Effects of Using a Video-Sharing Application on Multidisciplinary Staff During Pre-discharge Home Assessment Visits for Elderly Hospitalized Patients

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ABSTRACT

Background Pre-discharge home assessment visits for elderly hospitalized patients are conducted by the hospital staff to ensure a smooth transition to home care and are effective in preventing falls and reducing the rehospitalization rates. However, the effect of an application that enables the viewing of videos of the patient's home activities during the pre-discharge visit on the multidisciplinary professionals who provide services to the patient has not yet been fully clarified.

Methods Multidisciplinary professionals at 23 facilities located in western Tottori Prefecture who used a video-sharing application (Patto-Mie Net) were invited to be interview participants. Those who agreed were interviewed about the usefulness of the application in their work and its effect on multidisciplinary collaboration. A verbatim transcript was made, and thematic analysis was conducted using the qualitative analysis software NVivo.

Results Twenty-eight people participated in the interviews, including nurses, care managers, rehabilitation specialists, care workers, and other social care professions. Fourteen themes and five categories were generated from the analysis: comprehensive information visualization and transferability, identification of changes over time and prognostic prediction, promoting multidisciplinary collaboration, patient and family reality, and disadvantages and concerns.

Conclusion The use of an application that allows video-sharing of a patient's home movement status during a pre-discharge visit has revealed a variety of benefits for multiple professionals in hospitals and other facilities. In particular, the results were characterized by the psychological closeness between multiple professionals, promotion of interprofessional communication, and sharing of reality, including the psychosocial background of the patient and family.

Key words multiprofessional collaboration; predischarge home visit; thematic analysis; video-sharing application In Japan and other countries worldwide, discharge planning support is currently practiced as an effective support for patients, mainly elderly hospitalized patients. Discharge planning is an interdisciplinary approach for ensuring continuity of care, which provides the quality link between hospitals, community-based services, nongovernmental organizations, and caregivers.¹⁻⁴ Discharge planning support is intended to provide intervention from early hospitalization by a multidisciplinary team to bridge the various gaps that exist between the hospital and home care, thereby ensuring a smooth transition to home care. The effects of discharge planning support have been shown to improve patients' quality of life,³ reduce the readmission rates,^{3, 5} shorten hospital stays,⁵ and improve the activities of daily living (ADLs),⁶ among others.

Pre-discharge home assessment visits are another form of discharge support, in which mainly physical and occupational therapists, sometimes with medical social workers and nurses, visit the patient's home with the patient and family to assess the patient's movement status and home environment while actually observing the patient and making suggestions regarding environmental adjustments.^{7, 8}

Research suggests that pre-discharge home assessment visits by occupational therapists can reduce the risk of falling and increase the participation levels in geriatric and mixed rehabilitation settings. A systematic review of 14 studies found that pre-discharge home assessment visits reduced the risk of falling and increased the participation levels. A study of older adults and carers' perceptions of pre-discharge home visits found that the current model does not promote health and well-being because for some older adults, the home visit provoked anxiety; however, home visits are important to carers. A systematic review also found

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Online published 2023 May 12 Abbreviation: ADLs: activities of daily living that pre-discharge home visits for can be effective in reducing the readmission rates to hospital.⁸ Additionally, it can help promote safe discharge home from acute hospital and prevent readmission.¹⁰

At Hino Hospital, a core group of rehabilitation staff, care managers, and medical social workers from related medical and welfare institutions developed a system that records patients' movement status at home and in hospital wards and makes it available via an application for use by multiple professions (Patto-Mie Net).¹¹ This system is used to share the patient's movement status at home during the pre-discharge home visit with the hospital's multidisciplinary staff for smooth discharge support and a more specific and detailed information with home care staff (e.g., care managers and visiting nurses) by sharing videos of the rehabilitation status in the hospital.¹¹ Previous studies have reported that multidisciplinary mobile videoconferencing during pre-discharge home visits has benefits, including more appropriate occupational therapist recommendations, but with significant time constraints.^{12, 13} However, in a video-sharing application that can be viewed on mobile devices with no time constraints, it is not fully clear what effectiveness pre-discharge home visits have for multiple professions. This study aimed to explore how pre-discharge home assessment visits for elderly inpatients using a video-sharing application are accepted by the multidisciplinary professionals involved with the patient and what benefits and constraints they have.

SUBJECTS AND METHODS "Patto-Mie Net" video-sharing application

Hino Hospital is located in the mid-mountainous area of western Tottori Prefecture and is the core hospital for three surrounding towns (Hino-cho, Kofu-cho, and Nichinan-cho). The population of these areas is about 9,300 and the aging rate is 51.5% in 2022. Twenty-three medical facilities, including hospitals, long-term care welfare facilities, home nursing stations, and home care support offices, are located in the three towns and share information. In 2019, we developed an application called "Patto-Mie Net," which enables information sharing centered on images and videos, to facilitate smooth information sharing about patients from hospitalization to discharge and home care. This application can share videos, photos, and textual information about patients to registered users. Patto-Mie Net consists of a server that stores and provides patient information and a terminal owned by the user. Because it is an application, users can download the application to their own devices or to their own institutions. The features of Patto-Mie Net include: 1) transmission of difficult-to-verbalize information through video and still images, 2) labor savings for users by reducing text information, 3) specialized use on mobile devices for greater convenience through application, and 4) stable security performance. Specifically, each user registers basic information such as the patient's date of birth, level of nursing care, and care manager in charge, takes pictures of the patient's condition, movements, and living environment using the terminal, and posts data such as images and videos. The system also has a comment function for the posted data, allowing users to exchange opinions in a chat format. It is mainly used to record patients' movements at home during pre-discharge home assessment visits (Fig. 1); however, it can also be used to inform home healthcare staff of the movement status of hospitalized patients



Fig. 1. Screenshot of video clip of a patient's gait status at a predischarge home visit, as seen on the Patto-Mie Net application.

in the rehabilitation room. The selection of patients to be videotaped is decided at a preliminary meeting and verbal consent is obtained from the patient and his/her family. Rehabilitation specialists, medical social workers, nurses, and others who visit patients before discharge take several minutes of video or photographs of the patient's condition, and upload the data. The information is registered in Patto-Mie Net and can be viewed by any professional in charge of the patient.

Participants and data collection

The participants of the study included medical and social care professionals who use the Patto-Mie Net application. The inclusion criteria were defined as multidisciplinary professionals that had used the application, and the exclusion criteria were those that had not used the application. The sampling method was by purposive sampling. Seventy-three registered users of the application were invited to participate in the study, 32 consented to participate in the study, and 28 were included in the study finally. The researchers scheduled a date, time, and place; and conducted face-to-face individual interviews in a private room. The interviews were conducted from April to September 2021 by two or three researchers. Interview questions included the following: "How has using the application helped you in your daily work?"; "If it has helped you, what specific episodes have left a lasting impression?"; "Are there any negative effects of using the application?"; and "Has using the application had an impact on collaboration and cooperation between different professions and with other agencies?" After written consent was obtained, the interviews were recorded using digital recording equipment. A verbatim transcript was made of the recorded conversations.

Data analysis

Since the purpose of this study was to gain a deeper understanding of users' thoughts on the advantages and disadvantages of using the application and its acceptability, a qualitative analysis was chosen. Data analysis was conducted using thematic analysis, ¹⁴ a qualitative analysis method. The approach of thematic analysis follows a six-step process: familiarizing yourself with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report/manuscript. ^{14, 15} The generated themes were grouped into categories according to the similarity of content. In the thematic analysis, the advantages of using the application were analyzed first, followed by the disadvantages. Data analysis was performed collaboratively by three main authors (DS, TT,

and KY) and triangulated with the other authors. Data analysis was performed using NVivo Mac (Release 1.7). Nvivo software was used for text data management and text classification with manually generated codes, while all qualitative analyses in the thematic analysis were performed manually by the authors.

To ensure the rigor of the qualitative research, ¹⁶ the following procedures were implemented. Triangulation was conducted among multiple researchers to ensure the validity of the analysis results. Member checking on 28 study participants was conducted in which the results of the analyses were presented to the participants for confirmation, and they required no modification. Iterative data analysis was conducted during the coding of the textual data.

Ethical consideration

This study was conducted with the approval of the Ethics Review Committee of Hino Hospital (approval number, 2020-13). The participants were informed in advance that their cooperation in the study was voluntary, and written consent was obtained from all participants. Permission to publish was also obtained from the patient in the photo in Fig. 1.

RESULTS

Twenty-eight healthcare and social care professionals participated in the study, including eight nurses, seven care managers, five physical therapists, two occupational therapists, one speech therapist, three certified care workers, one medical social worker, and one medical office assistant (Table 1). Physicians were not included because their busy schedules made it difficult for them to participate in the study. The themes and categories generated, and the number of codes by occupation category and total codes are shown in Table 2. The thematic analysis generated 14 themes and five categories; the five categories were comprehensive information visualization and transferability, identification of changes over time and prognostic prediction, promoting multidisciplinary collaboration, patient and family reality, and disadvantages and concerns.

The results of the analysis by occupation category revealed the following characteristics. Nurses benefited more from the visualization of patient status at home and felt that the application was good for the communicability of reality including the psychological and social background of the patient. Rehabilitation professionals mainly benefited from the identification of changes over time and prognostic predictions with the use of the application. Care managers and other social care professions felt that the application was beneficial

Table 1. Background of study participants

ID	Profession	Years of Experience	Affiliation	Qualification	Interview Time (min)
1	Nurse	33	Community Relations Office, Hospital A	Registered Nurse	15
2	Nurse	4	Ward, Hospital A	Registered Nurse	18
3	Nurse	8	Ward, Hospital A	Registered Nurse	18
4	Nurse	32	Ward, Hospital A	Registered Nurse	17
5	Nurse	36	Ward, Hospital A	Registered Nurse	17
6	Nurse	40	Ambulatory Care, Hospital A	Registered Nurse	19
7	Nurse	35	Ambulatory Care, Hospital A	Registered Nurse	19
8	Nurse	18	Day Service, Welfare Corporation C	Registered Nurse	21
9	Care Manager	18	Home Care Support Office, Hospital A	Care Manager	18
10	Care Manager	12	Home Care Support Office, Hospital A	Care Manager	18
11	Care Manager	14	Home Care Support Office, Hospital A	Care Manager	18
12	Care Manager	9	Home Care Support Office, Welfare Corporation C	Care Manager	16
13	Care Manager	5	Home Care Support Office, Welfare Corporation C	Care Manager	16
14	Care Manager	12	Home Care Support Office, Welfare Corporation D	Care Manager	20
15	Care Manager	5	Home Care Support Office, Welfare Corporation D	Care Manager	20
16	Physical Therapist	19	Rehabilitation Room, Hospital A	Physical Therapist	19
17	Physical Therapist	7	Rehabilitation Room, Hospital A	Physical Therapist	19
18	Physical Therapist	20	Rehabilitation Room, Hospital A	Physical Therapist	19
19	Physical Therapist	16	Rehabilitation Room, Hospital B	Physical Therapist	35
20	Physical Therapist	3	Rehabilitation Room, Hospital B	Physical Therapist	35
21	Occupational Therapist	10	Rehabilitation Room, Hospital A	Occupational Therapist	19
22	Occupational Therapist	1	Rehabilitation Room, Hospital B	Occupational Therapist	35
23	Speech Therapist	13	Rehabilitation Room, Hospital A	Speech-Language-Hearing Therapist	19
24	Care Worker	22	Day Service, Welfare Corporation C	Certified Care Worker	21
25	Care Worker	17	Day Service, Welfare Corporation C	Certified Care Worker	21
26	Care Worker	15	Day Service, Welfare Corporation C	Certified Care Worker	21
27	Medical Social Worker	16	Community Relations Office, Hospital B	Certified Social Worker	35
28	Medical Office Assistant	5	Administrative Office, Hospital A	None	19

at the ease of decision-making by multiple professions, in facilitating communication with other facilities, and in approaching psychological distance between multiple professions.

A description of each theme and a representative quote from the text are presented in the following.

Comprehensive information visualization and transferability

Comprehensive information visualization through images and video

Patient information that is difficult to convey through verbal information alone can be visualized through images and video, facilitating the sharing of comprehensive patient information and collaboration among multiple professions.

Table 2. Results of a thematic analysis of perceptions of app use and the number of codes by occupation

Categories	Themes	Number of codes			
	-	Nurses	Rehabilitation staff	Care managers and other social care professions	Total
Comprehensive information visualization and	Comprehensive information visualization through images and video	4	5	7	16
transferability	Visualization of patient status at home	7	1	0	8
Identification of changes	Ease of understanding changes over time	3	4	3	10
over time and prognostic prediction	Facilitate setting goals of care until discharge	2	4	1	7
	Ease of predicting post-discharge life and service use	0	3	3	6
Promoting multidisciplinary collaboration	Promote information sharing and communication among multiple professions	2	0	3	5
	Facilitate exchange of ideas during multi- disciplinary conferences	1	3	2	6
	Ease of decision-making by multiple professions	1	1	8	10
	Facilitate communication with other facilities	1	1	4	6
	Approaching psychological distance between multiple professions	0	0	2	2
Patient and family reality	Communicability of reality including the psychological and social background of the patient	5	1	0	6
	Providing reassurance by sharing information with patients and families	0	0	2	2
Disadvantages and concerns	A desire for linguistic interaction as well as video-sharing	1	0	2	3
	Concerns about security	0	3	0	3

"I really thought that being able to see is the most effective and efficient way to communicate. I thought that even if we were to cooperate with each other, we could do things very precisely because we could see the situation from a quick glance, as opposed to talking over the phone." (certified care worker, ID 25)

Visualization of patient status at home

Visualization of the patient's movement status at home during the pre-discharge visit and after discharge, as well as specific conditions such as lines of movement when walking, steps, and handrails, significantly increases the amount of information compared with verbal information alone.

"It could be the state of your gait or the environment of your home. The position of the handrails, the environment around the bed, and so on. It's easier to understand the specifics if you can see the details in pictures or videos rather than just saying them." (nurse in the community relations office, ID 1)

Identification of changes over time and prognostic prediction

Ease of understanding changes over time

Images and video visualize before-and-after comparisons and changes over time, making it easier to assess patient status and determine improvement or deterioration.

"If you have a video of the movement, you can see how the movement was like the other day, but it improves or worsens the next time you go back." (ambulatory care nurse, ID 6)

Facilitate setting goals of care until discharge

Visualization of ADLs and movement status at home prior to hospitalization through video images makes it easier to determine the goals for care and rehabilitation.

"I also think it is easy to set a goal. Since the video

is what the patient looked like before being hospitalized, we may be able to assume that that is the goal. Even if the patient loses a certain function, it may give us an idea of where in the house the patient can live well at home." (nurse in the ward, ID 4)

Ease of predicting post-discharge life and service use

Based on the video images from the pre-discharge visit, it becomes easier for the ward staff to discuss and predict post-discharge living conditions and the care services to be used.

"If the patient is discharged from the hospital in this condition or if the patient goes home, we can talk about how to deal with, for example, day care services or home care services." (care manager, ID 14)

Promoting multidisciplinary collaboration Promote information sharing and communication among multiple professions

Information can be shared via video to the staff who did not accompany the patient on the pre-discharge visit, and information can be easily shared and conveyed to those in multiple professions who cannot actually see what is happening at home.

"The rehabilitation staff goes with us, which is fine, but care managers and others do not. If we have someone who does not go with us, such as a doctor, actually see it, it is easier to understand the patient's situation, even though we have to explain in words." (nurse in the community relations office, ID 1)

Facilitate exchange of ideas during multidisciplinary conferences

It facilitates the exchange of opinions during pre-discharge conferences and multidisciplinary conferences at home by having the patient's information grasped through images and videos in advance.

"Sometimes at the multidisciplinary home meeting, I give a report on how things are going after discharge, and at that time, if both the doctor and the nurses can see the images, it will help share information." (physical therapist, ID 19)

Ease of decision-making by multiple professions

Sharing images and videos facilitates decision-making among multiple professions about policies for care at home and what to do when there are problems such as pressure ulcers.

"I have a much greater amount of information on video, so I am able to have more concrete and detailed discussions with care managers and ward staff, such as what to include in the plan when they return home." (medical social worker, ID 27)

Facilitate communication with other facilities

Sharing of patient images and videos facilitates collaboration and communication between hospitals and other social care facilities.

"When the patient was discharged from Hospital A, we borrowed images of the discharge support from Hospital A. At that time, the consultation was sent to our facility, and from there, the consultation was sent to our hospital." (physical therapist, ID 20)

Approaching psychological distance between multiple professions

Information sharing through the application brings physicians and nurses closer psychologically to other professionals, making consultation and communication easier.

"The biggest thing here is that the sense of distance has become closer. I feel like I am closer to the visiting nurses. I feel like I can say things more easily." (care manager, ID 15)

Patient and family reality

Communicability of reality including the psychological and social background of the patient

A video can convey the patient's facial expressions and emotions, and it also makes it easier to see the patient's life, including the environment, culture, and family background of the home where the patient lives.

"By looking at the environment of a patient's home, we can see something of their life. Even if a patient is hospitalized and then moved to a different facility, we can share the same kind of conversation with the patient, such as how their home used to be." (nurse in the ward, ID 5)

Providing reassurance by sharing information with patients and families

Sharing and showing videos to patients and families can provide reassurance by clearly communicating the actual care and improvement status.

"I utilized it with my patients and their families as well. I am glad that I was able to share it with all parties involved. It was also helpful in planning the frequency of services." (care manager, ID 12)

Disadvantages and concerns

A desire for linguistic interaction as well as video-sharing

It would be better if not only images and videos but also verbal information as professional judgment and interpretation were added to the images and videos. In addition, it would be better if communication could be made while watching the images and videos.

"In fact, it would be very helpful to have information based on that. For instance, knowing how much muscle strength is being maintained. It would be very helpful to have that information in words." (care manager, ID 9)

Concerns about security

The ability to view videos and images on mobile devices has caused security concerns regarding personal information.

"So, you can see them even when you are not in the hospital. I'm a little worried about security, like the fact that I can see them outside of work." (physical therapist, ID 16)

DISCUSSION

This study revealed how the use of an application that shares a video of patient movement status during predischarge home visits can benefit the practice of multidisciplinary collaboration in community healthcare: it would enable visualization and communication of information more comprehensively than verbal information, enable the identification of changes over time and prognosis, promote collaboration among multiple professions, and communicate the reality of the patient and family. In terms of disadvantages and concerns, security concerns and a desire for linguistic interaction were also evident.

Regarding the effects of the pre-discharge visit, previous studies have reported that it enabled safe discharge and a smooth transition to home. ^{7, 10} This is similar to the findings in the present study that facilitated care goal setting prior to discharge and made it easier to predict post-discharge life and service use.

In addition, previous studies on pre-discharge visits using information and communication technology tools have reported that mobile videoconferencing by multiple professions has benefits, including more appropriate recommendations by rehabilitation professionals, ^{12, 13} which were also reported in this study as facilitating the exchange of opinions during multidisciplinary conferences and decision-making by multiple professionals. On the other hand, previous studies have pointed out the time limitation of mobile conferencing due to the simultaneous gathering of multiple professions as a disadvantage, but this application has no time limitation and overcomes this limitation. ^{12, 13}

The findings of the current study have several novelties. A novelty of the results of this study is that the use of a video-sharing application can approach the psychological distance between multidisciplinary professionals and promote interprofessional communication and collaboration among multiple professions. Moreover, the use of video tools enables the transmission of reality, including the psychosocial context of patients and their families, and allows multidisciplinary professionals to share the unique aspects of the environment and culture of the patient's home as a place where they are cared for.

It was also interesting to note that the primary value of using this application differed by occupation. The professional role of nurses is to address the psychosocial issues of the patients, 17, 18 so it is understandable that the nurses in this study felt that they would benefit from knowing the psychological and social backgrounds of the patients in their homes. For rehabilitation professionals, planning rehabilitation and estimating prognosis, especially for elderly patients, is very important, ¹⁹ and therefore they saw a benefit in the current results, especially that the use of the app facilitates prognostic prediction. Since care managers are usually located in facilities away from hospitals, it is difficult for them to communicate easily in the workplace, as is the case with multiple professions in a hospital. Therefore, it is thought that they felt that they would benefit from facilitating communication with other facilities. It is also possible that social workers felt that this application would help to reduce the psychological distance between them and the nurses, as the previous study showed that social workers felt more psychological barriers when working with nurses.²⁰

With regard to the disadvantages and concerns of the application, the desire for linguistic interaction as well as video-sharing, and concerns about security were mentioned. While this app can visualize the inside of a patient's home, which is not easily seen by hospital staff, it can also be unsettling for patients, and more robust security is an important improvement. Improvements with just the right balance of convenience such as allowing instant texting along with video and enhanced security will be needed.

A limitation of this study is that the effect of the video-sharing application on physicians was only indirectly analyzed because the participants did not include physicians. It is also possible that the participants in the study were primarily those who actively embraced the use of this application, in which case the more positive aspects may have been highlighted and discussed. In addition, this study was conducted in a single region of western Japan in a mountainous area, and the respondent occupations were limited, which may have influenced the results.

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