Enabling Change in Healthcare Structures through Teleconferencing

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Abstract

Developments in teleconferencing capabilities have made changes in work practices possible and are facilitating working partnerships between institutions. This study of a teleconferencing initiative examines how the work of a multi-disciplinary team (MDT) is affected by extending the meeting to remote locations. Challenges are highlighted, particularly in relation to the management of information flows, development of norms (meeting protocols) and record keeping.

1. Introduction

Demands for improved service, integrating new knowledge and maximising the use of technology, are driving change in work practices. Traditional hierarchical investigative models are being coordinated in new ways and more collaborative structures are emerging in healthcare. The Multi-Disciplinary Team (MDT) meeting is one such structure. Traditionally incorporated into the patient diagnostic process in large teaching hospitals [3], and sometimes called a Clinical Pathology Conference, the MDT meeting has expanded from its initial educational role to having an important management function. For example, the management of patients with suspected or known lung cancer is becoming increasingly complex and when a patient presents for investigation, a series of independent investigations are conducted which includes bronchoscopy, radiology and pathology. When all the tests are completed, the results are reviewed at an MDT meeting and a decision is made on the most appropriate course of action for the patient. State-of-the-art care often requires input from sources such as thoracic surgery, medical oncology, radiation oncology, pathology and radiology as well as others such as psychiatry and nursing. Multidisciplinary input to care is considered vital and a multi-disciplinary lung cancer conference is considered part of good practice management by NICE and the American College of Chest Physicians [5, 2].

A microscope with monitor, a lightbox and an overhead projector were traditionally the only technologies used in co-located MDT meetings, or clinical pathology conferences. Since early 2004, the Telesynergy teleconferencing system has been available as a result of the collaborative telemedicine initiative with the National Cancer Institute [10].

Although teleconferencing technology has the potential to increase accessibility and efficiency by limiting the need for patients to travel and providing access to shared and remote medical expertise, the implications of introducing teleconferencing in MDT meetings are not fully understood. This paper reports a study of the impact of teleconferencing on the work involved in MDT meetings. The work reported here is part of a larger on-going study investigating how technology might help in the diagnosis and management of patients with lung disease. We expect that comparing
co-located and multi-site meetings will allow for insights into how work processes can be affected by teleconferencing.

Initial results seem to confirm this expectation. Our findings so far suggest that awareness feedback through video might play a more important role in remote meetings than is usually acknowledged by designers and users of collaborative systems [14]. They also highlight the importance of pre- and post-meeting activities and work rhythms for the success of MDT meetings, as well as their implications with respect to electronic medical records. From a general computer-supported cooperative work (CSCW) perspective, these observations are important because they show that studying users in their natural settings often reveals system requirements and usability factors usually overlooked in more restrictive experimental settings.

2. Methodology

An ethnomethodologically-informed ethnographical approach [6] was adopted for this study. Over 20 hours of observations of co-located MDTs were noted and almost 10 hours of MDTs, linked to one or two remote hospital locations. Structured, semi-structured interviews and a questionnaire were used to check observations. Policy documents were reviewed.

The Telesynergy® system itself is described by Kempner [9] and McAleer [11] and consists of:

- a Tandberg 6000 teleconferencing unit (camera and screens);
- a document imager (for film radiology and printed matter);
- a high definition videocassette recorder for diagnostic ultrasound and (potentially) recording conferences;
- a microscope with camera for pathology;
- a personal computer for Microsoft PowerPoint presentations and digital radiology;
- high definition monitors for radiology;
- and other tools for drawing, highlighting and printing outcomes from the above data sources.

The Telesynergy® system utilises full-duplex audio and high quality video. There is no perceptual audio or video lag when using the system.

2.1. Meeting Setting

The work at the MDT meeting is collaborative and social in nature: sharing information, dialogue and discussion. The conduct of the meeting, while professional, is friendly, supportive and relaxed. The respiratory Multi-Disciplinary Team comprise three respiratory medical and two thoracic surgical teams, oncologist, radiologists, pathologists, radiation-oncologist, nurse specialists, physiotherapist, radiation therapist(s), database managers and technical assistant. Before the meeting, individuals prepare their contribution and remote hospitals submit radiology and pathology to facilitate a full review of the case. After the patient history is narrated, images are discussed and the diagnosis is clarified, the staging of the disease is established considering the combination of radiological, pathological, surgical and clinical findings. The next step is agreed following input from the specialists present. After the meeting, data items are recorded into a database and individuals follow up on tasks assigned. The respiratory MDT is a lateral co-ordinating structure within the hospital for the series of, independently conducted, hierarchical investigative processes preceding the MDT meeting.

The meeting room is rectangular in shape with one long wall dedicated to monitors and equipment, as shown in Figure 1. A SMART Board™ on the adjacent wall is utilised as a large display screen, in addition to the main plasma display and monitors. Attendees are seated in a theatre-like arrangement facing the equipment with the plasma display screen as focal point. A small table, with a pressure zone microphone, is centrally located among the participants. A desktop computer...
is used to display the patient details from a text file. These patient details are on view throughout the discussion both on the PC monitor and the large display (electronic whiteboard) on the side wall. The pathologist, radiologist and control operator sit at the front console beside their respective equipment. The operator switches between video, the document reader and microscope views onto the main display screen depending on the context of the discussion. The document imager and the microscope image are displayed on the plasma screen when the radiology and pathology, respectively, are being discussed. The monitor on the left of the main screen is intended for the incoming video image display, and the monitor to the right hand side is intended for out-going video image display. It was the intention to scan the radiology images and to demonstrate those images via PC, but it was found easier to use the document reader to demonstrate the radiological film features directly.

In addition to the above modes of display, the full telemedicine conference can be ported to an adjacent lecture theatre to accommodate the attendance of a wide variety of undergraduate students (medicine, radiation therapy and nursing) thereby fulfilling an additional and important educational role.

3. Findings

A survey prior to the teleconferencing initiative, demonstrated a positive attitude towards the adoption of new technology and participants have above average computer skills. The availability of artefacts (radiological and pathology), and audio links was considered of critical importance for MDT meetings over multiple locations. Lesser importance was placed on seeing remote participants. See Table [1] A record of the MDT meeting was regarded a good thing in principle but uncertainty was expressed about its format. Attitudes will be reviewed when more experience has accrued.
Besides the predictable opportunities afforded by teleconferencing, such as increasing individual experience, some observations deserve special mention.

1. Facilitating mutual activity, as in the narrative account of patient history, can provide important insights. The presentation of the patient’s clinical history to the meeting does this efficiently without requiring large expenditures of time.

2. Cultural norms at different sites influence how a case is narrated. At MDT meetings with teleconferencing, fewer people get involved in discussion, speech interaction tends to be slower and more deliberate and more time is spent per case, than during co-located MDT meetings. The conduct of teleconferencing sessions tends to be more formal than at co-located meetings.

3. Attendance at teleconference sessions has increased over 20% since the introduction of multi-site MDT meetings. Attendance at co-located MDT meetings has also increased, by about 10%, over the same period. While this increase may be due, in part, to curiosity about the teleconference, it also reflects greater importance been given, to the role of the MDT meeting in patient management.

4. More time is needed for the high level of cooperation and coordination of processes across multiple sites than is necessary for this multi-disciplinary activity, and is not always available.

5. It is felt critically important that radiology images and pathology samples to be discussed at the MDT have been submitted prior to the meeting, to the radiologist and pathologist respectively, for full discussion. The pre-meeting preparation which involves co-ordination of radiological images and pathology samples takes considerably more time when multiple hospitals are involved than for co-located meetings.

<table>
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<th>Requirement</th>
<th>Strongly Agree</th>
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<th>No Opinion</th>
<th>Disagree</th>
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Table 1. Participant’s requirements expressed prior to teleconferencing experience

During the presentation of a patient case, after the radiological images have been shown, the radiologists tend to remove the image from the document reader, prompting the operator to return to the remote site view, even though discussion on that artefact may be continuing. Prompting from remote sites has also been observed when the operator neglected to return to the room view after an artefact was presented. This suggests to us that video awareness feedback is valued by participants. This observation appears to contradict both the user-reported requirements expressed to the teleconferencing initiative reported in Table 1 and many studies in the CSCW literature. Several studies have concluded that the addition of a video channel has no effects on communication behaviour and that face-to-face communication is not demonstrably better than a simple voice channel [12, 4, 8]. While the observations here differ from the majority of the CSCW literature on the effects of communication modality on group collaboration some writers note that high quality video is as good as face-to-face and remote work without video was not as good as face-to-face [13]. And tasks involving negotiation, even subtle negotiation, have been shown to benefit from video commun-
The discussion on the next best step in patient care can be considered as a search for agreement between the professionals and likened to the negotiation process. The findings in this study, which appear to value video, may be explained by this clinical discussion.

A more detailed quantitative study of these observations is being currently pursued.

The generic requirements for the Electronic Medical Record (EMR) have been generally agreed, and it is accepted that systems should harness the potential of emerging technologies, such as teleconferencing [1]. It hasn’t been resolved how discussions on patients should be incorporated into the EMR. Similar to findings of Hartswood, [7] there is a discrepancy between the presumed role of the EMR in achieving service integration and the ways in which we actually use and communicate patient information. How do we record the specific artefacts discussed? Should treatment options considered be noted? Should all discussion be recorded? When discussion is taking place over multiple sites, which sites keep records? Findings in this study support Hardstone [6] who highlighted the importance of informal discussions and provisional judgements as part of the work process. Privacy is a critical issue for clinicians, it is also an issue for other domains [14] and while it is expected that the issue will resolve, in time, for non-medical domains, a solution for recording discussions and provisional diagnosis is likely to remain complex for medical professionals for the foreseeable future.

The EMR is patient centred, and there is a need to build databases where evidence can be collected and reviewed. The MDT meeting is an ideal forum for gathering collective data. Mechanisms will need to be introduced to incorporate feedback on outcomes from remote sites to the central database.

4. Conclusions

Developments in teleconferencing have facilitated this Multi-Disciplinary Team service being extended to rural centres where the full range of expertise is not normally available. The implementation of new technology and changing work practices is analogous to the 'chicken and egg' situation. Strong drivers for change are in evidence but unless the technological infrastructure is in place, change won’t happen. In this study we observed that having the technology available facilitated change.

The issues that emerged are procedural rather than technical. It is imperative that the remote hospital submits material in advance to allow time for the specialists to review materials for discussion at the conference.

The teleconference, like face-to-face meeting situations, facilitates the narrative of patient history. Protocols need to be agreed in respect of how business is conducted during the teleconference. Group norms need to be established early. Post-meeting tasks currently involve entering data into the departmental database and patient notes. Individuals may be assigned tasks during the conference for follow up. Practice guidelines for the integration of the discussion with patient medical records need to be developed. It may be helpful to develop models that distinguish between the final patient record and working files. Systems that support the work of medical staff could be seen as systems independent of, but linked to, the patient file.

The work of the multidisciplinary medical team in respiratory care is a relatively new model of patient care, but one that is becoming more and more utilised as its effectiveness is demonstrated. The role of technology in this emerging structure has yet to be fully investigated. The ongoing work in this study aims to identify how pre-meeting, meeting and post-meeting activities might be supported by technology and enhance effectiveness of the team structure. Analysis of the roles,
rhythms, tasks and activities of the team members, both before, during and after the meeting, is being elucidated. Enabling this team to extend its role to wider geographic locations is also under investigation. The effect of video on the interactions and work of the team is of special interest. Observations in the meeting setting are being formally studied through quantitative analytical methods.

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