

The therapeutic effect of taking a patient's history by computer

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SUMMARY. Sixty young women who presented at a general-practice health centre had their medical and social history taken by a computer before having an interview with the doctor. The average length of the automated interview was 90 minutes for the 54 patients who completed the programme, during which an average of 211 questions were answered. The patients found this method acceptable and we think that one of the main reasons for this was that the computer programme was so designed that the patients felt that the doctor was involved throughout.

The computer/patient interview also appeared to have therapeutic benefits, and the computer's summary of the history was a sensitive indicator of those topics about which the patient was most concerned. This combination enabled the doctor to communicate more quickly and in greater depth in the time available. In effect, the time which the doctor could spend with the patient was magnified.

We suggest that the benefits of this system for taking a history from a patient, of which one is the fact that any language or combination of languages can be used, could be extended to all classes of society.

Introduction

IN general practice the time to obtain a history from a new patient is often insufficient (Simmon and

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Miller, 1970). This is especially relevant in a practice in which there is a high turnover of patients. In hospital, junior staff may take part in the preliminary history-taking, and insurance medical examinations are preceded by a questionnaire. Nevertheless, doctors in general practice, in order not to prejudice the interview, are rightly cautious about obtaining information before they have seen the patient. They prefer to rely on their experience to sense the problem as the interview proceeds. The general practitioner's interest in the patient's history is usually wider than that of his hospital colleagues (Balint and Norell, 1973). He is concerned to obtain a diagnosis and to get to know the patient so that he has a base from which he may be of help to him or his family in the future (Morse, 1976).

Patients attend a general practitioner for physical, psychological, and social reasons (Fry, 1974). Many find it difficult to talk to the doctor (Forkner, 1971) and to explain the true reasons for their attendance (Lazare *et al.*, 1975). They may say "I'm sorry, I'm wasting your time", "You have much more important work to do", or "There are many people who are ill". They ask for a 'tonic', but their need is time. General practitioners, on the other hand, know that there may be little time available, even to deal with the patient's presenting symptoms. Often the initial complaint overlies other worries which the patient would like to disclose if he thought the doctor had the time to listen (Comfort, 1972). This paper outlines an attempt to find such time.

Aim

Our aim was to arrange for the patient's history to be taken by a computer before the interview and examination by the general practitioner.

Method

The project was carried out in a group practice in

London of which some of the population are nomadic. The project was designed to investigate history-taking in 60 young women, 15 per cent of whom were attending for the first time. They were in three consecutive groups, the average age being 24.5 years \pm 4.5. Those chosen included nurses, executive secretaries, machine operators, petrol-pump attendants, teachers, shop assistants, and one university student who came with her mother. Their presenting symptoms included depression, cough, backache, tiredness, the need for contraception, lower urinary tract symptoms, postcoital bleeding, sore throat, cold, influenza, gastric troubles, and vaginal irritation.

The experiment consisted of the patient being interviewed by the computer while seated at a terminal. A special room was set aside for this purpose which contained the computer terminal and other necessary equipment but otherwise was furnished in the style of a consulting room.

The patients in the first group were selected by either one of the doctors, the psychologist, or the staff nurse, who then introduced the patient to the computer. (Later it was found best for a doctor to do this.) Thereafter the patient was left alone and the computer conducted the interview eventually without any outside interruption. The patient was free to leave the room and could, if she wished, communicate with the nurse on an internal telephone. Immediately after the interview with the computer the patient was seen by the doctor, who usually had the results of the computer interview in front of him, unless they were not available owing to mechanical or computer failure.

The computer programme

The programme was written in conjunction with a 20-year-old female psychologist (J.M.) after she had witnessed doctor/patient interviews for three months. This preliminary investigation demonstrated that a patient's history contained many aspects about which a patient could be sequentially questioned. The final programme could explore 43 such aspects, though not all of them were needed for every patient. It emerged that the various aspects of the social history took up two thirds of this long programme, which accords with recent work on the clinical value of the social history (Holmes and Rahe, 1967).

The programme was arranged so that the patient's path through it depended on her answers, each question being selected according to her answers to preceding questions. Each question had to be answered with a simple "yes", "no" or "?" by pressing one of three keys (Evans and Whittle, 1970), so it was not possible to differentiate an assured answer from one which was uncertain, nor was it possible to answer with "don't know" or "erase".

The language the computer used was first developed by Evans and Wilson (1971). The questions contained a number of repetitive and reassuring phrases. The teletype was slow in its print-out, typing at a steady ten

characters per second. A period of eight minutes was allowed for each reply, after which, if there was no response, the computer automatically cut out and the line was disconnected. The time taken to answer each question was not measured.

The answers had to be recorded on the teletype because there was no better equipment available. When a breakdown occurred the programme was resumed at the point at which the interruption had occurred. At the end of the interview the computer delivered to the doctor a record of the patient's answers, shortened by omission of superfluous information. It then erased the answers from its memory store.

Equipment

The terminal consisted of a Data Dynamics ASR33 teletype machine connected to a remote computer system by an ordinary GPO telephone line. The only additional equipment was a post office modem which converted the signals to and from the teletype for transmission.

The computer was the Honeywell Mark 3 time-sharing system. At peak periods there were sometimes considerable delays in obtaining the programme. In order that the work of the practice should not be affected, another telephone was installed. After the first 20 patients a video or television screen was used. The equipment was simple and relatively cheap. The potential of such equipment for man/computer interaction has been discussed by Shackel (1969), Nickerson (1969) and Evans (1972).

Results

It was anticipated that as experience was gained the need for some changes would become apparent. The project was therefore designed in such a way that changes could be considered only in the intervals between each group of 20 patients.

In the first group the patient's reaction to computer interrogation was observed with some apprehension. The staff were inclined to interfere and interrupt the patient to check that all was well, and there were many difficulties with the computer equipment. The time taken by each interrogation and the effect of the project on the running of the practice were also assessed.

With the second group different computer equipment was used and the patient was introduced to the computer by the doctor who was going to see her subsequently. Interruption ceased. The doctor now focused his attention on the follow-up interview, at which he assessed the psychological effect of the computer on the patient by noting her comments and examining the summary print-out of the interrogation.

With the third group the doctor began to examine closely the patient's reaction to the computer and the information contained in the print-out, in order to get a better understanding of the problem which had made her decide to seek medical help.

Table 1. The distribution of answers from the computer summaries in the second series of 20 patients.

Number	Age	Social answers			Total	Medical answers			Total
		Yes	No	?		Yes	No	?	
1*	20	52	69	2	123	31	75	1	107
2†	26								X
3†	26								X
4*	25	57	59	11	127	73	47	3	123
5*	23	66	50	1	117	54	60	9	123
6*	23	62	59	6	127	37	60	5	102
7†	23	69	55	0	124	46	60	0	106
8†	21	64	50	6	120	56	56	12	124
9†	28	70	45	2	117	51	67	4	122
10†	20	49	43	9	101	21	68	8	97
11*	24	38	31	5	74				Y
12*	20	53	60	0	113	41	64	0	105
13*	18	38	48	11	97	36	67	5	108
14*	23	46	53	5	104	60	49	15	124
15†	30	8	15	0	23	13	36	4	53‡
16*	24	48	34	14	96	26	55	13	94
17†	26	57	64	0	121	6	66	0	72
18†	23	46	52	3	101	34	63	2	99‡
19*	20	52	55	8	115				Y
20†	23	49	57	1	107	36	72	1	109

*New patient. †Old patient. X Summary missing. Y Medical summary missing. ‡Incomplete.

The computer did not deliver a summary for patients 2 and 3, and the medical answers were not completed by patients 11 and 19. The average number of questions answered by each patient, of those who had completed the programme in this series, was 210, whereas for the whole series, in similar patients, the average was 211. The time taken to answer the questions varied between 90 and 120 minutes. The table demonstrates the low percentage (less than five per cent) of questions in the social programme answered with the “?” key.

The average length of the automated interview was 90 minutes for the 54 patients who completed the programme, during which an average of 211 questions was answered. Of two interviews which took over two hours, one was repeatedly interrupted by mechanical failures, and the other was prolonged because the patient found the questions so difficult to answer that she became confused. Two patients did not complete the programme for reasons unrelated to their views about the project, and three patients were prevented by mechanical failures from answering all the questions in the clinical part of the programme, which came at the end. One patient, who had not been introduced to the computer by the doctor, objected to the programme and walked out of the clinic. We therefore believe that most patients found this method acceptable.

Patients did not seem to mind whether the questions were put to them by a silent television screen or by a clattering teletype. They were fascinated by the novelty of the project. They said that during the interview they had lost all sense of time. It was clear that whatever their initial reaction to being interrogated by a computer, the patients became increasingly interested. The questions made them think about themselves. This made them eager to be asked further questions and want to talk about themselves. They were surprised to find

how penetrating the interview had been. One patient was startled that some questions should be so relevant to the answers she had just given. The more educated patients, for example, a medical secretary, a journalist, a teacher, were inclined to be frustrated by not being able to qualify and elaborate some of their answers. They felt constrained by the limitation of being able to answer only “yes”, “no” or “?”. One patient made shorthand notes of the questions and subsequently she submitted *her* answers in a long detailed document.

The summary print-out was not available for six patients owing to equipment failure, which caused initial annoyance to the doctor, until it was realized that the patient was not aware that the doctor did not have this information and was assuming that he knew all about her.

Two patients who were the most physically ill (for example, glandular fever) did not feel the programme had helped them, though one thought that the machine had found out what was the matter with her.

Table 1 itemizes the pattern of the questions asked in the second series of 20 patients.

Therapeutic effect

The friendly nature of the computer's questions and the seclusion, comfort, and leisure in which they were

answered induced a mood of introspection which seemed to have a therapeutic value. The patient was no longer apprehensive of the coming interview with the doctor. The outstanding finding at the subsequent face-to-face interview with the doctor was that the patients were relaxed and uninhibited.

The inability to qualify an answer sometimes forced a patient to appear to be more definite than she wished, or to answer by pressing the question-mark key. It became increasingly apparent that those questions in the social programme which had been answered by pressing the "?" key were those which had been emotive for the patient, whether she realized it or not; on average these accounted for five per cent of the total. In subsequent counselling either the patient referred to some of these questions herself, or, if she did not, she was asked by the doctor why she had answered some questions with the "?" key. Often the patient found it difficult to give a reason, but if these questions were repeated to her a story would often emerge which revealed intimate and disturbing aspects of her life or herself. It was also found, in those patients who showed a higher degree of uncertainty than average, that a large percentage of them had had, or needed, psychiatric help; for example, it was found that one patient with a score of 11 had been having private psychoanalytical treatment of which we had not been previously informed. It is our impression that by revealing these uncertainties the patient was less defensive and had focused the doctor's attention on those aspects of her life about which she was confused.

Discussion

Heron (1974) and Feinstein (1967) have discussed what takes place when a doctor interviews a patient in general practice, and which factors influence clinical judgement. We consider that both verbal and non-verbal components are important in general practice. In programming the computer we tried to simulate the verbal aspects of a general-practice interview. This produced a long sequential set of questions which covered many aspects of a person's life. Many general practitioners have expressed an understandable prejudice against such an impersonal form of evaluation (Johnson, 1975) because of the exclusion of the non-verbal components of an interview.

Nevertheless, we agree with Forkner (1971) and others (Simmon and Miller, 1970) who do not think it is possible for the general practitioner to get to know all about each of his patients (average list 2,400) in depth within the time available.

The basic right of each patient to have his own general practitioner has been preserved in the reorganization of the NHS (1974). At about the same time the concept of a problem orientated medical record form (Weed, 1969) was introduced to prevent the patient being subjected to repeated interviews from the various disciplines. Nevertheless, it has now emerged that to

enable the patient to be assessed as an individual the new record form needs a broader base of information (Feinstein, 1973).

Murray and her colleagues (1974) have stated that, in theory, this extra information could be obtained by an elaborate questionnaire, a method which is now used in hospital practice to obtain further information when the general nature of the patient's illness has already been diagnosed. But if in a large NHS general practice, which attempts to give a similar standard of care to all sections of the community that it serves, all the questions covering all the various aspects of every possible patient were to be put to any one patient, the number of questions asked would be very great and much time would be wasted. If, on the other hand, the questioner were to try to thread his way through such a questionnaire to the relevant questions, the 'hyper-paperosis' (Lennox and White, 1971) through which he would leaf would make the interview laborious and slow, and the subsequent extraction and storage of the information obtained would be difficult. Avery Jones (1975) has pointed out that these difficulties are avoided if a computer is used instead of a questionnaire.

The computer can be programmed to simulate a normal interview without the fatigue of confrontation. It can be adapted so that the questions can be related to the answers, which gives the patient the feeling that the doctor is involved in her past history. The speed with which the questions appear enhances this belief. The computer's interrogation is impersonal, critical, bland, thorough, and detailed. The computer is never tired and it can be programmed to give a sense of infinite patience. It has been shown that in a hospital clinical setting questioning does not appear to tire the patient (Greist *et al.*, 1973; Evans *et al.*, 1973; Loewy *et al.*, 1974; Wright, 1975; Lucas *et al.*, 1976). The interview can be prolonged, the number of questions that can be stored is enormous, and any number of patients can be processed separately or simultaneously.

The use of a computer to obtain information from patients before their problem has been identified has been examined only superficially (Schuman *et al.*, 1975). In order to find out if such a technique is feasible it was decided that this programme should examine a group of young women. It would question them about their family history, their medical history and present medical condition, and it would also ask them questions about their anxieties, phobias, and expectations in order to try and obtain some background information about their way of life.

Previous medical computer programmes had taken from 20 to 45 minutes (Evans and Wilson, 1971; Greist *et al.*, 1973; Evans *et al.*, 1973; Wright, 1975; Lucas *et al.*, 1976) and asked only a selected number of questions. Our programme took more than twice as long. It was remarkable, however, that the patients tolerated such a long period of interrogation with equanimity. We believe that one reason for this unexpected finding was that the questions were phrased

in a friendly and reassuring style which made the patients think that the doctor was taking a personal interest in them. One patient thought the doctor was conducting the interview from an adjoining room. It was presumably because the questions had emotive appeal that the patients were much easier to interview subsequently; because they then felt that the doctor knew all about them, they were prepared to discuss many aspects of themselves which they had had time to formulate, but which in the usual short interview they would not have had time, or the inclination, to reveal. In a previous study (Grossman *et al.*, 1971), in which the computer questions were not phrased in an informal and conversational manner, the computer interview obtained basic data but the subsequent interview was not significantly enhanced. We believe that this was because the patients did not feel that the doctor was personally involved in the computer interview.

In our opinion the hitherto unreported therapeutic effect of computer interviewing is the result of patients' realization that they are giving information directly to a doctor whom they have met. When the patients were introduced to the computer by anyone other than the doctor the subsequent interview was less successful. In addition, contact with the computer had taught them to be precise about their medical problems so that they could more easily delineate their problems to the doctor. It is to be noted that the computer interview was beneficial whether or not the answers to the questions were known to the doctor. This emerged when patients were examined after the computer had broken down when the doctor had none of the answers.

In the project described here the patients could reply to a question only by pressing one of three keys marked "yes", "no" or "?". Less rigid answering systems allow a wider choice (Holmes and Rahe, 1967; Schuman *et al.*, 1975). In this project the questions which had been answered with the question-mark key were the most revealing, and if these questions were repeated verbally, they recalled that cathartic experience that the computer interview had stimulated. The uncertainty created thus probably stemmed from inhibited psychological processes about which patients might be unaware but which might be very relevant to their illness (Wear, 1970). The computer interview had revealed to the doctor those questions which patients were most reticent about answering, and their confidence in the doctor was enhanced by his ability to put these very questions to them in the subsequent interview.

At first the doctors involved in the project expressed a disdain for this impersonal form of communication but their attitude changed as they became aware of its therapeutic value. It was interesting that, in contrast to the patients, most of the doctors, medical students and paramedical staff who answered the computer's questions were critical of the content and style of the programme, and did not believe it could be of help. Some of this hostility was apparent before they had been interviewed by the computer, but it is also important to

note that, unlike the patients, they were not approaching the computer in order that their answers might help the doctor to solve their problems. On the contrary, there was some evidence that they did not wish the computer, and therefore their colleagues, to have insight into their problems, even though no record of the answers was kept. This natural and seemingly unavoidable difference between patients and medical staff should be kept in mind when assessing the further use of computer interrogation in medicine.

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