

# Supporting Collaboration in Multidisciplinary Home Care Teams

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## ABSTRACT

*Collaboration is an important part of healthcare delivery. However, in home care, collaboration is difficult due to the mobility and schedule variability of the workers. In this paper, we investigate the difficulties inherent in home care collaboration. We present the results of a study carried out with home care clinicians in Saskatoon District Health, and identify five areas of collaboration that are difficult for home care workers: scheduling, information dissemination, information retrieval, short-term treatment coordination, and long-term treatment planning. We present recommendations for incorporating support for each of these areas into point-of-care clinical information systems that provide access to shared patient records. Finally, we discuss general design approaches for incorporating this type of support, including the need for workers to maintain awareness of the activities of others, and the need to integrate communication with the presentation of the health record.*

## INTRODUCTION

Collaboration is an important part of healthcare delivery. Patients may receive services from a team of healthcare workers from several different disciplines. Depending on the setting, these workers may collaborate both formally (e.g. case conference meetings) and informally (e.g. opportunistic discussions, phone calls). This collaboration allows teams of workers to share information about patients, coordinate treatments, identify problems, and develop complimentary treatment plans and goals<sup>1,2</sup>.

In home care, clinicians are mobile and rarely see each other face-to-face, so it is difficult for them to carry out these common collaborative tasks. Home care clinicians deliver care to patients in their homes, and often spend minimal time in the office, so opportunistic collaboration is rare, and formal collaboration may be difficult due to schedule variability within the team<sup>3</sup>. The difficulties inherent in information sharing and collaboration often force clinicians to make decisions and carry out treatments without access to the full range of relevant information that is available about their patients.

Recent advances in mobile technologies are beginning to make point-of-care (POC) clinical information systems (CIS's) viable tools for addressing the collaborative difficulties found in home care. These systems can provide benefits not available through other technologies (i.e. pagers, cellular phones, voicemail), including persistence of collaborative information, information sharing with all team members (or, if necessary, subsets of the team), and awareness of the activities of other team members. However, since the precise collaborative needs of home care workers are not well known, it is not clear how those needs can best be supported in a point-of-care CIS.

To investigate how home care collaboration can best be supported with a point-of-care CIS, we carried out an analysis of collaboration in multidisciplinary teams of home care clinicians in a local health district. We attempted to develop an understanding of current collaborative practices, and of situations where collaboration is difficult but desirable. In this paper, we will present the findings from this analysis by identifying five areas of collaboration that are difficult for home care workers: scheduling, information dissemination, information retrieval, short-term treatment coordination, and long-term treatment planning. For each area, we will present recommendations for supporting collaboration with a point-of-care CIS. Finally, we will discuss general design approaches for incorporating this type of support, including the need for workers to maintain awareness of the activities of others, and the need to integrate communication with the presentation of the health record.

During our discussions of CIS's in this paper, we will make the assumption that they contain some form of shared patient record, but we do not concern ourselves here with the extent of that record. Instead, our purpose in this paper is to consider how collaborative functionality can be incorporated into this type of system to meet the real world needs of home care clinicians.

## METHODOLOGY

We conducted interviews and field observations with clinicians and administrators in the Home Care department within Saskatoon District Health (SDH), the largest of the health districts in Saskatchewan, Canada. Patients who receive home care services in SDH are treated in their homes by clinicians from several disciplines, which can include occupational therapists (OT), physical therapists (PT), dieticians, nurses, home health aides, social workers, and case managers.

We conducted three rounds of interviews. The first round was informal and exploratory in nature, and we attempted to develop a general understanding of organizational and workflow issues by meeting with clinicians and administrators from each of the home care disciplines. The second and third rounds of interviews were semi-structured, and during each round we carried out eight 1 to 2 hour interviews. In each of these rounds, we interviewed a clinician from each of the home care disciplines with the exception of nursing where we included two – a registered nurse (RN) and a licensed practical nurse (LPN). In the second round, the interviewer attempted to identify current information utilization practices in home care, including documentation practices, collaboration practices, collaboration difficulties, and collaboration needs. In the third round, the interviewer was able to use the information

that was obtained through the first two rounds to explore information utilization practices in further detail.

After the interviews, we conducted field observations of a member of each home care discipline, again for a total of eight observations. Each observation lasted for the duration of a workday, and the clinicians were observed while they carried out their daily work activities. The focus of the data collection was similar to that of the second and third rounds of interviews, but the observations provided us with specific and detailed data that was not uncovered during the interviews.

In analyzing the data, we attempted to identify patterns of collaboration between home care workers. While we also investigated collaboration between home care workers and other information sources (e.g. office-based physicians), our discussions in the following sections will focus on collaboration within the home care team itself.

### **FINDINGS: FIVE AREAS OF COLLABORATION**

In this section we describe five areas of collaborative activity that were identified through the data analysis: scheduling of visits, disseminating information to other members of the team, retrieving information from other members of the team, short-term treatment coordination, and long-term treatment planning. In each of the following sections, we state the collaborative problem, describe how home care workers at SDH see the problem and how they attempt to solve it, and then make recommendations about how the problem could be addressed within a clinical information system. As we will discuss later, two design principles recur in our considerations of collaboration support: maintaining group awareness, and communication that is tightly integrated with the patient record.

#### **Area 1: Scheduling**

*Problem.* It is difficult for home care workers to coordinate their schedules so that unwanted conflicts are avoided, and so that desired meetings are possible.

*Findings.* The method used for scheduling in home care in SDH varies with each discipline. With the exception of the home health aides, all of the disciplines self-schedule; that is, they make their own appointments for visits with the patients. Home health aides are scheduled by the home care office, and this schedule varies little from week to week. Regardless of the discipline, there is no formal procedure for sharing schedules, and they are generally only accessible to the individual worker. A further complicating factor is that schedules for most of the disciplines are not always precise. Variations in caseloads and the unpredictability of treatments and travel lead to daily revisions of schedules, although the home care workers can usually make reasonable estimates of when they will visit a patient.

There is currently no good way for workers to determine others' schedules with respect to a particular patient. In some cases, visits by one discipline are fairly regular (e.g. a nurse visiting every morning to give insulin) and this information becomes known to the other workers on the team; however, other disciplines do not follow a regular

schedule. In other cases, it is possible for a home care worker to determine the schedules of other disciplines by asking the patient. However, the patient as information holder is not always a successful strategy. Various patients may "tidy up" professional calling cards that were left as an indication to other disciplines, or may give incorrect or unreliable information about other planned visits.

The inaccessibility of scheduling information leads to two undesirable situations. First, more than one home care worker may visit the patient's home at the same time. In this case, one of the home care workers must either wait while the other finishes their treatment, or decide to leave and try to give a treatment at a later time. Either way, a considerable amount of time may be wasted. Second, workers in some cases may want to schedule a visit to overlap with another person. Knowing where another treatment team member is at a given time allows for opportunistic meetings in a patient's home to discuss treatments or other issues related to a patient's care.

*Recommendation.* Even though it would be difficult to represent some disciplines' schedules in absolute terms, having general schedule information would prove useful for avoiding conflicts and finding opportunities for face-to-face collaboration. Some means of indicating schedules is required in point-of-care CIS's—not a heavyweight scheduling tool, which tend to be inflexible, but a way for home care workers to signal their intentions. The tool should be able to accommodate a degree of uncertainty in scheduling, and allow home care workers to represent a range of time in which they expect to visit a patient instead of a specific time when the visit will take place. In addition, the system should be able to filter and restrict information so that it is possible to get a quick look at the visiting patterns of a particular discipline, or to find an open space for planning a future visit.

#### **Area 2: Information dissemination**

*Problem.* It is difficult for home care workers to disseminate information to other members of the treatment team.

*Findings.* Since face-to-face meetings are often rare, home care workers must rely on other means to pass information to treatment team members. Different disciplines have different communication tools: OT, PT and Social Work have voice mail, and Nursing, Nutrition, and Home Health Aides carry pagers while in the field. Cellular telephones are not commonly utilized in the district. In addition to using voice mail and paging, messages are also passed through office staff, and handwritten notes are sometimes left at others' offices.

Disseminating information becomes more difficult when a message must be given to multiple team members. Since disciplines within SDH are not all housed within a common building, it is not possible to leave handwritten notes for all people. Likewise, voice mail is only available for certain disciplines. This means that home care workers must often use a combination of techniques to disseminate information. This creates a situation where only the most

essential information is conveyed, and information that may be useful but not vital is not passed on.

Other communication difficulties stem from differences in office hours among different disciplines and among different individuals. It is not always possible for home care workers to anticipate when they might be able to reach other treatment team members by phone, and in some cases office hours do not overlap between disciplines. For example, nursing typically leaves the office before PT, OT, and Social Work begin their day.

*Recommendation.* By introducing a point-of-care CIS with a shared patient record, information dissemination could be substantially improved in this setting. Provided that the CIS allows workers enough latitude to document unusual occurrences or observations, concerns, and revisions in planned treatments, a substantial amount of dissemination could be handled within the patient record itself.

However, some information that should be disseminated may not lend itself to inclusion in the patient record due to its informal nature. Organizational policies and concerns about the record as a legal document limit the types of information that home care workers are willing to disseminate in this way. For example, one type of information that home care workers regularly need to share with others is information about problems with patients' pets or family members. These kinds of messages are important, but workers do not want them to become part of the legal record for that patient. A tool for disseminating information in a way that is separate from the legal record would prove valuable. It is possible that this type of solution could still be tightly integrated with the patient record; by storing this communication separately from more formal patient data, and by automatically removing it when it reaches a certain age, informal dissemination could be supported without raising legal and policy concerns.

### **Area 3: Information retrieval**

*Problem.* It is difficult for home care workers to obtain needed information from other group members in a timely fashion.

*Findings.* When home care workers are in the field providing treatment to a patient, it is often necessary to request specific information from other individuals on the treatment team. The needed information may have direct relevance to how the provider carries out a patient's treatment, so it is important that the information is retrieved quickly. Unfortunately, it is usually not possible in the current setting to gather needed information in a rapid fashion. As previously discussed, it is difficult for home care workers to catch each other on the phone while in the office. Pagers offer a more immediate option, but they are not always very effective either. They require the person issuing a page to wait by the phone, while the page recipient must find a phone. Often a page arrives while a worker is either driving between patients' homes or performing a treatment in a patient's home; in both situations it is difficult for the worker to respond to the page. Some treatments, such as changing a wound dressing,

cannot be interrupted; also, holding a conversation on a patient's phone that concerns a different patient is a potential breach of confidentiality.

Most of the delays inherent in retrieving information from other home care workers are similar in nature. Two delays typically occur before the questioner receives an answer. First, a delay is introduced once the question is asked. The question recipient must retrieve the message and then respond to it, which can take widely varying lengths of time. The second delay is introduced once a message containing the response has been produced. The questioner may not immediately realize that the answer to the question is available, so a delay is introduced until the answer is retrieved. This is typical of voice mail. The question recipient does not receive the question until they check their voice mail, and the questioner does not get the response until they in turn check their voice mail. Similar delays are introduced with handwritten notes and messages passed through third parties.

*Recommendation.* Due to schedule variability between home care workers, it can be assumed that practical communication to address this issue should be asynchronous. E-mail or instant messaging systems are potential solutions. However, even though these solutions make it easier to send a message to a person, they do not address the problem of getting a reply in a timely fashion. Although this will remain a problem (e.g. some treatments still cannot be interrupted), mobile computer systems can at least ensure that requests are available to workers when they have the time to respond to them, and can address the confidentiality issue.

### **Area 4: Short-term treatment coordination**

*Problem.* It is difficult for home care workers to coordinate treatments with each other so that the treatments are complimentary.

*Findings.* When multiple home care workers treat a given patient, their activities may cause a change in the patient's health status, functional status, or environment. Even though treatments are separated by time, the changes brought about by treatments make the goals and actions of all home care team members interdependent. This interdependence necessitates short-term coordination in order to guarantee that actions taken by all home care workers work together toward outcomes that are beneficial to the patient.

Actions taken by one treatment team member often have direct impacts on the treatments of another team member. For example, if an occupational therapist performs exercises with a patient in the morning, the physiotherapist who treats the patient later that morning may find that the patient is too fatigued to participate in therapy. The physiotherapist could adjust their actions accordingly if they had an indication that the occupational therapist had recently visited the patient. This example illustrates what we will call loosely coupled coordination, in which it is beneficial to know actions that have recently been taken by treatment team members. In this case, home care workers

are not actively coordinating resolution of a specific issue, but are coordinating treatments so that they are complimentary and do not interfere with each other.

In other cases, home care workers' individual plans and goals are tightly coupled and their treatments must be closely coordinated in order to resolve a specific treatment issue. When this is the case, a higher level of awareness may be necessary to guarantee that specific team members know the patient's status and the actions that have been performed by others.

Most disciplines were able to cite specific situations in which they must use tightly coupled coordination with other disciplines. For example, OT often works closely with nursing on pressure relief and positioning issues. Many of the situations that were mentioned are acute and emergent in nature; therefore, coordination in this context seems to be utilized to resolve problems that demand intense scrutiny. This is perhaps unsurprising since the collaborative overhead required to coordinate treatments can be time consuming.

*Recommendation.* The shared patient record available in CIS's can provide up-to-date information about the actions that have been taken by other treatment team members as well as the patient's response to treatments. However, it is often difficult to retrieve this type of information from common information system interfaces. Approaches from information visualization could provide useful solutions for both loosely coupled and tightly coupled interactions. For loosely coupled coordination, home care workers should be able to easily discern the treatments that have recently been carried out by other team members. A visualization technique to show recent visits by time and discipline, for example, would provide the home care worker with enough information to decide when their own treatment would be most optimal. In the case of tightly coupled coordination, the information in the patient record will likely only be a partial solution, since the interacting clinicians will require more information than is normally communicated through the patient record. At some point, the home care workers may need to communicate directly on the phone or in person; however, the CIS can still provide a rich information base as a context for these conversations.

#### **Area 5: Long-term treatment planning**

*Problem.* It is difficult for home care workers to formulate shared treatment goals and care plans for particular patients.

*Findings.* When patients are admitted to home care, they are evaluated by a case manager who establishes the initial treatment plan and treatment team goals. However, when the treatment team has worked with a patient for a period of time, the common plan and goals often need revision. In an inpatient setting, treatment team meetings allow healthcare workers to "communicate care plans, common goals, and progress milestones."<sup>1</sup> However, this joint process of goal and plan formulation and revision does not often occur in home care due to scheduling difficulties.

Formulating a comprehensive care plan requires input from all treatment team members since each discipline tends to focus on specific aspects of health and function. This many-to-many style of communication helps each team member to understand issues they might otherwise overlook, and this allows the team to develop common plans and goals. Similarly, communicating in this fashion helps the individual healthcare worker to develop specific plans and goals that work toward common group goals.

Since home care treatment teams do not regularly meet and since none of the methods of communication available in home care (as previously discussed) are conducive to multi-way group communication, comprehensive care plans and team goals are not typically maintained in a collaborative group fashion. Instead, home care workers are prone to focus on individual discipline-specific goals as time passes instead of on shared treatment team goals.

*Recommendation.* Many CIS's do not provide for the multi-way communication that is needed to discuss and develop team plans and goals. A group communication tool is perhaps the most appropriate way to facilitate comprehensive care planning. Again, the schedule variability among home care workers makes synchronous communication tools impractical; asynchronous tools, however, are able to accommodate all team members.

#### **Summary**

It is important to emphasize that the introduction of a point-of-care CIS in home care that provides access to some form of shared patient record would in itself provide a significant improvement in collaboration, provided the CIS allows clinicians to make entries about their daily treatments. Daily entries that document treatments would give an indication of the actions carried out by a healthcare worker and the observations they have made. This allows collaboration implicitly—there is no specific support for direct collaboration between healthcare workers, but the documentation improves information access and fosters awareness of other treatment team members' activities and the outcomes of those activities.

Perhaps the best way to improve support for collaboration in home care is by providing added functionality in point-of-care CIS's. The collaborative difficulties outlined in the previous sections are not addressed by the implicit collaboration provided by a shared patient record, so addressing these difficulties as an additional layer is a reasonable approach.

#### **DESIGN APPROACHES**

In order to support the general recommendations outlined in the previous sections, it is necessary to consider design approaches for incorporating the recommendations into clinical information systems. We have already done significant design work with these recommendations as part of a project to develop a point-of-care CIS for home care clinicians in SDH. In the following sections, we will discuss general approaches that are useful for supporting the five recommendations: maintaining awareness, and integrating communications with the health record.

### **Maintaining awareness**

Home care workers often must make decisions and deliver treatments without a complete understanding of the actions of other clinicians. This understanding, known as *awareness* in computer supported cooperative work (CSCW) literature, helps team members determine how their own actions can best contribute to shared goals and plans<sup>4</sup>. Home care workers particularly need to stay aware of schedule information, treatment activities, and care plans, but all of the so-called “w” questions (who, what, when, where, why, and how) are relevant in this context. For example, it might prove important to know that the physiotherapist (who) revised treatment goals (what) after the previous visit (when) due to a change in the patient’s weightbearing status (why).

When we consider the five areas of collaboration, it is possible to identify baseline awareness information that is needed to support these activities in a CIS. For example, to carry out scheduling, it is valuable to know *who* the other treatment team members are, and *when* they intend to visit a patient (to schedule co-treatments or to avoid overlaps in treatment times). In the future, we will work toward developing a more specific framework for awareness in home care, and will identify specific types of awareness information that are valuable in home care collaboration.

### **Communication integrated with the health record**

Disseminating and obtaining information within the team is one of the core collaborative activities in home care, and is also one of the most difficult. Given the nature of the communication (e.g. notifications, updates, and cautions) and the variable availability of home care workers, asynchronous communication facilities such as email and instant messaging seem like a natural fit to this setting. However, it is important that communication facilities are integrated with the relevant shared patient record in the information system, since the patient record provides two kinds of important contextual information.

First, the participants in communication are clinicians who treat the same patient, and, therefore, should have access to the patient’s record in the CIS. Therefore, CIS’s should make it easy to send messages to the current team for the patient, or to regular subgroups (such as the therapists or the nurses) within that team. This suggests that the CIS can be used to present each patient’s record and patient-specific collaboration in a shared workspace that is accessible to the current treatment team.

Second, communication may be about a particular artifact (e.g. a document or event) in a patient’s record, and it should be possible to have conversations in the context of these artifacts<sup>5</sup>. Fitzpatrick calls this “conversations about the work at the point of work.”<sup>6</sup> In this way, important contextual information is obvious to message recipients. For example, if communications can be associated with a clinical document (e.g. an evaluation or daily treatment note), it reduces potential confusion about which specific clinical document is being discussed.

### **CONCLUSIONS**

In this paper, we considered collaboration in home care in SDH. Home care collaboration is limited by several characteristics of the setting, including the mobility of clinicians, schedule variability between team members, and the rarity of face-to-face meetings between team members. These difficulties are often partially addressed by technologies including pagers, voice mail, and cellular phones. However, these technologies are inadequate in addressing some of the complex collaborative activities that clinicians would like to engage in as part of care delivery.

We believe that a point-of-care CIS that provides home care clinicians with access to a shared patient record would significantly improve collaboration in home care teams. However, a data-centric CIS design does not address all of the collaborative needs of home care clinicians. Home care clinicians require support for scheduling visits, disseminating information, retrieving information from others, coordinating treatments, and creating care plans. A shared patient record does help to address these needs, but only in part. By integrating more complete collaboration support into CIS’s—particularly by supporting awareness and by supporting integrated communication—collaboration practices in home care can be supported and even significantly improved.

This research is part of an ongoing project with home care in Saskatoon District Health. Future work will include further field-based investigations to expand on these findings. We are currently developing a point-of-care CIS for home care clinicians that implements the requirements and design approaches discussed in this paper. In the near future, we will conduct a field trial of the CIS to test these concepts and to further validate our design approach.

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