Interprofessional Collaborative System to Raise Awareness and Understanding of Dementia Using an Action Observation Method

Kenichi Shibata[1], Naoki Kamiya[1], Shogo Ishikawa[2],

Hideki Ueno[3, 4], Akira Tamai[3], Yoichi Takebayashi[2]

1 Graduate School of Science and Technology, Shizuoka University, Japan

2 Graduate School of Integrated and Technology, Shizuoka University, Japan

3 Tsuruga Onsen Hospital, Japan

4 Chiba University Hospital, Japan

Email: shibata@takebay.net

Abstract

Interprofessional Collaboration in dementia care is an important theme. But there are few Support systems that make it possible to share and raise awareness of the situation of the person with dementia. Therefore, using a dementia inspection method named Action Observation Sheet (AOS), we developed an Interprofessional Collaborative System to raise awareness. We have conducted practical experiments to confirm if the system is effective for family and staff. The results show the system to be effective to increase awareness. The family and staff could use the results provided by the system to support people with dementia with more understanding.

Introduction

As Japan has become the first super-aged society, people with dementia, for which aging is the greatest risk factor, are rapidly increasing. Dementia is accompanied by various disabilities, including intellectual and psychiatric disability. The means of knowing the status of a person with dementia are neuropsychological and brain imaging tests. It is difficult, however, to make a diagnosis of dementia based only on imaging tests. It is also necessary to understand the situation of a person with dementia. There are some information systems to provide sophisticated care for dementia. Using such systems it is possible to recognize the symptoms of a person with dementia. At London University, in order to realize person-centered care, they are developing a mobile application which has the function of supporting recollection of memory (Maiden, *et al.* 2013). At Cambridge University, Cantab mobile application was developed using an iPad to administer a simple 10-minute test to detect symptoms of Mild Cognitive Impairment (Falconer, *et al.* 2010). At Shimane University, they are developing a new screening test for dementia that runs on an iPad and can be used for mass screening (Onoda, *et al.* 2013). There are few systems however, which utilize the observed information from several relevant persons to bring new awareness to the recognition of dementia.

In this study, we used an action observation method using the Action Observation Sheet (AOS) (Ono, Tamai and Iwata 2002), devised by Tamai, medical doctor in psychiatry, one of the authors, to determine the status of the person with dementia. The questions in the AOS are based on experience gained in a hospital. The AOS can be utilized to understand the degree of symptoms and the relationship between the state of the symptoms and brain. This AOS has been used in a dementia support project by the ministry of health, labour and welfare.

We describe herein an Interprofessional Collaborative System for family and staff, which shares and raises awareness of the situation of the person with dementia.

Utilizing observation information to raise awareness for people with dementia

The major Issues in dementia care are the behavioral and psychological symptoms of dementia (BPSD) such as delusions, loitering and violence. BPSD is often caused by the character qualities, environment, and mental state at that

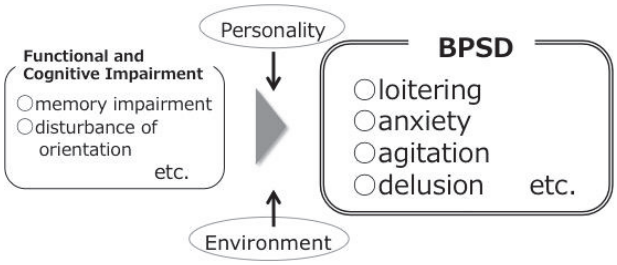

Fig. 1: Symptoms of dementia.

time of the patient. It has been found, however, that BPSD cannot be treated only by understanding the factors that cause the BPSD of the patient, but by devising a method of communication which addresses the symptoms. Therefore, consideration of the background of the person with dementia will affect the method of treatment.

For evaluation of the core symptoms (Figure 1), there is an image inspection by CT or MRI, and biochemical tests and sanitary inspection. For evaluation of cognitive and intellectual function, there is neuropsychological testing. The evaluation methods for BPSD include such as procedures as: Neuropsychiatric Inventory (NPI), Behavioral Pathology in Alzheimer's disease (Behave-AD) and Cohen-Mansfield Agitation Inventory (CMAI). However, the above measures categorize some symptoms as abnormal behavior. Therefore, such testing is insufficient as an indicator to provide discrimination and sensitivity to understand the situation of a person with dementia, The AOS can evaluate, not only the cognitive severity of dementia of BPSD, but is designed for the purpose of grasping the overall picture of dementia. The AOS has the following features. 1) Tool for aggregating the "observation" information by family and care staff. 2) 47 question items designed by a doctor specializing in dementia based on the clinical experience of more than 20 years. 3) With the symbols based on responses, recorded in the statistical processing, provide ease in viewing data. Using AOS, we developed a system that raises awareness of family and care staff.

Table. 1 : Sample of AOS about action of daily living.

Questions	Related items	Damaged segments	Symptoms
He/She immediately forgets what he/she just said.	Core symptom	Mesial temporal lobe	Recent memory disturbance
He/She cannot understand, no matter how simple the terms.	BPSD	Left temporal lobe	Sensory aphasia
He/She cannot remember the new things.	Signs	Hippocampus	Anterograde Amnesia
He/She gets frustrated by a small thing.	Signs	Frontal lobe	Irritability
He/She makes mistakes in easy calculation.	Signs	Left parietal lobe, Frontal lobe	Dyscalculia, Attentional deficit
His/ Her action is becoming sluggish.	Signs	Mesencephalon	Parkinson's symptoms
He/ She mistakes or forgets name of family.	Core symptom	Temporal lobe	Disorientation
He/She talks to himself/herself.	BPSD	-	Monology
He/She has no bladder control.	BPSD	Frontal lobe	Incontinence
He/She sometimes says "I want to die".	BPSD	Left hemisphere, Frontal lobe	Suicide ideation

A description of the situation of the subject by utilizing AOS

The response information of AOS provides a clue to know the extent of the cognitive function of dementia. If AOS is administered at different times, it creates an index to trace various alterations in the mental and physical state. A comparison of replies to AOS reveals the relationships, interests, and mind-set of the subject.

The AOS has 5 questions about activities of daily living (ADL) and 47 questions about the actions of daily living. ADL has 5 levels to select and "actions of daily living" survey has 5 options: 1) Strongly Agree, 2) Agree, 3) Agree a little, 4) Disagree, 5) Not sure. It is possible to assess the severity of the condition of a person with dementia from the answers to the questions. Questions about action of daily living are related to which part of the brain is affected and what symptoms appear. We show an example in Table 1. Using the AOS, we can obtain information about the relationship between behavior, symptoms, cognitive functions and which part of the brain is affected. When staff members think about a person with dementia using the information, it leads to psychological education. Therefore the AOS is useful to communicate with a person with dementia.

Certain studies (Ramírez, Górriz 2013; Astell 2010) of the communication support of the subject provide a support system using reminiscences which have the effect of promoting conversation. In this study, we utilize the observed information of the subject to supporting the family and staff. It is necessary to frequently update dementia test results in order to understand the situation and effectively manage the care of the subject. However, it is difficult to integrate information management with the results of the paper-based test. Therefore, the use of information devices which collate collected case data of dementia tests has increased in recent years. In particular, collected data of brain function imaging test and discrimination support system using MRI cerebral blood flow map image (Yamashita 2013) as well as early

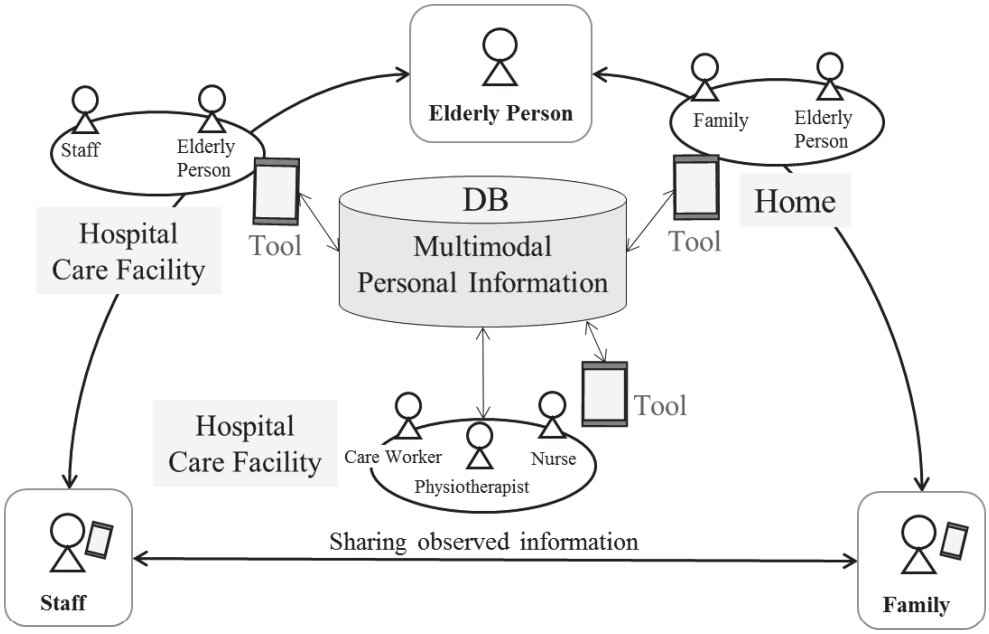

Fig. 2: Interprofessional collaborative system.

Alzheimer's dementia diagnosis support system (Matsuda 2013), provide ready analysis of necessary information. In this way a support system in collaboration with medical IT has been developed. However, it is difficult to establish a differential diagnosis of dementia with imaging alone. In this paper, by focusing on behavior and state of dementia, we developed a system to accumulate the observation information of family and staff.

Interprofessional collaborative system

We developed an observed information input tool based on AOS for acquiring data, not only from the subject, but also from family and staff. A more detailed description of this tool is contained in the section: "observation towards the situation understanding of dementia Person information input tool." This tool enabled us to collate the personal information of family and care staff of the subject to design an improved environment. See Figure 2. The preliminary focus of this paper is the hospital (Figure 2) where we describe an interprofessional collaborative system to collect and collate observed information. We cooperated with a hospital for dementia whose director is Dr. Tamai, the creator of AOS.

The medical workflow in a hospital for dementia

We observed the medical workflow for development of a system in the hospital. Figure 3 shows the medical workflow which details each job of staff members at any time, to collect the personal information of subjects. It shows relationships with subject, family and staff in each step in the flow of data about the subject. After the examination, the doctor utilizes the test results in a diagnosis and life counseling. Then, the staff explains the test results to the family.

Nurse, speech therapist, and occupational therapist administered the AOS survey the doctor is not at the center of this medical field; rather an interprofessional collaborative team structures the environment to support dementia care.

Observed information input tool for understanding the situation of subjects with dementia

We have developed an understanding the situation of subject with the use of a diagnostic survey. Moreover, utilizing the information based on the dementia survey, we developed an observed information input tool. We developed a system based on the AOS in collaboration with a hospital. Figure 4 shows the whole tool.

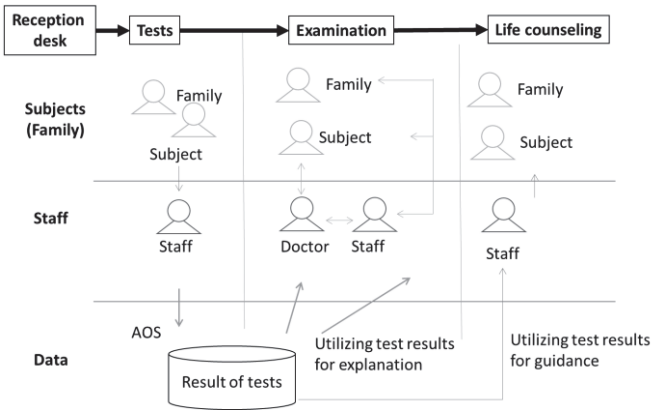

Fig. 3: Interprofessional collaborative system.

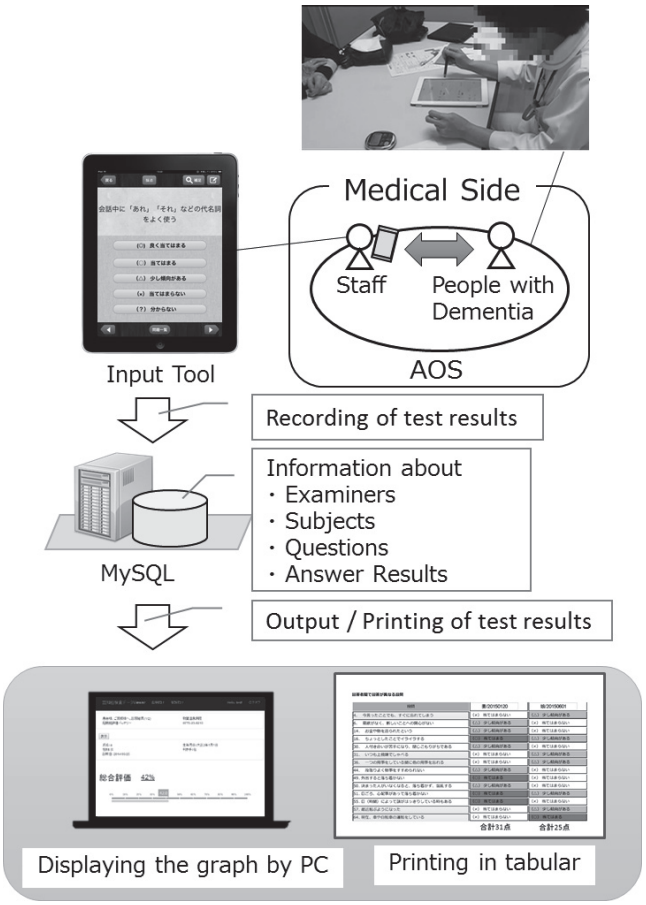

Fig. 4: Our proposed tool.

We developed a system based on the AOS in collaboration with a hospital. The system is constituted by the use of an application to collect answers for the AOS and collating the accumulated information, and database for storing the test information. The tool was implemented as a web application for use with a variety of devices in various environments. The system configuration is shown in Figure 4. For the application framework, we used Sencha Touch which is JavaScript library. The AOS at the heart of the tool is composed of responses by the subject or care staff who input answers for the subject. The System records information about the examiners, subjects, questions and answers.

It is necessary to provide a summary of the test results for sharing information with the staff and family. Therefore, the first step of developing a situation analysis tool based on AOS for understanding subjects was to develop a visualization tool for the situation analysis. The system shows the information of a person with dementia by compiling the answer results of more than one relevant person. The answer result contains past answers. The main feature of the system is the comparative analysis of observation information by more than one relevant person using the AOS. From the recorded information, the system shows the severity of dementia and relationship between respondent and the person with dementia.

An experiment with our proposed system in a hospital

We evaluated our proposed system with respect to the effect of awareness of family and staff in a hospital.

Method

We were experimenting with 1) the scene of examination by the doctor and 2) lifestyle guidance by Psychiatric Social Worker (PSW). In the scene of the examination, the participants are one doctor and five sets, including the person with dementia, and their family. In the scene of the lifestyle guidance, participants are two PSW and two sets including the person with dementia and their family. Participants agreed to sign a certificate of consent.

To conduct the experiment, first, we got observation information using the input tool. Next, the staff (doctor and PSW) gave an explanation of the status of the person with dementia to their family. After the experiment, we administered a questionnaire to the staff. We recorded all of the examinations by the camera. We made video recordings of the examinations of 23 subjects, which did not use the AOS.

Result

We show the time period of a normal examination, together with the number of opinion and questions from the staff and family, as well as the subject. See Table 2. We show time period of the examination using the AOS results and the number of opinion and questions from the staff and family and subject. See Table 3. Of the 23 interviews, five subjects explained the results of AOS, while 18 participated in the normal interview, without AOS. See Table 2 for description of five subjects. The average examination time using AOS is seven minutes and 39 seconds. The average time for the scene of the explanation of AOS results is one minute and 50 seconds. The average examination time not using AOS is 10 minutes and 17 seconds. The average time period of the scene of the explanation using the AOS results is one minute 10 seconds. Examination time using AOS was 40 seconds shorter than not using AOS.

Analysis of communication with subject, staff and family. Focusing on the content of the questions and opinions, the examination of those using AOS and not using AOS are different. Subjects explained the content of "I grow forgetful" so "I cannot use my phone". Moreover, a family member answered "Father lives with mother. We do not live together, so I almost answered "?", "I worry about a little thing" for

Table. 2: The results of doctor's questions without our proposed comparing sheet.

Medical Examinee	Total time of medical in-terview	Total time of explanation of AOS	Number of opinion from the family (About AOS)	Number of question from the family (About AOS)	Number of opinion from the subject (About AOS)	Number of question from the subject (About AOS)	Number of opinion from the doctor (About AOS)	Number of question from the doctor (About AOS)
Woman, Her daughter	5m2s	2m19s	0(0)	0(0)	1(0)	1(0)	0(0)	4(2)
A member of Family (Woman)	15m	55s	4(0)	4(0)	0(0)	0(0)	5(0)	4(0)
Woman, Young sister	14m33s	1m4s	0(0)	1(0)	0(0)	0(0)	5(0)	2(0)
Woman, Her daughter	3m8s	16s	0(0)	0(0)	1(0)	0(0)	4(1)	0(0)
Man, His Wife	13m40s	1m14s	6(1)	5(1)	4(0)	3(0)	13(2)	5(0)
Total	51m23s	5m48s	10(1)	10(1)	7(0)	5(0)	27(3)	15(2)
Average	10m17s	1m10s	2(0)	2(0)	1(0)	1(0)	5(1)	3(0)

Table. 3: The results of doctor's questions with our proposed comparing sheet.

Medical Examinee	Total time of medical interview	Total time of explanation of AOS	Number of opinion from the family (About AOS)	Number of question from the family (About AOS)	Number of opinion from the subject (About AOS)	Number of question from the subject (About AOS)	Number of opinion from the doctor (About AOS)	Number of question from the doctor (About AOS)
Woman, Her daughter	11m25s	1m38s	0(0)	0(0)	0(0)	0(0)	5(1)	10(3)
A member of family(Woman)	7m57s	3m40s	2(1)	0(0)	0(0)	1(1)	5(4)	6(0)
Woman, Young sister	4m43s	1m11s	2(2)	0(0)	1(0)	0(1)	1(0)	7(4)
Woman, Her daughter	6m48s	2m23s	6(4)	3(0)	0(0)	0(0)	5(1)	3(2)
Man, His Wife	7m30s	20s	3(0)	0(0)	2(0)	0(0)	4(1)	4(0)
Total	38m23s	9m12s	13(7)	3(0)	3(0)	1(2)	20(7)	30(9)
Average	7m39s	1m50s	3(1)	0(0)	0(0)	0(0)	4(1)	6(2)

myself instead of him. These contents are activities of daily living and information about daily living activities. Questions of AOS contains these view points. AOS provides a context to pull episodes not possible without AOS.

Discussion

Evaluation of the tool by the staff

In the enquete results by the doctor and the Psychiatric Social Worker (PSW), everyone responded that there is a difference in the perception of the subject between staff and family. We believe the tool helps to explain the difference of recognition. A PSW answer "I can feel the difference of thought because the difference in the recognition is clear", "I can compare with symptom" from the enquete. The AOS is useful in order to recognize the differences, but some people may be shocked or not accept that there is a difference in the recognition, in some situations. Symptoms of dementia are various, and people are also various. Therefore we infer that it is necessary to organize the information to transmit, in consideration of relationship, quality, and quantity of the difference of recognition.

According to the results, we got comments that are useful for explaining the differences in recognition among family members. We confirmed that staff and family were aware of differences between staff and family using the system.

Utilizing multimodal observed information in a hospital for dementia

This time, we were able to record the examination of agreeing subjects with video who had trust relationship with the doctor. Examples of analysis of examination with the video are rare. We consider that these experiments are useful information to continue to better psychiatric clinic. Moreover, observed information provides important factors for understanding the situation of the subject. However it is difficult to record all situations, and even if we can, it takes much time to analyze it. In consideration of such a point of view, the AOS can reveal the points where the actions of the subject appear.

The AOS evaluates a person with dementia with 47 questions. If we add more questions, we can get more detailed status. For example, “A person’s symptoms change between a short time or a few days ". From this question, we can get information about delirium. When designing questions for users, it is assumed that we can acquire observation information in an optimized environment.

Conclusion

This paper describes a collaborative system to raise awareness utilizing observation information for staff and family. From experiments, we confirmed that the system supports awareness of the difference between staff and family. Combining objective and subjective information with structured observation information will support Interprofessional collaborative for improving dementia care.

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