



Use of Electronic Mail for Postoperative Follow-up after Ambulatory Surgery

John E. Ellis, MD,* P. Allan Klock, MD,†
David J. Mingay, PhD,† Michael F. Roizen, MD‡

Department of Anesthesia and Critical Care, University of Chicago, Chicago, IL

The authors report on a patient who used electronic mail to report satisfactory recovery from ambulatory surgery and anesthesia. The potential benefits and pitfalls of using electronic mail for patient follow-up and communication, as well as research purposes, are reviewed. Potential benefits include cost savings, ease in collecting quality improvement data, and the potential for increased reporting of unpleasant events. Potential pitfalls include lack of universal access (with racial and socioeconomic differentials), privacy and security concerns, and potential slow responses to messages that might require emergent responses or actions.
© 1999 by Elsevier Science Inc.

Keywords: Ambulatory surgery; follow-up methods; cost efficiency; electronic mail.

Introduction

The majority of surgical procedures in the United States are now performed on an outpatient basis,¹ which has resulted in cost savings² while maintaining patient satisfaction.³ Information may be gathered at different times for preoperative and postoperative medical evaluation, quality improvement, and the assessment of satisfaction in outpa-

tients. As health care networks grow in size and geographical dispersion,^{4,5} these challenges may be magnified.

The recent explosion in the use of electronic communications and the Internet, including electronic mail and the World Wide Web, may provide alternative methods for preoperative evaluation as well as postoperative follow-up.

Case Report

The first author (JEE) was making rounds in the postoperative anesthesia care unit (PACU), when he was asked to evaluate a patient's readiness for discharge. The patient was a healthy 25-year-old white female triathlete, who had undergone plastic surgery (reductive mammoplasty) with general anesthesia. Her 105-minute anesthetic had consisted of 0.5% to 2.0% isoflurane in 70% nitrous oxide, 150 µg fentanyl, and 30 mg ketorolac intravenously (IV). Her stay in the PACU had been unremarkable. On questioning, she revealed that she lived alone, and only a few blocks from the hospital. She was discharged with an escort 2 hours after arrival in the PACU. At the time of discharge, she received JEE's business card, with instructions to call if she experienced any medical problems. As is routine at our institution, the business card included JEE's telephone and beeper numbers and electronic mail (e-mail) address. The next day, JEE received the following electronic mail message from her:

Subject: I'm a-okay!

Dear Dr. Ellis,

I am Dr. X's patient whom you permitted to return home yesterday...I came across your card and wanted to thank you for your concern. I seem to be doing fine after the anesthesia...I even took a five-mile walk this morning! Thanks again for letting me go home. I think it definitely worked out for the best!

*Associate Professor

†Assistant Professor

‡Professor and Chairman

Address correspondence to Dr. Ellis at the Department of Anesthesia and Critical Care, The University of Chicago, 5841 S. Maryland Ave., MC 4028, Chicago, IL 60637, USA. E-mail: j-ellis@uchicago.edu

Received for publication November 30, 1998; revised manuscript accepted for publication January 26, 1999.

Despite an episode of postoperative emesis at home, she seemed quite satisfied with her postoperative outcome.

Discussion

Increased opportunities for electronic communication have revolutionized many other industries, including banking, retail, and manufacturing. Similar changes are beginning to occur in medicine and health care.⁶ As access to the Internet branches out from expensive desktop computers to personal digital assistants, inexpensive network computers, television, electronic games, and cellular telephones, more commerce and personal interaction are expected via the Internet. At present, e-mail is probably the most widely used aspect of the Internet, although other parts of the Internet, including the World Wide Web, Usenet news groups, FTP (file transport protocol), and Telnet may be used by patients and clinicians.⁷

Obtaining postoperative or preoperative information electronically may seem impersonal, even if efficient. However, a fairly robust finding in the survey research literature is that respondents are more honest in reporting information that is socially sensitive when response is by computer questionnaire rather than to an interviewer.⁸⁻¹⁰ Our own work in a preanesthesia clinic has shown that most patients are quite willing to use an electronic device to provide a medical history and approve of such techniques.¹¹

At present, we employ a nurse who telephones surgical outpatients to assess postoperative recovery and satisfaction. The literature suggests that patients may report different levels of satisfaction, depending on the mode of questioning.¹² Additionally, in some studies, respondents' answers differed somewhat when the questions were presented visually rather than verbally.¹³ This result may occur most with long, complex questions or those with multiple response categories.

Health Care Uses of E-mail

Psychiatrists have reported using e-mail counseling to supplement face-to-face sessions in treating seriously ill patients.¹⁴ People with chronic illnesses who have been trained to use the Internet to communicate with fellow patients have found the technology very helpful.¹⁵⁻¹⁷ For example, gastroenterologists at Stanford University who sought to enroll patients with ulcerative colitis for clinical trials with a World Wide Web site found that 582 patients, in a 2-month period, had browsed the site and viewed a survey.¹⁸ Of those who browsed, 30% completed the questionnaire, and almost all (95%) who completed the questionnaire reported willingness to enroll in a study; 83% were also willing to release their medical records to verify their diagnosis. Most of these patients (>70%) had had the same e-mail address for over 2 years, suggesting that long-term follow-up could be performed electronically. Unlike the male predominance found among Internet users, the gender distribution of respondents was similar to that of patients who have ulcerative colitis. Compared with the general population, however, respon-

dents with ulcerative colitis have more education and higher household incomes. Neurosurgeons at New York University reported that a Web site generated e-mail from patients, and even new operative cases.¹⁹ Our experience with a departmental Web site has been that many lay people send unsolicited e-mail to ask physicians questions; this phenomenon has been documented in the medical literature.^{20,21} The *New York Times* described the experience of the Stanford Medical Group,²² which reports that the clinic has a central e-mail address. A nurse screens all messages and either responds or forwards them to the appropriate physician. Individual physicians varied in their willingness to share their personal e-mail addresses with patients.

Security concerns pose potentially serious problems with survey data collected by e-mail. That e-mail generally is not considered a secure communication medium may affect patients' truthfulness in answering sensitive questions. For example, in our research on patient satisfaction after prostatectomy, patients are asked questions by interviewers about erectile function and urinary incontinence.²³ It may not be appropriate to ask these types of highly sensitive questions via e-mail. However, as e-mail programs (stand-alone or generated by Web browsers) with encryption and digital signatures become more prevalent, these issues may disappear. In reality, patients appear to be more willing to disclose sensitive questions electronically than to a human interviewer.^{24,25} Recent publications have highlighted the potential privacy concerns when individuals send e-mail from accounts at work; some have suggested that patients use dedicated e-mail addresses separate from their place of employment, and that they should sign specific consent forms allowing e-mail communication with physicians.^{26,27} The American Medical Informatics Association has published guidelines for the use of e-mail by patients.²⁸ Discussion of security issues must address the reality that most breaches of confidentiality with electronic data occur by those with access to information who use it inappropriately.²⁹

For most patients, the telephone (a synchronous mode of communication) is a much more user-friendly, reliable, and immediate communication medium than e-mail (an asynchronous mode). It is the physician who may benefit most from the availability of e-mail: during pressing duties the physician is not disturbed by a page or phone call, yet he or she benefits from knowing that the patient is doing well. E-mail can be checked at a convenient time, not necessarily when the patient chooses to communicate. Asynchronous communication may be satisfactory for the "I'm okay" message, but if it were the only medium available for "I'm not okay," "I have a question," or, "I need help" messages, then we believe that patient care and satisfaction may suffer. One survey suggested that physicians are generally reluctant to share their e-mail addresses with patients for fear of being overloaded with questions, with no way of being reimbursed for the time spent answering e-mail. However, the move to fixed and capitated payment schemes may lessen the latter concern. Other physicians have reported that communicating via e-mail saves time overall rather than producing new bur-

dens. One study suggests that the average time required to respond to physician (10% of requests) or parent/patient (81% of requests) was 4 minutes.²¹ Additionally, unlike telephone conversations, e-mail generates documentation of the interaction with the patient, which may be valuable in a medicolegal context.

Physicians, in general,³⁰ and anesthesiologists, in particular, have used the Internet,⁷ although one recent study suggested that anesthesiologists in academic settings use the Web more often than those who are not.³¹ That study, however, was flawed by selection bias. The authors sought responses only from those already using anesthesia sites on the Web, rather than through random selection of anesthesiologists.

When healthy patients undergo minor procedures, the potential for cost savings provided by electronic follow-up techniques may be viewed favorably. In one British survey, the majority of patients undergoing minor outpatient procedures (varicose vein surgery, inguinal hernia repair, or vasectomy) believed that they would not benefit from an outpatient appointment following surgery.³² In another study of ambulatory surgery, only 2.5% of patients reported that they had needed to contact the hospital within 24 hours of discharge, most frequently for a problem with pain management.³³ The investigators suggested that patients should be given the option of foregoing an outpatient appointment after minor or intermediate surgery in favor of routine follow-up via a postal questionnaire. This approach could reduce unnecessary appointments and expenses for both patients and physicians. Similarly, patients enrolled in a university-based, family practice clinic viewed e-mail positively for communicating simple, nonurgent problems, such as requesting prescription refills, receiving laboratory results, and making appointments. Ninety percent of the patients who had corresponded with their physicians via e-mail used the medium to discuss a medical problem.³⁴

The limitations of e-mail for postoperative follow-up include lack of universal access to Internet technologies, security and legal issues, functional illiteracy,³⁵ and lack of interest in responding on the part of patients. The 1997 American Internet User Survey estimates that approximately 31 million Americans use the Internet.³⁶ A 1994 survey at Stanford University, admittedly an atypical sample, found that 46% of patients in the medicine clinic used e-mail, and 89% of those with e-mail use it at work.³⁷ Fifty-one percent agreed that they would use e-mail all or most of the time to communicate with the clinic, if it were available, and that many telephone communications could be replaced by e-mail. The barriers to e-mail use cited by respondents included privacy concerns at the workplace, choosing the appropriate tasks for e-mail, and methods for efficiently triaging electronic messages in the clinic.

The CommerceNet/Nielsen Internet Demographic Survey for June 1998 estimates that the number of Internet users over the age of 16 years in the U.S. and Canada has reached 79 million, up from 58 million just 9 months before.³⁸ While Internet users are younger, more affluent, predominantly male and Caucasian, and presumably healthier than the population as a whole,³⁹ they are

becoming more representative of the U.S. population. Current commercial telephone- and television-based Internet and e-mail access initiatives may further broaden access. Still, the racial and socioeconomic disparities in Internet and e-mail access remain significant drawbacks to their use for clinical purposes. Sample bias could be introduced into research studies if they relied solely on Internet and e-mail for data collection from patients.

The most common activities on the Internet cited by consumers were research (82% of respondents), education (75%), news (68%), and entertainment (61%).³⁹ One survey of current Internet users found that 40% to 60% describe themselves as interested in using the Internet to facilitate health maintenance and health care; the most commonly desired aspects were the ability to e-mail their physicians, and to obtain information on fitness, stress management, and disease.⁴⁰ A previous survey of 1,010 adults in the U.S. was less optimistic about continued penetration of Internet use among the populace; only 18% of those without Internet access at home said they planned to install it within the year. Of those who planned never to use the Internet, 75% were over 35 years old, suggesting that age groups who use medical care resources the most may have the least Internet access both now and in the future.⁴¹

Electronic follow-up, however, need not necessarily involve the Internet. Through automated telephone response systems, for example, patients can record spoken messages or respond to questions using a touch-tone keypad. Questionnaires by mail are also a possibility. One advantage of electronic follow-up is that data obtained may be immediately and seamlessly imported into quality improvement and satisfaction databases, inexpensively providing data that can guide future improvements in care.

We believe that e-mail may be valuable for positive feedback or as a research tool, to supplement, not substitute for, other channels of communication. If further study reveals that e-mail is an effective way of administering postoperative questionnaires, we may consider testing for mode effects by randomly allocating patients with access to e-mail to interviews by e-mail or by a nurse. Additional work is needed to determine whether electronic communication differs from traditional follow-up in terms of response rates, accuracy, patient satisfaction, or outcomes assessment.

References

1. Davis JE: Ambulatory surgery...how far can we go? *Med Clin North Am* 1993;77:365-75.
2. McManus SA, Topp DA, Hopkins C: Advantages of outpatient breast surgery. *Am Surg* 1994;60:967-70.
3. Palmer JS, Worwag EM, Conrad WG, Blitz BF, Chodak GW: Same day surgery for radical retropubic prostatectomy: is it an attainable goal? *Urology* 1996;47:23-8.
4. Iglehart JK: Rapid changes for academic medical centers (second of two parts). *N Engl J Med* 1995;332:407-11.
5. Iglehart JK: Academic medical centers enter the market: the case of Philadelphia. *N Engl J Med* 1995;333:1019-23.

6. Wang KK, Wong Kee Song LM: The physician and the Internet. *Mayo Clin Proc* 1997;72:66-71.
7. Ruskin KJ: The Internet: a practical guide for anesthesiologists. *Anesthesiology* 1998;89:1003-14.
8. Baker RP, Bradburn NM, Johnson RA: Computer-assisted personal interviewing: an experimental evaluation of data quality and costs. *J Offic Stat* 1995;11:413-31.
9. Waterton J, Duffy J: A comparison of computer interviewing techniques and traditional methods for the collection of self-report alcohol consumption data in a field survey. *Intern Stat Rev* 1984;52:173-82.
10. Tourangeau R, Smith TW: Asking sensitive questions: the impact of data collection mode, question format, and question context. *Public Opin Q* 1996;60:275-304.
11. Lutner RE, Roizen MF, Stocking CB, et al: The automated interview versus the personal interview. Do patient responses to preoperative health questions differ? *Anesthesiology* 1991;75:394-400.
12. Williams B, Coyle J, Healy D: The meaning of patient satisfaction: an explanation of high reported levels. *Soc Sci Med* 1998;47:1351-9.
13. Dillman DA: *Mail and Telephone Surveys: The Total Design Method*. New York: Wiley, 1978.
14. Johnston C: Psychiatrist says counseling via e-mail may be yet another medical use for Internet. *Can Med Assoc J* 1996;155:1606-7.
15. Feenberg AL, Licht JM, Kane KP, Moran K, Smith RA: The online patient meeting. *J Neurol Sci* 1996;139 (Suppl):129-31.
16. Ferguson T: Health online and the empowered medical consumer. *Jt Comm J Qual Improve* 1997;23:251-7.
17. Fernsler JI, Manchester LJ: Evaluation of a computer-based cancer support network. *Cancer Pract* 1997;5:46-51.
18. Soetikno RM, Provenzale D, Lenert LA: Studying ulcerative colitis over the World Wide Web. *Am J Gastroenterol* 1997;92:457-60.
19. Kim R, Kelly PJ: Applications of the World Wide Web to neurosurgical practice. *Neurosurgery* 1996;39:1169-81.
20. Widman LE, Tong DA: Requests for medical advice from patients and families to health care providers who publish on the World Wide Web. *Arch Intern Med* 1997;157:209-12.
21. Borowitz SM, Wyatt JC: The origin, content, and workload of e-mail consultations. *JAMA* 1998;280:1321-4.
22. Stanford Medical Group Electronic Mail Services. <http://www-med.stanford.edu/shs/smg/email.html>
23. Klock PA, Asbury JK, Mingay DJ, et al: The development of a valid and reliable postoperative satisfaction survey [Abstract]. *Anesth Analg* 1997;84:S193.
24. Turner CF, Miller HG, Smith TK, et al: Telephone audio computer-assisted self-interviewing (T-ACASI) and survey measurements of sensitive behaviors: preliminary results. In: Banks R, Fairgrieve J, Gerrad L, et al. (eds): *Survey and Statistical Computing* 1996. Chesham, Bucks, UK: Association for Survey Computing, 1996:121-30.
25. Turner CF, Ku L, Rogers SM, Lindberg LD, Pleck JH, Sonenstein FL: Adolescent sexual behavior, drug use, and violence: increased reporting with computer survey technology. *Science* 1998;280:867-73.
26. Spielberg AR: On call and online. Sociohistorical, legal, and ethical implications of e-mail for the patient-physician relationship. *JAMA* 1998;280:1353-9.
27. Mandl KD, Kohane IS, Brandt AM: Electronic patient-physician communication: problems and promise. *Ann Intern Med* 1998;129:495-500.
28. Kane B, Sands DZ: Guidelines for the clinical use of electronic mail with patients. *J Am Med Inform Assoc* 1998;5:104-11.
29. National Research Council. Committee on Maintaining Privacy and Security in Health Care Applications of the National Information Infrastructure: For the Record: Protecting Electronic Health Information. Washington, DC: National Academy Press, 1997.
30. The American Interactive Healthcare Professionals Survey. <http://etrq.findsvp.com/health/prsp-aihps.html>
31. Oyston JP, Ascah JG: The value of the Internet to anaesthetists. *Can J Anaesth* 1997;44:439-44.
32. Wedderburn AW, Dodds SR, Morris GE: A survey of postoperative care after day case surgery. *Ann R Coll Surg Engl* 1996;78 (2 Suppl):70-1.
33. Ghosh S, Sallam S: Patient satisfaction and postoperative demands on hospital and community services after day surgery. *Br J Surg* 1994;81:1635-8.
34. Neill RA, Mainous AG 3d, Clark JR, Hagen MD: The utility of electronic mail as a medium for patient-physician communication. *Arch Fam Med* 1994;3:268-71.
35. Williams MV, Parker RM, Baker DW, et al: Inadequate functional health literacy among patients at two public hospitals. *JAMA* 1995;274:1677-82.
36. Emerging Technologies Research Group: The 1997 American Internet User Survey. <http://etrq.findsvp.com/internet/overview.html>
37. Fridsma DB, Ford P, Altman R: A survey of patient access to electronic mail: attitudes, barriers, and opportunities. *Proc Annu Symp Comput Appl Med Care* 1994;18:15-9.
38. The CommerceNet/Nielsen Internet Demographic Survey. June 1998 Internet Demographic Highlights. <http://www.commerce.net/research/stats/highlights.html>
39. Cortese A: A census in cyberspace. *Business Week*, May 5, 1997.
40. Emerging Technologies Research Group: The 1997 American Internet User Survey. <http://etrq.findsvp.com/graphics/health/interestihs.gif>
41. Napoli L: Study finds growth and growing pains online. *The New York Times*, June 11, 1997.