

The Effects of Camera System on Caregivers' Behaviors to Persons with Dementia

Taro Sugihara¹, Kenichi Nakagawa², Xi Liu¹, and Tsutomu Fujinami¹

¹ Japan Advanced Institute of Science and Technology, Ishikawa, Japan
{sugihara, fuji, s0750215}@jaist.ac.jp

² Freelance programmer
macsi@m2.spacelan.ne.jp

Abstract. We installed a camera system into a group home to investigate how such a device may help caregivers in responding to the behaviors of the persons with dementia. We studied how their behaviors have changed by introducing the system into the home through video recording and a series of interviews. We found that the system enables caregivers to optimize their responses to the persons with dementia depending on their degree of mobility.

Keywords: group home, persons with dementia, caregiving, and camera system.

1 Introduction

Japan is a super-aged society. Despite the urgent need for care support systems and for eligible care workers at group homes, neither qualified persons nor any type of systems has caught up with the rapid social change.

There are methodologies such as human-centered design [1] and user-centered design [2] that reflect users' needs, and improve usability in terms of custom-made design. However, dementia care is a difficult field because it depends heavily on contexts such as residents' behaviors and their surroundings including the equipments employed to help them. Davenport argues that knowledge management systems should be embedded into the flow of job processes of expert workers [3]. It is necessary to adopt his argument for supporting caregiving, too.

Most researches of caring persons with dementia (PWD) focus on supporting the communication problems [4][5][6], but it is also important to help caregivers to improve the quality of life for the elderly with dementia, some of whom reside in group homes. We have conducted several field researches by introducing camera systems into group homes and employed a qualitative method for analyzing the effects of the system, with a hope to develop useful systems for caregivers [7][8]. By supporting caregivers, we can not only develop their abilities but also lead them to improving the quality of life for residents, which in turn result in easing caregivers' physical and mental work stress.

In this article, we describe a field research to investigate the effects due to the introduction of a camera system for helping caregivers at a group home. We conducted interviews to five caregivers and a couple of managers as well as a video observation for our research.

As for the ethical issue, our research has been approved to carry out the experiment by the ethics committee at Japan Advanced Institute of Science and Technology.

2 Methods

2.1 Interview

A series of semi-structured interviews were carried out before and after installing the camera system. We interviewed caregivers to ask what they think of the system and which aspects they regard most effective in terms of dementia care. In the interviews we asked the following questions:

- What is the burden for dementia care? (before)
- What is/are the most important factor(s) for dementia care? (before)
- How do you use the camera system? (after)
- How do you think about using the system? (after)
- How does the system change your work stress? (after)

Table 1 shows the overview of our field study. The group home accommodated nine residents to its full capacity and the number of caregivers was as required by the law. The profile of the interviewees is illustrated in Table 2. We graded the caregivers to three groups depending on their work experience, that is, one group with less than three year experience, another with 3-7 year experience, and the other with more than 7 year experience. Every caregiver has worked for at least three years as caregiver at a group home and was qualified to care the elderly. Three of them were qualified as a nurse, too.

Table 1. Overview of the group home and this research

Feature		Data
Residents		9
Total of caregivers		8
Interviewees		5
Caregivers in the daytime		2 or 3
Caregivers in the nighttime		1
Residential area		first floor
Start of operation		2008 March
Timing of interview	before	2007 November to December
	after	2008 May
Timing of video observation	before	2008 March
	after	2008 Decmber

2.2 Video Observation and Analysis

We observed behaviors of the caregivers and the residents by recording them. The caregivers and the managers allowed us to record their images with two extra video cameras, not as part of the camera system. We carried out the data collection for one day before installation and another day after installation. We analyzed behaviors of a

Table 2. Profiles of interviewees

Interviewees	Sex	Experience level	Qualification of nurse	Prior job
c1	female	high	eligible	Nurse of hospital for dementia care
c2	female	moderate		Caregiver of carehouse for dementia care
c3	female	high	eligible	Nurse of hospital for dementia care
c4	female	moderate		Housewife
c5	female	moderate		Another group home

caregiver and residents observed in the corridor (V1 in Fig. 1) and in the living room (V2) to concentrate our investigation to the events closely related to daily activities such as the assistance in the restroom.

We counted how often each resident took an action and how the caregiver responded to it for every ninety minutes from four o'clock in the evening to half past five in the early morning (16:00 to 5:30). We studied the behaviors observed in the evening and at night because we expected the effects of the system to be best evaluated for the time period. The number of caregivers is limited to one at night and the camera system is thus expected to be most effective then. Preceding studies also suggest that caregivers are most benefited from the kind of system during the night [8][9].

We eliminated some behaviors of the residents of our data analysis when they were just wondering in the corridor or living room because such behaviors do not particularly require reactions by caregivers.

3 System Installation to a Group Home

3.1 Overview of Camera System

Since the caregivers were inexperienced with computers, we designed the system with four wireless cameras, a portable monitor and a note PC as a server. The server gathered visual data from the cameras and a Web browser was used to display the information collected from four video signals. The information was converted into signal of TV footage by a down-scan converter to be emitted to the portable monitor. Malfunctions due to mishandling by the caregivers or residents were reduced because they did not operate the system through the monitor.

3.2 Installation Process

We respected the privacy issue because the manager and caregivers were both concerned with the matter. They were particularly worried about video recording. The recording function was therefore not included in the camera system and its cameras were only placed in common spaces such as entrance hall, corridor and living room. The cameras and the monitor were placed as shown in Fig. 1.

Through the interview before installation, the caregivers mentioned their demands for the system. Their comments were mostly about toileting assistance. That is, when some resident enters the restroom, caregivers have to check who it is and how many times she used it. Caregivers were also anxious of possible accidents at night due to the lack of sights. The cameras were thus placed to cover caregivers' blind spots such as the corridor (Z1). The camera at the living room (Z2) was for monitoring the falling accidents. The other cameras, Z3 and Z4, were for monitoring unnoticed walkout of residents and checking visitors. The portable monitor was usually placed by the sink in the kitchen because one of the caregivers always worked there.

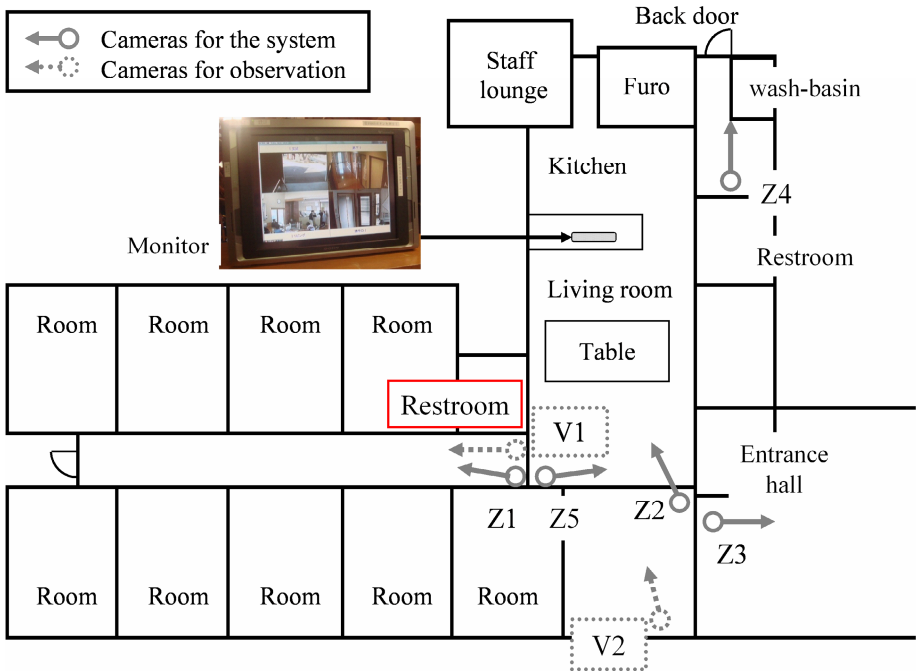


Fig. 1. Camera arrangement at the group home and its outlooks

After three months we began to operate the system, a new camera was set up to watch the entrance hall (Z5). This issue was raised by a manager and caregivers alike; they noted that the place was a serious blind spot because a resident may walk out unnoticed. They wanted to be warned when a resident walks into the entrance hall so that they can prepare for her walkout.

4 Results

The series of interviews revealed that the system reduced caregivers' physical and mental stresses because they could judge the appropriate timing for taking actions by watching the monitor. They appreciated the system, especially owing to the elimination of

blind spots. When some resident shows up from her room, approaching to the restroom (depicted in the center of Fig. 1), caregivers in the kitchen may not be aware of the incident. If they notice it, they suspend their work in progress to come to the place and see who has entered there.

A veteran caregiver told us that she realized the system to be valuable although she use to believe that caregivers should only rely on manpower. She roughly estimated that mental stress was decreased by 20 to 40 percent and the physical one by 20 percent. Other caregivers appreciated its positive effects, too. They felt the system improved their work styles significantly because it enabled them to focus on the task at hand such as writing residents' daily records, washing dishes and cooking.

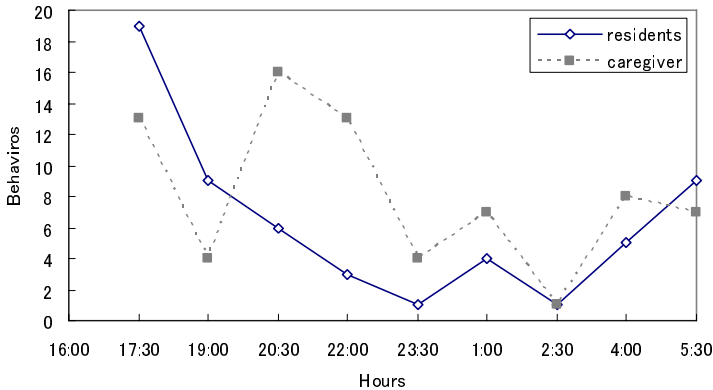


Fig. 2. Behavior patterns before system installation

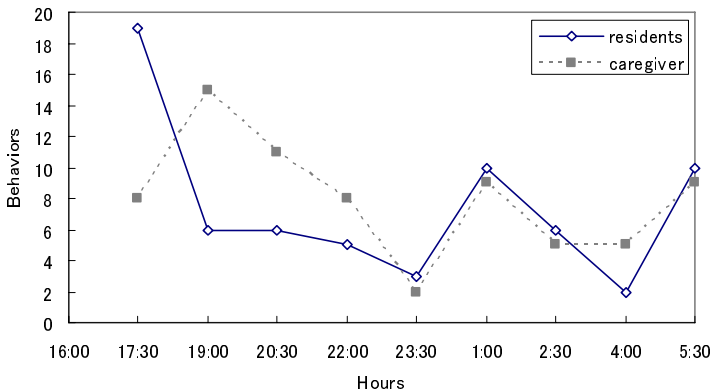


Fig. 3. Behavior patterns of after system installation

The video analysis validated their testimony. Fig. 2 shows the behaviors of the residents and the caregiver, respectively, in March, before we installed the camera system in the group home and Fig. 3 shows those in December after the caregiver had used the system for nine months. Those figures indicate that the caregiver's responses

to the residents' behaviors have been optimized to some extent as the difference between the behaviors of the residents and those of the caregiver was decreased, especially between 23:30 and 5:30. Note that the total number of their actions did not differ so much. That is, the camera system has not reduced the workload, but helped the caregiver to adjust her efforts to the residents' demands.

5 Discussion

It is rather surprising that the caregiver's workload did not differ before and after the installation of the camera system. The system helped her to optimize her efforts to taking care of the residents. The question is whether the change found in the caregiver's responses is desirable for her. We believe that the caregiver is benefitted from the installation of the camera system because she can take things under control by adjusting her behaviors depending on the demands from the residents. She can continue her work at hand, i.e., writing a daily record of each resident, if she thinks that she does not need to take an immediate action to a resident's particular acts such as using the restroom as long as she can manage it by herself.

We were told that the caregivers had to run up to the place when they noticed that someone entered the restroom. They had no means to see who entered the restroom before the camera system was installed. They felt a stress in doing so because they believed that such reactions might make the residents feel awkward. That is why the system contributed to easing the stress which the caregiver felt when such a system was not available although the overall workload did not particularly change.

6 Conclusion

We analyzed how the camera system affects on the caregiver. Our observation using two video cameras showed no distinctive difference to the caregiver's behavior before and after the installation of the camera system. A series of interviews, however, revealed that the stress they felt was removed whose reason we believe lies in that they can take things under control by monitoring the residents' behaviors with the camera system.

Data collection is further required to verify our findings as we only carried out our experiments several times. We also need to improve the camera system by investigating the caregivers' needs with additional field studies.

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