

Supportive Technology for Managing Relevant Information in the Medical and Nursing Care Field

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Abstract. In Japan, the aging of society has become a serious problem that has increased the importance of being able to flexibly share information between medical and nursing care workers. In this study, we examine the real needs of workers in this field and devise and construct a support system that can assist in collecting and acquiring information of interest at work sites. We additionally consider how to apply psychology to improve information sharing. Our aim is to create an environment that facilitates smoothly sharing information, and we propose a comprehensive system of information sharing toward that aim.

Keywords: Aging society · Care · Team care · Information sharing · Conditions of interest · Filtering

1 Introduction

The number of people in Japan who are 65 years or older recently reached 32.77 million people, a rate of about one in four people. The aging of society is progressing at a much faster speed in Japan than in other countries. In the future, it is expected that an increasingly large portion of the population will be over 75 years of age [1]. The aging of society has rapidly increased the needs of the home care and nursing care field. The Ministry of Health, Labour and Welfare of Japan has been promoting the construction of a comprehensive support system at the local level, a so-called regional comprehensive care system, to be complete around 2025. It is important that medical and nursing care workers can share information between them to better serve the elderly. The regional comprehensive care system is aimed at those who need long-term care and support in order to continue living life in their preferred way [1].

The goal of the study described in this paper is to facilitate sharing, via groupware, of information about elderly care recipients. This sharing is among teams of different medical and nursing care professionals and is intended to allow providing better service in the medical and nursing care field.

2 How to Realize a Comprehensive Community Care System

To realize a local comprehensive care system, it is important that health, medical, and welfare teams cooperate closely. The degree of information sharing that is achieved in the Japanese system by using the conventional contact notes is insufficient. It is

necessary for those in health and welfare support to coordinate with the medical facilities where medical care is rendered [2]. Although the goal of providing medical care is being addressed, improving the quality of life (QoL) of care recipients is now seen as increasingly important. Doing so is essential in order to realize a regional comprehensive care system.

3 Information Sharing in the Home Care and Nursing Care Field

3.1 Questionnaire Survey

To clarify problems with information sharing in the home care and nursing care field, we surveyed health care and long-term care workers (62 people) by questionnaire. The questions and the results are listed here.

Question 1. When you share information to health care and long-term care workers, what method do you use routinely and during emergencies? (Multiple answers allowed)

Question 2. Are you satisfied with your means of information sharing?

Table 1. Means of sharing information ordinarily

Dialogue	Phone	FAX	E-mail	Web-system	Other
26	32	19	4	1	9

Table 2. Means of information sharing during emergencies

Dialogue	Phone	FAX	E-mail	Web-system	Other
17	42	7	1	0	1

3.2 Interviews

We interviewed medical and nursing care workers (visiting doctors, visiting nurses, social workers, and care managers). During interviews, we asked about what problems they are facing with the current system to information sharing. The following problems were identified by informants.

- Inability to obtain necessary information at the time it is needed
- Lack of simple method to share information
- Insufficient support for acquiring and storing information
- Importance of information is difficult to assess

4 Problems

In this study, using the questionnaire survey and interviews as a base, we focused the research on the following two problems.

4.1 Information Sharing

At present, the primary medium of sharing information is paper (e.g., contact notes, documents sent by fax). However, this paper-centric system means that information sharing is not simple, and it is particularly difficult to share information in real-time between those in different roles.

4.2 Information Overload

Medical and nursing care workers are busy and require large amounts of information. Because of this, information is often not available when needed. In addition, it is hard to find the important information within a set of information.

5 Proposed Method

In this study, we propose the following system. Medical and nursing care workers designate the conditions of interest [3] (hereinafter, COI) for potentially interesting information. Using this method, information that is relevant to the COI can be rapidly disseminated to those medical and nursing care workers who have expressed interest.

Using the above-mentioned problems as a starting point, we re-surveyed workers about what information they need. We set the COI on the basis of survey results.

5.1 Information Sharing Using Groupware

Conventionally, information sharing in the medical and nursing care field uses analog media, such as telephone and fax. In this study, sharing of information occurred via a free groupware application, Cybozu Live. Cybozu Live allows creating and managing a group space suitable for use by small teams. One reason for using Cybozu Live in the medical and nursing care field is that it can be used free of charge. We decided to adopt Cybozu Live as the groupware application because of its combination of performance and function.

5.2 Setting of COI

Using questionnaire surveys and interviews, we determined the relative priorities of information for each role in medical and nursing care and assigned these priorities as the COI. The priority of each type of information for each role is shown in Table 3.

5.3 Support for Receiving Information of Interest

Cybozu Live has a function that notifies members of new information by e-mail. However, all members are notified of all information, even information that is not of interest. This means that workers who should be receiving the information may miss it

among other information, and workers who do not need the information are notified of it anyway. In this study, we combined information-sharing using Cybozu Live with filtering in Gmail to support receiving information of interest only.

First, medical and nursing care workers create a Cybozu Live account, using a Gmail address that has been created in advance. Notices of information newly entered into Cybozu Live is are sent to the Gmail addresses associated with the occupational roles by Cybozu Live. Then, a COI filter (i.e., a filter that is based on the COI of each worker’s point of view) is applied to each address associated with an occupational role, and the messages identified by the COI filter are given specific labels. Figure 1 shows the setting screen for the COI filter in Gmail. Figure 2 shows the conceptual flow of the COI filters.

Table 3. Priority of information types, by occupational role

Role	High ←———— Priority —————→ Low			
Home doctor	Status of a patient	ADL*	Follow-up of prescription	Care situation of family
Home nurse	Status of a patient	Situation of medication	Future directions	ADL*
Care manager	Status of a patient	Wishes of the patient and family	ADL*	Drug side effect
Care helper	ADL*	Drug side effect	Status of a patient	Wishes of the patient and family
Physiotherapist	Status of a patient	ADL*	Care situation of family	Follow-up on rehabilitation
Pharmacist	Status of a patient	Follow-up on prescription	Situation of medication	—

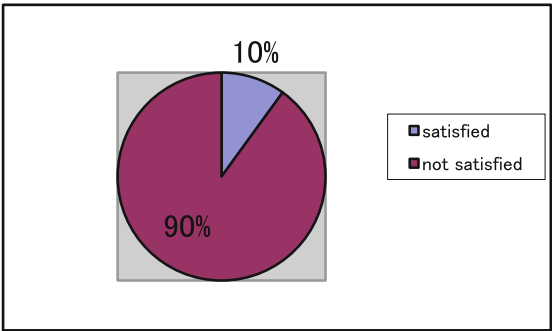


Fig. 1. Answers to Question 2: Are you satisfied with your means of information sharing?

Settings

General

Labels

Inbox

Accounts and Import

Filters and Blocked Addresses

The following filters are applied to all incoming mail:

☐

Matches: **from:(no-reply@cybozulive.com)** **緊急**
Do this: Skip Inbox, Apply label "[実験]〇〇△△▽▽", Mark it as important

☐

Matches: **from:(no-reply@cybozulive.com)** **状態**
Do this: Skip Inbox, Apply label "[実験]〇〇△△▽▽", Mark it as important

☐

Matches: **from:(no-reply@cybozulive.com)** **服薬**
Do this: Skip Inbox, Apply label "[実験]〇〇△△▽▽", Mark it as important

☐

Matches: **from:(no-reply@cybozulive.com)** **処方**
Do this: Skip Inbox, Apply label "[実験]〇〇△△▽▽", Mark it as important

☐

Matches: **from:(no-reply@cybozulive.com)** **今後**
Do this: Skip Inbox, Apply label "[実験]〇〇△△▽▽", Mark it as important

Fig. 2. Setting screen for COI filters in Gmail

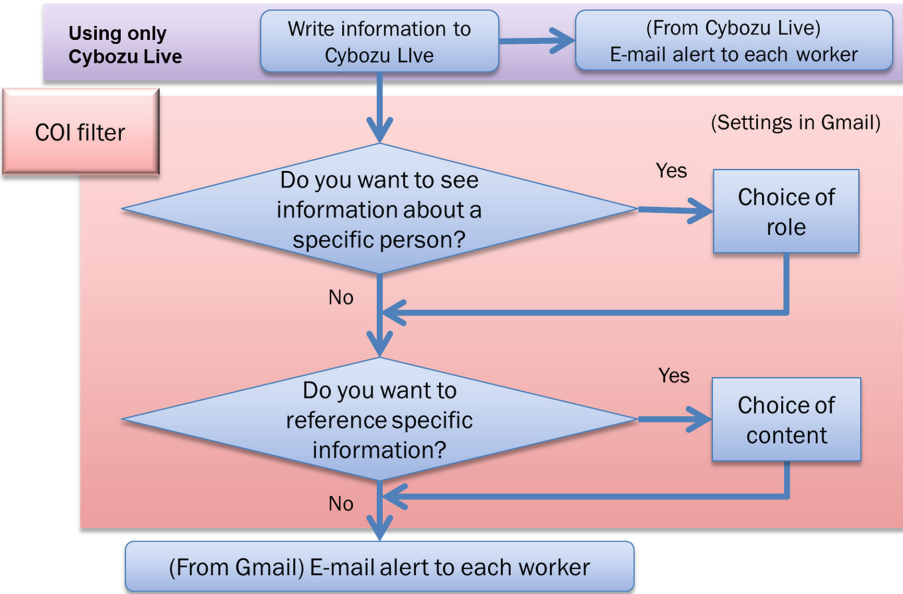


Fig. 3. Flow of COI filters

6 Information Sharing by Team

As described above, it is important for the realization of the regional comprehensive care system that information can be closely shared within the teams involved in home care and nursing care. However, our interviews show that there are obstacles to workers sharing information in the fields of home care and nursing care. This includes obstacles such as each occupational role using different systems and the specific information required for each occupation being different.

This study aims to eliminate barriers as much as possible when sharing information and to apply psychological insights about teamwork to the information system so as to be able to share information smoothly. An overview of the groupware information-sharing system is shown in Fig. 4.

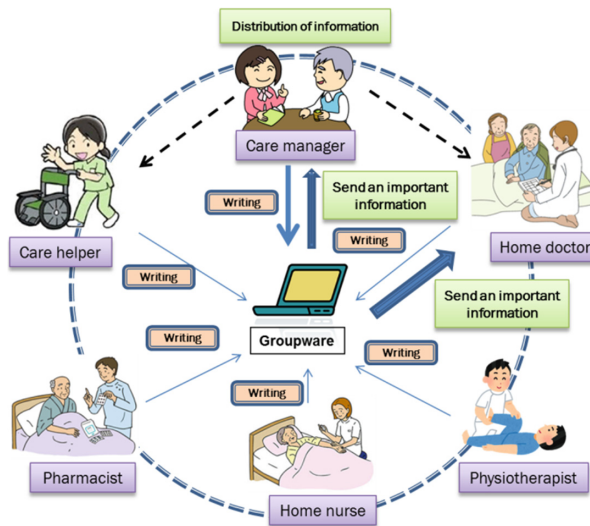


Fig. 4. Flow of sharing information in teams

6.1 Psychology of Teamwork

For teamwork, it is important to consider the elements to be provided as part of team formation. This study targeted adapting to these elements to create teams. The following elements are necessary for team formation.

1. The presence of clear objectives to be jointly achieved
2. Cooperation and interdependence between members
3. Allocation of roles among members
4. Clear boundaries between the members of the team and other people

6.2 Application of Psychology to Teamwork

In this study, we apply the psychology of teamwork to the information systems. Specifically, we considered whether the specific functions of the groupware (Cybozu Live) suitably address the psychology of teamwork, as described below.

1. The presence of clear objectives to be jointly achieved

The objects are to building a comprehensive community care system and to provide better services to the elderly.

2. Cooperation and interdependence between members

Workers will keep in touch via the chat function of Cybozu Live, which will help them tackle the challenges.

3. Allocation of roles among members

By using the to-do function of Cybozu Live, workers in any occupational role can confirm the role that those in other occupations are playing. This will build recognition of role allocation.

4. Clear boundaries between the members of the team and other people

The group function of Cybozu Live makes it clear who the team members are.

7 Experiment

7.1 Experimental Purposes

We performed experiments to verify that the COI filter had been applied correctly and that acquisition of information was properly supported at the time of information sharing.

Ideally, medical and nursing care workers would act as participants in the experiment. However, because of time demands on these workers, we solicited Tokyo Denki University students to act as participants.

7.2 Participants

Six students of Tokyo Denki University participated in the experiment. Six positions were represented, with one student assigned to each: home-care doctor, home-care nurse, care manager, care helper, physiotherapist, and pharmacist.

7.3 Procedure

Using tablet terminals, each participant transmits information to other participants in Cybozu Live according to a scenario of previously prepared information. Then, the other participants confirm whether they have been notified as specified by the COI filter, which is set in advance.

The duration of the experiment was one week.

7.4 Experimental Results

Twenty-three entries were submitted to Cybozu Live, and it was confirmed that each generated e-mail had been given the correct label in Gmail.

7.5 Evaluation

After the experiment, we asked participants to evaluate the effectiveness. The evaluation can be separated into benefits and drawbacks, as follows.

Feedback about benefits:

- It makes the information that we want easy to see.
- Because receiving a lot of e-mail often causes important information to be buried, the system is convenient.
- I prefer to collect information freely by changing the filter.
- If we filter using COI for each type of content, I feel that work becomes smooth.
- It is convenient to save time looking for information that I want.
- Feedback about drawbacks:
- Synonyms are not applied to the filter.

Five of the six participants expressed a desire to use the system. The other participant reported a favorable impression of the system.

8 Considerations

8.1 Consideration of the Entire System

In this study, we devised a prototype of an information-sharing system that combines existing groupware (Cybozu Live) with an e-mail system (Gmail).

However, both are existing systems, and they are not specialized to medical and nursing care. Therefore, from the results of interviews and questionnaires, we consider it important to develop a system from an occupational point of view for future use in the medical and nursing care fields.

8.2 Discussion of Problems

The following is a discussion of the two issues that were considered in this study.

– Information sharing

Information-sharing in the fields of home care and medical care is primarily done via analog media. A method that uses groupware could address the need for information-sharing in real time.

However, at present, nursing care staff collectively exhibit low information literacy. Therefore, it will be necessary to develop simpler information systems.

– Information overload

The COI-filter method used in this study enables medical and nursing care workers to acquire only relevant information, and more generally allows busy workers in any occupation to preferentially obtain only important information.

However, the scope of this study means it is possible that information that was not caught in the COI filter has been overlooked. It remains to apply the method to medical and nursing care at work sites.

8.3 Psychology of Teamwork

This experiment employed the psychology of teamwork in applying the functions of the groupware. However, a future system could be developed with explicit consideration of the psychology of teamwork. Specifically, there is a need to design the interface of the information system to emphasize team aspects.

8.4 Experiment

The experiment in this study used students of Tokyo Denki University as participants. This should be extended to medical and nursing care workers in the future. The teams of medical and nursing care workers involved elder care contain many people, and so it will be necessary to seek cooperation from various medical care workers and perform demonstration experiments.

The present experiment did not compare between cases in which we adapted the COI and cases in which we did not. It will be necessary to consider both cases when performing the experiments at work sites.

In addition, participants entered information prepared in advance on the basis of the information-sharing scenario into the groupware in this experiment. Therefore, there is a possibility that information will not be appropriately filtered by the COI filter when workers use the system at work sites. This was pointed out by participants as a drawback of this system. A possible solution is to increase the accuracy of filter by testing the system at work sites and performing demonstration experiments until the system is practical for us in the medical and nursing care fields.

8.5 Setting the Conditions of Interest

In this study, we set the COI, but we think that a universal COI will not be suitable for all people. To address this, it is necessary to create a standard model of interest conditions by collecting more data on the COI. Further, there is a possibility that the COI will need continual change. This is difficult to carry out via changing settings each time in Gmail.

For a future system, it is desirable to have a mechanism to simply set the COI to control information sharing.

9 Conclusion

We conducted a study of a system to support acquiring information, for use in sharing information among medical and nursing care workers. However, parts of the system are likely to be unsuitable for medical and nursing care workers at this time. Information sharing that uses COI filtering may be desirable to realize and develop in order to provide the best system in the future.

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