PRACTICE OBSERVED

Practice Research

Computer assisted screening: effect on the patient and his consultation

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Abstract

The initial impact of computer assisted preventive screening in general practice consultations has been monitored. The technology has not been found stressful by patients, and the power of the consultation to alleviate low arousal has been increased by computer use. No appreciable increase in the duration of consultation was detected, despite an average computer initiated input of two minutes eight seconds. The computer has successfully prompted preventive screening and health education with a sixfold increase in the number of potentially relevant procedures being mentioned.

The actual information presented by the computer has been shown to be crucial, with the terminal's mere presence an ineffective reminder. The computer terminal was used in 65% of the consultations for which it was available, which, if sustained, represents an effective screening programme for attending patients.

Introduction

The doctors at the Colliingham Health Centre have designed a computer system, which allows interactive use during the consultation. The patients' files contain extensive demographic and preventive medicine information and the terminal is used primarily as a reminder of individually appropriate opportunistic screening. Computers are being used more widely by general practitioners, although only a small minority use terminals during the consultation. The evaluation of the effects of such use on the dynamics of the consultation has been suggested before computer aided consultations become commonplace.¹

Attitude measurement has already identified concerns among some patients over computerisation in general practice. The first such survey received wide methodological criticism after claiming that many patients would react strongly against computers—67% said that they would change their general practitioner. Another survey found that 23% of general practice patients would be uncomfortable in a doctor's surgery if they saw a computer. We found that 83% of patients were generally in favour of medical computerisation, but 31% had reservations concerning loss of confidentiality with the advent of general practice computing.²

The present study meant evaluating the actual effects of computerising medical consultations rather than the "blind" attitudes of patients. The low vocabulary "mood adjective checklist" (MALC) stress and arousal scale has previously been outlined and has proved sensitive by showing the effect of a second doctor sitting in during training consultations.³

It is a fast and simple psychometric test, which has shown that about two thirds of patients consulting a general practitioner enter the consultation with a higher level of stress than when they leave. Similarly, most patients leave the consultation with a higher level of arousal than that measured before the consultation, although the prevalence of arousal increase has shown more variation—between 52% and 72% after "control" consultations in different studies. The effect of most consultations in reducing stress and increasing

an average of 48 seconds, two minutes and eight seconds were occupied by the CPMS. No significant difference between consulting times in any group for any doctors were detected by a test.

PREVENTIVE CONTENT OF THE CONSULTATION

Table IV shows that computerised consultations resulted in a large increase in the mention of three preventive procedures: cervical smears, tetanus immunisations, and blood pressure recordings. Of the possible mentions (table V) of these measures in each group, 12.7% were mentioned in group 1, 18% were mentioned in group 2, 78.6% were mentioned in group 3 ($p < 0.001$). In group 3, 23% of the smears mentioned were actually done or arranged, 64.7% of tetanus immunisations mentioned were done or arranged, and 90.9% of blood pressures mentioned were recorded or arranged for a future visit. Preventive measures not done or arranged were either established not to be due or applicable, or they were referred by the patient or deferred for the patient to "think about".

TABLE IV—Number of preventive and educational procedures mentioned during consultations in each of the three groups

Items mentioned by the computer	Group 1 (n=10)			Group 2 (n=21)			Group 3 (n=19)		
	DA	DA	DA	DA	DA	DA	DA	DA	DA
Cervical smear	0	0	0	0	0	0	4	4	14
Tetanus	0	0	0	0	0	0	11	11	16
Blood pressure	0	0	0	0	0	0	11	11	16
Items not mentioned by the computer	0	0	0	0	0	0	0	0	0
Weight	0	0	0	0	0	0	0	0	0

TABLE V—Observed and possible mentions of computer initiated items: cervical smear blood pressure tetanus

Items mentioned	Group 1 (n=10)			Group 2 (n=21)			Group 3 (n=19)		
	DA	DA	DA	DA	DA	DA	DA	DA	DA
Cervical smear	0	0	0	0	0	0	4	4	14
Tetanus	0	0	0	0	0	0	11	11	16
Blood pressure	0	0	0	0	0	0	11	11	16
Weight	0	0	0	0	0	0	0	0	0

When the computer was used there were fewer mentions of health education measures about which it has no information or prompt facility, such as weight and smoking. A Fisher's exact probability test showed that this was not significant, but it indicates nevertheless that the actual information presented is important, and that the machine's presence does not act as an intrinsic prompt to doctor to "think prevention". This is confirmed by the similarity between groups 1 and 2.

Discussion

In view of the estimated 75% of patients who consult their general practitioners each year (the promotion of prophylactic and other screening measures during consultations has wide reaching potential in the maintenance of healthy patients). If computer use continues in 65% of consultations a large proportion of the practice population could be screened each year. Patients who rarely or never attend surgery, however, will inevitably continue to be an ill screened population. Clearly the benefits of this method of prevention must be weighed against other changes in the consultation, such as duration and patient anxiety.

Surveys assessing attitudes towards computerisation in general practice have provided useful subjective guidance on potential areas of concern to patients. The actual use of computers in general practice, however, has been unfamiliar to all respondents participating in such surveys. Patients participating in the present study have been introduced to the use of general practice computing and a more objective measurement of effects has been made. This study was carried out in the first months after computer

terminals were installed. Their presence was still unfamiliar to patients and, to an extent, doctors. Computer use was limited to the presentation of reminders of deficits in the patients' preventive medicine cover, resulting in discussion or treatment of the items shown.

Survey results may have led us to anticipate a stressing effect and this has been supported by a previous study, which showed that computer use in the presence of patients in a more diagnostic capacity in a hospital outpatient setting produced undesirable effects on the level of patient's postconsultation stress.⁴ A diagnostic mode of use, however, may reinforce some of the patient's greatest fears—that computers may replace skilled practitioners or that computer errors will prove detrimental to their health. In this study computer use had no effect on patient stress.

No marked effect on the arousing potential of the consultation was seen when computer use was used in hospital outpatient depart-

ments. The computerisation of general practice consultations, however, produced arousal increases in patients more consistently. As this was, for all participating patients, the first encounter with doctors using computers some of this may have been attributable to novelty.

Consultation durations showed wide variance for all doctors, but even when the computer was used there was no marked increase in the number of consultations exceeding their appointed seven minutes and 30 seconds.

Doctors differed in their style and extent of their use. Doctors A and B initiated computer use at a definite point, often having established with the patient that all they came for had been dealt with. A question such as "Is there anything else?" preceded computer entry and the discussion or action necessary, or both. Doctor C used his spare moments throughout the consultation to enter the patient's identification and plan on the screen before initiating discussion or action at the end. He was the only doctor to use the computer's prompt for routine urine testing, and the only doctor for whom mean consultation times with computer use were increased by the combined duration of computer use and initiated discussion.

Doctor B showed the longest mean consultation duration for those consultations with the computer available for use, but not in fact used. He also used the computer less frequently than the two other doctors, and may consciously or otherwise have used time as a criterion for deciding whether or not to enter the computer phase. Doctor A used the computer most often and for the longest mean duration. Even so, an average of two minutes and 35 seconds of computer initiated activity added only 14 seconds to his average consulting times. Doctors A and B included preventive care in consultations in this way without a comparable increase in consultation times.

While these results seem favourable some modes of use may increase consultation times or where consultations have apparent extra content for no extra time there may be more indicated by the slight decline in discussion of the two health education topics, smoking and weight.

The effect of the computer on patient stress and arousal, consultation duration, and the uptake of preventive medicine was highly satisfactory. Most procedures thus included are carried out or arranged (about 65% of those observed here). The only potential

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arousal is thought to be desirable, since stress shows in inverse proportion to memory of consultation content, and performance efficiency improves as arousal increases, until excessive arousal causes declining efficiency. Illness itself combined with seeing the doctor may create a state of relatively high stress and low arousal in patients, which the consultation seems to alleviate.

A prime consideration in the feasibility of computerising consultations is whether or not doctors and patients have the time for such an adjunct to the consultation. Consultation duration is important to doctors, but they at least have some control over the time spent with each patient. Longer consultations may be a greater problem to patients who tend to wait verbal or non-verbal cues from the doctor before leaving the consultation. Some have other appointments or wish to return to work. Others already find waiting times frustrating, and longer consultations imply longer waiting times.

The computer in Colliingham has been used initially to prompt extra medical care by issuing preventive reminders. Doctors have not abandoned the conventional medical records and still use these for the routine consultation content. The computer is not needed as such, therefore, but requires the identification of the patient should doctors wish to add preventive care to the consultation agenda. This extra but unforced use of a computer terminal has provided a good opportunity to observe the extent and duration of computer use.

The intrinsic benefit of preventive care to patients cannot be disputed. Other methods of implementing such care, with and without a computer, have been documented.⁵⁻⁷ For this method of computer use it was thought that the efficiency should be assessed in terms of education and prevention by comparing the preventive measures mentioned and done during consultations with and without the computer present.

Since the presence of a video camera has already been shown to effect neither stress nor arousal it was considered an acceptable method of data collection.⁸

Method

Over a period of eight months a selection of patients attending morning, afternoon, and evening surgeries were chosen from the appointment book. Where practicable they were chosen according to a random selection of appointment numbers (from 1 to 12), but unsuitable patients were replaced by the next suitable attending patient. A maximum of four patients per surgery were included, but only three proved more manageable. Sixty patients were selected for each of two groups. Equal numbers of men and women patients were chosen for each group; children (under 16 years) were excluded, and no patient was selected more than once.

TABLE I—Number of patients and computer status of groups compared

Group	Computer status	Men		Women	
		DA	DA	DA	DA
1	None	10	10	10	10
2	None	10	10	10	10
3	None	10	10	10	10
4	None	10	10	10	10
5	None	10	10	10	10
6	None	10	10	10	10
7	None	10	10	10	10
8	None	10	10	10	10
9	None	10	10	10	10
10	None	10	10	10	10
11	None	10	10	10	10
12	None	10	10	10	10
13	None	10	10	10	10
14	None	10	10	10	10
15	None	10	10	10	10
16	None	10	10	10	10
17	None	10	10	10	10
18	None	10	10	10	10
19	None	10	10	10	10
20	None	10	10	10	10
21	None	10	10	10	10
22	None	10	10	10	10
23	None	10	10	10	10
24	None	10	10	10	10
25	None	10	10	10	10
26	None	10	10	10	10
27	None	10	10	10	10
28	None	10	10	10	10
29	None	10	10	10	10
30	None	10	10	10	10
31	None	10	10	10	10
32	None	10	10	10	10
33	None	10	10	10	10
34	None	10	10	10	10
35	None	10	10	10	10
36	None	10	10	10	10
37	None	10	10	10	10
38	None	10	10	10	10
39	None	10	10	10	10
40	None	10	10	10	10
41	None	10	10	10	10
42	None	10	10	10	10
43	None	10	10	10	10
44	None	10	10	10	10
45	None	10	10	10	10
46	None	10	10	10	10
47	None	10	10	10	10
48	None	10	10	10	10
49	None	10	10	10	10
50	None	10	10	10	10
51	None	10	10	10	10
52	None	10	10	10	10
53	None	10	10	10	10
54	None	10	10	10	10
55	None	10	10	10	10
56	None	10	10	10	10
57	None	10	10	10	10
58	None	10	10	10	10
59	None	10	10	10	10
60	None	10	10	10	10
61	None	10	10	10	10
62	None	10	10	10	10
63	None	10	10	10	10
64	None	10	10	10	10
65	None	10	10	10	10
66	None	10	10	10	10
67	None	10	10	10	10
68	None	10	10	10	10
69	None	10	10	10	10
70	None	10	10	10	10
71	None	10	10	10	10
72	None	10	10	10	10
73	None	10	10	10	10
74	None	10	10	10	10
75	None	10	10	10	10
76	None	10	10	10	10
77	None	10	10	10	10
78	None	10	10	10	10
79	None	10	10	10	10
80	None	10	10	10	10
81	None	10	10	10	10
82	None	10	10	10	10
83	None	10	10	10	10
84	None	10	10	10	10
85	None	10	10	10	10
86	None	10	10	10	10
87	None	10	10	10	10
88	None	10	10	10	10
89	None	10	10	10	10
90	None	10	10	10	10
91	None	10	10	10	10
92	None	10	10	10	10
93	None	10	10	10	10
94	None	10	10	10	10
95	None	10	10	10	10
96	None	10	10	10	10
97	None	10	10	10	10
98	None	10	10	10	10
99	None	10	10	10	10
100	None	10	10	10	10

The 60 patients in group 1 (10 men and 10 women for each of three doctors) were asked to help by accompanying the experimenter (SR) to an interview room, where they completed the low vocabulary MALC stress and arousal scale. This requires the independent presentation of 28 single word items to subjects, who then "pen" each under the most appropriate of four headings (I definitely feel, I think I feel, I don't think I feel, I definitely don't feel). The patients were told that the doctor they had arranged to see would like to video record their consultation in connection with the research project and they were offered the opportunity to decline. If they did not object written consent was obtained. They were asked to return to the experimenter after the consultation. The doctor was told to record selected patients by a marker in the patient's notes. After the consultation patients completed the stress and arousal scale again and confirmed that video recording had taken place.

A further 60 patients in groups 2 and 3 were treated in the same manner, but during these consultations the doctor had access to a computer terminal on his desk, which he used as his discussion.

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Doctors A, B, and C are the three male principals in a rural general practice, run from a modern purpose built health centre. On average they use the computer in 65% of those consultations for which it was available (52%, 65%, and 55% for doctors A, B, and C, respectively). The video recording of consultations in which the computer was available for use were viewed and subdivided according to whether or not the computer had actually been used. This gave three groups for analysis.

The three groups were then compared with respect to stress and arousal changes, and the video recordings were assessed for consultation duration; preventive care was included in the consultations.

RESULTS

MEASUREMENT CHECKLIST

The changes in stress and arousal before and after the consultation are shown in table II. The three groups were compared using 2x2x2 tests, presuming the most desirable outcome of any consultation to be decreased stress and increased arousal with any other result constituting a less desirable outcome. There were insufficient data to compare individual doctors, so all statistical tests were applied to the totals for all three doctors.

TABLE II—Changes in stress and arousal before and after consultation

Group	Stress		Arousal	
	Less desirable outcomes or no change	Desirable outcome decrease	Less desirable outcomes or no change	Desirable outcome decrease
1				
1a	5	15	9	11
1b	6	14	10	10
1c	6	14	9	11
1 Total	17	43	28	31
2				
2a	2	1	2	1
2b	2	4	4	4
2c	1	4	2	4
2 Total	6	15	8	15
3				
3a	1	12	1	14
3b	2	11	4	9
3c	7	82	4	38
3 Total	10	105	9	61