Abstract

Face-to-face interactions, via teleconferencing link, are investigated for multidisciplinary medical team (MDT) meetings. Comparison is made between colocated MDT meetings and those held in teleconference. Attitudes towards video changed positively, over a period of 8 months, following participants’ experience of teleconferencing. Analysis of display screen use reveals 60% of case discussion time was time spent in face-to-face view with remote sites, contrary to expressed views of its relative unimportance. The value of the video link in MDT meetings, held in teleconference, is found to have higher than expected value.

1. Background

Multi-disciplinary medical team (MDT) meetings being held over a teleconference link are becoming a regular feature in many hospital settings. Ongoing pressures to deliver high standard services to geographically distributed locations through the utilization of teleconferencing technology is resulting in the implementation of systems without the full implications being investigated or fully understood. Services are currently being developed which rely on teleconferencing technology to their delivery [4, 8, 2, 1].

This increasing use of teleconferencing for specific purposes, such as in MDT meetings, is affording the opportunity to explore issues in the use of video technology that have not been fully resolved [5]. Although the usefulness of video-mediation in the communication of detail on artefacts has been identified [13], there is an on-going debate on the value of video in computer-mediated communication [12].

Furthermore, the interactive nature of medical work is only now being fully appreciated and issues pertaining to how medical staff interact, and exchange information in the course of their work, are emerging [7] [6].

2. Goals

The goal of the work reported here is to assess the use and value of video at multidisciplinary medical team meetings held in teleconference. This work is part of a larger, longitudinal, on-going study to assess how technology might help in supporting the work of multidisciplinary medical teams, and their meetings in particular.

3. Method

Our approach is ethnomethodologically-informed ethnography in nature [3], utilising questionnaires, semi-structured interviews and the study of artefacts. Through participant observation, approximately 2 hours of meetings, involving the multidisciplinary medical team under study are witnessed on a weekly basis. Twice monthly this meeting connects to two remote hospitals via a teleconferencing link. Observations are verified through the use of video recordings at intervals. The key observations, questionnaires and semi-structured interviews are undertaken with the respiratory multidisciplinary medical team at St. James’s hospital, a teaching hospital and tertiary referral centre for lung cancer. Other multidisciplinary medical teams are observed for comparison purposes from time to time.

3.1 Questionnaire

A questionnaire was designed to assess changes in attitude of team members towards the use of video and was used to survey the group in 2005, after approximately 8 months experience of teleconferencing. Attitudes were assessed before the teleconferencing initiative, in 2004, and reported earlier [9]. Aspects of the meeting where video might be more valued are of particular interest. Among the recent questions (in 2005) is one that was asked in the initial
questionnaire a year earlier (in 2004), before the introduction of teleconferencing. That question asked each participant directly if he or she wished to see the remote party on the video link. Other questions assessed the need for video with respect to the evaluation of radiology and pathology images during patient management discussion, and awareness issues.

3.2 Analysis of Artefacts

An S-VHS recording was taken of the screen display at meetings. This S-VHS recording was transferred to DV tape, imported into Apple iMovie 4.0.1 and annotated using Elan [11] annotation tool. Individual patient case discussions were identified and the case type, managing Consultant and type of referral, i.e. if local GP or tertiary referral. For each case discussion, individual speaking turns and pauses were annotated also, as well as the screen display synchronous with speaker turns and pauses. Conversational analysis of turn taking practices is work in progress and for the purposes of this particular study, analysis was performed on annotations made from the screen display in recordings of 52 patient case discussions. The purpose of this analysis of screen displays was to compare actual behaviour with expressed sentiment in questionnaires and interviews with regard to the use of artefacts and the visibility of remote parties.

3.3 Meeting Evaluation Exercises

Over a six week period involving both teleconference and colocated meetings, and six months after the issue of questionnaires (section 3.1) participants were asked to evaluate each meeting on a number of scales. They were asked to give an overall rating for the meeting and also to give a more specific answer in relation to elements of the meeting: the presentation of clinical details and bronchoscopy findings; radiology and pathology results and the patient management discussion. Evaluation sheets were distributed to all attendees which included both active participants at the meeting and observer medical staff in training.

3.4 Semi-structured interviews

Team members were interviewed as part of this on-going study and observations made during MDT meetings were checked as well as the interpretation of the questionnaire results. Attitudes assessed in the initial questionnaire were not discussed with participants before results on the subsequent questionnaire were compiled.

3.5 Equipment

The meetings take place in a dedicated meeting room utilizing the Telesynergy® high resolution medical imaging workstation [10]. The meeting room and workstation are described in more detail in our earlier paper [9]. The same equipment is used for colocated and teleconference meetings. The only difference between the two scenarios in the use of equipment is the use of the video conferencing link to connect to two remote sites at teleconferencing sessions.

4. Results

The respiratory multidisciplinary team at St James’s Hospital meet once weekly to review the diagnosis of patients presenting with lung disease, agree staging of cancer cases and make a decision on the next step in the patient’s management. Twice monthly, this group meet with other specialists at two remote hospitals via teleconference links. The remote hospitals have some specialist lung disease services provided by the larger centre. It is also an opportunity for the remote clinicians to broaden their experience through exposure to rare patient cases, and confer with specialists on treatment policies. There is also an important educational aspect to these meetings which will not be discussed here. Other than the teleconference links, the meetings in teleconference serve the same functions as the colocated meetings and work processes are the same for both settings.

4.1 Questionnaire

It has already been reported [9] how participants were ambivalent in their views of the importance of the video link before the implementation of teleconferencing, with 53% saying that they had no opinion on the matter. There was high agreement (74%) of the necessity to be able to review radiology and pathology artefacts.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>No opinion</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants '04</td>
<td>5%</td>
<td>21%</td>
<td>53%</td>
<td>21%</td>
<td>0</td>
</tr>
<tr>
<td>Participants '05</td>
<td>19%</td>
<td>50%</td>
<td>19%</td>
<td>8%</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 1. Change in user’s requirement to see remote people during a teleconference meeting
At the time of the installation of the Telesynergy® facility, its purpose was to support the sharing of artefacts between geographically distributed centres. (After installation, it was found to be used more as a full teleconferencing facility.)

After approximately eight months of teleconferencing experience, the number of those expressing ‘no opinion’, on the need for video, reduced to 19% and almost 70% strongly agreed or agreed that they required to see the remote party on the teleconference link. This represents a clear change in attitude following some experience in using the Telesynergy® system and the full results are depicted in Table 1 and Figure 1.

The following results were compiled from responses to the questionnaire conducted in 2005.

When questioned on the use of artefacts at meetings and the necessity of being able to see radiology and pathology artefacts over the teleconference link, the team was unambiguous in their answers and felt it critically important to be able to share and view radiology and pathology at teleconferences as well as at colocated meetings, regardless of whether the object was under immediate discussion or if other clinical findings were being discussed. It was postulated that when discussing patient clinical details and the patient management decision there would be a greater need to see all the participants in the discussion (including those over the video link), than when discussing patient artefacts. As expected, there was a preference demonstrated to being able to see the people when discussing a patient’s details than to seeing the artefact when that object was being presented (Figure 2). But the results are surprising in their ambiguity on the value of seeing remote people in teleconference. The graph in Figure 2 illustrates the requirement by participants (expressed in questionnaires) to see the remote party during discussion on a patient’s clinical presentation in comparison to a discussion on the patient’s artefacts. In contrast, the graph in Figure 3 shows the responses with respect to the wish to look at a patient’s artefact during a discussion on that artefact compared to their wish to see the artefact while discussing the patient’s clinical presentation. Thus, participants are clear in their wish to see the patient’s artefacts, regardless of the type of discussion. The participants at the main site are not so clear in their expressed wish to see the remote party. There was less ambiguity articulated by remote participants at teleconferences who all placed a high value on seeing the people at the main site. However, since number of remote participants is small this result is being further investigated.
Participants at the meetings want to know when they are connected to the remote site. They have said it is more important to them to know what the remote site is looking than being able to see the remote participants. Figure 4 summarises responses to the relative value placed on seeing the remote parties in teleconference and seeing what the remote participants are looking at. At interview with the meeting attendees about this question afterwards it was felt that there may have been some ambiguity in our use of the word ‘image’. For many people at the meeting the word ‘image’ is used to specifically refer to ‘radiological images’ and not the more literal meaning intended by the researchers. However, to know if people are watching is considered a very important requirement for participants at the meeting.

![Figure 4. The relative importance of seeing the remote party and seeing what the remote people can see](image)

### 4.2 Analysis of Artefacts

Given that participants expressed critical importance to seeing the radiology and pathology artefacts during meetings, and not so much importance to being able to see the remote party, we expected the analysis of artefacts on display at meetings to verify the views expressed. During meetings, prompts are provided by participants to select and display either the microscopic image, patient details from a PC, radiology images from a document reader, or video input from the remote site during teleconferences. Analysis of the images displayed on the main plasma screen are illustrated in Table 2 and Figure 5.

For over 60% of the time, a patient case discussion in a teleconference is spent in the face-to-face view with the remote site. We can see from Table 2 and Figure 5 that both the time for radiology and pathology displays is significantly reduced in teleconference. The reduction of over one-third and two-thirds for radiology and pathology respectively reflects the relative importance these objects are given in discussion by the clinical staff. The relative reduction of 62% for patient details compared with that for pathology of 75% is surprising since the patient detail artefact is not considered an object of direct discussion, but as detail displayed for background information purposes. The content of the patient detail sheet is presented verbally at the outset of discussion along with other relevant clinical information. (The 1% remote site view in a colocated setting in Table 2 represents the remote site being connected in the background of a colocated discussion.)

<table>
<thead>
<tr>
<th>Meeting Element</th>
<th>Colocated Meeting</th>
<th>Teleconference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiology</td>
<td>34</td>
<td>22</td>
</tr>
<tr>
<td>Pathology</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>Patient details</td>
<td>41</td>
<td>4</td>
</tr>
<tr>
<td>Unrelated artefact</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>Blank Screen</td>
<td>4</td>
<td>nil</td>
</tr>
<tr>
<td>Remote site</td>
<td>1</td>
<td>60</td>
</tr>
</tbody>
</table>

**Table 2. Analysis of artefacts displayed on screen during patient case discussion (displayed as %).**

![Figure 5. Use of artefacts at co-located (left) and teleconference (right) meetings](image)

### 4.3 Evaluation Exercises

Responses to the evaluation exercise were generally satisfactory, with most respondents demonstrating satisfaction overall. Table 3 summarises the % of participants who agreed that about the right amount of time was spent on each element. For example, 90% of respondents agreed that
‘about the right amount’ of time was spent on the radiology part of the discussion. However, some small differences were noted, and while statistical significance is not demonstrated for some of the parameters, Pearson’s CHI Square test showed significance with 1 degree of freedom for the overall values of 83% and 62% for colocated and teleconferencing meetings respectively (Table 3). Overall ratings (shown in Table 4) for the meetings do not correlate well with expressed satisfaction with the meeting elements and observer ratings are lower than participant ratings. While most participants consider individual elements of the meeting as ‘about right’, the overall satisfaction rating is 7.4 and 6.9 for colocated and teleconference meetings respectively (on an 11 point scale).

The use of artefacts at meetings was considered very satisfactory at all meetings by both participants and observers. When results are analysed with respect to the participant and observer ratings however, both the meeting elements involving discussion and the overall meeting ratings are slightly lower for teleconferences than for colocated meetings. Overall ratings are summarised in Table 4 for teleconferences and colocated meetings by participants and observers. The differences between the evaluations by the participants and the observers may be explained in the fact that the meeting aims to serve different objectives for the two groups. We were surprised that the teleconferences tended to be evaluated less favourably than colocated meetings by both participants and observers. However, the differences are small and this finding is being further explored.

<table>
<thead>
<tr>
<th>Meeting Element</th>
<th>Colocated meeting</th>
<th>Teleconference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical findings</td>
<td>77</td>
<td>72</td>
</tr>
<tr>
<td>Radiology</td>
<td>90</td>
<td>88</td>
</tr>
<tr>
<td>Pathology</td>
<td>94</td>
<td>93</td>
</tr>
<tr>
<td>Bronchoscopy findings</td>
<td>90</td>
<td>81</td>
</tr>
<tr>
<td>Patient management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>discussion</td>
<td>74</td>
<td>58</td>
</tr>
<tr>
<td>Overall the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>meeting elements</td>
<td>83</td>
<td>62</td>
</tr>
</tbody>
</table>

Table 3. Evaluations of elements at Colocated and Teleconferencing MDT meetings (expressed as % of ideal score).

4.4 Interviews

While the interviews afforded opportunities to check observations and interpretations given here, they also served as important opportunities for team members to interact with the researchers, build rapport and trust. For the researchers, the interviews also contributed to a richer understanding of the work of the multi-disciplinary team and difficulties for medical and nursing staff in today's climate.

5. Conclusions

Reported studies have failed to agree that video is important in computer-mediated communication [5]. Although the usefulness of video-mediation in the communication of detail on artefacts has been identified [13], our work suggests that issues remain in the need for people to see one another in the execution of their work tasks. While we agree that the absolute importance of video is difficult to quantify, we believe our results reveal an underlying necessity for face-to-face views in teleconferencing at MDT meetings. Our findings indicate that the simultaneous display of artefacts and face-to-face views is desired for MDT meetings held in teleconference.

Our results may appear contradictory in that the expressed views of the meeting participants seem to be contradicted in their behaviour when they request to see the remote parties on screen. However, our interpretation, based on a combination of ethnographic observation, interviews and the quantitative findings, is that there is an aspect of the conversational processes, not yet fully elucidated, that is interrupted in the computer-mediated scenario.

We note that there is no ambiguity in the responses to questions regarding the use of artefacts such as radiological images and pathology samples at meetings. We also note a wide variation in the responses to the assessment of elements in the meeting that do not involve the use of artefacts. These meeting elements that do not involve artefacts tend to centre on more subjective aspects of the clinical assessment, such as the patient’s clinical presentation and the patient’s performance status. These more complex clinical assessments may involve a greater interactive component for the clinician in the conduct of his or her work than previously appreciated.
6. Acknowledgements

Our thanks to Dr. Finbarr O’Connell and all the members of the multidisciplinary team at the respiratory conference in St James’s Hospital, Dublin, for their cooperation in this on-going study. We gratefully acknowledge the professional advice of Dr. Myra O’Regan, Department of Statistics, Trinity College Dublin. We also thank the Centre for Information Technology, National Institutes of Health, Bethesda, USA, the Department of Health and Children, Ireland and the School of Radiation Therapy, Trinity College Dublin.

This research is supported by funding from the Irish Research Council for the Humanities and Social Sciences.

References