safety and security through*; the possibility to prevent and discover accidents, alert when needed, and localization
- *Increased independence through*: reminders and predictability in everyday life

4.1.1 Increased safety and security

Prevent and discover accidents

Use of telecare provided a possibility to prevent accidents such as fire and falls. To participants with physical impairment such as impaired hearing, a smoke detector connected to a light and vibration system in bed could warn the participant about fire during the night. In addition, light sensors were used to prevent fall during the night, to participants with impaired walking function.

> *They (light sensors) are absolutely amazing, when I open the door… or I get inside, it (the light) turns on.* (Sophia)

Sensor technology was considered especially important to participants with cognitive impairment. Several of the participants had been reflecting upon their own situation and were afraid of forgetting important things, such as for instance turn off the cooking plate. A stove detector provided increased safety and security by automatically turning off the plate.

> *It may happen more often with those who do not (remember)…like me.* (Alice)

Participants with cognitive impairments experienced increased safety and security through the use of camera surveillance. The nurses were not always present, and telecare provided a possibility for following up over distance, a new opportunity for increased safety. Some of the participants wanted telecare instead of some of the visits from nurses. Camera surveillance was for example experienced as giving a feeling of more safety at night than surveillance by strangers.

> *If someone (nurses) is coming to see you during the night, then you cannot know who it is. Therefore, it is much better to have that camera there.* (Eva)

However, one issue was related to camera surveillance. It was hard to see if the camera was on or off. One participant could not remember when the camera was turned on, and she felt

uncomfortable changing her clothes besides the bed. She was afraid that the nurses could see her through the camera.

> *When I'm going to put on my night clothes, I feel like they can see me … I cannot stand facing the camera.* (Eva)

Moreover, the participants with comprehensive service needs said that telecare could not replace all visits from home care services.

> *I'm not often outside because it is so much trouble. So, it's very reassuring to know that they (nurses) will come and look after me.* (Molly)

Furthermore, telecare was experienced as providing a possibility of alerting home care services or family caregivers when needed.

Alert when needed

Participants with physical impairment were worried about falling, and several had experienced one or more falls. They were concerned about being alone and being unable to get up themselves. A personal alarm was used indoor, and a GPS was used as a digital personal alarm outdoors. Telecare was experienced as a solution to some of the challenges of being old and frail, as Alice stated:

> *It (the personal alarm) can help me if I'm falling … I cannot get up as I normally could because of my back and knee.* (Alice)

Moreover, for participants who felt unsafe due to general deterioration in health condition or fear of burglary, telecare provided a possibility to alert home care services or family caregivers when needed. A door sensor was for example used for different purposes; as a wandering alarm to a participant with dementia, and as a burglary alarm to participants who felt unsafe.

It feels safe to have it (door sensor) if anybody should come. (Eva)

Furthermore, the personal alarm was experienced as so important that some of the participants believed that all older adults should have the opportunity to obtain the service, especially those living alone. When participants could alert when needed, participants experienced to get help quicker if something happened.

You feel confident when you have this arrangement…If I press the alarm, they (nurses) will come as fast as they can. (Molly)

In addition, participants expressed increased safety and security through the possibility of being located outside.

Localization

Participants with impaired walking function, or with cognitive impairment, experienced increased safety and security from a GPS device that could alert helpers and locate them. Some of the participants had experienced that they were not able to call with a regular phone when they fell.

Last year, I could not call with this one (phone) so it is much better that I have this (GPS) around my neck. I can just press the alarm and they can see where I am. (Lucas)

However, one participant stated that the GPS device showed an incorrect location. The family searched for hours while she was with a friend. The participant had become unsure if she could trust the device again, but was tolerant of errors due to the benefits the device offered.

It was such a disappointment. I was so sure that they could keep an eye on me wherever I was. I feel like I'm not sure about it. But then I think I may have to stop thinking like that. (Sophia)

Furthermore, telecare enabled increased independence in many cases, due to the possibility to remain in their current dwellings, receive reminders and due to the increased predictability in daily life.

4.1.2 Increased independence

Remain in their current dwellings

A majority of the participants expressed great desire to live in their own homes and be as independent as possible. They did not want to move to a nursing home as long as they felt safe. The idea of moving to a nursing home was apparently akin to losing their independence and was only considered an option if they felt forced.

> *The most important is that I am capable to live on my own and not get too frail. I just hope I can stay at home and I hope I do not have to leave (to a nursing home).* (Alice)

Nevertheless, the consequence of independence for one participant was loneliness. One participant had previously been on a short-term stay in a nursing home, where she felt comfortable. She did not have much appetite at home and seemed depressed. She received a medication reminder to help her remember her tablets, in addition to visits from home care services. During the interview, Nora said:

> *I think it was better if I was dead…I always thought I was going to a nursing home. I have been on a short-term stay. In the morning I dressed and washed myself. Then we had a dining room. We went all together and ate breakfast and dinner and everything.* (Nora)

To participants who wanted to remain in their current dwelling, reminders was in most cases experienced as helpful to those who had cognitive impairments.

Receive reminders

Several participants with cognitive impairment experienced reminders of daily tasks as increasing their independence. When they received reminders, they managed to handle issues themselves, such as meals, medicines and special events.

> *When memory gets worse it is ok to receive reminders, because then you remember it, and then you can do it.* (Gabriel)

However, for one participant who did not need a voice reminder, this was experienced as stigmatizing. The medication reminder voice seemed humiliating to Ella:

> *That lady who is talking. I'm getting crazy about it … No, it's so stupid that it's as if I should be senile.* (Ella)

The use of telecare also enabled more control and freedom in everyday life, and participants experienced increased predictability.

Predictability in daily life

Participants with cognitive impairment expressed that they did not want to bother anyone and believed that they were less dependent on visits from home care services on specific times when they had telecare.

> *If they are late, I take the medicines when I eat. I like it best.* (Nora)

One of the participants had a history of drug addiction and when the medication was distributed through a medication reminder throughout the day, this provided a feeling of control over side abuse.

> *The thought of side abuse is less. Just knowing that I have them (the pills) makes it better, I think, psychologically.* (John)

However, some participants said that it was too easy to get more tablets than intended out of the medication reminder type 1. One participant stated that more control to each individual

could be a problem for persons with a history of drug addiction.

> *It is too thin. The meaning and everything are very clever. But for drug addicts, it will not help even with metal. They will use the ax. (What should one do?) Yes, right? They must consider everyone carefully.* (John)

Moreover, family caregivers were a driving force behind the use of telecare devices and they followed up the service that reassured the older adults. The participants stated that family caregivers' knowledge about possibilities and how to use the devices was essential for sustainable use.

> *The nurses have never mentioned anything about it … she (my daughter) has arranged everything.* (Gabriel)

4.2 Family caregivers' experiences using telecare

Two themes emerged when interpreting the family caregivers' experiences using telecare:

- *Ease the concern for a time through*; continuous monitoring, less homebound, own knowledge of telecare, continuous follow up and adjustments.
- *Ambivalence between wanting to contribute to living at home and the stress and concern this causes due to*; a wish to maintain the older adults` autonomy, general care tasks and telecare being an additional task.

4.2.1 Ease the concern for a time

Continuous monitoring

The majority of family caregivers in our sample did not live in the same house as the older adults. However, they lived nearby, and visited and helped the older adults regularly. The family caregivers experienced the use of telecare as an extra safety and security tool through the possibility of continuous monitoring, when the older adults were alone. They saw it as an

opportunity to get help quicker if something happened, which relieved some of the concerns they had.

> *We certainly feel safe. She will not lie on the floor for a long time if she falls.* (Daughter of Eva)

Moreover, the family caregiver who lived in the same house as the older adult participants, experienced to be less homebound.

Less homebound

The husband to one of the older adult participants said the medication reminder was a relief. The couple became less dependent on staying at home on specific times of the day.

> *Earlier, we and the nurses were dependent on being present 3-4-5 times a day. Now they (nurses) are only here once in the morning … so I would say it is a big advantage.* (Husband of Maya)

Furthermore, several participants expressed that own knowledge of telecare was of great importance.

Own knowledge of telecare

Several of the family caregivers who lived nearby the older adult participants bought telecare devices or helped apply for devices. They saw the older adults' needs; and reported to home care services. In these cases, the family caregivers knew about telecare and had some knowledge about using it.

> *I may have taken some shortcuts in relation to others who don't know. I say directly what they (home care services) can apply for…So, for sure it helps.* (Daughter of Daniel)

Family caregivers helped the older adults receive more telecare devices than they otherwise would have. In some cases, the older adults used technology because the family caregivers' had initiated it. Some of the family caregivers had more knowledge about devices than the home care nurses. One participant wanted a device for forwarding alarm to family caregivers, and this device was completely unknown to the nurses.

> *They did not know what it (a smoke detector that could alert family caregivers) was when I started talking about it.* (Daughter of Daniel)

However, some of the family caregiver participants that did not have previous knowledge of telecare, expressed a lack of information and training from home care services. They expressed a desire to be included in the service, and to receive information about how it worked in daily life.

> *When it is installed (the camera), family caregivers should be shown how it works. I miss that.* (Daughter of Eva)

Furthermore, the participants expressed a need for continuous follow up of the service.

Continuous follow up and adjustment

Family caregivers helped the older adults to remember to wear the telecare devices, they tested if everything was ok, entered information into the memo calendar, and adjusted the technology as needed. Furthermore, some family caregivers who lived nearby their parents received alarms.

> *I always have the cell phone on the nightstand... I live only two minutes away. They (nurses) probably would not have been there for half an hour.* (Daughter of Clara)

Family caregivers who lived nearby said that telecare could be very helpful, at least for a while. Reminders could help the older adults remember daily tasks, and this led to fewer questions for family caregivers. However, the reminders did not work as well when memory

deteriorated. This may indicate that in some cases telecare usage started too late. As Gabriel's daughter said:

> *If we had thought about it before, then he would have enjoyed it for a longer period of time. He needed it before he got it … but it can be helpful for a while*. (Daughter of Gabriel)

The older adults' family caregivers experienced increased safety that could ease their concerns for a period, depending on the older adult's health condition. Nevertheless, they had ambivalent feelings between maintaining the older adults' desires to live at home and the concern this caused.

4.2.2 Ambivalence between wanting to contribute to living at home and the stress and concern this causes

A wish to maintain the older adults` autonomy

The family caregivers wanted to contribute to the older adults maintaining their independence and avoid being sent to a nursing home.

> *He does not want to go to a nursing home, he says. As far as we can, we must try.* (Daughter of Gabriel)

Family caregivers to older adults who were living alone expressed that the older adults should decide over their own lives, even if they were worried.

> *I have to decide for myself, she says, but I`m worried about the night…she probably has fallen 7 times.* (Daughter of Eva)

Furthermore, several of the family caregivers of older adults who lived alone, had great responsibilities for practical issues in the older adults' home.

General care tasks

Care tasks were perceived as a burden to some participants who lived nearby, although they saw this as a necessity for the older adults to continue living at home. When the older adults' health deteriorated, their family caregivers got even more to do. Some older adults did not want more help from home care services, which led to even more responsibility for their family caregivers.

> *When she was ill, I lived there. Slept on a couch, but eventually I could not manage it anymore.* (Daughter of Clara)

Furthermore, some of the participants said that help from home care services was not enough. This was especially true for older adults who lived alone. Family caregivers perceived that the older adults were dependent on them; otherwise they had to pay extra to hire an aid.

> *If she should be all alone … that's not good enough.* (Daughter of Eva)

In addition to general care tasks, some participants experienced extra responsibility and tasks regarding the telecare service.

Telecare as an additional task

Family caregivers wanted to participate in the service. However, in some cases this was experienced as an extra burden. This could be for example receiving alarms during the night.

> *Once they (nurses) called half past two during the night because she had not returned to bed. I do not think it is right.* (Daughter of Eva)

Participants that needed to follow up telecare from a distance, expressed that routines and division of responsibilities were not clear between family caregivers and home care services.

> *It is not clear what the role of family caregivers is, and what the role of the municipality is.* (Daughter of Alice)

In some cases, the family caregivers had serious concerns about whether the older adults

could live at home alone. This uncertainty and the burden they experienced led to an ambivalent feeling between fulfilling the older adults' last wish to live at home and the relief it would be if they moved to a nursing home.

> *We accept it for now ... this is in my mind all the time, if she could be in a nursing home where everything had been arranged.* (Daughter of Eva)

The family caregivers wanted to use telecare to help the older adults continue living in their own homes. However, they experienced a great responsibility due to care tasks and following up with the service.

5 Discussion

The most unanticipated finding was how well the technology worked over time for frail older adults, unlike previous studies showing that the technology was truly challenging for this group. This is thought-provoking when telecare is used in some cases as a replacement for human care. All of the interviewed participants were still using the telecare service at the second interview, despite some of them experiencing challenges. This was due to the benefits they experienced, and family caregivers were a driving force for receiving and following up with the telecare service. However, the family caregivers experienced that telecare could benefit them but was also an additional responsibility. We discuss the findings below and argue that telecare improves the care offered by home care services, and the importance of family caregivers for continual use.

5.1 Telecare improves the care offered by home care services

Older adults experienced increased safety, security, and improved independence when using telecare over time. This is supported by previous studies (Karlsen et al., 2017) but usually applied to first-generation telecare systems and the participants were not followed up over time, in most of these studies. The present study shows findings from a range of telecare

devices and from older adults with different needs in various contexts. However, according to Pols and Willems (2011), a technology being good does not merely point to a characteristic of the technology, "good" emerges when the users and devices develop a relationship. Because of the contingency of establishing relationships, it is hard to predict exactly how the use of telecare will evolve (Pols, 2017). Findings from the present study show that telecare may work over time and be perceived as "good care" when it covers individual needs and is easy to use. This is despite the telecare service resulting in less supervision from home care services in some of the cases. The participants expressed that telecare prevents need for more help and increases their opportunity to age in place.

A few challenges were experienced in this study; however, they did not inhibit usage. Nevertheless, some technical improvements were suggested to better fit the older adults' needs. A better medication reminders for those with a history of substance abuse and psychiatry were examples of requested services. Moreover, one participant was afraid of changing her clothes in front of the camera because she did not remember when the camera was turned on. Previous studies show that the use of cameras for monitoring could cause serious feelings of violation of privacy (Demiris et al., 2008). However, Eva's experience with the camera increased her feelings of safety and security, as opposed to visits from "strangers" from home care services, but she needed to see more clearly when the camera was activated. The needs for telecare seemed to overrule possible privacy concerns. According to Essén (2008), technology surveillance is not necessarily constraining but can also be enabling. Findings indicate that telecare may be preferred over the option of moving to a nursing home.

The findings also show that some of the participants who had home care supervision services before they received telecare did not want to replace the face-to-face contact with technology. Older adults' reluctance to use telecare as a replacement for face-to-face contact resonate with

the study of Aceros et al. (2015). Nevertheless, this did not apply to most of the participants in our study. For many of the participants, it was a relief to be more independent. Moreover, findings reveal that one solution alone does not meet all requirements. Telecare may cover one need, but reveal another, for example the desire for social support. In some circumstances, the consequence of independence is loneliness and in such cases a nursing home may be preferable to telecare interventions. Telecare should therefore be considered individually in the context of other measures and assistance.

5.2 The importance of family caregivers for continual use of telecare and the burdens and benefits they experience

While the caregiving role may be a fulfilling one, providing care to older adults can be challenging as family caregivers in many cases balance family, career, and caregiver tasks (Cassie & Sanders, 2008). Less attention has been paid to technology's impact on caregivers (Vallor, 2011). This consideration is important because telecare will not only impact the older adults, namely those cared *for*, but according to Vallor (2011), it will also affect family caregivers in the environment. They were seen by the older adults in this study as an important driving force behind the telecare service. The older adults had several devices because of the family caregivers' own initiative to apply for and follow up with the telecare service. Family caregivers expressed that they wanted to be involved and to participate in the service to fulfill the older adults' wishes to remain at home and be more independent. Telecare could provide a feeling of extra safety and security and they would worry less. The findings indicate, as resonated in previous research (Mortenson et al., 2017), that this type of technology can decrease the caregivers' burdens.

However, family caregivers experienced a great deal of responsibility due to care tasks and following up with the telecare service. As supported by Berge (2017), the family caregivers

expressed serious concerns about the older adults' impaired health conditions and their safety. The family caregivers in the present study were willing to try telecare due to their concerns and care tasks. Moreover, some of the family caregivers said that own awareness was necessary to know what to apply for and how to follow up with the service. This indicates that there will be new demands on home care services (Milligan et al., 2011), as the findings from this study reveal that when family caregivers in some cases had more knowledge about telecare than home care services, they wanted to acquire more devices. Thus, there may be an increased need for more expertise from healthcare providers in order to offer equally good service and solutions for those who do not have family caregivers to assist them.

The family caregivers expressed that they needed to continuously follow up with the telecare service. They understood the older adults' needs and could ensure that everything worked as it should to maintain continued use. However, this responsibility may require competence and knowledge that not all family caregivers have or a role that some may not want. Some participants experienced ambivalent feelings toward fulfilling the older adults' wishes to remain in their own home or the relief it would be if they moved to a nursing home. As in line with previous findings, the majority of family caregivers in our sample were women (Borenstein & Pearson, 2010) and previous research shows that women experience higher levels of burden than male caregivers (Thompson et al., 2004). This should be considered when including and transferring responsibility to family caregivers.

A notable limitation of this study is that family caregivers were interviewed only once. Older adults who received telecare were considered to be the main participants in the present study. However, the findings indicate that family caregivers are important to achieve sustainable use of telecare and ageing in place. Seven family caregivers had active roles with the telecare service and hence could be interviewed, as the intention in the study was to understand experiences with the actual use of telecare. Nevertheless, it could also have been useful to

interview family caregivers who did not participate in the service, or who lived some distance from their parents, to obtain knowledge about what they perceived to be important or how home care services could support their participation in the service.

Moreover, the older adults in this study received telecare voluntarily in addition to home care services. They were therefore willing to try telecare, and this may have had an impact on the experiences and the findings in this study. In Norway, older adults have the option to decline telecare, and family caregivers may choose to participate in the telecare service. To establish trustworthiness, criteria from Lincoln and Guba (1985) were employed, which are applicable to a Gadamerian research process. The findings were discussed and presented in consensus with the co-authors, and the perspectives of the participants were represented as clearly as possible to achieve credibility and confirmability. According to Fleming et al. (2003), understanding is not possible independent of language and culture. It is also likely that the context may have affected the experiences of the participants in this study. However, the findings might be transferable to other older adults and family caregivers in similar contexts.

6 Conclusion

Telecare did improve the care offered by home care services in a number of cases. Older adults experienced increased safety and security through the possibility to prevent and discover accidents, to alert when needed, and the possibility to be located if needed. Moreover, the participants experienced improved independence through receiving reminders and experiencing increased predictability in everyday life. Challenges with the devices did not lead to non-use because of the benefits the participants experienced. Furthermore, telecare did delay moving to a nursing home, but could not always prevent this. Moreover, family caregivers wanted to be involved and to follow up with the telecare service and were considered as important for the continued use of telecare. They experienced that telecare

could ease the concern for a time, before the older adults' health conditions deteriorated through; continuous monitoring, less homebound, own knowledge, and continuous follow up and adjustment. However, some family caregivers experienced great responsibilities that could lead to ambivalent feelings about contributing to the older adults' living at home and the stress and concern this caused.

7 Relevance to clinical practice

Home care services should implement and use telecare to older adults, to increase safety and security, and to empower individuals to be more independent. However, solutions to meet needs that telecare cannot cover is crucial. In addition, nurses should provide continuous information and conduct follow up, and evaluation of the telecare service for adjustment to a person's needs, as these may change over time. The question "what is important to you" as the author asked the participants in this study should routinely be asked when installing telecare service and following up the use to illuminate individual needs. In addition, nurses should regularly consider who could benefit from using telecare, based on e.g. cognitive impairment and history of substance related disorders. Furthermore, telecare should be used to prevent increased need for home care services. This study clearly shows that family caregivers are a significant resource for promoting the continued use of telecare. However, cooperation and responsibility between the user, family caregivers, and home care services should be more apparent. It is important for telecare to relieve the burden that the family caregivers experience; it should not be an extra burden and increase their responsibilities. A careful mapping of individual needs should be considered, not only regarding the older adults, but also include family caregivers.

More research is needed on how home care services may involve and support family

caregivers, so they are able to support older adults to remain in their own homes. Furthermore, increased attention is necessary for identifying measures to meet needs that telecare cannot cover.

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Table 1 Demographic characteristics.

+PARTICIPANTS	AGE*	CIVIL STATUS	BACKGROUND/NEEDS*	TELECARE DEVICES*	FAMILY CAREGIVERS *
SOPHIA	88	Living alone, widow	Impaired vision, hearing, and walking function.	Personal alarm, light sensors, electric stove alarm, GPS tracking, medication reminder type 1*	Daughter in law (53-disabled) - applied and followed up
DANIEL	93	Living alone, widower	Impaired vision, hearing, and walking function, heart flare, stoma.	Personal alarm, bed sensor, smoke detector, light and sound warning system, stove detector*	Daughter (58-social educator) - applied and followed up
GABRIEL	71	Married, lives with his wife	Early dementia. Comprehensive service needs.	Personal alarm, memo calendar	Daughter (43-nurse) - applied and following up
ALICE	88	Living alone, widow	Impaired walking function, impaired hearing, forgetful.	Personal alarm, light sensors, electric stove alarm*, light and sound warning system *	Daughter (51-case worker) - applied and followed up
CLARA	92	Living alone, widow	Feels unsafe, impaired walking function.	Personal alarm, smoke detector, door sensor	Daughter (62-assistant in health care sector) - applied and followed up
EVA	87	Living alone, widow	Feels unsafe, early dementia, impaired vision and hearing, impaired walking function. Comprehensive service needs.	Personal alarm, door sensor, video surveillance	Daughter (64-store owner) - applied and followed up
MAYA	83	Married, lives with her husband	Early dementia, impaired walking function.	Personal alarm, medication reminder type 1	Husband (86-retired) - Supported and followed up
ELLA	73	Living alone, widow	Asthma, Diabetes, impaired walking function.	Personal alarm, medication reminder type 2	No responsibility
LILLIAN	88	Living alone, widow	Impaired walking function, forgetful. Comprehensive service needs.	Personal alarm, medication reminder type 2, electric stove alarm*	No responsibility
EMILY	79	Living alone, widow	Wheelchair user, comprehensive service needs.	Personal alarm, medication reminder type 2	No responsibility
SARAH	91	Living alone, widow	Feels unsafe, dizziness, forgetful.	Personal alarm, medication reminder type 2, GPS tracking *	No responsibility
VICTORIA	87	Living alone, widow	Early dementia. Comprehensive service needs.	Personal alarm, video surveillance, medication reminder type 2	No responsibility
MOLLY	89	Living alone, widow	Early dementia. Comprehensive service needs.	Personal alarm, medication reminder type 2	No responsibility
NORA	93	Living alone, widow	Early dementia. Comprehensive service needs.	Personal alarm, medication reminder type 2	No responsibility
JOHN	58	Living alone, not married	Substance abuse and psychiatry, osteoporosis.	Medication reminder type 1	No responsibility
MARIA	89	Living alone, widow	Impaired walking function, dizziness.	Personal alarm, light sensor	No responsibility
LUCAS	64	Living alone, not married	Substance abuse and psychiatry, impaired walking function, COPD.	GPS tracking/digital personal alarm	No responsibility
OLIVIA	90	Living alone, widow	Early dementia. Comprehensive service needs.	Personal alarm, medication reminder type 2	No responsibility

- Age - age at first interview
- Comprehensive service needs- visits from home care services x2 or more/day, in addition to telecare
- Telecare devices - telecare devices received between first and second round of interview, in addition to what they had before.
- Family caregivers - Older adults who had close family caregivers that had a responsibility in relation to the telecare devices.

Table 2 Description of telecare devices

Telecare device	No. of installations	Description
Personal alarm	16	The personal alarm is worn around the wrist or the neck. If the user of the alarm needs help, he/she can activate it. Alarms were in most cases received by home care services.
Medication reminder type 1	3	Nurses dose medication in the medication dispenser. The dispenser locks with a key. If the user forgets to take the medication, the dispenser can send an alarm to home care. Visual and audio alarms are not dismissed until the dispenser is raised, and pills are dispensed.
Medication reminder type 2	8	The medication reminder makes sure that the medicine is taken at the correct time. The nurses bring the patient specific, prescribed multi-dose medicine sachets from the pharmacy and loads them in the automatic medicine dispenser in the person's home. The robot offers instructions on how to take the medicine. If the medicine sachet is not taken despite three reminders, the dispenser locks the dose in a separate chamber so that it is not taken at the wrong time. The robot sends home care nurses automatic and uninterrupted information about patients' medicine taking, and alerts if the medicine is not taken. In this way, the robot acts as a communication device between the client, nurses and, if needed, family members.
Light sensor	3	A wireless motion-activated sensor unit that can be placed on the floor or on any surface for optimal positioning. When the person disturbs the sensing field, the light turns on, and instantly makes a safer pathway.
Electric stove alarm	4	The stove alarm provides fire protection by activating if the cooker becomes too hot or if an empty hotplate is left on.
GPS positioning/tracking	3	A mobile personal alarm with GPS tracking and GSM. If help is needed the user can press an alarm button, and immediately up to four pre-defined alarm recipients are called in parallel. The first person to respond is connected and can talk to the user. In addition, an SMS with position and the name of the first responder is sent to all alarm recipients.
Memo calendar	1	A tablet with software for structuring daily activities and for sending reminders. The software allows caregivers to add events in the calendar from another device.
Smoke detector	2	In case of fire, the smoke detector will alert the user, and send an alarm to caregivers and to the

		fire station. It can also send alarm to caregivers and to the fire station if the battery is low.
Door sensor	2	A wireless sensor on the door to prevent wandering during the night. The door sensor is connected to the same system as the personal alarm. When a monitored door is opened, the transmitter sends a signal to home care service.
Video surveillance	2	A camera is installed in the bedroom. The health care professionals can log into the camera at scheduled times during the night to see if the user is in bed.
Light and sound warning system	2	Provides information about several types of events. The warning system has two light sources at the top and bottom, which flashes with pattern and speed depending on the alert, and a color display that displays warning symbols. It also has sound and speech alerts.

Table 3 Illustration of the analytic procedure

Meaning unit	**Codes in Nvivo 11**	**Sub-themes**	**Themes that represent a shared understanding between researcher and participants**
It (the personal alarm) can help me if I'm falling … I cannot get up as I normally could because of my back and knee. (Alice)	The personal alarm can help if falling	Alert when needed	Increased safety and security
They (light sensors) are absolutely amazing, when I open the door… or I get inside it (the light) turns on. (Sophia)	The light sensors are amazing	Prevent fall	