Teaching Nurses to Build a Hospital Without Walls: Developing a Training Curriculum for Telehomecare

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Abstract. "To what extent can people be taught to engage in Computer Supported Cooperative Work (CSCW)?" is a question which has rarely been discussed at meetings of CSCW researchers. The present study suggests that qualitative research can contribute to the development of a curriculum for preparing nurses to work with patients who live at a distance from themselves. Building on the ethnographic research stream within CSCW, a qualitative study was conducted of three different telehomecare (THC) programs in order to identify work issues and difficulties which could be addressed in a training course for telehomecare nurses.

1 Introduction

With increasing demand for hospital beds, tight funding frameworks, and scarce human resources, convalescing and chronically ill people are increasingly receiving medical care at home. Various types of home care programs are appearing, one of which is telehomecare (THC), which is the use of computer and communication technology in the delivery of nurse managed care to patients at home. With this approach, sick patients at home transfer data or describe symptoms and health states to nurses usually in a remote institution, who in turn provide information and recommend certain actions to their remote clients. In many programs, there are three main actors in the day-to-day operations, the nurse, the patient, and the communication or computer technology. In general, the nurse can be considered to be the conductor in this orchestrated activity.

Managers at a post-secondary educational institution in particular felt that there would be an increased need for nurses who could provide telehomecare and for managers who could plan and implement such programs. Accordingly they pursued and obtained funding for the development of an online distance education program in order to train and prepare an anticipated cohort of nurses who would be needed to staff such programs. In this report, we will discuss the identification and analysis of nursing practices which helped to shape the development of a curriculum for training nurses to work in telehomecare programs. This paper departs from common analysis

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of CSCW technology design practices, and instead concentrates on the *design of a training curriculum*.

As part of this project, the authors conducted research into telehomecare in order to facilitate curriculum development. The project manager and researchers felt that intimate knowledge of the work practices of telehomecare nurses would set the curriculum development on a solid footing. The focus of this paper is to document the ways in which a qualitative study of the work activities in telehomecare influenced the curriculum and to discuss certain aspects of the work environment and collaborative work practices observed. The objective was not to influence the design of technology, but rather to determine if some of the methods commonly used in CSCW could be extended to the design of a course curriculum. Since the training was intended to help prepare nurses who would be engaged in telehomecare, there was a desire to render visible, in a detailed and frank way, the work that this entails [1], with the hope that this would influence the curriculum and eventually help prepare nurses for it.

Although qualitative and ethnographic studies of workplaces have been carried out frequently in conjunction with computer system design and development, it appears that the use of these approaches for curriculum design is relatively original. In the first section, we will identify work within social studies of medical practice and CSCW on which the current study builds. The subsequent section outlines the methods used to gain some understanding of the work of the nurses. This is followed by a brief analysis of key work practices which influenced the design of the curriculum. Finally, we will provide a brief critique of the enterprise of preparing nurses for telehomecare through a continuing education course.

1.1 Studies of Medical Work and Telehomecare

Social science studies of medical work are not new; a long line of sociologists and anthropologists have analysed various aspects of medical work and institutions (for example, [2], [3]). More recently, there has been a major thrust to understand the role that paper records play in institutions in general [4], [5] and in the organization of medical work in particular [6], [7]. There has also been an interest in understanding why computer systems developed in one medical context, may not easily transfer to another [8].

Within the literature on telehomecare, several authors emphasize potential benefits of such a program, such as more patient visits for a given budget, high patient satisfaction (patients are happy not to be in or have to travel to the hospital) [9], less hospital care [10], and less travel for homecare nurses. However, other authors indicate that the anticipated economic benefits may not be very significant [11], that numerous risks arise with this form of homecare [12], and some emphasize that extensive planning and organizational preparation is necessary prior to program implementation [13]. Medical personnel may also find the changes in work practices difficult to accept or unattractive [14]. Thus, some authors suggest that behind the often positive portrayal of telehomecare, lie a number of issues and difficulties with which personnel will be confronted. Questions then arise as to what aspects should be addressed in training programs, and how effective will this training be?

The authors noted above suggest a number of areas for further scrutiny: the complex nature of the medical setting, activities which become routines and those which are exceptions, the role of artefacts of all kinds in the work (paper documents, computer systems), concerns about telehomecare, and administrative practices in telehomecare programs. In our research, we were also interested in identifying that which the medical personnel found to be difficult or troublesome, with a view to alerting students to these issues and reporting others' approaches to solving the problems experienced. It was anticipated that some difficulties could be overcome relatively quickly (such as how to troubleshoot common technical problems), but that others could remain troublesome even with experience.

1.2 Other Aspects of the Project Context

Various instructional design features were to be used in the training program delivery. These included: an online delivery mode, web pages, streamed video to enhance learners' exposure to the knowledge and opinions of experts, instructor facilitation of a discussion board to support a community of learning, and patient case studies to stimulate discussion and problem solving.

Based on an estimation of program content and learners' work and study patterns, the THC course was developed as a 25 hour program and was to be provided as a post-diploma continuing education program. The sponsoring educational institution had developed a set of courses in telehealth, and although teaching staff had knowledge of other types of telehealth programs, none had developed or worked within a telehomecare program prior to the project.

2 The Methodology Used to Develop Knowledge of Telehomecare Practices and Issues

Research activities were undertaken to develop an understanding of the work practices and issues which could arise in the development of a telehomecare program. One set was an extensive review of the THC literature, and the observation of THC training at various sites. Another set was an in-depth case study of an existing telehomecare program in Quebec, and observation of two other programs. The context and methodology for the three case studies will be discussed below. As well, current telehomecare nurses were also invited to comment on a draft outline of the training curriculum and later on a protoype version of the on-line program (an additional participatory approach).

The first THC program we studied had been in operation in Quebec for 3 years. This program used a computer based monitoring technology, which had been developed as a joint venture between the hospital and a company. The case study entailed repeated interviews with two line-level nurses, a nurse program coordinator, a main doctor associated with the program, and a senior manager. The interviews explored the reasons for the creation of the program, its history, usual and unusual tasks, what patients and staff learned during participation in the program, the information which circulated, what personnel felt was useful to teach to others, and

interactions with others. During the interviews, the emphasis was on identifying usual routines and patterns, along with perceived difficulties in the work.

Another part of this case study was five days of close observation of the work of the nurses. This entailed paying attention to: the circulation and forms of information [4], [15]; the way in which nurses monitored patient data; the nature of telephone conversations with patients; the way in which patient records were created, updated, and used; conversations between personnel; patient visits to see nurses at the hospital and vice versa, and following nurses around the hospital.

There was some concern that a single case study could result in a training program that was too oriented to a particular THC program, thus in order to broaden the base of knowledge concerning learning needs in telehomecare, shorter studies were undertaken of two other telehomecare programs. Both employed different communication technology than the main field study site. One program, in a New Brunswick hospital, was for post-cardiac surgery patients. The technology used in this program (mainly a videophone with data transmission from peripheral devices) had been developed in-house, from commercial components. The other program, in Ontario, was in the developmental stage, and involved the participation of a technology supplier, which provided off-the-shelf technology and acted as a consultant to the program. The training provided by this technology provider, given that they had the experience of several program start-ups, provided information in terms of what this company believed was important for nurses to know.

A final approach to the curriculum development was the consultation of publications on telehomecare (some of which have been cited here), and documents which suggested policies and procedures (in particular, [15], [16], [17]). The Kinsella volumes were particularly oriented to the learning needs of nurses and managers, and thus were a significant resource.

The three programs used various technologies which had been developed in different ways. The question of how the technology was developed is not significant in relation to the curriculum development (nurses would most likely be users of the existing technology), and will not be discussed here. However, certain characteristics of the technology were important in relation to the curriculum, and these will be highlighted below.

3 Observations

First it would be useful to provide a little more background information on the nurses in telehomecare programs and the technology that they use. Nurses who are hired for these programs tend to be very experienced. Thus the nurses were quite familiar with hospital and care procedures, and this in itself was probably a positive factor in what appeared to be slow acceptance of such programs in the hospitals. Thus, it was likely that nurses who would be hired in other telehomecare programs would also have extensive experience, and that the curriculum developers could assume that the participating nurses had pertinent knowledge about care of the target patient populations, and hospital processes.

Another important background element is that there are two general modes of telehomecare: interactive mediated visits (telephone or video conference) and

computer monitored care. In the sites we examined, the Ontario and New Brunswick sites used videoconferencing to carry out the patient visits. This entailed relatively little change in established care procedures, aside from the fact that a nurse could not feel the patient or physically intervene (for example, to change dressings). Assessment, instructions, and patient education took place interactively with the patient. However, the Quebec program appeared to represent a greater departure from traditional patient activities and nursing routines. In this case, patients sent in data to the nurse's monitoring station according to reporting periods programmed by the nurse. In a very direct sense, this program involved computer supported cooperative activity. Assessment, instruction, and education was carried out automatically through an Internet based interactive computer system, which forwarded patient answers to the nursing stations. If the nurse received abnormal data, then the nurse could telephone the patient to verify and probe into this data with the patient. The question then arose as to how to train nurses in relation to these significantly different ways of providing remote care.

To answer this question, the curriculum team first recognized that many of the underlying issues that appear with telehomecare transcend any particular program. We called these common issues, training topics. For example, patient selection criteria are generally established and the patient has to be assessed for their conformity (a preliminary way of "configuring" the patient so that only patients with needs which can be met by the program enter it). Nurses also need to: seek and obtain consent to participate, instruct patients in how to use the technology, communicate clearly to patients, and be able to explain the rationale of the program to other staff. As well, the organization which hosts a telehomecare program needs to establish procedures such as home assessment, and have forms (or electronic patient records) to track and review the care given. Thus several general topics were identified which addressed certain types of knowledge and skills (see Table 1).

Table 1. Key training topics

Advantages and limitations of THC, program rationale
Patient selection and recruitment, patient flow, discharge
Patient information and consent
Patient instruction in technology
Home assessment
Types of THC technology
Organizational records
Documentation of care
After hours care
Technology operation and trouble shooting
Care protocols

However, although we had identified general topics, it was apparent that actual work practices often varied from one program to another. The patient selection criteria in one program was not necessarily the same as another. The way of responding to patients after hours (nurses in most programs work primarily during the day) varied from one program to another. Thus it became apparent that these

different practices needed to be addressed in the curriculum. More examples of general topics and particular practices will be noted below.

An important curriculum topic was technology trouble shooting. If problems appeared with the "technology," then this would drive the activities of the nurses. In the Quebec program, nurses reported that approximately half of their telephone conversations with patients were about data entry problems or other technology related problems (this did not take up half of their time though). Nurses in the other programs similarly had to develop technology problem solving skills, though these were clearly different from one program to another. As reported elsewhere [18], strategies and problem solving tips can be learned on the job and we did observe on the job sharing of these among co-workers. In the New Brunswick program, there was an actual one week apprenticeship period alloted for this. This observation in relation to common problems with the technology had a direct impact on the training curriculum, in that an entire section of the curriculum was devoted to informing nurses about this aspect of their work, and proposing strategies for developing trouble shooting skills.

Another key topic that was identified was patient recruitment and patient flow. In an emergency department, patients may literally stumble into the emergency department "program" of care. Nurses do not generally go out of their way to look for patients. Not so in the case of telehomecare. In Quebec, nurses actively checked a paper list of patients admitted to the hospital, and identified those that they thought would soon be suitable candidates for the program. After that, they would leave a form with the attending physician, and ask if the physician accepted to assign the patient to the program. If asked about this, the nurse would explain the program to the physician. If the physician accepted, then the nurse would visit the patient and ask him or her if they consented to participate. In other words, in order for the computer supported cooperative activity to begin, another actor, physicians, had to "cooperate" with the nurse, endorse the philosophy and practices of the program, and agree to continue to provide care. In short, telehomecare created a new and significant task for the nurse, which was patient recruitment. This is also an example of the way in which one of our curriculum topics, nurses' knowledge of the telehomecare program and their ability to explain its rationale, was intimately linked to another topic, that of patient recruitment.

Once in the program, then another new task was training the patient in the use of the technology. In the New Brunswick program, the patient stay was relatively short (about a week), resulting in high patient turnover. In this program, patient training in the technology became a necessary but repetitive and sometimes unpleasant task for the nurses. This observation also resulted in learning activities in the curriculum to help nurses teach patients about using the technology.

Another topic became the development and/or use of care protocols. A protocol represents an attempt to both standardize and make routine the care activities for patients with a given illness. For example, patients with diabetes would be asked a set of questions related to that particular illness. In the Ontario program, no new protocol procedures were introduced, and nurses continued to use whatever protocols they may have used previously for their traditional home care activities. In the New Brunswick program, a computerized questionnaire was used by the nurses which suggested particular questions to ask, and answers which could be ticked off. A senior nurse with considerable experience had developed this protocol using specialized software.

Work in this program, at least for this senior nurse, had taken on an added dimension of learning about new software and the formalization of knowledge and practices [19].

The development and use of patient protocols was even more significant in the Quebec program, which used the computerized monitoring program. Patients would sign on to the web phone based system, and be led through a series of screens which would ask questions about their symptoms and accept text or numeric data. Much of the time of the program coordinator (a nurse) had been taken up with the development, computer entry, validation, and teaching of protocols to other nurses. In this work, a general protocol was developed first, which could take weeks to produce, and entailed analysis of medical articles, inquiries about national and regional best practices, and validation by a physician. Once the protocol was represented on paper, it had to be translated into software, through a protocol editor (which took a few days to learn). In short, the nurses created a sort of computer program for each patient by using the protocol editor. The automated protocol "coordinated" patient activity, since patients had to fill in the screens three or four times daily. It also acted as question asker, instructor (the patient was reminded to do certain activities and the reasons for this), motivator, and note taker. However, although the software assumed certain nurse activities, the price for this was that nurses had to learn how to develop and computerize the protocols, and spend time developing the protocols and customizing them to patients. Some general information about care protocols was included in the curriculum, but because of the complexity of this activity and its use in only one program, the curriculum did not teach nurses how to develop such automated protocols.

Another important observation was the significant differences in patient care philosophy between the two program modes (interactive vs. monitoring). In the interactive mode (ie videoconference), nurses continue to inquire orally about patient symptoms, direct care, and to remind patients of required action. In the Quebec program, there was a distinctive philosophy of shifting responsibility for patient care from the nurse to the patient. The personnel in this program had a pronounced attitude of involving patients directly in their home care. For example, patients became responsible for taking their blood pressure correctly (whereas there were automatically inflated blood pressure cuffs in other programs), patients had to enter their own data (weight, medication, etc.) into the computer system so that they would know what this was, and a conscious decision had been made to not use peripheral devices which automatically transmit data to the nursing station. Nurses were aware that patients could enter false data, but felt the patient was responsible for this. In terms of the new nurse - technology - patient relationship, part of traditional nurse responsabilities (i.e. taking blood pressure, asking about symptoms and recording them) had been shifted to the patient. This example helps to illustrate the surprising turn that "cooperative" work took within this program. This program variation was a difficult topic area for the curriculum designers to incorporate into the training curriculum, and one which ultimately was not addressed directly.

Finally, to build on an expression used by [20], it is interesting to note that some of the nurses in the New Brunswick program indicated that in some ways they had been too successful at eliminating the walls of the hospital, and that it had become a little too easy for patients to enter into the nurse's home space. They noted that patients could page them after hours, at home when the nurse was asleep, and woke

the nurse up just to say they had difficulty getting to sleep! The late night telework situation of the nurses was invisible to the patients. In a way, the hospital and bedroom walls which separated the nurse's work space from their residence had actually disappeared. The curriculum simply alerted the nurse students to this possibility.

4 Conclusion

A qualitative research approach was taken in order to identify issues, difficulties, routines, and exceptional work which nurses carry out in telehomecare programs. Building on the concepts and methods developed by others (particularly [1] [4] [15] [17], we were attentive to the flow of information and the artefacts active in this process, the definitions that individuals and organizations gave of their work, and the importance of making visible routine and problematic aspects of their work. This analysis revealed several topics suitable for a training program which could be of use to nurses wishing to work in telehomecare (Table 1). Several of these key topic areas were presented and discussed above.

The particular technology used can also impact certain aspects of the interaction between nurse and patient. The two programs which used videoconferencing required patients to be available at a pre-arranged time, once a day. This is not the same kind of patient - nurse interaction as occurs when a patient sends in data three times a day. In the Quebec program, days or weeks could go by without a telephone call to or visit with the patient. The nurses who used the video conference technology also appeared to have less discretion in relation to the way he or she structured the working day. As well the choice of technology (made by managers) impacts on patients in that it may prevent certain patients from receiving telehomecare. The monitoring technology used by the Quebec program did not have a function for capturing images (although theoretically possible, this would have required much development to integrate image capture into the existing technology), and so patients with wound care were excluded from it (whereas wound monitoring, which was enabled by the camera, was a key aspect of the post-cardiac surgery program in New Brunswick).

A dilemma emerged in our efforts to develop the curriculum for telehomecare nurses. The qualitative analysis reported here contributed to the identification of this dilemma, and in a way this could be considered to be a sign of the success of the analysis. As noted throughout the text the dilemma was how to create a common curriculum for nurses who would work in telehomecare programs when these programs could be quite ideosyncratic. Moreover, the college providing the instruction was allied with a particular THC program, with its own inter-organizational referral system, videoconference technology, and private nursing services provider. Understandably, the college wanted to instruct nurses who would be working in that program. The solution that we adopted was to alert students to certain general issues (such as patient recruitment, training patients in technology), to outline the range of practices that we had observed, and to provide information specific to the program associated with the college.

It is worthwhile to remind the reader that the eventual contribution of the curriculum to the preparation of nurses is unknown at this time. In this regard, it is useful to point out that two of the three programs noted here were started with relatively little nurse training (in the third program nurses received only two days of training from the technology provider before starting to work in the program). If nurses can begin to participate in a program after relatively little training, to what extent will nurses and managers believe that the college training outlined here is needed? At this point nurses' and managers' perceptions of the usefulness of such training is still largely unknown, although there has been some positive appreciation of the prototype on-line training.

Nevertheless, we believe that the implementation of THC is likely to be facilitated if nurses know in advance the kinds of issues that are likely to arise and if they are prepared with knowledge of possible approaches to solving these. Although the question, "To what extent can people be taught to engage in CSCW?", remains unanswered, the present report suggests that a first step in answering this question is to develop such a training program. The qualitative research reported here contributed to the development of a curriculum for preparing nurses to work with patients who live at a distance from their place of work. Subsequent to this, and after nurses participate in the course, further evaluation may then indicate the extent to which the course actually prepares nurses to work in telehomecare programs.

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References

1. Suchman, L.: Making Work Visible. Communications of the ACM (1995) 38 (5) 57-65.
2. Strauss, A, Fagerhaugh, S., Suczek, B. and Wiener, C.: Social Organization of Medical Work. Chicago: University of Chicago (1985).
3. Garfinkel, H.: "Good" organizational reasons for "bad" clinic records, in H. Garfinkel, Studies in Ethnomethodology, Prentice Hall, Englewood Cliffs (1967) 186-207.
4. Harper, R.H.R.:. The Organisation in Ethnography: A Discussion of Ethnographic Fieldwork Programs in CSCW. CSCW (2000) 9 239-264.
5. Trigg, R.H., Blomberg, J. and Suchman, L.: Moving document collections online: The evolution of a shared repository. Proceedings of the European Conference on Computer-Supported Cooperative Work ECSCW'99, Kluwer, Copenhagen, Dordrecht, (1999) 331-350.

6. Berg, M.: Medical Work and the Computer-Based Patient Record: A Sociological Perspective. Methods Of Information in Medicine, (1998) 37: 294-301.
7. Harper, R., O'Hara, K., Sellen, A., and Duthie, D.: Toward the Paperless Hospital? British Journal of Anaesthesia, (1997) 78, 762-767.
8. Forsythe, D.: New Bottles, Old Wine: Hidden Cultural Assumptions in a Computerized Explanation System for Migraine Sufferers. Medical Anthropology Quarterly (1996) 10 (4): 551-574.
9. Maiolo, M., Mohamed, E., Fiorani, C., de Lorenzo, A.: Home telemonitoring for patients with severe respiratory illness: the Italian experience. Journal of Telemedicine and Telecare, (2003) 9 (2) 67 -71.
10. Riegel, B.; Carlson, B.; Kopp, Z: LePetri,B; Glaser, D.; Unger, A.: Effect of a Standardized Nurse Case Management Telephone Intervention on Resource Use in Patients with Chronic Heart Failure. Archives of Internal Medicine, (2002) 162 (6) 705-712.
11. Shepperd, S., Iliffe, S..: Hospital at home versus in-patient hospital care. (Cochrane Review), The Cochrane Library, (2003) Issue 4.
12. Roback, K., Herzog, A.: Home informatics in healthcare: Assessment guidelines to keep up quality of care and avoid adverse effects. Technology and Health Care (2003) 11 (3) 195 - 206 .
13. NIFTE.: National Initiative for Telehealth Framework Framework of Guidelines. Ottawa. (2003) www.cst-sct.org.
14. Steding, P.: Telehealth Users Step Up to the Microphone. Success in Home Care. (2001) November/December, 14-21.
15. Berg, M.: Accumulating and Coordinating: Occasions for Information Technologies in Medical Work. CSCW (1999) 8: 373-401.
16. Kinsella, A.: Home telehealth: process, policy, and procedures. Kensington, MD, Information for Tomorrow, (2003).
17. Kinsella, A.: Home healthcare: Wired and ready for telemedicine. The nurses' and nursing students' edition. Kinsington, MD, Information for Tomorrow, (2003).
18. Orr, J.: Ethnography and Organizational Learning: In pursuit of learning at work. In S. Bagnara, C. Zucchermaglio, and S. Stucky, (eds.): Organizational Learning and Technological Change. New York, Springer-Verlag, (1995).
19. Berg, M.: On Distribution, Drift and the Electronic Medical Record: Some Tools for a Sociology of the Formal. In Proceedings of ECSCW'97, Hughes, J, Prinz, W., Rodden, T., and Schmidt, K. (Eds.), Kluwer, (1997) 141-156.
20. Wilson, L., Gill R., Sharp, I., et al.: Building the Hospital Without Walls -- a CSIRO home telecare initiative. Telemedicine Journal (2000) 6: 275-281.