Be Well!: A Computer-Based Health Care Interview for Hospital Personnel

**Warner V. Slack, M.D., Charles Safran, M.D., Hollis B. Kowaloff, B.A.,
Jennifer Pearce, M.B.A., M.P.H., Thomas L. Delbanco, M.D.**
Center for Clinical Computing, Harvard Medical School, Departments of Psychiatry
and Medicine, Beth Israel Hospital and Harvard Medical School, Boston Massachusetts

We developed a computer-based health care interview for employees at an urban teaching hospital. The interview is part of the hospital-wide, integrated Center for Clinical Computing (CCC) system at the Beth Israel Hospital in Boston, and is available on 1500 terminals located throughout the hospital. The program emphasizes medical problems and patterns of living for which behavioral change is considered desirable. Conducted in private and with protection of confidentiality, the interview offers information about people and facilities available to help members of the hospital community seek better health. Between May 15, 1990, and May 14, 1992, a total of 1281 people completed the interview, and 84% indicated an interest in one or more of the health-related programs offered by the hospital.

That these are difficult times in America was illustrated by the unhappiness reported by 43% of the participants, including 5% who indicated that life sometimes seemed not worth living. We hope they availed themselves of the opportunity offered by the interview to obtain help for their problems, and that other hospitals will do what Beth Israel Hospital is doing to promote well-being among its employees.

INTRODUCTION

Boston's Beth Israel Hospital, a major teaching hospital of the Harvard Medical School, has approximately 5100 employees and an additional 1000 clinicians with staff appointments and hospital privileges. In 1985, the hospital implemented Johnson and Johnson's Health Management, Inc., "Live for Life" program. This voluntary service, which was designed to promote physical and emotional well-being among the hospital's personnel, consisted of a self-administered (pencil-and-paper) health questionnaire, health education classes, and an exercise fitness center. In 1990, Beth Israel Hospital converted "Live for Life" to "Be Well!," the hospital's own employee health management program. In conjunction with this conversion, we replaced the paper questionnaire with a computer-based "Be Well!" interview.

The use of a digital computer to take a medical history was described more than 25 years ago [1], and computer-based medical interviewing has been under investigation ever since [2]. Computer-based interviews have been written to take general medical histories [3-7] and histories in various specialties, including surgery [8], psychiatry [9-12], neurology [13-15], nephrology [16], and nutrition [17,18]. The computer has been studied as a means to offer instruction, counseling, and therapy directly to patients by the process of interactive dialogue [10,16,18,19]. And in a recent study, a computer-based interview was used successfully to screen blood donors for the risk of HIV transmission [20]. It is now well recognized that patients respond favorably to computer-based interviews that are carefully written, and that people are often more responsive when potentially embarrassing questions are posed by a computer rather than by a human interviewer [4,12,21-25].

In the development of Beth Israel Hospital's Be Well! interview, we used principles derived from our research with patient-computer dialogue [1,4,9,10, 12,14-16,18,20]. In the following article, we describe the computer-based interview and provide data on the extent of its use and the satisfaction of its users.

METHODS
The Interview
The interview begins with words of welcome, information about how to proceed, a brief discussion of the purpose of the program ("We hope we can help you discover how your life style affects your health and what you can do to improve your health"), and assurances that all responses will be kept in con-

fidence and made available to clinicians only at the request of the respondent. Next, there is a series of frames that teach the inexperienced user how to operate the computer terminal, how to change answers and back up to previous questions, and how to use responses to indicate uncertainty, such as "don't understand," in case of incomprehension, "maybe (don't know)," in case of irresolution, and "skip it,"in case of reluctance to respond.

The interview itself begins with a section to elicit demographic information, with emphasis on the circumstances of each participant's employment at the hospital. The computer then lists the seven health-related sections that the interview comprises and offers participants the opportunity to select the sections in the order of their personal preference. The "general medical history" consists of a brief family history followed by a review of systems, with emphasis on medical problems and patterns of living for which behavioral change is considered desirable. The "nutrition" history contains questions about meals, snacks, and binge eating [26]; the "exercise" history deals with patterns of physical exercise; the "habits" section contains questions about use of tobacco, alcohol, and drugs; the "safety" section deals with risks encountered and precautions that can be taken in conjunction with a person's life style at home and at work and his or her means of transportation (e.g., by automobile, bicycle, or motorcycle); the "environment" section asks questions about possible environmental hazards at home and at work; and the "stress" section deals with symptoms and possible causative factors related to stress, anxiety, and depression at work and in private life.

Upon completion of each section, the program offers to display a summary of the information provided, and at the end of the interview, the program offers a clinical evaluation of problems that could be favorably influenced by changes in behavior. In addition, en route through the interview the program offers information about referral services. If, for example, a person indicates that he or she is depressed and that "life sometimes seems like it's not worth living," the program provides the names and telephone numbers of places to turn to for help — the Employee Assistance Program, the Samaritans, and the hospital's emergency room.

Upon completion of the interview, each participant is invited to answer a series of questions designed to elicit his or her opinion of the session. The

participant is then offered the opportunity to visit the nurse in the Be Well! clinic for a follow-up medical evaluation and the opportunity to participate in one or more of the hospital's health management programs. If he or she elects to follow the computer interview with a visit to the Be Well! clinic, the nurse in atten-dance will, at the participant's request, print a detailed summary of the interview, for use by both nurse and participant, which contains suggestions and recommendations for future courses of action.

Access to the Interview

Written in Converse, a programming language designed for patient-computer dialogue [27], the Be Well! interview is part of the hospital-wide, integrated Center for Clinical Computing (CCC) system and is available on any one of the 1500 terminals located throughout the hospital [28-30]. Each authorized user gains access to the interview by means of a unique computer-assigned confidential password, or key. Employees whose jobs do not entail routine use of the CCC system are given special passwords that grant access to the interview on computer terminals located in the Be Well! office and the department of employee health. The com-puter-assigned password that identifies each user provides an electronic signature, kept in confidence, for each transaction with the computer. We have used these signatures to determine the frequency with which the Be Well! interview has been used by hospital personnel and the results of each interview.

RESULTS

Between May 15, 1990, and May 14, 1992, 1281 people (941 women and 340 men) completed the Be Well! interview. Each interview took about 30 minutes from start to finish. Most of the participants (97%) were between 20 and 59 years of age. Six hundred fifty-five participants (51%) classified themselves as "professional," 282 (22%) as "clerical or secretarial," 126 (10%) as "technical," 74 (6%) as "managerial," 28 (2%) as "service workers," and 98 (8%) as "other"; 18 (1%) preferred not to answer.

During the course of the interview, a large number of participants indicated an interest in becoming better informed about the health-related programs offered by the hospital — 883 (69%) for the physical fitness center, 465 (36%) for the stress reduction program, 296 (23%) for the "time management" program; 192 (15%) for the low-back protection program; and 86 (7%) for the smoking-cessation program. For participants who expressed a desire to be contacted

directly, this information was made available to the Be Well! nurse for use in guiding them to the appropriate programs.

It is clear from the results of the interviews that many of the participants were eager to obtain additional health-related information from the nurse in the Be Well! clinic. In response to the question "Would you like to get some more information [about safe sex practices] when you visit with the Be Well! nurse?," 190 people (15%) answered "yes." In response to "Do you have any questions about birth control?," 118 people (9%) answered "yes," and of these, 95 (81%) answered "yes" to the question "Would you like to talk about this when you visit with the Be Well! nurse?"

Real and potential difficulties in life were common among hospital personnel, as indicated by their responses during the interview. In response to the question "In the past month have you felt sad, discouraged, or hopeless?" 546 people (43%) answered "yes" and an additional 129 (10%) answered "maybe" (26 people preferred not to answer). In response to a follow-up question — "In the past month has life sometimes seemed like it's not worth living? — 68 people (5%) answered "yes" and 41 (3%) answered "maybe."

As has been our experience with other computer-based interviews [1,4,10,12,20], participants reacted favorably to the Be Well! interview. The majority found their time with the computer worthwhile — 549 (43%) answered "yes, definitely" and 558 (44%) answered "yes, maybe" — and 880 (69%) found their experience "interesting." For the most part the questions were deemed comprehensible — 1245 participants (97%) found them "easy to understand." In response to the question, "[whom] would you prefer to have this health screen with?," added half way through the year of study and asked of 502 participants, 238 (47%) indicated no preference and 16 (3%) preferred not to answer. But the computer came out ahead in comparison with a human interviewer. Whereas 60 participants (12%) indicated a preference for a nurse or doctor, 188 (37%) indicated a preference for the computer.

Of the 1281 participants who completed the computer-based interview, 517 (40%) availed themselves of the opportunity to visit the Be Well! nurse for a follow-up evaluation and to consider entering one or more of the Be Well! programs.

DISCUSSION

The hospital-wide CCC computing system is used many thousands of times each day, both by laboratory and departmental workers whose jobs require them to use the computer, and by clinicians who find the computer to be indispensable as they care for their patients on a day-to-day basis [28-30]. For these people, who are signing onto the computer many times each day in the course of their work, the Be Well! interview is readily available as one of the programs in the "Utility Option" menu. These people are accordingly disproportionately represented among those who have taken the interview. In the future, we hope to install additional terminals, conveniently located for hospital workers whose only use of the CCC system at present would be the Be Well! interview.

In response to the question, "Did the computer sometimes ask you more than you wanted to tell?," 204 participants (16%) answered "yes." By contrast, in response to the question, "Did you sometimes want to tell the computer more than it asked?," 632 participants (49%) answered "yes." It seems clear that we will need to make some additions and subtractions at the time of future revisions of the interview.

These are difficult times for many people in America, and this was graphically illustrated by the high incidence of unhappiness (43%) among those who completed the interview, including an alarming 5% of all participants who indicated that life sometimes seems like it's not worth living. We hope that these unhappy people moved quickly to avail themselves of the opportunity offered by the computer-based interview to obtain help for their problems. Personnel in American hospitals and clinics, whose mission is to minister to the needs of others, often suffer undue physical and emotional hardships of their own, both in the course of their work and in their private lives. In the spirit of charity beginning at home, we hope other hospitals will do what Beth Israel Hospital is doing to promote well-being among its own employees.

When asked to compare the computer-based interview with an interview with a doctor or nurse, more participants indicated a preference for the computer, a finding that we have reported previously [4]. It must be kept in mind, however, that the *computer* was doing the asking. Had a nurse or doctor posed the same question, it is possible that the preference

14

would have been reversed. In an earlier study of a computer-based medical history [4], some respondents answered "yes" to preferring the computer *and* "yes" to preferring the doctor, apparently not wanting to hurt either one's feelings. One thing that was clear from these results was that human beings are not always Aristotelian in their logic.

It can be argued that the largest yet least utilized health care resource, worldwide, is the patient or prospective patient [31]. There are a number of common, important medical problems, in our opinion, such as sore throat and urinary tract infection, that the patient could manage alone, if he or she were provided with the clinical information necessary to do so wisely and well. Whether clinical management, preventive or remedial, is primarily the responsibility of the professional or the patient is often, it seems, dictated by forces of supply and demand. If, for example, the biochemistry of insulin or the physiology of the pancreas were such that the juvenile diabetic needed but one injection per year, it is likely that the academic endocrinologist in a teaching hospital would be administering the insulin, and at considerable expense. If the child needed an injection every six months, the pediatric diabetologist would be the agent of delivery; if every three months, it would be the primary care physician; and if once a month, the nurse practitioner. But since the child needs the insulin at least once a day, the parent or child is responsible for administering the injection, without assistance. And for the most part the parent or child does so with admirable skill (and personal convenience) and at a small fraction of the cost of comparable care at the professional level.

The Be Well! interview is now in routine use at Beth Israel Hospital. With the rapidly increasing concern in the United States about the high cost of medical care, there is more and more reason to look for good ways to involve people further in the delivery of their own medical care — ways that will at once improve the quality of preventive and remedial care and reduce the costs of administrative and professional services. In so doing, it is essential that patients and prospective patients be made welcome participants in the process of medical decision making — a shift of control that we have long advocated [32,33]. In this spirit, the Be Well! programs of the Beth Israel Hospital are offered to hospital personnel, offered with the hope that they will involve people further in the delivery of their own medical care.

REFERENCES

[1] Slack WV, Hicks GP, Reed CE, Van Cura LJ. A computer-based medical history system. N Engl J Med 1966; 274: 194-8.

[2] Slack WV. A history of computerized medical interviewing. MD Comput 1984; 1: 52-9.

[3] Slack WV, Van Cura LJ. Computer-based patient interviewing. Postgrad Med 1968; 68-120.

[4] Slack WV, Van Cura LJ. Patient reaction to computer-based medical interviewing. Comput Biomed Res 1968; 1: 527-31.

[5] Mayne JG, Weksel W, Sholtz PN. Toward automating the medical history. Mayo Clin Proc 1968; 43: 1-25.

[6] Coombs GJ, Murray WR, Krahn DW. Automated medical histories: factors determining patient performance. Comput Biomed Res 1970; 3: 178-81.

[7] Grossman JH, Barnett GO, McGuire MT, Swedlow DB. Evaluation of computer-acquired patient histories. JAMA 1971; 215: 1286-91.

[8] Peckham BM, Slack WV, Carr WF, Van Cura LJ, Schultz AE. Computerized data collection in the management of uterine cancer. Clin Obstet Gynecol 1967; 10: 1003-15.

[9] Maultsby MC, Slack WV. A computer-based psychiatric history system. Arch Gen Psychiatry 1971; 25: 570-2.

[10] Slack WV, Slack CW. Patient-computer dialogue. N Engl J Med 1972; 286: 1304-9.

[11] Greist JH, Gustafson DH, Strauss FF, Rowse GL, Laughren TP, Chiles JA. A computer interview for suicide-risk prediction. Am J Psychiatry 1973; 130: 1327-32.

[12] Slack WV, Porter D, Balkin P, Kowaloff HB, Slack CW. Computer-assisted soliloquy as an approach to psychotherapy. MD Comput 1990; 7: 37-58.

[13] Stead WW, Heyman A, Thompson HK, Hammond WE. Computer-assisted interview of patients with functional headaches. Arch Intern Med 1972; 129: 950-5.

[14] Bana DS, Leviton A, Swidler C, Slack WV, Graham Jr. A computer-based headache interview: acceptance by patients and physicians. Headache 1980; 20: 85-9.

[15] Chun RW, Van Cura LJ, Spencer M, Slack WV. Computer interviewing of patients with epilepsy. Epilepsia 1976;17: 371-5.

[16] Fisher LA, Johnson TS, Porter D, Bleich HL, Slack WV. Collection of a clean voided urine specimen: a comparison among spoken, written, and computer-based instructions. Am J Public Health 1977; 67: 640-4.

[17] Evans SN, Gormican A. The computer in retrieving dietary history data. I. Designing and evaluating a computerized diabetic history. J Am Diet Assoc 1973; 63: 397-407.

[18] Witschi J, Porter D, Vogel S, Buxbaum R, Stare FJ, Slack WV. A computer-based dietary counseling system. J Am Diet Assoc 1976; 69: 385-90.

[19] Selmi PM, Klein MH, Greist JH, Sorrell SP, Erdman HP. Computer-administered therapy for depression. MD Comput 1991; 8: 98-102.

[20] Locke SE, Kowaloff HB, Hoff RG, et al. Computer-based interview for screening blood donors for risk of HIV transmission. JAMA 1992; 268: 1301-5.

[21] Van Cura LJ, Jensen NM, Greist JH, Lewis WR, Frey SR. Venereal disease: interviewing and teaching by computer. Am J Public Health 1975; 65: 1159-64.

[22] Lucas RW, Mullin Pj, Luna CBX, McInroy DC. Psychiatrists and a computer as interrogators of patients with alcohol-related illnesses: a comparison. Br J Psychiatry 1977; 131: 160-7.

[23] Greist JH, Klein MH. Computer programs for patients, clinicians, and researchers in psychiatry. In: Sidowski JB, Johnson JH, Williams TA, eds. Technology in mental health care delivery systems. Norwood, Conn: Ablex, 1980, 161-82.

[24] Carr AC, Ghosh A, Ancill RJ. Can a computer take a psychiatric history? Psychol Med 1983; 13: 151-8.

[25] Millstein SG, Irwin CE Jr. Acceptability of computer-acquired sexual histories in adolescent girls. J Pediatr 1983; 103: 815-19.

[26] Witschi JC, Kowaloff HB, Slack WV. An interactive dietary interview for hospital employees. MD Comput 1993; 10: 216-24.

[27] Bloom S, White R, Beckley R, Slack W: Converse: a means to write, edit, administer and summarize computer-based dialogue. Comput Biomed Res 1978; 11: 167-75.

[28] Bleich HL, Beckley RF, Horowitz GL, et al. Clinical computing in a teaching hospital. N Engl J Med 1985; 312: 756-64.

[29] Safran C, Slack WV, Bleich HL. Role of computing in patient care in two hospitals. MD Comput 1989; 6: 141-8.

[30] Bleich HL, Safran C, Slack WV. Departmental and laboratory computing in two hospitals. MD Comput 1989; 6: 149-55.

[31] Slack WV. Patient counseling by computer. In: Zoog S, Yarnall S, eds. The changing health care team. Seattle, Wa: Medical Communications and Services Association 1976, 108-11.

[32] Slack WV. The patient's right to decide. Lancet 1977; 2:240.

[33] Delbanco TL. Enriching the doctor-patient relationship by inviting the patient's perspective. Ann Intern Med 1992; 116:414-18.