

A Study on Effect of Media Therapy for the Elderly with Dementia to Nursing Care Quality

Miyuki Iwamoto¹, Noriaki Kuwahara¹, Kazunari Morimoto¹, Yoshihiro Niki²,
Doi Teruko³, Yuka Kato⁴, and Jin Narumoto⁴

¹ Kyoto Institute of Technology, Japan
cabotine.six.stars@gmail.com

² Vision Ace Co., Ltd., Japan

³ T M Medical Service Co., Ltd., Japan

⁴ Kyoto Prefectural University of Medicine, Japan

Abstract. Japanese society contains an extremely large elderly population, unprecedented elsewhere in the world. In fact, the elderly make up about 23.3% of the Japanese population. Consequently, the number of elderly people with dementia is also increasing at an unexpectedly rapid pace, with 10% of Japanese citizens over 65 diagnosed with dementia. While group homes are covered by the Japanese "Long-term Care Insurance System," and offer people with dementia a better quality of life, the behavioral and psychological symptoms of dementia, (BPSD,) often place a great burden on care staff. Many facilities now suffer from a shortage of care staff .Drug therapies have limited effects on BPSD, so non-pharmacological therapies, like reminiscence therapy, are sometimes used. However, the effects of these techniques are often not medically confirmed. In this study, we introduce a media therapy technique, which enhances reminiscence therapy by using media and information technologies, and report promising results for mitigating BPSD. Also, we investigate the keys to our success. So far, we have conducted our proposed media therapy on two residents in the nursing home. Both cases showed significant improvements, but due to space limitations, we only show the effects on the ability of the care staff to see to the patient's needs. The therapy session allowed care staff to distract the patient from her BPSD and calm her down by offering her topics from her past. For further investigation, we analyzed videos recorded during therapy sessions, with interesting results. Sharing a resident's good memories with care staff is key to quality care, and media and information technologies can facilitate this process. While we only examine one case here, we would like to note that the results of our other resident case indicated similar effects.

Keywords: elderly, reminiscence videos, senior care home, dementia.

1 Introduction

According to world population reports, in 2001, it was estimated that there were 24.3 million people with dementia. In developed regions, dementia rates for people over the age of 60 were reported between 4 and 6%. This number increases to 20-33% in

people over 85. Estimates suggest that the number of people diagnosed with dementia continues to grow at a rate of 4.6 million people annually, reaching 81.1 million people in 2040.

Population aging has accelerated rapidly in Japan, and now the aging rate is very high. There are 1.5 million people with dementia over the age of 65 in Japan today, but it is estimated that they will be over three million people in the 2020s, approaching 10 percent of the population over the age of 65. The increased number of people diagnosed with dementia is a major social problem that will only grow more serious in the future, as life expectancies continue to rise.

Dementia is quite varied in its symptoms, severity, and extent. We extracted the overview of the definition, types and symptoms of dementia from the dementia text book published by Japan Society of Dementia Research and described below [2].

Several definitions have been proposed, including in the World Health Organization's ICD-10, the DSM-III-R, and the DSM-IV-TR. Here, we provide an overview of dementia for those unfamiliar, largely taken from the Japan Society for Dementia Research's "Dementia Textbook." Differences aside, the concept remains the same. Dementia is a collection of impairments of previously normal intellectual function, caused by acquired brain dysfunction, which decreases mental performance. This includes such symptoms as memory loss, aphasia, and executive function disorder. For a symptom to be an "acquired dysfunction," it must involve a change in the organic material of the brain and lower the patient's intelligence. The ICD-10 states that this fault must be sustained for more than six months. The intellectual disability thus creates a strong effect on the patient's daily life and social behavior. It is not intended to be acute or temporary, and the above symptoms are also found in the absence of consciousness disturbances

Due to the damage to higher brain functions such as memory, orientation, knowledge, action, cognition, language, emotion, and personality, people with dementia become antagonistic towards situations in which they've placed themselves. Dementia can be induced by a variety of causes. Its pathology and symptoms are very diverse. Symptoms can be divided into core symptoms and peripheral symptoms. The core symptoms include memory impairment, executive function disorder, apraxia, aphasia, and agnosia. Patients with dementia may exhibit execution dysfunction, difficulty in initiating action, reduction of spontaneity, behavioral conversion dysfunction, impulsive behaviors, and disinhibition. Apraxia is a degradation of motor skills or coordination without any link to sensory impairment. Patients may be unable to put on clothes or use tools properly. Agnosia is an inability to recognize objects through use of the senses, including physical landmarks or other visual stimuli, as in visuospatial agnosia. It may also apply to sounds. "Peripheral symptoms" refers to various behavioral disorders and psychiatric symptoms that appear to be affected by the patient's environment and physical condition. This category includes delusions, hallucinations, anxiety, impatience, depression, wandering, aggressive behavior, sleep disorders, eating disorders, including binge eating and pica, and resistance to care, among others.

The Symptoms of "BPSD". The Behavioral and Psychological Symptoms of Dementia, or BPSD, are the "core symptoms" of dementia. It occurs in conjunction with memory loss, psychiatric symptoms, and a decline in comprehension ability, and was

previously referred to as "problematic behavior" or "nuisance behavior". The symptoms are divided into behavioral and psychological symptoms, with more symptoms appearing as the dementia progresses from mild to moderate. Behavioral symptoms may include violence, verbal abuse, wandering, rejection, and unsanitary acts. As the manifestation of symptoms differs from person to person, all symptoms may not always appear. These symptoms appear frequently as dementia progresses from mild to moderate, leading to a rapid decrease in quality of life accordingly, and an increased burden on caregivers.

As symptoms develop and progress, dementia patients often become apathetic, entering a lethargic state. They lose the desire to do things themselves, and eventually lose interest in everything, even daily life. Patients with vascular dementia, often caused by repeated mild strokes, often become apathetic. Uninterested even in getting dressed or washing their faces, patients with apathy cause great mental stress for family members and caregivers. Apathy can also lead to a patient becoming bedridden, due to disuse of physical and mental functions. Drug therapy is often unsuccessful in treating apathy. As drug therapy is often ineffective, caregivers reach out to patients with touch and eye contact, and address the patient by name. Getting close to patients is thought to help them maintain their bodily functions and cognitive functions.

Also, the frequency of sleep disorders is very high in elderly patients with organic brain diseases, such as dementia. In fact, the symptoms which are most frequently observed in limbic dementia are insomnia, irregular sleep patterns, (such as day-night reversal,) and sleep-related disorders, such as delirium. In many insomnia cases, patients do not remain in bed, which leads to behavioral disorders such as wandering, agitation, excitement, and even violence. Caregivers and family members often become exhausted before the patient tires. As a result, it is difficult for some elderly people with dementia and behavioral disorders like night wandering to receive home care. This has become one of the biggest reasons leading to their institutionalization [1].

Drug therapy for dementia is presently limited to therapeutic medication, but these medicines are basically for Alzheimer's disease. In Alzheimer's disease, anti-cholinesterase inhibitors such as donepezil hydrochloride are effective, but these are symptomatic drugs, which only suppress its progress to a certain extent [2].

As drug therapy to eradicate dementia does not currently exist, it is necessary to increase the therapeutic effects of non-drug therapy.

Currently, reminiscence therapy is a well-known non-drug psychological and social therapy for dementia. Reminiscence therapy is a form of psychotherapy used mainly for the elderly, first used in the early 1960s by Dr. Robert Butler. Butler believed that elderly people's talk about memories is meaningful, though it had previously been regarded as the "tedious talk of old age." Simply put, reminiscence therapy asks patients to talk about their memories, either one-on-one or in small groups.

This is part of daily life, and perhaps nothing special, but the act serves several different psychological functions. The conversation is not used strictly as psychotherapy, but also as an activity in intergenerational exchanges or community activities.

At the moment, reminiscence therapy is gaining attention as a non-drug therapy in both clinical psychology and medical institutions, such as nursing care facilities and long-term care facilities. With the increase in number of the elderly requiring care and

assistance, preventive care has become an important part of welfare. Additionally, research has suggested that reminiscence, including conversation with people, is effective at preventing or slowing the onset of dementia. This method draws attention to respecting the feelings and experiences of each individual. Non-drug treatments such as day care are also essential, but some regard for the caregivers, who exhaust themselves physically and mentally caring for their patients, is also important. In many cases, patients do not get enough conversation partners due to the decreasing staff-to-patient ratio. Enhancing the support for both caregivers and patients is thus an important issue. Various methods have been proposed to help improve for patients and their families so far. In this study, we created an interactive digital photo album using old photos of the patient, and showed it to the patient, her family, and nursing staff together over a large screen. We then conducted media-based reminiscence therapy, enjoying the conversation with the patient. Reminiscence therapy is believed to stabilize the mental condition of elderly people suffering from dementia, and reduce behavioral disorders. This therapy was also conducted using old tools, toys, or photos, in a group led by experienced listening staff. Our reminiscence therapy is different from general cases, since the patient, her family, and the nursing staff became a therapy group while using the photo album. Using photographs and visual stimuli to aid memory recall is considered effective in reducing the psychological disorders and behavioral disturbances of dementia.

In this study, we focused on the content and photographic images when the patient, family, and staff engaged in conversation using media therapy, and hope to quantify those images effective at promoting stable actions and mental condition in the patient.

The process of the media treatment is as follows.

First, the family of the patient provided old photographs of the patient's life. In order to make the media therapy "album of memories" [2], the editor listened to stories about the patient associated with old photos, selected a portion of the patient's history, then copied the selected photos to an iPad as a digital photo album. The photos were arranged in chronological order and categorized by story. After that, the patient had six weekly media therapy sessions, each lasting 60 minutes. Family and staff were present for all sessions, and the photos were displayed on a large screen.

2 Experiment

2.1 Experiment Abstract

In this study, for the patient, her family members, and nursing staff participating in the media therapy, we quantified the effects of the therapy and to what degree it elicited mental and behavioral changes in the patient.

This experiment was conducted with the assumption that all those present for the therapy participated in group sessions actively and had a positive relationship. The purpose of the experiment was to verify what kinds of images produced a positive response, and associate the images with their effects after the session, by recording

the sessions with a video camera. We analyzed the patient's expression and speech during therapy. We also carried out interviews with the patient's family and close nursing staff.

2.2 Contents of Experiment

In the experiment, we allowed the patient, her family, and care staff to freely talk about the memories associated with the photographs presented. This process is referred to as media therapy, which is a type of reminiscence therapy. Reminiscence therapy is said to be an effective conversational support in suppressing dementia. It often helps stabilize individuals with dementia and reduces behavioral disorders. Normally, it is done in groups led by experienced staff using items such as old tools, toys, photos, and paintings. Media therapy is quite different from standard reminiscence therapy in that we create a digital photo album using photographs from the patient's life, and the therapy is carried out using that album, with family and care staff who are close to the patient.

2.3 Experiment Environment

Figure 1 shows the state of the experiment. Figure 2 shows the equipment used in the experiment. Figure 3 shows the layout of the experimental environment. This experiment was carried out using the multi-purpose room of the nursing facility. As shown in Figure 3, conversation was conducted with the patient's family sitting next to her, and the nursing staff further away. Images were displayed on a large screen as shown in Figure 1, and an iPad was used as shown in Figure 2. The iPad was put at the patient's side, and experiment staff was waiting behind the patient in order to change to the next photo. The experiment staff changed to the next slide whenever they got the signal from the family member, or when too much time was taken on any particular slide. As shown in the environment layout in Figure 3, we set three video cameras to capture the change in the patient's expression. One was placed in position to capture the patient's reactions; the second was placed to capture all participants; the third was placed to capture the large screen at the front.

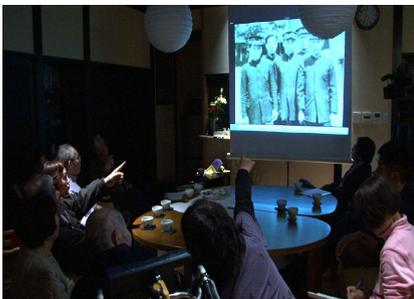


Fig. 1. The state of the experiment



Fig. 2. The equipment used in the experiment

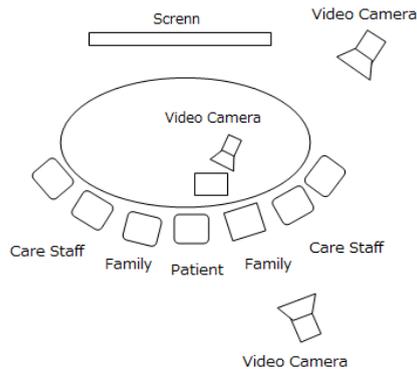


Fig. 3. The layout of the experimental environment

2.4 Experiment Participants

Our participants for this experiment were one elderly resident of a nursing home, one member of her family, and several members of the nursing home staff.

Nursing Home Resident

Age: 80s

Difficulty of daily life due to dementia: Moderate

Symptoms of dementia: Moderate

Diagnosis: Alzheimer's with mild memory failure

Problem in care assistance: Habitual of delusion and wandering (BPSD)

The resident participating in our study had developed a wandering habit and a delusion habit consisting of a distrust of familiar people, such as nursing staff and family.

2.5 Experimental Methods

The media therapy was performed as follows.

- Acquire photographs from the nursing home resident's life from her family.
- Interview family members about episodes associated with the photo in advance.
- - Choose the most memorable episodes in the patient's life as content for each session.
- Create an interactive digital photo album on the iPad using the photos that have been selected. Photos are classified according to the event or story, and sorted in chronological order.
- In each session, the resident, her family, and nursing staff discussed the photos presented in the multipurpose room freely, as the photos were presented on the screen.

- Each session was recorded with cameras, positioned as shown in Figure 3.
- The camera on the table was intended for close-ups of the patient's face during the session, to monitor her expression.
- The camera next to screen was aligned to capture all participants in the session.
- A third video camera was set up behind to record which photo is being displayed on the screen.

Sessions of media therapy were held once a week, and carried out a total of six times. Each session lasted for a maximum of 60 minutes. Each photograph was displayed for several minutes, or was changed when the patient and her family wanted a change. The first few transitions were performed by experiment staff, but further transitions between pictures were controlled by the nursing staff or the patient's family.

2.6 Evaluation Items

Three cameras were used to capture the resident's expressions and actions throughout the sessions. In addition, we recorded the conversation, and used it as a guide to help gauge the strength of her responses. We compared it to her expression to see which photographs brought her pleasure or joy. Facial expressions were correlated with emotions in a previous study [2]. In addition, after the session, changes observed in the patient during and after therapy were discussed and recorded in interviews with her family and care staff.

2.7 Analysis of Expression

The expressions of the patient were analyzed from the video recordings. Analysis was carried out using the major literature "expression analysis" techniques, to understand which photos made her look happier or more joyful [3]. This document defines expressions of happiness as follows.

- Lower eyelids rise, eyes narrow
- Pupils dilate
- Wrinkles appear in the outer corners and beneath the eyes
- The mouth opens to expose the teeth as the upper lip rises and the lower lip lowers.
- Grooves or wrinkles appear over the corners of the mouth from the sides of the nose

These conditions, usually in conjunction, characterized a "happy" or "joyful" expression.

In this expression analysis, we expressed the degree of smile on a frame-by-frame basis. We defined 0% as an expressionless state that does not laugh at all, and 100% as a state of highest laughter. We used the highest degree of smile expressed as the result for each photograph displayed.

3 Results

The results of the experiment described in section 2.5 are shown below.

In Figure 4, we show the results of the expression analysis from the content of the video recorded during the experiment. As the photograph was changed roughly every 2 minutes, the average smile time was about 2 minutes per photo. Figure 4 places the contents of the video on the horizontal axis, and the degree of the patient's smile on the vertical axis.

The alphabet of the horizontal axis indicates the following.

- A: Images from the patient's time as a nursing student (16 pieces)
- B: Images of the patient's newlywed days (25 pieces)
- C: Images of the patient's marriage and child-rearing days (17 pictures)
- D: Images of the patient's family and home during her middle age (23 pictures)
- E: Images of the patient's time as a nurse (21 pieces)

In this expression analysis, we expressed the degree of smile on a frame-by-frame basis. We defined 0% as an expressionless state that does not laugh at all, and 100% as a state of highest laughter. We used the highest degree of smile expressed as the result for each photograph displayed.

From the results of the session shown in Figure 4, we can see that the patient's smile became more pronounced when we were talking about her time as a nurse and as a nursing student, (letters A and E.) The photographs for sessions B to D are from her life after working as a nurse, covering the time from her marriage through her middle age. We found that there tended to be more smiles when the topic of her time as a nurse arose. In addition, as a result of the (significance level 5%) t-test of the degree of smile in each video, we recognized a significant difference between the smiles related to her time as a nurse and the others.

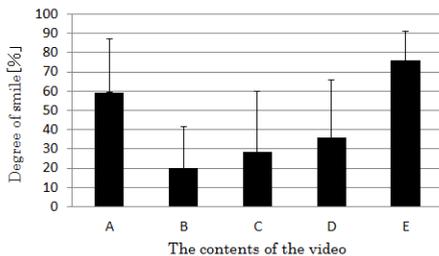


Fig. 4. Degree of smile

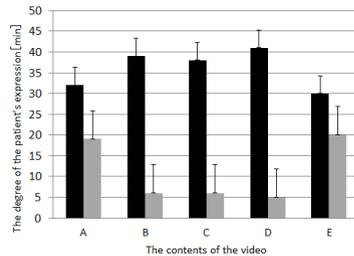


Fig. 5. Time of not smile and smile

Figure 5 shows the average time that the smiled for each type of image during the 60 minutes session. The vertical axis represents the degree of the patient's expression. The horizontal axis shows the contents of the video. The labels A to E are the same as in Figure 4. The left side of the bar in the graph indicates no expression, the right indicates a smile. Figure 5 shows more smiles for photos related to topics A and E. We also observed a low tendency towards lack of smile for topics B to D. In addition,

due to the onset of BPSD before starting the fourth session, the patient's mental state before the session was worse than usual. However, the session started with a story from the patient's time as a nurse, so there was no significant difference compared to two other times when we talked about her family. We believe that when we talk about her time working as a nurse, her emotions are more changeable and more apparent. The graph shows that the amount of time unsmiling is longer than the time spent smiling. This is because the patient concentrated on the image for a long time to find a particular person or herself in the photo. Thus, she tended to smile less while concentrating. Also, as a result of the (significance level 5%) t-test on each video, we recognized a significant difference between the subject's time as a nurse and other topics. Considering the general positive response of the patient and the reports of care staff, the results of this experiment showed that the patient tended to look happier to talk with her family and nursing staff during therapy than at other times. It is possible that the patient herself felt special to have so many people gathered about her just to take part in her reminiscence. During second session, the conversation turned to a time when the patient's family suffered misfortune. When the patient discussed this period, the care staff honestly felt that the patient had been through a hard time and struggled, but the family members participating in the session had doubts as to the content of the conversation. It is considered possible that the patient's story was not necessarily true in some parts.

In the fourth session, emotional incontinence had been observed in the patient before the session began. At the start of the session, we used photographs from when the patient was working as a nurse at a university hospital. This seemed to cause a change in the patient's feelings. After that, there was no significant change in sentiment even after a story of her home and family. From this, we believe that it was the content of her memories from when she was working as a nurse that made her feelings milder.

From about the fourth therapy session, changes also appeared in the patient's family. Gradually, they began to show understanding towards the patient's caregivers. We believe this change was due to learning more of the patient's history, which they did not know until now. They thus began to understand the patient, little by little. Also, one of the nursing staff made a notable comment during an interview after completing the media therapy. After media therapy, when the patient fell into BPSD, the burden of calming her down was dramatically reduced, as staff had more clues about how to let the feelings of the patient subside. For example, in case the patient tries to escape from the nursing facility, staff reminded her of an episode from when the patient was a nursing student, and how she had often defeated the curfew. The fact is that the patient seemed to have been a very excellent student, but she did not forget the sense of fun she had felt during the therapy. Staff and family felt that this story was told with a touch of pride. This episode struck a sympathetic chord with the patient. After that, she did not attempt to escape.

4 Differences from before and after Therapy

The following three points from the patient's care record indicate changes brought about as a result of therapy. First, Figure 6 shows the hours the staff spent sharing

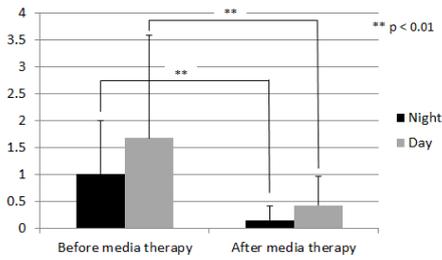


Fig. 6. The hours the staff spent sharing with the patient

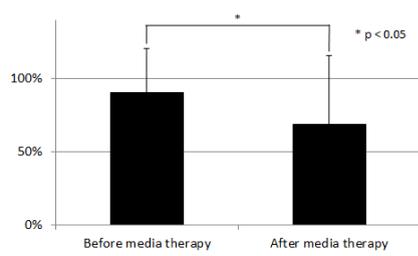


Fig. 7. The time that the patient appealed to nursing staff

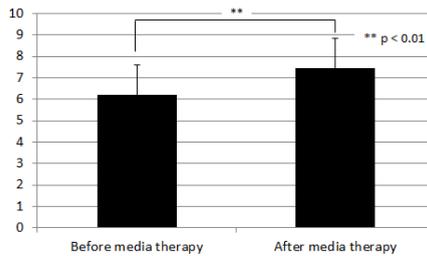


Fig. 8. Sleep time

with the patient night and day. Figure 7 shows the time that the patient appealed to nursing staff. Figure 8 shows the patient's sleep times.

Figure 6 shows the time on the vertical axis, before and after therapy on the horizontal axis. The left side of the graph shows daytime, and the right shows night. After therapy, the time spent with the patient was significantly reduced to less than 30 minutes both at night and during the daytime, while before therapy that time was about one hour at night and over one hour during the day. When the patient spoke to nursing staff before therapy, staff had difficulty understanding how to calm her down, but after therapy, they had a better understanding of what topics to use. We believe this is why care time decreased so significantly after therapy. In addition, we compared the patient's complaints to nursing staff before and after therapy. We found that the patient complained nearly 90% of the time, almost every day, before therapy, but only 70% of the time after the therapy. We believe the nursing staff were able to make a conversation with the patient, and use what they learned during therapy to help make the patient happy. We examined the patient's sleep time before and after therapy.

The sleep time is on the vertical axis, before and after therapy on the horizontal axis. We found that after therapy, the patient was able to sleep longer than before.

5 Conclusion and Future Topics

5.1 Discussion

Using media therapy, wherein an elderly nursing home resident was helped to share her life history with her family and nursing staff, we were able to help build a better relationship between the three parties. Even if the family is not active in the resident's care, we believe this provides an opportunity to rebuild the family's relationship.

Before undergoing media therapy, when the patient expressed BPSD, there was a serious burden on the nursing staff. After therapy, the time taken caring for the patient and subsequent stress on care staff was significantly reduced, as staff had better knowledge of the patient's personality and emotional triggers.

After several sessions of therapy, the patient felt more able to talk about her past. Furthermore, even if the patient's mental state is agitated at the beginning of a session, gradually, she was able to calm down, because a lot of people were paying attention and listening to her stories. We believe that patients might be able to forget their misgivings about the future by talking about the pleasant portions of the past. Thus, even if the patient experienced extreme emotional ups and downs, or BPSD, by participating in media therapy, other people would be able to help stabilize the patient and provide better care. Additionally, media therapy allows the patient to return to normal spirits in a short time, rather than being trapped in feelings of discord. We believe this approach might be the key to improving patient quality of life. While all images used were tied to the patient's memories, not all of the images were necessarily tied to positive memories. We believe it best to work to identify those images and experiences that bring the patient happiness. These images and memories provide better tools with which to calm the patient down, and can be discovered during therapy.

5.2 Summary and Future Challenges

The media therapy that we have proposed is a potential treatment, part of dementia care for elderly people who have been placed in long-term care facilities.

By providing a case study, we have shown the improvements that can be expected: the quality of services can be improved, family ties can be rebuilt, and the burden on care staff can be reduced.

In analyzing the patient's facial expressions, we found that the freest smiles came from memories that made the patient want to boast the most, when she talked about the times she most enjoyed. We found that the patient examined the pictures related to these memories more seriously.

We regard the fact that the family participated in the session together, and were able to know a side of the patient that did not know before, as a great achievement. However, if family members talk more than the patient, the patient would often nod, occasionally agreeing or prompting the conversation forward, saying little other than, "Yes," "No," or, "Is that so?" In the future, when family members participate, we will need to encourage the patient to speak more freely about others' remarks. For this

reason, it may be necessary to set up a system to signal the family members without the patient noticing if the patient seems to be growing bored or restless.

To enable longer conversations, this time, staff created the digital photo album manually. However, it would be more convenient to have a database of photos relevant to the patient, and construct the photo albums that way. These are our challenges for the future.

We would like to consider a system that can search videos and images easily using a touch panel, so that it can be easily manipulated without special staff, with media categorized in different folders. While we were able to conduct these sessions in one location, we would also like to consider more difficult situations, as when the family and resident are separated by a long distance. In these cases, some manner of PC or tablet PC software would allow therapy to take place, provided care staff could be trained in its use.

Lastly, we would like this system to be usable as a remote interactive system, but also serve as a way for families, local residents, medical staff, or volunteers to monitor elderly people who live independently.

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