Formal and Informal Modes of Information Sharing in a Japanese Nurse Team

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Abstract

Information sharing activities among a nurse team were observed. There were formal information sharing activities exemplified by the shift change report. In the shift change report, the previous shift nurses transfer necessary information to the incoming shift nurses. More informally, nurses often orally inform other nurses with updated information to one another. The observations revealed that the formal information sharing activities relied mostly on written information, while the informal information sharing activities relied on oral communications. It was also noted that information providers' awareness of "who needs what" plays an important role in informal information sharing.

Research on medical groups is an important application of small group research. There are several approaches to investigate functioning of medical teams. For example, one might consider status differences among team members as an obstacle to effective information exchange and attempt to reduce the negative effect of status differences (e.g., Hofling, Brontzman, Dalrymple, Graves, & Pierce, 1966; Ohtsubo, Shimada, Morinaga, & Misawa, 2003). Recently, however, researchers have become increasingly interested in groups' information processing function (Hinsz, Tindale, & Vollrath, 1997). What makes group information processing different from individual information processing is the possibility of distributed information processing. For example, Hutchins (1995) describes how a navigation team knows their present location by dividing the entire process of position fixing into several subtasks and assigning those subtasks to different members. Whether such distributed information processing works depends on how effectively a group can integrate segments of information processed by different members (cf. Radner, 1997). In Hutchins' navigation team, a well-designed role structure among the team allows them to integrate the information effectively.

Cognitive activities of nurse teams can also be approached within the socially distributed cognition framework. First, nurses typically differ in their level of experience–knowledge and

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skills are not evenly distributed. Hence, less experienced nurses can obtain useful information from more experienced nurses. This type of information sharing among work teams has been well-studied under the rubric of transactive memory (e.g., Moreland, 1999). Moreland notes that "[the transactive memory] system combines the knowledge possessed by individual group members with a shared awareness of who knows what" (p. 5). It is also emphasized that members with different backgrounds or expertise can contribute their knowledge in a complimentary manner (Wegner, 1987). Nurses are well aware of other nurses' knowledgeableness. However, they tend not to have different areas of expertise because they engage in basically the same set of tasks. Also, their knowledgeableness strongly correlates with their length of experiences. Accordingly, the transactive memory system among nurse teams tends to become a rather simpler rule of "ask senior members." For this reason, I shall not apply the transactive memory perspective to nurse teams in this study.

There is, however, another source of knowledge differences among nurse teams. Nurses' knowledge about patients becomes immediately outdated with changes in patients' conditions. For example, in changing shifts, such as from the night shift to the dayshift, the previous shift members have more updated knowledge than the incoming members. Thus, effective information transfer from the previous shift members to the next shift members is essential. Moreover, even within the same shift period, it is impossible for nurses to simultaneously attend to all patients who are in different rooms. Indeed, medical circumstances could change minute by minute—patients might sporadically find themselves in need of a nurse's help. Accordingly, collective monitoring of patients should facilitate effective nursing. Note that the awareness of "who knows what," which is an essential element of the transactive memory system, is little use for this purpose because knowledgeable members are temporarily changing due mostly to unpredictable changes in patients' conditions. The purpose of this exploratory study is to describe how one Japanese nurse team deals with such a temporarily changing job environment.

In this article, I report on an observational study focusing on information sharing among nurses in a city hospital. The observed information sharing activities are organized in terms of their formality—viz., whether the activities are prescribed by formal rules or not. A prominent example of a formal information sharing activity is the reporting of a patient's information from the previous shift members to the incoming shift members (henceforth referred to as "shift change report"). What kinds of information should be transferred and how to conduct the report session are prescribed by formal rules. I also observed various informal information sharing activities. Because of their informal nature, it was impossible to decide a priori what kinds of activities to observe. Therefore, without a specific rubric from which to organize these activities, I noted all that I observed.

Background of the Observed Hospital

The observational site was the internal medicine floor of a city hospital located in one of the largest cities in Japan. There are about 30 physicians representing 11 specialties. I was allowed to observe the nurse station of the internal medicine ward. For sanitary reasons and other concerns, I remained in the nurse station and did not observe how nurses were interacting with inpatients. Therefore, my observations were necessarily restricted to events that occurred in the nurse station. I observed the ward during the periods of August 5-6, August 31-September 1, and November 1-2, 2002. I also conducted an interview with the chief nurse of the ward on August 5, before starting the observation. The following descriptions in this section are based primarily on the interview.

The internal medicine ward is equipped with 55 beds (including 5 beds for intensive care). Most inpatients of the ward suffer from diabetes, hepatic disease, and diseases of the digestive organs. Inpatients are divided into two types, referred to as A and B. Patients categorized as Type A are those whose condition is most serious while those with less serious conditions are categorized as Type B. Inpatients who are just there for some tests or who are waiting for an operation are also categorized as Type B. The capacity for each type of inpatient is 20 for Type A and 35 for Type B. Nurses are also divided into two groups, referred to as Groups A and B. Each group is responsible for the corresponding type of inpatient.

I observed activities during the dayshift service. However, it might be useful to first explain the nurse rostering system employed by the hospital. There are three shifts: dayshift (8:30 am to 5 pm), semi-night shift (4:30 pm to 1:00 am), and night shift (12:30 am to 9:00 am). Every nurse may serve for any of the three shifts. For example, a nurse might work the dayshift and will come back for the semi-night shift on the next day. One unique aspect of this hospital's rostering system is that two nurses (i.e., one from Group A and one from Group B) working the dayshift on a particular day are obligated to serve on the night shift the next day (i.e., about 7 hours after the dayshift). These nurses are called "leaders" of the dayshift. During the dayshift, as far as I observed, the leaders engage mostly in paper work instead of engaging in ordinary nursing services. It should be noted that the particular nurse acting as the dayshift leader is re-assigned on a daily basis.

During the dayshift, there are about four to five nurses in each group. Each inpatient is assigned to a single nurse. Since one nurse who is assigned the leader role on the dayshift is not assigned inpatients, the number of nurses who take care of inpatients is three or four. Thus, if there are four group A nurses on the dayshift, each nurse except the leader is responsible for approximately one third of the type A inpatients. (On exceptionally busy days, the leader is also assigned some inpatients.) There is no redundancy in this assignment. The

number of assigned inpatients fluctuates from day to day depending on the total number of inpatients and the number of nurses working the dayshift. Additionally, the same nurse is not necessarily assigned the same inpatients on different days because the particular nurses working dayshift also change each day.

In the semi-night and night shifts, there are three nurses. These three nurses' roles are referred to as A, B, and C. The Nurse A role is assigned to members of Group A and the Nurse B role is assigned to members of Group B. Nurses A and B are responsible for inpatients of Types A and B, respectively. The Nurse C role may be assigned to members of either group. Nurse C is expected to provide support for Nurses A and B. However, in practice, Nurse C mostly helps Nurse A, who is usually busier than Nurse B. The leaders of the dayshift serve as Nurse A or B for the night shift. Thus, practically, the leaders keep updating information of the inpatients' conditions through 24 hours from the beginning of the dayshift to the end of the night shift. Naturally, they become the most knowledgeable members by the end of the night shift. Therefore, it is important to see how they transfer their updated information to the incoming nurses.

Results

Formal Modes of Information Sharing

As stated earlier, the shift change report is a marked example of the formal information sharing activities. During the dayshift, there are two such reports: from the night shift to the dayshift, and from the dayshift to the semi-night shift. In the following, I describe how these two reports are conducted. There are other formal information sharing activities that I noticed as well. I shall also briefly summarize those other formal information sharing activities.

Shift Change Report (Night Shift to Dayshift). As explained previously, during the night shift, there are two nurses, referred to as A and B, who are responsible for inpatients of each group. Therefore, information needs to be transferred from a single person (i.e., night shift A/B) to a group (Group A/B). However, in the shift change report from the night shift to the dayshift, there is no formal face-to-face information transfer.

In this hospital, important information, such as inpatients' conditions, is transferred in a written format. Nurses are required to write medically important information down on a note called "nursing records." In this hospital, all pieces of information are filed together for each inpatient. Specifically, the nursing records are filed together with other medical documents, such as medical charts written by doctors. The first thing that dayshift nurses are to do upon arrival is to read through the files of inpatients for whom they are responsible on that day. The nurses refer to this activity as *joho-shushu* (information gathering). Since the files also

contain prescriptions from doctors, nurses not only gather information about inpatients' condition during the night shift (and previous days) but also what treatments each patient is to receive on that day. Accordingly, nurses make their schedule for the day during this information gathering phase.

At 8:30 am, the chief nurse initiates the shift change report. She first announces to all dayshift nurses general information, such as how many beds are currently occupied and who is leaving the hospital on that day. Nurse A from the night shift also reports to all dayshift nurses information about inpatients in extremely serious condition. Then, each group holds a meeting separately. Each dayshift nurse, except the leader of the day, declares her schedule, which she made during the information gathering phase, to the other nurses. In each group, the night shift nurse who usually sits nearby and listens to the dayshift nurses' schedules sometimes makes comments on the schedule providing supplementary information. Supplementary information includes information that one is not required to report on the nursing records. For example, Nurse A informed dayshift nurses that one inpatient has a bottle of water that his or her son brought. Nurse A continued that it might be better not to allow him or her to drink it too much although no formal prescription was made (September 1, 2002). As seen in this example, the formal mode of information sharing via nursing records is supplemented by an informal information sharing activities in the shift change report from the night shift to the dayshift.

Shift Change Report (Dayshift to Semi-Night Shift). From the dayshift to the semi-night shift, the leaders of the dayshift orally report inpatients' conditions to the semi-night shift nurses. At 4:30 pm, the chief nurse initiates the shift change report. The leader of Group A reports each patient's condition to Nurses A and C of the semi-night shift. The leader of Group B reports each patient's condition to Nurse B. Remember that the leaders of both groups do not engage in nursing tasks during the dayshift. Therefore, one of the important parts of the leader's job is to get an accurate picture of each patient's condition by the time of the shift change report. They not only rely on the nursing records but also acquire information through informal conversations during the dayshift. Since they tend to stay in the nurse station, other nurses who sporadically come back to the station can inform them of important information about a patient to be shared with other nurses. Although the shift change report from the dayshift to the semi-night shift is conducted orally, it is noteworthy that the report is based mostly on the written nursing records.

When the leaders and semi-night shift nurses are conducting the shift change report session, other dayshift nurses continue engaging in ordinary nursing services. Accordingly, the nursing records might become outdated even during the shift change report. In one instance, I observed a dayshift nurse come to the shift change report session and inform the

leader and semi-night members about a patient's most recent temperature (August 31, 2002). Also, during the shift change report, if there is something unclear in a nursing records or that the leader does not know, the leader asks for clarification from the nurse who is responsible for it. For example, the leaders usually do not know when ongoing drip infusions will finish. If there are some ongoing drip infusions during the shift change report session, the leader and the semi-night shift nurses might ask the nurse who is responsible for the treatment when it will finish (observed on August 31 and September 1, 2002). Such informal oral communication can be considered as a means to give supplementary information and to provide flexibility to the formal, nursing records-based communication.

Other Formal Information Sharing Devices. In the nurse station, there is a whiteboard on which nurses list important treatment schedules of the ward. The whiteboard can show schedules of one week. Although the descriptions are simple, they make it visible to every nurse "who is taking which test and when." Also, once the test or treatment is completed, the nurse responsible adds a mark in red ink indicating "completion." Therefore, it is obvious to all nurses if some preplanned treatments are missed (or being missed). There is another smaller whiteboard, on which every doctor's name is printed. If a nurse has a question about a doctor's prescription, she will write her name at the side of the doctor's name so that the doctor will see which nurse is looking for him or her. This nurse-doctor communication is supposed to be mediated by the leader. Even when a nurse happens to see the doctor and asks him or her the question directly, the nurse should report a summary of the communication to the leader.

Prescriptions from doctors to nurses are communicated through each patient's file. Each time a doctor makes a new prescription, he or she inserts it into the file and indicates it by raising colored bars attached to the file. Different colors are used for different purposes. It is interesting to note that these formal communications tend to utilize visually mediated reminding devices (i.e., whiteboard, colored bars; cf. Norman's, 1988, notion of visibility). Also visually mediated, the shift change reports are primarily dependent on written nursing records. As we shall see, this reliance on the visual modality forms a remarkable contrast with the predominance of the auditory modality in informal information sharing activities.

Informal Modes of Information Sharing

During the observations, I often observed that a nurse declared her ignorance (often just talking to herself) and other nurses provided relevant information. It is interesting to note that in this type of information sharing, information providers' awareness of "who needs what" rather than information seekers' awareness of "who knows what" plays an important role. For example, a nurse was looking for a particular patient. She called the patient from the nurse

station via bedside phone and got no reply. Note that by her vocalization of the patient's name, other nurses became aware that she was looking for a particular patient. In this instance, another nurse immediately informed the nurse that the patient was currently in the dayroom (August 5, 2002). In another instance, one nurse needed to call a different ward and began to look through the hospital telephone book vocalizing "what is the number of the ward of XXX." A second nurse who happened to know the number immediately informed this nurse of the number (November 2, 2002). It is interesting to note that the information providers in the above examples took the information seekers' vocalizations as a sort of reminder that they possess the relevant information. An interesting parallel can be found in informal information sharing during the shift change report from the night shift to the dayshift. As we saw, Nurses A and B of the night shift provide supplementary information to the dayshift nurses. It is likely that the dayshift nurses' declaring their schedules function as a reminder that they have some information unwritten in the nursing records.

To assess the effectiveness of this type of information sharing, it is important to note that the state of "who needs what" is ephemeral in the above examples. Accordingly, this type of information sharing occurs at best in a haphazard manner–it occurs when and only when an information provider happens to be present in the right place at the right time. The presence of this type of informal information sharing, nonetheless, seems to affect the effectiveness of the nurse team. An instance illustrates how this mode of communication could facilitate the team's effectiveness. One nurse was checking a document listing every patient's supper menu for that evening. She was called by a patient and left the nurse station. After a few minutes of her leaving, a different nurse came into the nurse station and began to check the same document again. However, there was no need to double-check the document. When she started to check it, she declared "I am going to check the supper list." In this instance, she was not informed that the list had already been checked (November 2, 2002). It is obvious that the unnecessary double check could be avoided if there had been someone who could have let her know "someone has already checked it." Therefore, it can be considered that the positive effect of the informal modes of information sharing have on team productivity is not negligible.

Formal rules might facilitate this type of informal information sharing as an unintended byproduct. In answering to nurse calls, vocalizing the caller's name is required to avoid misidentification of patients. Keiko Yamauchi (personal communication) pointed out that this vocalization enables nearby nurses to immediately share which patient is currently in need of help. On several occasions, it was observed that nurses other than the one who took the call went to the patient. I asked the chief nurse whether they were aware of this function of vocalization. She said that the hospital neither intended nor was aware of this function. I counted the number of such instances in a period of one dayshift (8am to 5pm, 11/02/2002). At

the internal medicine ward, there was one such instance out of 14 nurse calls on that day. I also conducted the same follow-up observation at the general surgery ward (8pm to 5pm, 08/07/2003). Again there was one such instance out of 22 nurse calls. These results are consistent with the chief nurse's report that they do not vocalize the caller's name to let other nurses take care of the caller. However, such cases were observed in both wards and I observed similar instances on other days of observation. Therefore, the unintended function of vocalization that Yamauchi suggested is not completely nonexistent. More importantly, nurses seem attentive to other nurses' utterances, which are not intended to communicate some information to them, and use those utterances to know if they can provide some help or relevant information. Such tendency of nurses are also observed when doctors look for a particular patient's file vocalizing "where is Mr/Ms. XXX's file." Nurses who heard it tends to tell the doctors where the file is or even get the file for them.

Discussion

I observed nurse team's information sharing activities. Some information sharing activities were based on formal rules, whereas others were more or less informal habits. It is interesting to note that in these two types of information sharing, there is a difference in the modality of information sharing. The formal information sharing activities rely heavily on written information or visual signals. Nurses are required to write all medically important information in the nursing records. Incoming nurses for the next shift first gather information on patients from the nursing records. Prescriptions from doctors to nurses are also transmitted in written form and signaled with colored bars attached to the file. Nurses also utilize a whiteboard when they need to contact doctors. Furthermore, another whiteboard is used to share the schedule of treatments. In addition, whether the prescriptions have already been completed or not is made visible by adding a "completion" sign with red ink. In contrast, informal information sharing activities depend primarily on auditory information (e.g., vocalization). It is noteworthy that writing information is a time-consuming activity. While written information is less likely to be lost in comparison to information stored only in someone's head, the benefits of writing information might not always be worth the cost in time, especially if the information is peripheral. On the other hand, vocalizing immediately accessible information is not a demanding task. Thus, facilitative effects of oral, informal information sharing are not negligible.

Despite the difference in the modality of information sharing, from a different perspective, it can be said that some of the formal and informal information sharing activities utilize a similar trick. As I noted, doctors' prescriptions are inserted into the patients' files.

When they are inserted, the doctors put a colored bar as a reminder. On the other hand, in the informal information sharing, I pointed out that ignorant nurses' utterances function as a reminder. Viewed in this way, again the difference in the modality makes sense. The information sharing activities prescribed by formal rules cannot be missed. However, because nurses and doctors work according to different schedules at different places, it is difficult to enforce doctors to give prescriptions to nurses directly. Therefore, it is useful for them to use some reminders that stay at the same place for a certain period of time. Visual signals fit this purpose better than auditory signals. On the other hand, if a nurse just tries to see if there is someone who knows information that she needs, vocalizing is considered as a more convenient reminder as far as information-providing nurses were attentive to her vocalizations.

It is also interesting to note that information sharing via the nursing records has similarity to the transactive memory system. Nurses use information in the nursing records by their awareness of "where is what." As I pointed out, it is difficult for nurses to anticipate who has the most updated information at a particular time. Even under this type of job environments, information seekers' awareness about where is the needed information plays an important role. Nonetheless, this study suggests that the transactive memory system alone cannot be sufficient for group members who work under temporarily changing environments in which knowledgeable members are unstable. The observed nurse team's solution to this problem was that members attend to other members' temporary need for some information and provide it actively when they possess it. Generality and utility of this solution should be further investigated in other types of organizations and by means of more systematic research, including laboratory experiments.

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