Original article

▶ # Social presence in telemedicine

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Summary

We studied consultations between a doctor, emergency nurse practitioners (ENPs) and their patients in a minor accident and treatment service (MATS). In the conventional consultations, all three people were located at the main hospital. In the teleconsultations, the doctor was located in a hospital 6 km away from the MATS and used a videoconferencing link connected at 384 kbit/s. There were 30 patients in the conventional group and 30 in the telemedical group. The presenting problems were similar in the two groups. The mean duration of teleconsultations was 951 s and the mean duration of face-to-face consultations was 247 s. In doctor–nurse communication there was a higher rate of turn taking in teleconsultations than in face-to-face consultations; there were also more interruptions, more words and more 'backchannels' (e.g. 'mhm', 'uh-huh') per teleconsultation. In doctor–patient communication there was a higher rate of turn taking, more words, more interruptions and more backchannels per teleconsultation. In patient–nurse communication there was relatively little difference between the two modes of consulting the doctor. Telemedicine appeared to empower the patient to ask more questions of the doctor. It also seemed that the doctor took greater care in a teleconsultation to achieve coordination of beliefs with the patient than in a face-to-face consultation.

Introduction

Social presence can be described as the actions, understanding and confirmation that appear to result from 'being there', that is, being physically present and having available a number of modalities and clues that influence communication. Little is known about social presence in telemedicine, in particular in video-mediated teleconsultations, which may require different skills from face-to-face consultations.

Research from cognitive and social psychology confirms that movement of the lips, tongue, or jaw and facial expressions can help in 'turn taking'[1] (a turn constitutes an action taken by any of the participants individually after one of the other participants has either spoken or performed some action). A 'turn', therefore, is one action in a sequence of events in which there are a number of participants who communicate back and forth.

Short et al.[2] were dubious whether video-mediated communication could offer any benefits beyond those of voice-only communication and concluded that the chief benefit of seeing the face is to achieve a sense of 'social presence'. Sellen[3] reached a similar conclusion and argued that conversing in the same physical space is not the same as conducting a video-mediated conversation.

Face-to-face consultations facilitate a number of different styles of interaction that assist in gaining an overall view of the patient, whereas video-mediated consultations do not support the same number of channels for gathering information. The physical space also provides a number of additional clues and cues that assist in providing further information. Several groups of workers have found that in face-to-face conversations speakers take more turns, the length of the turn is shorter and more interruptions are used than in video-mediated conversation[4-7]. It might therefore be concluded that face-to-face conversations tend to be less formal and more spontaneous because they contain less formal hand-overs of turns. However, there are also studies showing no difference, or a difference in the opposite direction[3,8].

When a group of people communicate a set of tasks, for example the shape of objects or diagrams, the process is known as 'mapping'. The work of Boyle et al.[9] defined a 'map task' which is relatively easy to standardize. In addition, a coding scheme for map task dialogues

already exists and has been tested in other studies[10,11]. However, no such template exists in telemedicine.

We hypothesized that telemedicine provides less social presence than conventional consulting.

Methods

We studied consultations between a doctor, emergency nurse practitioners (ENPs) and their patients in a minor accident and treatment service (MATS). In the conventional consultations, all three people were located at the main hospital. In the teleconsultations, the doctor was located in a hospital 6 km away from the MATS and used a videoconferencing link connected at 384 kbit/s. The telemedicine equipment has been described elsewhere[12]. The ENP in the MATS was different from the ENP in the face-to-face consultations, but the same doctor participated in both settings. A protocol for the teleconsultation was used which obliged the ENP to follow a series of predefined steps[13]. The ENP therefore directed the process of the consultation and the doctor was obliged to follow it.

For each teleconsultation we noted the interactions between the doctor and the nurse, the doctor and the patient, and the patient and the nurse. Each of these interactions was then divided into turns, words and interruptions. It was also noted which of the three main participants in the consultation had interrupted. We have previously observed that many 'backchannels' are used in teleconsultations, so the number of backchannels was also noted. Backchannels are comments such as 'mhm' or 'uh-huh'; they are a measure of understanding and reassure the parties that information has been heard and conveyed correctly. Backchannels were not counted as turn taking because they are really a manifestation of confirmation or encouragement.

Since there has to be a considerable amount of coordination of beliefs in a teleconsultation, we noted these as 'repairs' or 'repeats'. A repeat or repair constitutes a confirmatory action. These actions clarify issues or reinforce important ones. An example of this would be the doctor saying, 'I think there is a fracture of the sustentaculum tali,' and the ENP replying, 'You mean the small shelf-like bit of the calcaneum which supports part of the talus?'

All consultations were video-recorded. The purpose of this was to confirm the counts that had been made during the consultation.

We tried to ensure that the teleconsultations and face-to-face consultations had similar content. Thus we selected five examples of problems in each of six anatomical areas: the hand, the wrist, the elbow, the shoulder, the foot and ankle, and the knee and lower leg. Examples of the problems were a potentially unstable ankle injury and a case of suspected deep-vein thrombosis.

Results

There were 30 patients in the conventional group and 30 in the telemedical group. The presenting problems were similar in the two groups (Table 1) and in each series radiographs were taken in all but one case. The mean duration of teleconsultations was 951 s (range 480–980, SD 417). The mean duration of face-to-face consultations was 247 s (range 40–720, SD 142).

In doctor–nurse communication there was a higher rate of turn taking in teleconsultation than in face-to-face consultation. There were also more words, more interruptions and more backchannels per teleconsultation. In doctor–patient communication there was a higher rate of turn taking, more words, more interruptions and more backchannels per teleconsultation. In patient–nurse communication there was relatively little difference between the two settings. Table 2 shows the details.

Discussion

In general, there is little doubt that using a protocol for telemedical consultations ensures good participation by all three persons in the process. It avoids hierarchy and the often embarrassed silences of participants who do not know what their role should be. It ensures that the generalist is the person who is directing the process most of the time[13].

Doctor–nurse communication

In the teleconsultations, the doctor–nurse communication showed a much higher rate of turn taking than in the face-to-face consultations. This was because the

Table 1 Presenting complaints

Presenting complaint	Teleconsultation group	Face-to-face consultation group
Hand problems	5	5
Wrist problems	5	5
Elbow problems	5	5
Shoulder problems	5	5
Ankle/foot problems	5	5
Knee/lower leg problems	5	5
Totals	30	30

Table 2 Statistics of the consultations

	Doctor–nurse		Doctor–patient		Patient–nurse	
	Telemedicine	Face to face	Telemedicine	Face to face	Telemedicine	Face to face
Mean no. of turns per consultation	59	23	46	19	23	25
Range	14–121	12–55	13–89	8–36	8–36	12–41
SD	26.2	9.1	19.8	7.2	8.7	9.2
Mean no. of words per consultation	944	345	1012	380	943	775
Range	245–2133	144–786	316–1890	145–763	207–1588	226–1212
SD	424.7	148.1	448.7	150.1	399.2	276.9
Mean no. of words per turn	16	15	22	20	41	31
Range	1–54	1–63	4–44	4–37	2–69	3–41
SD	11.4	13.1	12.8	8.4	16.8	10.4
Mean no. of interruptions per consultation	12	7	18	5	16	15
Range	8–18	4–11	8–22	2–9	13–20	11–19
SD	2.8	1.8	4.3	1.6	1.8	2.2
Mean no. of interruptions by doctor (D) or patient (P) per consultation	8 (D)	5 (D)	7 (D)	4 (D)	8 (P)	8 (P)
Range	4–12	3–9	2–15	1–9	2–14	1–16
SD	2.4	1.4	3.6	1.7	3.0	3.5
Mean no. of interruptions by nurse (N) or patient (P) per consultation	4 (N)	2 (N)	11 (P)	1 (P)	8 (N)	7 (N)
Range	2–6	0–5	5–17	0–4	1–14	1–17
SD	1.1	1.2	3.4	0.9	3.2	3.6
Mean no. of backchannels per consultation	18	9	15	7	6	2
Range	13–22	5–13	10–18	4–9	3–10	0–5
SD	2.3	1.9	2.0	1.7	1.7	1.0
Mean no. of repeats or repairs per consultation	5	4	9	4	4	4
Range	2–8	2–8	3–13	2–6	1–8	1–8
SD	1.5	1.3	2.2	1.3	1.7	1.7

doctor had to ask the ENP to perform more tasks, such as using her tactile sense or manipulating the camera (e.g. 'Can you show me the back of the ankle in close up?'). The nurse often had to ask whether the image was satisfactory and whether the examination process was sufficiently visible to the doctor for him to reach a clinical decision.

Backchannel doctor–nurse communication was higher in the teleconsultation than in the face-to-face interaction because, for example, during the process of demonstrating the image of a body part or a radiograph, the visual confirmation cues were reduced (due to the use of the picture-in-picture facility).

The physical presence afforded by co-location allows for more awareness of movement and action than that provided by an image of a person. The cognition required for the situation is distributed across a number of people and artefacts[14]. In contrast, in a teleconsultation, one person must try to manage the situation. In the face-to-face condition, it is easier for the different elements to 'feed off' each other and work together. Although a videoconference provides some facilities

for doing this, one must rely more upon spoken instruction. Although the average number of words per turn in the telemedical and face-to-face consultations was similar, there were more interruptions in the teleconsultations. This may be a feature of their much longer duration (an average teleconsultation lasted four times longer than a face-to-face one) and reflect the requests by the doctor for more examinations to be performed by the nurse. The number of interruptions by the doctor and the nurse was the same in the telemedical and conventional consultations.

Doctor–patient communication

The overall number of turns was again higher in the teleconsultations. This may be because the patient felt less intimidated than in the face-to-face situation and asked more questions. Although a telemedicine link may represent a barrier between doctor and patient, it nevertheless appears to facilitate more communication on the part of the patient.

In the face-to-face consultation the patients appeared to find it more difficult to interrupt and the doctor found it easier to terminate the consultation. In teleconsultations, it is possible for the doctor to terminate the consultation by getting up from the seat or directing the closing comments to the nurse, but it is difficult to do this without appearing peremptory. The doctor also feels some level of uncertainty and tends to ask, 'Is there anything else you wish to ask?' In face-to-face consultations, the patient's body language is useful and in teleconsultations the feedback is not as good.

Patient–nurse communication

In both the telemedical setting and the face-to-face setting, the patient and the nurse were in the same room. The interactions could nonetheless differ in the two forms of consultation. However, there was relatively little difference in the two types of setting, except that the average number of words used in the consultation was somewhat less in the face-to-face situation.

There were more backchannels between nurse and patient in the teleconsultations than in the face-to-face consultations. In video-based consultations the nurse acts as more of an intermediary between doctor and patient. The nurse plays an extremely important role in both settings but in the teleconsultation provides an important channel of communication, often elaborating the explanation of the injury provided by the doctor (e.g. 'The doctor said it was a fracture; is it just a crack?'). This was partly because the nurses were uncertain whether the patient had heard the doctor properly.

Repairs/repeats

During any kind of consultation the doctor, the ENP and the patient have to collaborate to ensure that they all understand what is being referred to. It has been suggested that when a doctor refers to a part of a bone as the sustentaculum tali, for example, it is not enough for him merely to say the noun phrase[15]. The doctor is responsible for ensuring that the ENP has really understood what is meant. Thus the doctor may offer an alternative phrasing or await repeats or repairs (e.g. 'Do you mean the small shelf of the calcaneum which supports the talus?'). The repeats or repairs provide confirmation that something has been understood; in face-to-face communication fewer of them would be expected to be used, as a nod might suffice. For doctors, they provide confirmation that they have been heard and understood; for nurses, repeating the phrase might indicate that they had understood the task or were now doing it. This method of verbal interaction in the video-based method is extremely important and is often the

basis for moving on to the next question or examination. As visual cues are less good, the verbal cues provide back-up and reassurance.

The process of teleconsultation

The process of teleconsultation is not a straightforward interaction between two individuals. The patient is sitting next to the ENP and is expected to comprehend at least part of what takes place between the doctor and the ENP. In most cases, in a teleconsultation, the third person is a silent side participant. Side participants are what Goffman[16] called 'unaddressed recipients' of talk. Even though the third person is not addressed directly, she/he is a party to the conversation. According to collaborative theory, all participants in a conversation assume responsibilities for their mutual understanding, and can therefore be taken to accumulate common ground along with the speaker and the addressee. In telemedicine, however, the doctor and the ENP have a certain commonality of technical knowledge and their collaborative understanding is likely to exclude the patient on occasion[17]. It is therefore the duty of both professionals to be certain that patients understand the nature of the injury that they have sustained and the kind of treatment which is to be embarked upon. The rapport achieved in the initial stages of nurse–patient communication can influence the feelings of a patient in relation to treatment and is an important factor in setting up the basis for doctor–patient interaction. In the case of video-based consultations, the communication that occurs between the nurse and the patient can greatly influence the feedback received by the doctor at the other end of the link.

In the present study, the mutual understanding between all three parties in the teleconsultation was possibly better than in the face-to-face consultation. The doctor and the ENP seemed to take particular care to explain things to the patient in detail and spent more time doing so than in a face-to-face consultation. The doctor used more repeats or repairs with the patient in a teleconsultation than in a face-to-face one. This may be a manifestation of the newness of the technology or it may be that telemedicine introduces a change in the working relationship between the participants. Clearly, further research is required in this field.

Conclusion

The present study showed that telemedicine appears to empower the patient to ask more questions of the doctor. It also seemed that the doctor took greater care in a teleconsultation to achieve coordination of beliefs with the patient than he did in a face-to-face consultation. Thus telemedicine consultations lasted much

longer than face-to-face consultations. Face-to-face consultations allow for a physical awareness of the patient that teleconsultations do not and this permits the doctor to see things that in the teleconsultation must be asked about instead. The physical consultation allows doctors to use their senses in diagnosis whereas in a teleconsultation they must rely more upon the patient, the nurse and their combined responses. Nevertheless, telemedicine does provide a means by which doctors, nurses and patients can confer to achieve a diagnosis and treatment. It must be remembered, though, that the technology does have some drawbacks. The lack of multi-sensory feedback means that verbal cues must be more regularly initiated to provide continuity and confirmation. Nevertheless, there are positive aspects too (such as patient ease in some cases) and these issues merit further research.

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