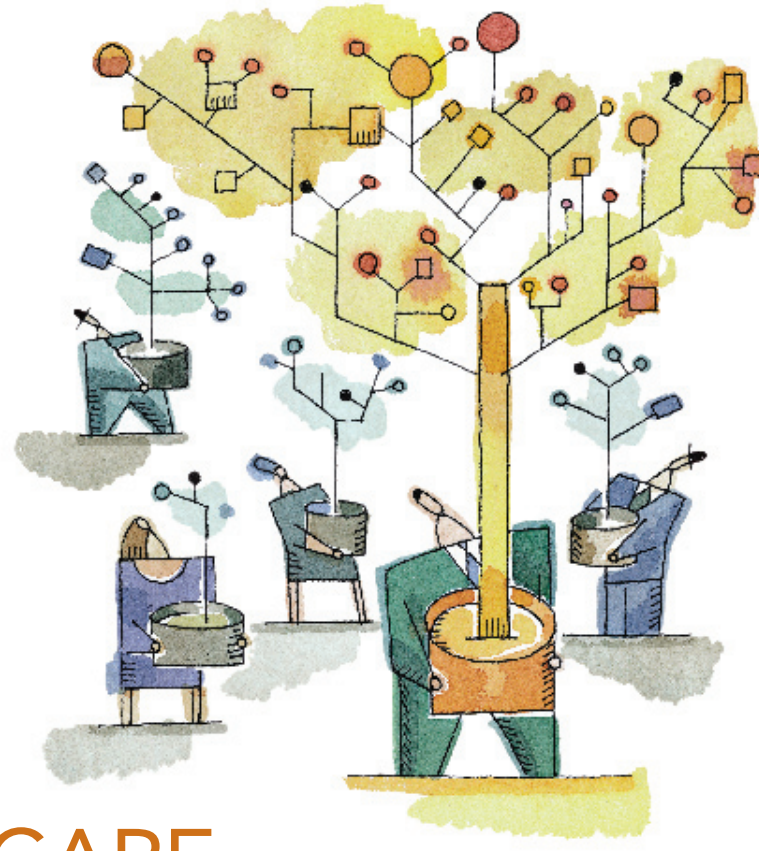
One of the biggest challenges of using an electronic health record (EHR) system is how to fill it with patient data. What data should be entered, who should enter it, and when should it be done? I've seen many strategies tried, and in my experience the ideal solution is to have patients enter as much data as possible themselves before beginning a patient visit. This saves physicians time and can even lead to higher-quality data. After all, the patient is the person most interested in providing a thorough history.

This article is intended to help you decide whether you want to have your patients enter their own histories and, if the answer is yes, to settle on the best approach. It is based on both my experience and literally thousands of studies done during the past 40 years. Patient-entered histories have proven to be effective, and the time a patient-entered history can save leaves you time to do an unhurried assessment and plan. Better yet, some vendors have now moved to the Web, so patients can do their histories easily at home.



ROBIN JAREAUX

IMPROVING CARE WITH AN AUTOMATED PATIENT HISTORY

The best way to fill your EHR with patient data might be to let your patients do it themselves.

JOHN BACHMAN, MD

Alternative histories

There are bound to be advantages and disadvantages to whatever method you choose for collecting patient data and getting it into an EHR. Here's a rundown of the most common strategies:

Electronic templates filled in by physicians or nurses. This strategy involves creating electronic templates for the EHR that list questions to be posed to patients in the exam room, with their answers entered into the computer by a nurse or a physician.

The obvious disadvantage of this method is lost productivity, but the disadvantages go beyond that. Although family physicians are good at multitasking, they should avoid trying to fill in templates during a patient visit. That time should be spent talking with and treating the patient. Using templates interferes with both the normal flow of open-ended questions and the physician's focus on the patient's reactions and mannerisms. Patients would like physicians to look at them, not at a computer

DESPITE PHYSICIANS' RESERVATIONS, 90 PERCENT OF PATIENTS IN MOST PRACTICES CAN USE THIS SORT OF SYSTEM.

screen, when they are telling their stories. Moreover, most templates use yes/no questions that patients could easily do themselves if they were allowed.

Paper templates filled in by patients. With the paper method, the patient fills out a paper questionnaire, which is then scanned to populate some of the EHR's fields with the patient's responses.

The method has a handful of advantages:

- It is familiar.
- It is simple.
- It saves the time it would take to ask the questions.

However, its limitations might outweigh those advantages:

- Some patients will fail to fill out forms completely. When that happens, the physician or the practice's staff members will have to use valuable time updating and filling out the incomplete forms electronically.
- You will need to process the paper questionnaires with a scanner, which you'll need to buy. Afterward, the forms will need to be shredded and discarded. These steps insert inefficiency into your practice.
- It might be difficult to quickly revise a paper questionnaire whenever a new question is needed (e.g., during a bird flu epidemic).
- Paper questionnaires tend to provide a high number of false-positive responses. A patient might mention a symptom without defining the severity. At the Mayo Clinic, it was determined that, even after giving three sets of paper questionnaires, each one based on the preceding one, there were still many false-positive responses.[1-3]

Interactive computerized interviews filled in by patients. This method, in my opinion, is the ideal solution. Because the interview is computerized, the patient's answers to questions at one point in the interview can determine the questions asked later; this ability to follow any of a number of designed-in branches of inquiry is one of the most important distinctions between these computerized interviews and paper questionnaires. Using one of the systems now on the market, the patient can do his or her part on a Web-based portal from home or in the waiting room before an office visit (see "Currently available systems" on page 41). The physician can then edit the patient's work, rather than doing all the data input. A few editorial changes might be needed, but the bulk of the work can be done before the patient encounter starts. Reviewing a structured history that the patient has provided can be done quickly and efficiently.

The advantages of using patient-entered data are numerous:

- Physicians receive more data than they would from a conventional history.[4] Computer programs generally provide more information than physicians document. Examples include interviews related to infertility (2.9 times as much data) and general gynecology (1.6 times as much data).[5] One study found 35 percent more information in histories gathered by computers,[6] while another study found 56 percent more information in such histories.[7] Yet another study discovered a program on life events that revealed 40 percent more important new information, and this information led to improved communication with 22 percent of patients.[8]
- Patients like it. Despite physicians' reservations, 90 percent of patients in most practices can use this sort of system.[9] Elderly patients are slower but more accurate than young people.[10]
- Interpreters can be put to better use. One of the available systems offers a Spanish-language version that allows a comprehensive history to be taken without an interpreter and then outputs the responses in English. Another has 30 different languages available. These programs allow you to spend more time with

Patients can enter data about themselves into electronic health records using interactive computer interviews in the waiting room or at home on the Web.

In computerized interviews, patients' answers to questions at one point in the interview determine which questions will be asked later.

Studies show that physicians receive more data using computerized patient interviews than they do from conventional patient histories.

About the Author

Dr. Bachman, a family physician, is the Saunders Professor of Primary Care at the Mayo Foundation, Rochester, Minn. Author disclosure: nothing to disclose.

the interpreter on assessment and planning.

• Patients are better organized after completing the computer questionnaire.[8,11]

• Patients are more likely to reveal social secrets to a computer than to a physician as shown in studies on a number of subjects, including suicide,[12] psychiatric evaluation[13] and adolescent drug use,[14] to name a few.

• The programs can produce scales that help measure the severity of illnesses (e.g., the Epworth sleepiness scale) or the likelihood of a problem (e.g., the Woman Abuse Screening Tool or the Zung scale assessments for depressive symptoms).

• The information is provided in a format that can easily be read before the patient visit (see the sample output on page 42). This lets the physician start the exam focused on problems identified by the patient. For example, if the patient has chest pain, then the physician talks with the patient about the nature of this pain. If the patient says he or she hasn't had surgery to remove gallstones, then it's highly unlikely that the patient has had surgery to remove gallstones. The physician can usually ignore this sort of negative response because patients can enter data into an EHR with an accuracy rate of 94 percent to 97 percent.[15]

• The physician can adjust the number of questions the patient is asked on a particular subject and, of course, can determine during the visit how many of the patient's answers to review and where to ask for additional information. For example, an ear, nose and throat specialist can set the program to ask for a high level of detail on questions related to ear, nose and throat, and a low level of detail on everything else. A family physician could set the program for a medium level of detail on all subjects. And if the patient has a litany of complaints, having the interview means that the physician is more likely to have all the relevant history at the outset of the visit, and the patient is less likely to have an "Oh, by the way" complaint at the end. The physician is better situated to decide whether to deal with a few medically significant issues on the current occasion and postpone others to a follow-up visit.

• The interview provides data that are discrete and structured. While physician-completed templates are very appropriate for other parts of the clinical examination, especially the physical examination, and for documentation of procedures, computerized patient interviews make them less necessary in the history.

• The interview has no real-time constraint because no staff labor costs are involved.

• If the patient is able to complete a previsit interview before the office visit, then the office visit is streamlined even more. The Cedar Rapids Family Practice Residency in Cedar Rapids, Iowa, provides an excellent example. If a patient calls for a pregnancy test, she is asked to come in that same day. When she arrives, she completes an automated patient history, then receives prenatal vitamins and education. She returns later for a physician visit. Their unpublished work shows that patients are happier, the clinic's no-show rate for doctor visits is dramatically reduced and the clinic's qualifications for metrics are 100 percent.[16]

• Branching computerized interviews solve the problem of false positives because a patient is not given the choice of not answering a question. They just keep going.

There are disadvantages to the electronic interview, too:

• The patient might not be able to read the materials. If this is the case, other options will be needed.

• About 10 percent of the population chooses not to do their histories on computers.

• Physicians sometimes try to confirm all the answers

About 90 percent of patients are capable of using computerized patient histories.

Elderly patients are slower but more accurate with computerized interviews than younger patients.

Physicians can adjust the number of questions patients are asked on a particular subject.

CURRENTLY AVAILABLE SYSTEMS

Here are some of the systems that allow patients to enter their own history.

EncounterSuite's TurboHX
(http://www.medicalnetsystems.com)

This program, which currently is in beta testing, is used in numerous EHR systems and patient portals.

Instant Medical History (http://www.medicalhistory.com)

This program can interface with several EHR brands.

Medisolve (http://www.medisolve.ca)

The company furnishes a computer kiosk, and the program includes 30 languages.

PATIENTS CAN ENTER DATA INTO AN EHR WITH AN ACCURACY RATE OF 94 PERCENT TO 97 PERCENT.

to the questions – try to duplicate the work of the computer – with obvious ill effects on efficiency.

The workflow

With a Web-based computerized interview system, patients log on to the system, either at home or in the waiting room or office, and enter information according to your instructions. The electronic interviews typically start by offering the patient a list of complaints. The patient selects one, and the interview proceeds in a series of simple questions and answers. At the end of the interview, the patient is asked if there are other complaints and may enter those. When all the preliminary interviewing is done, the patient's history is submitted directly to the history portion of the EHR. The electronic interview of the patient usually takes 10 to 30 minutes.

If you are already using an EHR, you should check whether it includes a system for doing patient entry. Instant Medical History is used by a number of EHR systems, including Cerner, eClinicalWorks, NextGen, Practice Partner and SOAPware. It is used in major online portals such as Medfusion. Although Instant Medical History, which costs about $50 per month, occupies more than 95 percent of the market, there are other niche players in this arena, as indicated in "Currently available systems" on page 41.

If you do not have an EHR, the patient's responses to the questionnaire can be placed on a dictation template or just printed and added to their chart.

In my practice, a simplified version of the output is printed for the patient, using language that the patient will understand. When I enter the exam room, I have reviewed the simplified version and can give the patient a copy to review. While the patient is looking at this summary, I call up the first page of the medically sophisticated version of the history in my EHR.

At this point, we are both ready and I begin the interview. My total focus is on the patient, and it's unusual for me to need to look at the computer. When we finish, we often review the history together and make any changes that need to be made. We also review other pertinent information such as prevention, ongoing treatment and other chronic problems.

More efficient, better outcomes

The desirability of this workflow seems obvious: Physicians should not do what nurses or medical assistants can do, and none of them should do what patients can and are willing to do. Time studies show that history taking in this manner is more efficient than the traditional

SAMPLE OUTPUT

This is an example of what your EHR would produce using Instant Medical History if it were set up to exclude negatives.

Chief Complaint

K.J. is a 23 year old female. Her reason for visit is "cough."

History of Present Illness

She reported: Wheezing sometimes.

Severity: She reported: Continuous cough.
Duration: She reported: Cough 7 to 10 days.
Timing: She reported: Nocturnal cough.
Context: She reported: Paroxysmal cough. Nonproductive cough.
Modifying Factors: She reported: Cough worse recumbent.
Associated Signs and Symptoms: She reported: Recent coryza improved then worsened.

Past, Family and Social History

Past Medical History
History of Sinusitis. Esophageal disease.
Social History
Activities for Daily Living
History of: 3 days in bed in last 2 weeks due to illness or injury.
Tobacco Use
History of: Smokes cigarettes every day now. Smoking cigarettes. Currently uses tobacco.

Review of Systems

Constitutional
She reported: Exhaustion and fatigue.

method and allows more time for discussing the assessment and plan.[4] Best of all, it is also associated with better clinical outcomes.[4] FPM

Send comments to **fpmedit@aafp.org.**

1. Mayne JG, Martin MJ, Morrow GW Jr, Turner RM, Hisey BL. A health questionnaire based on paper-and-pencil medium individualized and produced by computer. I. Technique. *JAMA*. 1969;208:2060-2063.

2. Martin MJ, Mayne JG, Taylor WF, Swenson MN. A health questionnaire based on paper-and-pencil medium individualized and produced by computer. II. Testing and evaluation. *JAMA*. 1969;208:2064-2068.

3. Mayne JG, Martin MJ, Taylor WF, O'Brien PC, Fleming PJ. A health questionnaire based on paper-and-pencil medium, individualized and produced by computer. 3. Usefulness and acceptability to physicians. *Ann Intern Med*. 1972;76:923-930.

4. Bachman JW. The patient-computer interview: a neglected tool that can aid the clinician. *Mayo Clin Proc*. 2003;78:67-78.

5. Bingham P, Lilford RJ, Chard T. Strengths and weaknesses of direct patient interviewing by a microcomputer system in specialist gynaecological practice. *Eur J Obstet Gynecol Reprod Biol*. 1984;18:43-56.

6. Simmons EM Jr, Miller OW. Automated patient history-taking. *Hospitals*. 1971;45(21):56-59.

7. Quaak MJ, Westerman RF, Schouten JA, Hasman A, van Bemmel JH. Computerization of the patient history – patient answers compared with medical records. *Methods Inf Med*. 1986;25:222-228.

8. Schuman SH, Curry HB, Braunstein ML, et al. A computer-administered interview on life events: improving patient-doctor communication. *J Fam Pract*. 1975;2:263-269.

9. Slack WV, Leviton A, Bennett SE, Fleischmann KH, Lawrence RS. Relation between age, education, and time to respond to questions in a computer-based medical interview. *Comput Biomed Res*. 1988;21:78-84.

10. Herzog AR, Rodgers WL. Age and response rates to interview sample surveys. *J Gerontol*. 1988;43:S200-S205.

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

12. Greist JH, Gustafson DH, Stauss FF, Rowse GL, Laughren TP, Chiles JA. A computer interview for suicide-risk prediction. *Am J Psychiatry*. 1973;130:1327-1332.

13. Carr AC, Ghosh A, Ancill RJ. Can a computer take a psychiatric history? *Psychol Med*. 1983;13:151-158.

14. Paperny DM, Aono JY, Lehman RM, Hammar SL, Risser J. Computer-assisted detection and intervention in adolescent high-risk health behaviors. *J Pediatr*. 1990;116:456-462.

15. Porter SC, Silvia MT, Fleisher GR, Kohane IS, Homer CJ, Mandl KD. Parents as direct contributors to the medical record: validation of their electronic input. *Ann Emerg Med*. 2000;35:346-352.

16. Zelnick C. Instant Medical History entered directly into Medical Logic. Presented at: Towards the Electronic Patient Record Conference, Seattle, Wash; May 14, 2002.

By having patients enter their histories before the exam, physicians can spend more time in the exam room talking to and treating patients.

In addition to increasing efficiency, computerized patient interviews have been associated with better clinical outcomes.