

# Evaluation Of Touchtone Telephone For In-home Completion Of HealthQuiz™ Preoperative Assessment Questionnaire

D Mingay, M Roizen, M Belkin, L Headley, J Foss

## Citation

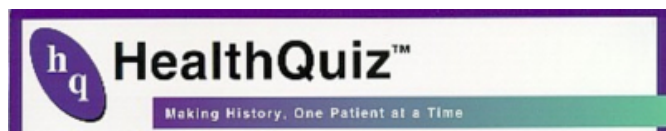
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## Abstract

HealthQuiz is a preoperative assessment questionnaire that patients take on a computer with Internet connectivity. To accommodate patients without Internet access we developed an automated touchtone telephone administration system for HealthQuiz. To evaluate the new system, we asked 80 patients to take the questionnaire before a scheduled appointment in the preoperative clinic. Twenty-one percent failed to complete HealthQuiz before their appointment. The reasons given were inability to use the system, forgetting to call, cost of a long-distance call, and illness. Most patients who completed the questionnaire gave high overall ratings for the task, and for the interview pace, voice clarity, task simplicity, and convenience. Only its length (median time of 23 minutes) was criticized by a substantial number. The results suggest that if simple response categories are used, medical questionnaires averaging longer than 20 minutes can be successfully administered by automated touchtone telephone.

These results were presented as a poster at the 1999 meeting of the American Society of Anesthesiologists (Anesthesiology 1999;91:A1201). More information about HealthQuiz is available at [www.healthquiz.com](http://www.healthquiz.com)

## Figure 1



## INTRODUCTION

HealthQuiz (University Community Healthcare Inc., 5741 S. Drexel Avenue, Chicago, IL 60637) is a preoperative assessment questionnaire that patients take on a computer with Internet connectivity.<sup>1</sup> Depending on age, gender, and responses to specific health-related questions, the patient spends 15-25 minutes answering between 104 and 140 questions. A report is then generated that shows health areas needing attention, provides a risk index based on the patient's physical status, and suggests laboratory tests based on patient history (<sub>1</sub>). Studies have shown that HealthQuiz is well-accepted by patients, has high test-retest reliability, lowers costs by reducing unnecessary testing and OR delays,

and has sensitivity and specificity at least as great as tests ordered by anesthesiologists and surgeons (<sub>2</sub>).

HealthQuiz is most cost-effective if taken by patients from home before their preoperative clinic visit (<sub>3</sub>). This lowers clinic costs and improves efficiency by identifying patients who do not need a preoperative clinic visit; indicating the approximate visit length for those who do; and avoiding the costs, space requirement, and disruption to patient flow of in-clinic administration of HealthQuiz. If no preoperative visit is scheduled, HealthQuiz is best taken from home several days before surgery so that there is time to obtain indicated tests, consultations, and therapies.

Approximately 80 percent of our surgical patients report that they do not have Internet access at home or work and thus are unable to take HealthQuiz without coming into the clinic. In contrast, over 95 percent have touchtone telephone service in their homes. Thus, we developed a system by which patients could take HealthQuiz from their homes using a touchtone telephone. An Interactive Voice Response (IVR) version of HealthQuiz was prepared using the Dialogic 41/ESC IVR system (Dialogic Corporation, 1515 Route 10, Parsippany, NJ 07054). In a preliminary study that relied on usability testing methods (<sub>4</sub>), patients were observed and administered questions while they took

telephone HealthQuiz and afterwards. Based on the findings, we made some changes to the system to reduce errors and make the task easier and more satisfying. The purpose of the study described here was to evaluate two methods of administering telephone HealthQuiz in a clinical setting.

METHODS

Fifty orthopedic surgery patients were given an instruction sheet in the surgeon’s clinic by the surgeon’s nurse and asked to complete HealthQuiz by telephone from home before an appointment at our Preoperative Clinic. A clinic employee telephoned 30 other consecutive surgical patients with verbal instructions for taking HealthQuiz before their clinic appointment. Using a touchtone telephone, the patient called a telephone number at any time that was convenient, entered his/her identifier number, and responded to voice digitized survey questions by pressing keys on the telephone keypad. Several of the first heard demographic questions required numeric answers; for example, the patient’s age, height, and weight. All of the preoperative questions were answered with yes, no, or not sure, by pressing 1, 2, or 3, respectively. To hear a question again, to change an answer, or to postpone the interview until later the patient could press \*, 0, or #, respectively.

Within 24 hours of completing HealthQuiz or their clinic visit, patients were debriefed via telephone by the investigator (DJM). Patients were asked a total of 24 questions that were in the form of rating scales and yes/no, multiple-choice, and open-ended questions. These questions asked about the patient’s ability to do the task, the reactions to it, and the circumstances under which the questionnaire was taken.

Figure 2

Figure 1: Patient view screen



Figure 3

Figure 2: Demographic question from the Preoperative HealthQuiz

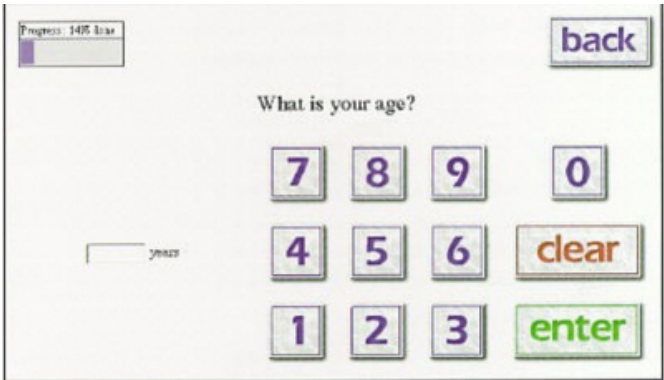
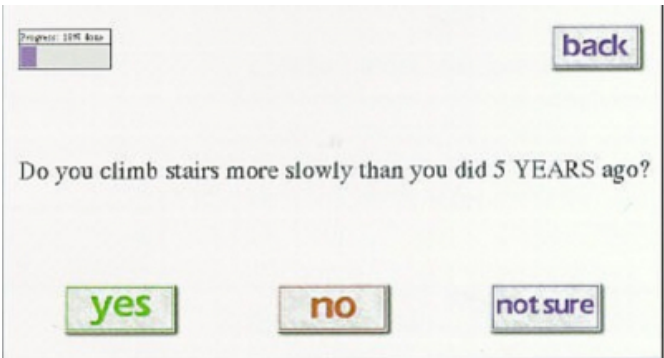


Figure 4

Figure 3: Question question from the Preoperative HealthQuiz



ETHICS

The procedures followed with human subjects were in accord with the institution’s Internal Review Board (IRB), and of the Helsinki Declaration of 1975, revised in 1983.

RESULTS

Only two patients refused to take telephone HealthQuiz (six who seemed confused about the task or were older than 85 were not asked to take it). Seventeen patients (21%) failed to complete the questionnaire before the clinic visit, because of inability to use the system (6 patients), forgetting to call (5 patients), cost of a long-distance call (4 patients), and feeling too ill (2 patients). Overall, 63 patients (79%) completed HealthQuiz (median age 56 years with 13 aged 66-85 years). The completion rate was significantly higher for the orthopedic patients asked to do the task in-person by the surgeon’s nurse (43 of 50: 86%) than for the surgical patients who were telephoned by a Preoperative Clinic staff member (20 of 30: 67%; chi-square=4.19, 1 d.f. p<.05). Almost all patients reported finding it easy to answer the

questions by pressing keys (mean rating of 1.67; 0, very easy; 10, very difficult). The majority of patients gave high ratings for the other aspects of the task they were asked about, including interview pace, voice clarity, task simplicity, and the convenience of taking the questionnaire from home.

Overall liking for the task on a scale from 0, very much disliked, to 10, very much liked, was 8.2. Only six said yes or not sure to whether HealthQuiz was difficult or somewhat difficult to use. None reported requiring help answering the questions. Only its length (median completion time of 23 minutes) received a substantial number of negative ratings. Twenty-five percent of patients rated the questionnaire as much too long and 16% rated it as a little too long. Five of the six patients for whom the task required a long distance call reported a preference for a local or toll-free call. All reported that they were likely to be as truthful with HealthQuiz as with their doctor. Debriefing questions that asked how different tasks could be carried out suggested that at least 50% of patients did not understand how to repeat a question or change an answer, although few reported wanting to perform these actions.

## Figure 5

Figure 4: Physician's report

PreOp Physician Report for: EGO 414.9 (Dr. Jack)	
Package dated 12/12/2011 1:30PM, Serial 12/12/2011 1:30PM - regular with 17 min	
<b>Symptoms Review</b>	<b>Demographics</b>
<ul style="list-style-type: none"> <li>Bleeding/bruising</li> <li>Easy bruising</li> </ul>	Hx: 1.3 BMI: 29.1 kg/m <sup>2</sup> BP: 106 mmHg HR: 66 mmHg Wt: 212 lbs Ht: 72 in Race: Caucasian Age: 45 yrs Gender: Male Duration: 24 min
<b>EGO 414.9</b>	<b>Allergies</b>
The following code was suggested:	No Allergies
Hx: 1.3 BMI: 29.1 kg/m <sup>2</sup> BP: 106 mmHg HR: 66 mmHg Wt: 212 lbs Ht: 72 in Race: Caucasian Age: 45 yrs Gender: Male Duration: 24 min	<b>Suggested LABS</b>
Hx: 1.3 BMI: 29.1 kg/m <sup>2</sup> BP: 106 mmHg HR: 66 mmHg Wt: 212 lbs Ht: 72 in Race: Caucasian Age: 45 yrs Gender: Male Duration: 24 min	TGO 414.9 WBC 90.00
<b>Medications</b>	<b>Tobacco/ETOH/IVDA</b>
Aspirin 81mg Ibuprofen 400mg Acetaminophen 650mg	No tobacco No alcohol No IVDA

## DISCUSSION

Whether invited in-person or by telephone, most patients were willing and able to complete HealthQuiz from home by using a touchtone telephone. The majority reported high levels of satisfaction with the task. Obtaining a health history before a patient's preoperative clinic visit or surgery admission should lower costs and improve quality of care, provide greater convenience for the patient and anesthesiologist, and improve the efficiency of the health system.

Although the overall results were positive, the findings suggested ways to improve the response rate, reporting accuracy, and satisfaction with the task. Changes subsequently made included switching to a toll-free number, giving patients the instruction sheet in the surgeon's clinic whenever possible, alerting them to the length of the questionnaire, and stressing the benefits of completing it. In addition, the instructions heard on the telephone were shortened to reduce the duration of the call, and written and verbal instructions were modified to emphasize how to hear a question again and how to change an answer.

The successful use of an automated telephone system and its convenience and low cost suggest that the method may be useful for administering other questionnaires in clinical and research settings. Possible applications include administering patient satisfaction surveys, collecting repeated pain severity ratings of chronic pain patients, and tracking postoperative complications.

## References

1. Roizen MF, Coalson D, Hayward RSA, Schmittner J, Thisted RA, Apfelbaum JL, et al. Can patients use an automated questionnaire to define their current health status? *Med Care* 1992;30:MS74-84.
2. Lutner RE, Roizen MF, Stocking CB, Thisted RA, Kim S, Duke PC, et al. The automated interview versus the personal interview. *Anesthesiology* 1991;75:394-400.
3. Mingay DJ, Farrell S, Belkin M, Kim R, Hanlon M, Roizen MF. Development of an automated telephone administration system for the HealthQuiz preoperative assessment questionnaire. *Anesth Analg* 1999;88:S43.
4. Nielson J, Mack RL. Usability inspection methods. New York (NY): Wiley; 1994.

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