The desk-top computer as a magic box: patterns of behaviour connected with the desk-top computer; GPs' and patients' perceptions

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**Background.** The use of computers in general practice is becoming increasingly common. There has been concern about effects on doctor–patient communication.

**Objectives.** The aim of this study was to identify common patterns in the use of desk-top computers by GPs with regard to interaction with the patients, and to assess the GPs' and patients' perceptions of the use of the computer.

**Method.** Thirty-nine video-taped consultations with five different GPs were analysed inductively, inspired by the principles of 'grounded theory'. On separate occasions the five GPs and 12 of the previously video-taped patients watched and commented on the video recordings of their own consultation.

**Results.** The study showed that the computer was sometimes used in a way that was not originally intended. Use of the computer could be identified as a way of obtaining 'time-out' in the consultation. It could also be a referral to a 'magic box'. The conversation often changed when the computer was used. The interviews showed that the patients lacked understanding about the computer's functions. They also lacked knowledge about the possibility of loss of confidentiality with electronic files. The patients found it disturbing not knowing what their doctor was doing when he worked on the computer, and they preferred being able to see the computer screen. The GPs were surprised at how their own use of the computer looked on the video, and as a result of the interview they wanted to change their behaviour.

**Conclusions.** It is concluded that patients need more information about the use of computers by GPs, and that GPs may benefit from paying more attention to their computer use.

**Keywords.** Attitude to computers, behaviour, communication, computer-assisted consultation, family practice.

**Introduction**

The use of computerized medical records is rapidly spreading. In 1995 nearly 70% of Danish GPs used desk-top computers for their medical records. Corresponding figures were 80% in Great Britain, 60% in Sweden, and 40% in the Netherlands.1 The computer offers advantages over traditional paper-based file systems, providing easily accessible clinical information, and help with bills, prescriptions, and other clerical tasks. This means that the computer may be used in many situations during a consultation, of which it has become a significant part. The GP needs to integrate the use of the computer with his interview and consulting skills, and important questions are: to what degree and how have the GPs and patients integrated the computer in the consultation? How do they perceive the use of the computer, and what influences these perceptions?

The available literature on the topic is limited. The few studies performed showed that many patients had positive attitudes towards the GPs' use of the computer, but they also identified patients who saw some problems.2-4 GPs may spend significantly more time using the computer than using their paper notes.5 The amount of time during which the GP did not interact directly with the patient was increased by computer use,5,6 indicating that a change in consultation...
behaviour had taken place after the introduction of the computer. The few studies in the field concluded that more knowledge is needed to help doctors to understand and apply methods of integrating computers in their consultations.

The aim of the present study was to identify patterns of GP and patient behaviour related to the computer, and to describe GPs’ and patients’ perceptions of the computer.

Method

Choice of method
According to Timpka and Arborelius,\textsuperscript{7} video recording is an optimal method for observing doctor–patient communication, the influence of the video-tape recorder on the participants’ behaviour being marginal.\textsuperscript{7,8} The method of stimulated recall has been evaluated and recommended by several authors\textsuperscript{9,10} as a way of assessing the participant’s perceptions of a consultation. Patients and GPs are able to give adequate and detailed information about their experiences. Since the objective was to identify behaviour and describe feelings, a qualitative inductive approach inspired by ‘grounded theory’\textsuperscript{11} was chosen for the analysis.

Selection of participants
To exclude initial difficulties as a reason for the behaviour patterns identified the recruited GPs had used a desk-top computer for more than 10 months and had been in practice for more than 5 years. In addition, the GPs and interviewed patients were selected in order to obtain as wide a representation as possible, as recommended by Lunde\textsuperscript{12} and Kuzel.\textsuperscript{13} The objective was to obtain broad variation of the data, while still being able to identify common patterns that would cut across the variations. Factors taken into account were that patients’ age, sex and previous experience with computers influences their attitude to computers in the surgery.\textsuperscript{14} Domicile location (urban/rural) is likely to influence experience with computers.

For the patients the study comprised two parts, a video-recording section and an interview section (see below). The video-taped patients ($n = 39$) were included consecutively on an ordinary day in the surgery. Of this group 12 patients were selected for an interview. This group represented a range of age, sex, educational background and previous experience with computers.\textsuperscript{4}

For the GPs ($n = 5$) variation existed with respect to age, sex and surgery location (urban or rural area).

Study plan
As recommended,\textsuperscript{11,15} repetition was a hallmark of both the collection of data and the analysis in this study. By performing the primary analysis for each GP and related patients before moving on to collect a new group of data, it was possible to test, extend, and improve the categories that had been identified from the previous video recordings and interviews.

GPs fulfilling the above criteria were invited to participate by letter. A total of five GPs from five different practices participated, but only one GP was recruited at a time. The video recorder (VCR) was placed in the consultation room on an ordinary day in the practice. Before entering the consultation room the patients were asked to participate. If they agreed, the VCR was turned on by the GP; a third person was never present in the room during the consultation. This procedure was continued until seven or eight consultations had been recorded. All of the participants, including the GP, were told that the study was focusing on aspects of doctor–patient communication. They agreed to remain ignorant of the specific focus of the study (use of the computer).

The recordings were analysed using an inductive approach (see below). The aim of the analysis was to identify patterns of behaviour related to the computer, and to see how they influenced the interaction between the GP and the patient.

Two or three of the video-recorded patients were selected according to the strategic criteria mentioned above. About 1 week after the recording sessions, the GP and the selected patients observed and commented on the recording of their own consultation during an interview. Except for two GPs who were interviewed at the Institute of General Practice, the interviews took place in the participants’ homes. The interviewees were asked to stop the video-tape in order to make comments as often as they liked. The interviewer also stopped the video-tape to ask questions, which were guided by the previous analysis of the consultations. These interviews were recorded on audio-tapes and analysed using the same principles as the video analysis (see below). The aim of this analysis was to describe how patients and GPs perceived the use of the computer and what might have influenced their opinions.

The analysis
Video- and audio-tapes were transcribed verbatim. All non-verbal action concerning the computer was noted for the video recordings. The text served as a basis for an analysis inspired by the principles of Strauss and Corbin\textsuperscript{1} and Tesch,\textsuperscript{13} and structured by the software tool NUDIST.\textsuperscript{16} During the analysis, the text and tapes were studied repeatedly. All episodes in the consultation when the computer was used and all statements in the interviews were classified into different themes according to the content; this was the ‘primary coding’\textsuperscript{11} (if a GP looked at the computer for no obvious reason the sequence could be named ‘what is he looking for?’). A number of codes were generated and episodes or statements with similar codes were compared with respect to conformities and discrepancies. Groups of
similar episodes/statements were categorized, and connections between them were identified (the episode mentioned above was categorized and connected with the context of the consultation, and the main category ‘time-out’ arose). The analysis included a constant search for cases that did not fit the systems of categories already developed (disconfirming evidence\(^{13}\)). The system was then revised, or new categories were developed. By the end of the analysis every consultation and interview had been studied at least four times.

**Study group**

The GPs comprised three men and two women, aged 39–57 years. Two surgeries were located in an urban area, and three in a rural area. The GPs had practised for 5–12 years, and they had used a computer in their consultations for 11–16 months. The consulting room terminals consisted of a visual display and a keyboard placed on the GP’s desk. The GP could use it to access the records of any of their patients, they could write and search for notes, prescribe medicine and update lists of medicine, and write referrals for specialists and laboratories. A printer was situated in the room and prescriptions and referrals could be printed out during the consultation and handed to the patient. There were no electronic connections to computers outside the practice. The old manual notes were still present but were not used in any of the recorded consultations.

With respect to the patients who participated only in the video-tape section of the study, there were wide variations in the reasons for attending (from a sore throat to relapse of severe endogenous depression); there were 26 women and 13 men, aged 21–79 years. The consultations lasted 7–35 minutes (mean, 11.4 minutes). Of this group, seven women and five men, aged 25–78 years, were interviewed. Their educational background varied from unskilled worker to graduate in computer science.

All five GPs and 12 patients were interviewed individually. The interviews lasted 35–125 minutes. The data were collected between 1 January 1995 and 1 July 1995. All interviews and analyses were carried out by the author.

**Results**

**Analysis of consultations**

In this present study the participants were sampled with the objective of obtaining as much information as possible, not with the purpose of being statistically representative. It is important to stress that the numerical proportions of the categories mentioned in the following are presented to give the reader an impression of the constitution of the material; they are not claimed to be proportions transferable to any population outside the study group.

Five main categories were identified during the analysis. The desk-top computers were used 302 times during the 39 consultations (GPs A–E: 40, 37, 52, 71 and 102 times, respectively).

‘Time-out’. This main category was used 101 times (20, 10, 26, 9 and 36 times, GPs A–E, respectively). It includes sequences in which the GP used the computer in some way (glancing, touching, writing, printing, etc.) when they seemed to need a break to solve a problem, or to get away for a while to rest. Sometimes the computer was used when it was time for the GP to lead the conversation in another direction. For example, in one consultation, the patient kept returning to a problem which the GP felt was solved already. While the patient was talking, the GP glanced at his computer screen for longer and longer periods (C1). In another consultation, a patient presented with fear of being pregnant. The GP tried to make her talk about her sexual practices, but she was very reluctant. At that point the GP looked at the screen for about 20 seconds and then asked, “is it difficult to make your husband use condoms?” (E5).

‘Magic box’. This main category included 77 episodes (9, 8, 15, 22 and 23, respectively). The category includes sequences in which the GPs referred to the computer by pointing or nodding towards it when presenting medical facts or plans and conclusions to the patients. These were situations in which the facts presented were a result of the GP’s abstractions, not facts on the computer screen. By being used in these situations, the computer achieved a veracious character or the character of a ‘magic box’. For example, one patient asked the doctor if any food items, e.g. coffee, wine, or sausages, could cause the problems with his stomach. The GP pointed to the monitor and said, “oh yes, coffee can be bad for your stomach” (E7). A mother brought her 2-year-old child for a check-up after pneumonia. The GP examined the child, then looked for a while at his screen, pointed to it, and said, “he is getting better, no doubt of that” (D8).

‘Conversational changes’. This includes sequences in which there was a change in the form or the rhythm of the conversation when the GP used the computer. The conversation might stop in the middle of a sentence, and some patients then remained silent. Other patients resumed talking as soon as the GP glanced away from the computer, and in so doing synchronized their talk with pauses in the GP’s work. While the GPs were confining their visual attention to the computer, the topics of conversation sometimes changed, and ‘small talk’, e.g. about holidays, the weather, or ‘town gossip’, was frequent. In other words, the GPs restricted their conversation to more undifferentiated short responses.
'The lookers'. Only five of the 39 patients looked at the computer screen during the consultation (A1, C6, D1, D5, D7), four of whom were invited to look by their GP (A and D). Only one GP had placed the screen so that the patients could see it easily (D).

'Explanations'. The GPs explained to their patients why they were using the computer at a particular moment only 43 of the 302 times the computers were used (9, 6, 5, 18, 5 times, respectively). An explanation could be, ‘I am looking for your latest blood tests’ or ‘let’s see what we found out last time’.

Analysis of interviews
In the following the characters in parentheses following the quotations refer to interview number and page.

Interviews with GPs. When asked about their attitudes to the computer and the patients’ understanding, the GPs said that they had not thought much about the patients’ knowledge about the computer. The GPs believed that the patients knew what they needed and wanted to know about the computer’s functions. They had consequently not considered giving information about the innovation. The GPs based this assumption on the fact that very few patients had asked questions about the computer.

At the beginning of the interviews, before the video-tapes were shown to them, the GPs said that they perceived the computer as a neutral instrument in relation to the communication with the patient, and that they were satisfied with the new ‘tool’. Despite that, the GPs’ comments as they looked at the videos showed that sometimes they did use the computer as an instrument that, for instance, could help to guide the conversation in another direction or give them a short break in which to think, as was indicated in the category ‘time-out’. The GPs said that they were generally unaware of this in the specific situation. One GP commented on a situation in which he looked at the computer while the patient was talking:

"See, we are not going through that matter again, I have heard that six or seven times now. Maybe that (using the computer) is my way of showing that we have to stop that and go on with something else. But I am not doing it consciously" (Cp2).

This unawareness of some of the ways in which the computer was used was also shown by the fact that, when looking at the video-tapes, each GP mentioned that they were surprised about their appearance, now sitting in the observer’s position. They said that they would change their perceptions of the computer since they now saw their use of it as a possible intruder in the contact between them and the patient. One GP commented,

"Well, as I remember it, it was my job to listen to her at that moment. But at the same time I was looking at the computer screen, and the question is: Am I really listening? It seems a little silly, doesn’t it? I do feel that it might irritate the patients, distract them" (Ap2).

Another GP said:

"It seems a little strange, doesn’t it? That was my first impression when we started today. Yes, damn it, I really am looking too much at that screen. You see I had no problems with that computer until you came and recorded those videos" (Ep41).

All the GPs said that they wanted to change their use of the computer in some way after the interview. They said that they might use it less, or at other moments during the consultation, or they might move the monitor to another position on the desk.

Interviews with patients. With respect to knowledge about the computer’s functions and confidentiality, contrary to the GPs’ opinions, the patients’ knowledge about the computer varied considerably. Only five of the 12 patients were aware that their personal records were kept on the GPs’ computers. One patient said,

"What he is looking at that thing (the computer) for. I don’t know, I really don’t’" (05p3).

The patients who had the best understanding were those who had actually seen the computer screen, and patients who had asked their GP questions about the computer themselves. Several patients mentioned that it would have been nice had the doctor told them something about what the computer was used for.

Only one of the 12 interviewed patients knew that it was only the GPs at the surgery who worked with the computer system and drew information from the databases. The other patients thought that the system was accessible to other social institutions, insurance companies, employers and, of course, skilled hackers. Some of the patients were rather concerned about this.

"It is somewhat unpleasant with all these personal files everywhere: it is a bit like feeling: ‘Big Brother is watching you’. It is almost too much” (03p4-5).

"Yes, of course there are connections, and these hackers, they can enter wherever they want" (01p4).

Patients’ answers to questions about the computer’s functions fell into two groups. One group regarded their doctor’s computer as a modern pen and paper, recognizing it as an advantage for the doctor and thus an advantage for themselves.

"It’s a lot easier for them now, isn’t it? Before they
had to rummage through all the papers to find your files and all that, and one just had to sit and wait’” (04p8).

Some patients in this group expressed concern about the possible loss of confidentiality and about the risk of errors in the system.

‘‘You know it is almost the devil’s work—they can push the wrong button and things like that, and when it first goes wrong in the machinery, it is in the whole system” (09p5–6).

Another group ascribed more unrealistic functions to the computer, e.g. a power of advanced medical abstraction. In this way they believed that the computer could help the GPs to solve medical puzzles. Some patients in this group saw this as an advantage, providing their GP with even more competence.

‘‘Well, I believe in that machine, and I think it brings him up to date with all the new stuff about diseases and so on, and that’s also good for me’” (06p5).

By contrast, some patients expressed lack of confidence in the doctor because he needed help from the computer.

‘‘Yes, that’s right, he is looking a lot at that thing; it’s as if he is seeking help from it, or is he keeping something secret in there?” (09p3).

These wonderings about incompetence were also seen by a patient as a manifestation of power: a GP with a computer could always claim to be right, because his conclusions could be drawn from a modern machine.

‘‘You know, it doesn’t matter what I say to him—it hurts me here, I feel sick. All he does is turn on his computer and there I am—a healthy man” (12p2).

The more a patient knew about the computer’s functions, and the more he felt sure about what the GPs were using it for, the more positive was his attitude towards the computer.

The patients said during the interviews that they could achieve understanding from looking at the screen while the GP was working. The patients’ wish to see the screen was governed by the way they perceived the situation. The more insecure they felt about what the GPs were doing, the stronger was the wish to see what was going on.

‘‘I think it is more secret now. For example, at that specific moment I tried to watch because it really irritated me that I didn’t know what was going on’” (05p8).

The patients who were used to watching GPs work on the screen were very pleased with it. During the interview they mentioned how it helped them to gain a better understanding of their own situation. In this respect, it must be mentioned that all but one of the GPs argued for the importance of patients having free access to the screen. However, it was possible for the patients to see the computer screen in only one of the surgeries. One group of patients thought that they were not allowed to watch the screen while the doctor was working.

None of the patients who were able to watch the screen felt disturbed by it. They said that they looked when they wanted to, and did not look when they thought there was nothing important. By contrast, the patients who felt disturbed by the computer connected this with the feeling of being ‘kept out’. This was because they felt that they had to be quiet as long as the GP was working, and because they did not know exactly what was going on. A feeling of insecurity intensified the presentiment.

‘‘It’s just me sitting there, waiting. And I become alert and aware of all the little things” (03p3).

Discussion
The video-recording of the interviewee’s own consultation as the primary basis of the interviews and as a stimulator of the interviewee’s memory may widen the scope of the findings.

The qualitative and inductive approach gives the strength of broad explorative information. The validity of the study must be judged in the context of qualitative studies: the participants cannot be claimed to be quantitative representative of Danish GPs and patients, but their actions, perceptions and feelings are expected to be transferable.¹⁷,¹⁸

As described, the analysis was conducted after each round of data collection, and the categories of the patterns of behaviour in the consultations and of the participants’ perceptions, were identified during the period of the data collection. At the end of the data collection, the data from the video-tapes and interviews fitted well with the categories identified earlier in the study. This means that a point of redundancy was reached, and since the participants were selected in order to obtain broad variation, this increases the credibility of the results, according to Kuzel.¹³ Whether the results can be transferred to other GPs and patients can be determined only on an individual basis by those involved in situations comparable with the research setting (utilization/pragmatic validity)¹⁷,¹⁸.

In discussing the utilization of the results it is important to note that it was not the author’s intention to criticize the desk-top computer as a tool, or the GPs who use it. The intention was to describe some of the patterns of behaviour connected with the computer in order to raise consciousness among the GPs about these patterns. The study showed that the rhythm of the conversation could change when the computer was used. This may well also happen when GPs handle their paper notes. This study did not examine consultations in which a computer was not present, but Warshawsky et al.⁶
and Greatbatch et al. examined differences between consultations before and after the desk-top computer was introduced. They showed that use of the computer resulted in consultations that were less patient-centred and more doctor-centred. This suggests that some of the patterns identified in the present study may be connected to the use of the computer.

The data from the present study showed that the GPs used the computer for purposes other than those originally intended, such as obtaining ‘time-out’, or referring to a ‘magic box’ that might give medical statements a higher value. These were mostly unconscious or subconscious actions. Of course there have always been elements that disturb a consultation, and there is no doubt that doctors have always used different stratagems to obtain a break in order to think, without ‘giving the game away’. The present study indicates that the computer has come to play an important part in the consultation. It is perhaps more important that the GPs were basically unaware of this until they watched the recordings of their consultations. Paying attention to one’s own reasons for using the computer at specific moments could be beneficial. Becoming aware of one’s actions, e.g. by watching oneself on video-tapes, is a hallmark in the process of understanding and optimizing the act of communicating with the patient.

The present study confirms that watching oneself communicate with the patient by way of video-taped consultations at regular intervals can be recommended.

When exposed to an unpleasant situation, people experience more discomfort when the situation is connected with loss of control than when it is not. This may explain why the patients with poor understanding of the computer’s functions, and patients who could not see the screen or thought that they were not allowed to look at it, said that they had a feeling of ‘being kept out’; they therefore perceived the GP’s use of the computer as a disturbance or even a manifestation of power. In this connection it is very surprising that, even though patients in Denmark have legal rights to see their own records, seven of the 12 patients thought that they were not allowed to read their own files on the computer screen.

Since a positive attitude towards the GPs’ use of the desk-top computer was shown to be governed mainly by good understanding of the computer’s functions and potentials, and since the GPs were wrong about the patients’ understanding, there is reason to recommend the giving of systematic information about the computer and not to wait until the patients ask themselves. This information should include facts about what the computer is used for, and what it is not used for, and what access there is to the GPs’ data for other institutions or people. It may also be beneficial to find a place for the computer on the desk that allows the patients to see the screen, and to tell them that they should feel free to watch if they want to.

The analysis of the consultations showed that the reasons for using the computer were seldom explained in the specific situation. Explaining to the patient what the computer is being used for at a particular moment might not only help the patient’s understanding, but might also make the GP more aware of the reasons for using it at that specific moment.

In summary, the study showed that specific patterns of behaviour could be connected with use of the desk-top computer. GPs were surprised when they viewed their recorded consultations, and they all stated an intention to change some of their behaviour concerning the computer. The study also showed that patients lacked information about the computer, and that explanations and permission to look at the screen during the consultation could make patients’ attitude towards the computer more positive.

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