Introduction of Telecare Mediated Home Care Services Pushes Forward a Re-Delegation of the Cooperative Care Work

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Abstract. In this paper, we apply activity theory as a theoretical framework to study conventional home care service practice versus telecare as a means for delivery of home care services. In doing so, we translate home care services into work activities to explore the cooperative nature between the nurses and the elderly care receivers. Findings indicate changes in how the cooperative care work are distributed when moving from conventional home care services to telecare mediated home care services. In our work, we conclude that introduction of new work practice results in increased delegation of responsibility and practical self-care activities to the elderly care receivers. Thus, telecare such as video consultation in the home is not appropriate for all elders. Nevertheless are those who mastery these responsibilities, rewarded with increased flexibility in their daily life activities since the delivery of services is more predictable and timely.

Keywords: Home care · Elders · Telecare · Work practice · Self-care

1 Introduction

The growth of the elderly population challenges the current organization of elderly care services in order to support sustainable development and efficient use of scare health care resources [1]. Housing – oriented elderly care services have become an international trend [2], but are still viewed as controversial in Norway. Housing – oriented care services are described as upscaling of sheltered housing together with extensive and robust home care services, and downscaling of nursing homes – but with maintained services for short – term stays for temporary in-patient care [2]. The housing - oriented care services are also motivating for a stronger involvement of the resident's family and local community. Additionally is incorporation of welfare technology valued as a key enabler for the re-organization of public health care services [3]. Welfare technology is the Nordic term for assistive technology and includes a wide range of technologies intended to support various users' need. The Nordic term is often classified into four main categories in relation to the technical assistance it seeks to support [3]: (1) safety and security technology (2) compensation- and wellbeing technology (3) technology for social contact (4) technology for care and treatment.

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In this research setting, we are studying introduction of telecare as a means for delivery of selected home care services [4]. Our reference to telecare is restricted to the use of video consultation to provide remote home care services to home dwellers who are formal health care receivers. The introduction of telecare as a part of the home care service organization is not a new invention; however there are few studies of telecare that have touch upon cooperative care work within the research field of HCI. This paper aims to add to the existing HCI literature by comparing work arrangements of conventional home care setting with telecare mediated home care services. The paper is organized as follows. Section 2 presents background of this paper. Section 3 is about related work. Section 4 describes the empirical setting. Section 5 presents the analysis based on applied activity theory in order to explore the conventional versus telecare mediated care service as a new way of delivery home care services. Section 6 lists findings. Finally, we discuss findings in relation to related work as well as we make some design considerations for telecare as a means for delivery of home care services, before we conclude the paper.

2 Background

The effort of incorporating welfare technology in the home care service organization is an initiative to develop home care services that are more efficient. Thus, the objective of technology mediated home care services are to hopefully serve more care receivers by less use of resources. Additionally, the introduction of technology can offload the nurses with routine tasks and enable them to allocate time on their core activities such as personal care and grooming [3, 5, 6]. The municipal home care services are provided to those home dwellers that have special need for assistance in order to live as independent. The delivery of services is related to activities that elderly home dwellers cannot do themselves, as well as the nurses motivate the elderly care receivers to carry on with self-care activities as long as they master doing these. This aspect of caring requires the nurses to evaluated the care receivers' physical and cognitive capabilities to make formal decisions on which tasks the elders need support in doing, and which tasks they master to do themselves. Thus, the care service is encounter in the relationship between the home care service's nurses and their care receivers. However, the home care organization is challenged in their daily work of providing services to an increasing group of care receivers, as well as care receivers have experienced problems with conventional home care service's practice as the nurses have an unpredictable work flow and restricted time per visit. Each home visit is estimated in time according to the formal agreement on which tasks the user should be supported with. However, unexpected incidents during visits can prolong the nurses time spent in the home. Thus, it is difficult to arrange a fixed time for each visit, so often the users have to wait for the nurses to come along before they can carry on with their daily life activities. The user can expect the visit to take place within a set time interval, e.g. the nurses inform a user that they will arrive between 9 to 12 o'clock. Thus, the user has to be at home within this time range. Many users have severe health care issues and seldom leave their homes without accompany. While others, especially active aging users can find it troublesome to be stuck at home

waiting for the nurse. Introduction of remote care services such as telecare has a greater flexibility for both the care giver and the care receiver as the service can be provided at a set time from a remote location. However, the conventional relationship between home care service staff and their care receivers will change when the caring is mediated by incorporation of technology as a part of the care work. Hence, the cooperative work processes will be different when the nurses and home dwellers are located at different places. We acknowledge that the cooperative work arrangements of the home care service organization is highly interdependent as the object of the care service depends on shared effort in order to receive the most optimal outcome of the service. In example, if the care receiver does not follow instructions given by the nurses for self-care activities such as for example fasting ahead of morning blood glucose monitoring; this can affect the outcome of the long term management of treatment. Similarly, if the nurses forget to bring forward essential information or instructions required for the maintenance of self-care activities (such as which symptoms to report if experienced); the care receivers are not able to have awareness of symptoms that may be critical to their health situation.

In this present paper, we study how the cooperative work arrangements between the home care service nurses and care receivers are changed by the introduction of home telecare. We are doing so under the assumptions that the care work that takes place in the home is interdependent and distributed cooperative work. Thus, we explore the care service duality by exploring how the object of the care service are mediated by the subject as the activities unfold in practice both in conventional home care services and in telecare mediated home care services. Particularly, we seek to explore interruptions or breakdowns that are experienced during the cooperative work arrangements to inform further design of telecare mediated home care services.

3 Related Work

Fitzpatrick and Ellingsen [7] recognize the move of technology into the home as a "*movement towards technology - enabled care at home with a greater focus on self-care*." [p. 637]. The authors [7] further state that the exploration of telecare, telehealth, and other monitoring- and/or self-care technologies can indicate a drift towards increased remote care services, and a reduction of local care resources in the home, as well as the services are more user-centered with focus on the users well-being.

Bratteteig and Wagner [8] also discuss the move of home care technologies into the home in order "*to understand the work to make home care work*" (p. 145). The authors [8] explore how the introduction of technologies change the caretaking in the home in relation to the care receiver, informal caregivers (family members, friends and neighbors) and the larger network of professional caregivers (practical support, professional home care services and care centers with more). Procter et al. [9] explore user experiences of elderly people who are "aging in place"[1] with support of assistive technologies

[1] Aging in place is defined as "*having the mental and physical capability of living in one's own home in old age; not having to move from one's present residence to receive care or services in old age*", retrieved 21.02.2016 from Dictionary.com.

and care services. Proctor et al. [9] state that "successful aging"[2] is feasible by daily effort of older people and their care network. Procter et al. [9] argue for the ease of customization of the technology in order to support individual needs, and the importance of mutual awareness within the care network to reduce response time when the care receiver has experienced adverse events or accidents.

Aaløkke et al. [10] argue that "*technology needs to evolve together with the elders as their needs and abilities change over time*" (p. 376). The authors present their findings by reflecting on the role of technology in assisted living housing [10]. They argue that assistive technologies often are introduced too late in the elderly care pathway, e.g. in acute phases of the old age [10]. Thus, the authors' stress the importance of introducing assistive technologies before extensive health care services are needed, as well as the technology should be more understandable for the elderly users in order for them to better succeed in adopting the technology [10].

Ballegaard et al. [11] explore use of supportive healthcare technology for elderly home dwellers (from age 60–77 years old). The authors [11] recognized that use of supportive technology is only one of several activities that elderly people are doing during a day. Hence, they argue for a design of technologies that can be integrated as a natural part of the home environment. They further state that this can be done if building services or products on familiar and/or existing technology in the home to maintain the "*continuity in the citizen's life*" (p. 1813). Thus, the authors further argue that elderly people can view modern technology as disruptions in their daily life activities.

4 Methods

4.1 The Empirical Setting – A Collaborative Change Experiment

The empirical setting is based on field work carried out in a sheltered housing located in the old town of Oslo, Norway. This sheltered housing contains 87 apartments for elderly residents as from 67 years of age. The homes are municipal rental flats, and the residents have applied for these through the municipal housing office. The office evaluates each application based on formal criteria for the allocation of sheltered housing. In this setting, we initiated a collaborative change experiment together with the district's municipal home care service organization. Home care services are complex in character by its multidisciplinary teams that performs a wide range of mobile and fluctuating care work. Thus, we chose to focus solely on the home care nurses work. The nurses provide their services to residents of the sheltered housing that have got formal decisions of receiving home based care services. We shadowed the nurses as part of our fieldwork whereas they were doing mobile home care work, thus in this manner we were given access to the homes of the elderly home dwellers. Thus, we were able to capture both the nurses and the elderly care receivers own user perspectives on the home based services. Several of the care receivers expressed a wish for more timely delivery of services

[2] Rowe and Kahn defined in 1997 three central components of successful aging as follows *"… low probability of disease and disease-related disability, high cognitive and physical functional capacity, and active engagement with life.*".

in order to get started with their day – thus we addressed this problem by introducing telecare as an alternative delivery of selected services for those who had minor care needs. We chose to build on existing and familiar technology in the home, by using the television as the platform for telecare mediated home care services. The change experiment consisted of five steps as follows: (1) Preliminary field studies (2) Task elicitation (3) Usability testing in controlled environment (demo - apartment) (4) Diagnostic evaluation in real environment (private homes) (5) Post – experiment workshop. For more detailed information of the change experiment and its various steps, see [4].

4.2 Participants

We recruited eight elderly participants who were existing home care receivers and who all lived in the sheltered housing. The participants expressed a motivation for participation based on own experience of delays of delivery of services, which resulting in them sitting home waiting for the nurses to come along. Additionally did one of the participants express concerns of having "strangers" from the home care service staff into the home several times during a day. The participants had various health issues, as well as different levels of user experiences with technologies. However, they all knew how to operate the television interface, and they quickly learned how to operate the TV- camera controller in order to operate the Skyping service. The average age of the residents in the sheltered housing was of 83 years of age, and the participants were represented by 6 women and 2 men.

The two participants from the home care service staff were home care service nurses. The staffs were especially selected by the home care service management as the study required them to get time off from some of the traditional work tasks in order to have time to participate in the study. The participating nurses had past experiences of using the Skype service.

5 Activity Theory as the Framework for Analysis

5.1 Activity Theory

Activity theory is based on the assumption that all human activity, from a historical standpoint, is mediated by use of cultural tools [12]. Thus, activity theory emphasizes that it is the activity itself that is the unit of analysis [13]. And it is the motivation behind the activity that separates one activity from another [14]. Cultural tools used in motivated activities can vary in shape and be from the material or ideal world [14].

Our initial analysis is based on Leont'ev's approach of activity theory [12] by the given assumption that a motivated human activity is carried out within a collective context. Leont'ev [12, 15] understands activities as "*units of life, which is organized in three hierarchical layers*" [16], see Fig. 1 below.

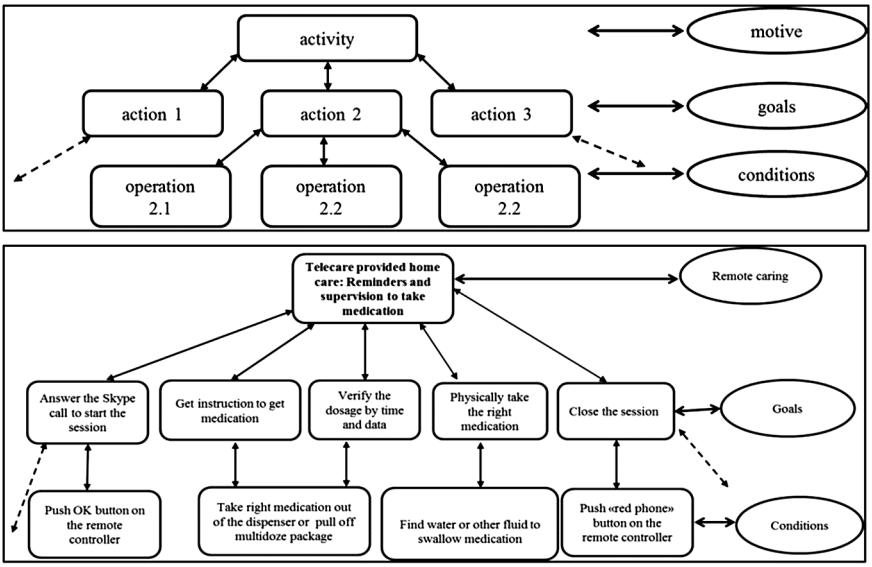

Fig. 1. Illustration of Leont'ev hierarchical structure of activity [16] above and the activity of remote caring below illustrates a simplified mapping of actions and operations.

Leont'ev argues that human activity is mediated by use of tools that need to be learned by repeated training [12]. Leont'ev further states that only after repeated training is humans able to become experienced practitioners [12, 17]. During the initial training of new practice, the practitioners are planning carefully the incremental actions needed to be carried out in order to reach the object of an activity. Thus, first over time, when these consciously goal-oriented actions are sufficient enough repeated; new practice is learned, and the users become experienced practitioners. Thus, the users are able to implement learned actions as familiar operations of routine work. Leont'ev [12, 15] states that experienced operations may be disrupted and changed during the course of an unfolding activity. Such disturbances are forcing operations to revert back to the level of action, where practitioners again have to raise awareness on their actions as new practice needs to be revised and learned [12]. The shifting mechanism between conscious actions and unconscious routine operations are as a whole the driving force behind all human activity, where human mediation of cultural tools are developed by recurring experience over time.

In this study, we also want to explicitly explore the relationships of the cooperative care activities by focusing on interruptions or breakdowns that occurred during the different work arrangements. Especially in situations where the activity is forced to take a different development than originally planned in order to adjust the mediating relationships within the activity system. We are doing so by applying Engeström's activity system model [18] that gives us an overall view of the activity system consisting of the relationship between the subject and object, object and community, subject and community. These relationships are mediated respectively by tools, division of labor, and laws. By applying Engeström's model we are able to highlight more explicit who

are the subject of the activity, and we can map experienced interference that occurs as the activity unfolds. Thus, we consider Engeström's development of activity theory as a particularly suitable for bird's-eye view of a collective activity.

5.2 Conventional Home Care Practice

Conventional home care services are provided by the nurses in the homes of elderly care receivers. Thus, the cooperative work of home caring includes the nurses and care receivers. The nurses provide services such as personal care and grooming, supervision of medications, wound care, supervision of the general condition, dressing/undressing, motivate healthy nutrition and fluid intake, and preparation of simple meals. The home care services are shift based and divided into three shifts; day, evening and night. The nurses are working in teams that are covering services for users who are located in a fixed area within the district to reduce the time and distance when traveling on visit from one user's home to another. The head nurse divides an equal amount of users to each of the team members with considerations of providing them an evenly distributed workload throughout a work shift. The team members can adjust their workflow as they prefer to a certain degree. However, the health care needs of the users are essential to what extent the users are visited once or several times during a day. Their care needs and location of residence are central when the nurses are planning their work flow in regard to the visiting order of their assigned users. Users who need assistance to personal care and grooming, or those who have to get ready for the day care center are prioritized first during a day shift. While users with minor care needs, e.g. supervision of medication, are taken later after the prioritized morning visits are done. However, there are exceptions of the workflow order, e.g. if users with extensive and minor care needs live close to each other; the nurses may decide to put them in the following order if it is more efficient in regard to time consumptions. The prioritization of visits is to some degree opposite during the evening, as users with minor care needs are taken first during the shift, e.g. to prepare dinner or supervise the intake of medication. Thus, users with extensive care needs are taken in the end of the evening shift, e.g. for assistance to get into bed.

Users who get visits during the night shifts have often extensive care needs such as need for support in the home that includes support from two nurses. For example, this could be users who have physical disabilities and need support to be turned over in bed to prevent bedsores or who need personal care and grooming as a result of incontinence. However, night visits can also apply to care tasks that only require supervision from a nurse.

Figure 2 displays a simplified activity system of the nurse (subject) who by use of the medicine dispenser can provide the users with accurate medication dosage, and supervise that the elderly care receiver take the prescribed medication and drink water or other fluid to help passing the medication from the mouth to the stomach. The model has restriction as it does not explicitly illustrate the time aspect, but merely focusing on the object of conventional caring within its context. A number of elderly care receivers were complaining that the nurses came on delayed visits, and this interference the division of labor mediated relationship of the object and the community that is marked by

the bold broken arrow, see Fig. 2. In order to develop more efficient and timely home care services to active elders; we chose to introduce and test telecare mediated home care services as part of the change experiment [4].

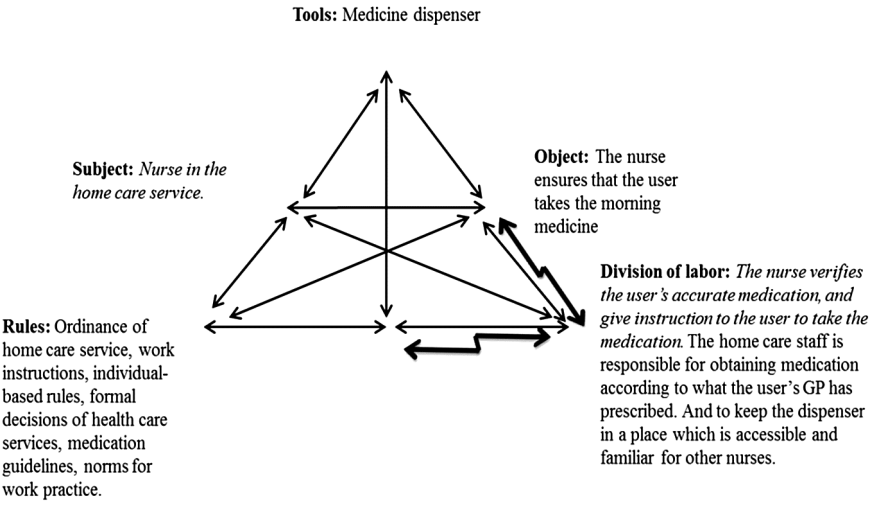

Fig. 2. The illustration displays conventional home care service where the nurse ensures that the user takes the morning medication

5.3 Telecare as a Means for Delivery of Home Care Services

Telecare mediated home care services are carried out by the home care service nurses and users through the television interface by use of TV Cam HD for Skype calls (hdmi connection). Thus, the cooperative work of home caring is provided by the same participants, but the work is delegated differently and the participants are not located at the same place. The nurses provide selected services that are found appropriate for remote delivery of caring including supervision of medication intake, provide instructions for self – care of wound care, provide instructions for prevention and everyday rehabilitation activities, supervise the general condition, stimulate to proper nutrition with others. The users care needs are essential to the amount of telecare sessions per day, or if the telecare sessions are mixed together with conventional home care visits. However, the users are able to receive services timely and according to a time that is preferable for them. The work flow and the time of visits are less affected by other users' care needs or location of residence. However, this setting of care work requires that the users are prepared and ready to take the call when the nurse is calling.

Figure 3 displays a simplified activity system of the elderly care receiver (as the subject) who by use of the medicine dispenser and telecare technology is reminded of taking the accurate medicine dosage under supervision from the nurse. The remote delivery of services put the user as the subject of the activity, as the user is the one who is actually performing the practical work tasks. Thus, the user is assigned with increased responsibility and self-care activities. The assumptions for this delivery of services are

that the user master the telecare session and that the dispenser is filled and accessible, as well as water or other fluid. In cases where the nurse is unable to perform supervision from remote as the user is not responding or there are technical issues, the nurse has to visit the user in addition to the telecare call. There is less flexibility in the remote setup of caring as every assumption behind the object of the activity has to be present in order for the work to be accomplished. Thus, the practical care work is done by the user and not the nurse in this setup of caring. Moreover, if the medicine dispenser is empty or absent, the user may not be able to perform the fixed work tasks; and managing work-arounds from remote location can be troublesome. However, telecare mediated home care services transform conventional home care service by the re-delegation of labor. Additionally we see a need for developing the law mediated relationship of the subject and the community. Especially concerning who are appropriate for remote delivery of services, is local and remote caring counted as equal home visits, should the deductible be adjusted when the user is doing more work and gets increased responsibility. Moreover, we see a requirement for developing instructions for the new work routine, e.g. can users have a say about receiving remote versus local caring, or is it the application office for health care services that gets to decide, furthermore what actions should be taken if the user does not responds to the call etc.

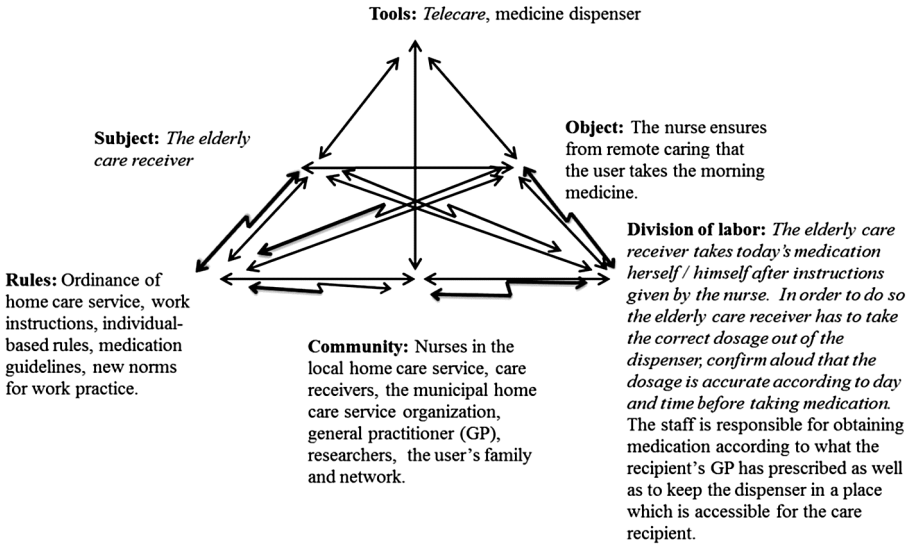

Fig. 3. The illustration displays the re-delegation of work when telecare is introduced in order for the nurse to supervise that the user takes prescribed morning medication.

6 Findings and Discussion

The introduction of telecare as the means to deliver home care services transforms the current cooperative work of conventional home care services since new delivery of service is forcing forward a redistribution of the practical work by delegating more work

to the care receivers. We also experienced that telecare mediated home care services resulted in increased responsibility to the users because of the increased self-care activities. However, the users who mastered the telecare solution to its full potential were rewarded with increased flexibility in their daily life activities since the delivery of services was more predictable and timely. Though, we experienced during our fieldwork that some of the recruited participants got increased decline of physical or cognitive abilities, so over time they did not master to either respond to the telecare sessions or they needed care services that were not suitable for remote delivery, e.g. support with personal care and grooming. Thus, in the last period of our experiment; two participants received both telecare m home care services and conventional home care services.

To succeed in making the home care services more efficient by use of telecare, the telecare session should replace one or several conventional home care visits. It is therefore necessary to establish new work routines at the home care service office. For example in regard to the selection process of users that would be suitable candidates for remote delivery of home care services. The users should ideally have minor health care issues in order to supervise them from remote location. It is also important to implement mechanisms that capture signs of reduced abilities of self-care activities – since elderly people often have fluctuating general conditions. In our study, we experienced repeated events of users that did not master to get out of bed in order to take the call – and over time we had to re-organize our study to first assist them in the home, and then later call them. Thus, it is necessary to establish new rules of work practice to the home care nurses, e.g. what to do if a specific user does not respond to the call within a set time interval. Moreover, if a user is not able to join the telecare session over time, the nurses have to evaluate if this is a temporary decline that require temporary conventional home care services, or if the user should receive merely conventional home care service in the future. Our study supports the argument of Fitzpatrick and Ellingsen [7] that concerns users getting increased responsibility, e.g. users are delegated increased self – care activities when assistive technology is moved into their home. Thus, the division of the care work is changed as the delegation of work tasks are shifting from the nurse playing an active role locally in conventional care setting, to the user taking the active role in the home when the nurse is present from remote location. There are several contributions that highlight the importance of active aging and successful aging, thus this push towards increased responsible to the user can be an initiative for them to stay independent longer. However, it is a danger that users who have declined abilities are unable to take the delegated responsibility of active self-caring so this responsibility has to be balanced according to their capabilities. This finding is related to the work of Procter et al. [9] that argues for the importance of mutual awareness within the care network. This is especially critical in user situations where the user experiences sudden decline in the general conditions. Thus, the care network has to establish mechanisms that capture sudden changes in the current health situation. Aaløkke et al. [10] emphasize that technology has to develop according to the shifting need of users. This is a relevant argument in relation to telecare sessions, as telecare is valued as appropriate for users that have minor care needs, so telecare could be introduced in early onset of old age. Moreover, as users are experiencing declining health, they should be supported with additional technologies such as sensors to support their safety and security, e.g. fall sensors or door

controllers for wanderers. The use of sensors requires none or less awareness from the user side since the technology is automated to alert in predefined situations. Future studies are required in order to fully capture the limitations and potentials of telecare mediated health care services for active elders.

7 Conclusion

In this present paper, we apply activity theory as a theoretical framework to study the cooperative care work in the home of elderly people. We are doing so by comparing conventional home care services with telecare mediated home care services. Especially we are concerned about the transformation of care work and how this affects the cooperative care work of the care providers and care receivers. We conclude that introduction of telecare mediated home care services results in increased delegation of practical self-care activities and responsibility to the elderly care receivers. Thus, telecare such as video consultation in the home is not appropriate for all elders. Nevertheless are those who mastery these responsibilities, rewarded with increased flexibility in their daily life activities since the delivery of services is more predictable and timely.

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