

# Internet-Based Medical Visit and Diagnosis for Common Medical Problems: Experience of First User Cohort

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## Abstract

**Objective:** Internet-based medical visits, or “structured e-Visits,” allow patients to report symptoms and seek diagnosis and treatment from their doctor over a secure Web site, without calling or visiting the physician’s office. While acceptability of e-Visits has been investigated, outcomes associated with e-Visits, that is, whether patients receiving diagnoses receive appropriate care or need to return to the doctor, remain unexplored. **Materials and Methods:** The first 156 e-Visit users from a large family medicine practice were surveyed regarding their experience with the e-Visit and e-Visit outcomes. In addition, medical records for patients making e-Visits were reviewed to examine need for follow-up care within 7 days. **Results:** Interviews were completed with 121 patients (77.6% participation). The most common type of e-Visit was for “other” symptoms or concerns (37%), followed by sinus/cold symptoms (35%). Back pain, urinary symptoms, cough, diarrhea, conjunctivitis, and vaginal irritation were each less frequent (< 10%). A majority, 61% completed e-Visits with their own physician. The majority of patients (57.0%) reported receipt of a diagnosis without need for follow-up beyond a prescription; 75% of patients thought the e-Visit was as good as or better than an in-person visit, and only 11.6% felt that their concerns or questions were incompletely addressed. In a review of medical records, 16.9% had a follow-up visit within 7 days, mostly for the same condition. Four of these were on the same day as the e-Visit, including one emergency department visit. **Conclusions:** Outcomes for the e-Visit suggest that it is an appropriate and potentially cost-saving addition to in-person delivery of primary care.

**Key words:** e-health, medical records, telemedicine, telehealth

## Introduction

**H**ealthcare organizations have responded to patient requests for more convenient and efficient physician access by developing e-Visit technology. The structured e-Visit is an online tool that allows patients and physicians to com-

municate electronically in a secure network over the Internet. e-Visits enable the patient to complete a medical encounter with a doctor from home or work (or anywhere in the world with Internet access) for nonemergency healthcare issues. In the structured e-Visit, an established patient reports symptoms in a standardized way. These symptoms are reviewed by his or her physician within a specified time frame. The patient receives a diagnosis and care plan, which may include a prescription and/or other suggestions for follow-up.

The structured e-Visit is gaining in popularity in response to research showing that patients desire electronic access to healthcare providers. However, adoption has been slow because of difficulty in designing effective electronic communication for medical diagnosis (e.g., to elicit symptoms), challenges in reimbursement, and concerns over privacy.<sup>1,2</sup> Published research in this area is also rare. One study described implementation of e-Visit technology for well-child care encounters but only examined acceptability, not outcomes.<sup>3</sup> Studies have examined patient-physician electronic messaging,<sup>4</sup> but not structured attempts to elicit symptoms and make a diagnosis in a messaging environment.

We have not been able to identify studies that have examined use of structured e-Visits in general medical clinics and outcomes associated with this form of physician contact. Accordingly, in this research we examined use of e-Visit technology developed for wide distribution in practices associated with the University of Pittsburgh Medical Center (UPMC) health system. We examined the first cohort of adults to use the system in a telephone survey conducted within 6 months of the e-Visit. We investigated (i) how well e-Visit questionnaires captured symptoms, (ii) whether e-Visits were perceived to be comparable to in-person visits, (iii) why patients made use of the e-Visit, and (iv) whether the e-Visit delivered effective medical care. As a measure of the efficiency of the e-Visit, we also reviewed medical records for this set of patients to determine what proportion had a medical encounter within 7 days of the e-Visit and features of follow-up care.

## Methods

### SITE AND SAMPLE

An independent research team from the University of Pittsburgh’s Graduate School of Public Health conducted a telephone survey of the first 156 users of UPMC’s HealthTrak e-Visit system. The 156 e-Visit patients received care from a large medical practice with multiple sites. The practice has approximately 7,000 patients who have access to electronic medical records (EpicCare; Epic Corporation, Verona, WI). e-Visit users were contacted within 6 months of their e-Visit and completed a 30-min telephone survey. A clinician reviewed electronic medical records for each e-Visit encounter to

assess follow-up care. The project was approved as a quality improvement study by the UPMC Quality Assurance Council.

### HEALTHTRAK E-VISIT TECHNOLOGY

The UPMC HealthTrak system is a secured online patient portal. In the e-Visit, a patient completes an interactive on-line questionnaire appropriate for specific health conditions, which is then sent to the doctor as an electronic message. e-Visit questionnaires were developed for the seven highest-frequency episodic illnesses seen in practices, which are often managed through telephone contact. The initial set of conditions included back pain, cough, diarrhea, conjunctivitis, sinus/cold symptoms, urinary symptoms, and vaginal irritation/discharge. A final "other" category was also developed to allow patients to submit requests for health issues not covered by these specified conditions. Upon receiving completed questionnaires, the physician reviews the patient's electronic medical record and medications and may also send questions to the patient to elicit additional information. At the end of the visit, the physician provides the patient with a diagnosis, any tests or prescriptions that may be needed, and medical instructions. The entire visit is stored within the patient's electronic medical record for future reference.

The e-Visit takes the following form. After a patient logs into his or her personal UPMC HealthTrak record, a section entitled "e-Visit" appears in the menu option. A "What is an e-Visit?" information page helps the patient understand the concept of an electronic patient-to-physician virtual Internet visit. For further instruction, patients can also view a video demonstrating an e-Visit. Clicking on "Submit an e-Visit" brings the patient to the e-Visit Terms and Conditions page, which also contains an Emergency Disclaimer. A patient must acknowledge and accept the Terms and Conditions to continue with the e-Visit.

After clicking "Accept," a "Reason for e-Visit" page appears. It lists the seven possible conditions and symptoms the patient may have. The patient must select a pharmacy for any prescriptions needed for the e-Visit or add a different pharmacy name and phone number in a free text field.

After selecting one of the reasons for the e-Visit, patients review their own health issues, medications, and allergies that are on file in their electronic medical record. The patient must acknowledge that the information is correct or submit changes in medical information by typing in the free text box.

If the patient chooses one of the seven predefined symptoms, a questionnaire appears on the next screen. The patient must answer all questions, which include single, multiple, and free text answers. If the patient chooses an "other" symptom, he or she completes multiple text fields to describe the symptoms or problem. The patient has an opportunity to review answers, make changes, or clear the questionnaire and begin again. When satisfied with answers, the patient chooses the "Submit e-Visit" button, which sends the e-Visit message to the physician's office. The next page notifies the patient that the e-Visit has been successfully submitted and lets patients know that they can expect a timely response from a doctor. Patients are told that they should contact the doctor's office if they do not receive a response by the end of the next business day or if symptoms worsen.

In rare instances, responses from patients who submit e-Visit requests indicate a need for in-person treatment. In those instances, physicians will close the encounter and request that the patient schedule an appointment.

During the interview period, e-Visits did not require a patient copayment. Currently, the charge for an e-Visit is \$60, and the copay for UPMC patients is \$20. Uninsured patients are charged \$30 for the e-Visit.

The UPMC HealthTrak application is a branded implementation of an Epic Systems MyChart application (Verona, WI). More information on technical specifications is available from the authors.

### MEASURES

The telephone survey included questions designed to elicit socio-demographic features of users, features of the e-Visit, information about the physician completing the e-Visit as reported by the patient (including time until response), measures of e-Visit satisfaction and accessibility, and finally what happened after the e-Visit. The last included five categories: "diagnosis and prescription: no need for follow-up," "diagnosis: need for follow-up," "diagnosis: no need for follow-up," "no diagnosis: no course of action," and "unsure."

Clinician review of e-Visits assessed whether e-Visit users had a medical care episode within 7 days of the e-Visit noted in the electronic medical record, whether patients required a level of medical attention that required immediate in-person care, and whether follow-up care was for the same or a new medical condition.

### ANALYSES

Descriptive statistics for the sample were calculated for users and their experience with e-Visits. The interview data were also examined according to two patient groups: patients reporting that their questions were answered in the e-Visit and patients reporting that their questions were not fully answered. Differences were examined with  $\chi^2$ -test in the case of proportions and *t*-tests for differences in mean scores.

### Results

Of the 156 patients who completed e-Visits, 121 completed the telephone interview (77.6%). Only 11 patients (7.1%) refused the interview. The remainder included 15 with working telephones who could not be reached despite multiple attempts; five with disconnected telephones; two who had moved and left the region; and two who denied making an e-Visit. Interviews were completed between August and November 2009. All patients making e-Visits were tracked in the electronic medical record.

### FEATURES OF E-VISIT USERS

As shown in *Table 1*, e-Visit users were mostly women (71.1%) and employed (86%). About half had completed college. All age groups were represented, though people over age 60 were less likely to make e-Visits (12% vs. 24.8%–32.5% in other age groups).

Nearly all e-Visit users reported owning a computer, and the modal amount of time using the Internet was 1–2 h/day. About three-

**Table 1. Features of e-Visit Sample**

Sociodemographics, %	
Female	71.1
Age	
18-39	32.5
40-49	30.8
50-59	24.8
60+	12.0
College graduate	48.7
Currently employed	86.0
Computer Access and Proficiency, %	
Own a computer	97.5
Daily Internet use, hr	
< 1	9.9
1-2	42.1
2-5	19.8
> 5	28.1
Visit health Web sites	
> Once a week	21.5
Once a week	19.8
Once a month	42.1
Once a year	11.6
Never	5.0
Use of on-line services, past 12 months	
Purchases	86.8
Travel reservations	76.9
Banking	73.6
Filing income tax	50.4
Social networking	49.6
Managing investments	33.9
Shared calendar	21.5
Medical Status	
Number physician visits, last 12 months (median)	3
<i>n</i> = 121.	

quarters reported visits to health-related Web sites at least once each month. More than half the users had used the Web for purchases, travel reservations, and bank transactions in the past 12 months. A third to a half had used the Web for filing income taxes, social networking, and managing investments.

Users were frequent visitors to their doctor's office. The median number of physician visits in the last 12 months was three.

## HOW USERS MAKE E-VISITS AND REASONS FOR THE VISIT

Patients used their own computer in 81% of e-Visits (presumably from home) and used a computer at work in 16.5% of instances (Table 2). The remaining 2.5% of e-Visits were made from other places.

Patients were asked an open-ended question about their primary reason for making the e-Visit rather than an in-person visit. Over 40% mentioned convenience as the primary reason. Other answers included patient perception that their symptoms were routine and did not require face-to-face physician contact for diagnosis and treatment (17.6%). About 12% made the e-Visit because a timely appointment with their physicians was unavailable. Another 10% took advantage of the e-Visit because they like new technologies. Smaller numbers reported making the e-Visit specifically to avoid an in-person visit or to avoid the copay required with an in-person visit.

## TYPES OF E-VISIT

The major type of e-Visit involved "other" symptoms or concerns, that is, something outside the seven most frequent symptom categories developed for the e-Visit. Thirty-eight percent of the e-Visits fell into this category. These included a great variety of symptoms and conditions, with none clearly predominating. Patients completed e-Visits involving blood pressure values, fractures, diabetes management, skin conditions, prostatitis, pain, sleep issues, vomiting, mononucleosis, and hemorrhoids. The next most common type involved sinus or cold symptoms (34.7%). None of the other symptoms or conditions exceeded 10% of the e-Visits.

## OUTCOMES ASSOCIATED WITH E-VISITS

The e-Visits were well regarded by patients (Table 2). Only 11.6% of patients felt that their questions and concerns were not adequately addressed in the e-Visit, and over half thought the e-Visit questionnaires captured symptoms adequately. Over three-quarters said the e-Visit was as good as or better than an in-person visit. A majority, 61.2% completed the e-Visit with their own physician (and the remainder with physicians and staff in the same practice). Physicians also responded to patient e-Visit information quickly, with 71.1% responding within 12 h. Over 90% reported that the e-Visit Web page was easy to use.

In over half the e-Visits, patients received a diagnosis and treatment plan without need for follow-up; these included 53.7% in which patients received a prescription and 3.3% in which physicians did not order a prescription. In another third of the e-Visits, in-person follow-up was recommended. Absence of a diagnosis or clear course of action was reported by < 10% of patients making e-Visits.

## CORRELATES OF DISSATISFACTION WITH E-VISIT

Table 3 compares patients who said all their questions had been addressed by the e-Visit with those who reported that their questions had not been well addressed. The latter group was small (11.6%,

**Table 2. Features of e-Visit Reported by Patients**

How e-Visit was made, %	
Own computer	81.0
Completed at work	16.5
Reason for e-Visit (coded open-ended text), %	
Convenience	40.5
Routine symptoms, no need to see physician	17.6
No available in-person appointment	11.8
Interested in new technologies	10.5
Avoid copay	7.5
Wanted to avoid in-person visit	7.3
Unsure	5.0
Type of e-Visit, %	
Other	38.0
Sinus/cold	34.7
Back pain	7.4
Urinary symptoms	5.8
Cough	5.8
Diarrhea	3.3
Vaginal irritation	1.7
Not sure	3.3
Quality of e-Visit, %	
Questionnaire captured symptoms very well	56.2
Physician responded within 12 h	71.1
Made e-Visit with own physician	61.2
Questions/concerns answered	86.8
e-Visit as good or better than in-person visit	77.7
Not difficult to make e-Visit	94.2
Outcomes of e-Visit, %	
Diagnosis and prescription: no need for follow-up	53.7
Diagnosis: need for follow-up with/without Rx	33.1
Diagnosis: no prescription, no need for follow-up	3.3
No diagnosis, no course of action	6.6
Unsure	3.3

**Table 3. Differences Between Patients According to Whether Questions Were Felt to Be Satisfactorily Answered**

	ALL QUESTIONS ANSWERED, N = 105, %	QUESTIONS NOT SATISFACTORILY ANSWERED, N = 14, %
Had to see MD after e-Visit	35.7	18.0 <sup>a</sup>
Received diagnosis during e-Visit	94.2	71.5 <sup>a</sup>
e-Visit as good as or better than in-person visit	83.7	28.6 <sup>a</sup>
Would make another e-Visit	99.0	71.4 <sup>a</sup>

<sup>a</sup>p < 0.001 by  $\chi^2$ . Two respondents excluded because of missing data.

n = 14). Patients in the two groups differed significantly in the likelihood of receiving a diagnosis in the e-Visit, their satisfaction with the e-Visit, and the likelihood they would make another e-Visit (though a majority of dissatisfied patients still reported they would consider making additional e-Visits). Further analyses show that dissatisfied e-Visit users were more likely to be younger and to spend more than 5 h/day using the Internet.

**CLINICIAN REVIEW OF ELECTRONIC MEDICAL RECORD**

In a review of medical records, 16.9% of e-Visit users had a follow-up visit within 7 days of the e-Visit. In four cases, the follow-up visit was for a different medical condition, suggesting that the need for follow-up care after e-Visits was actually lower. Another four e-Visit patients were seen by physicians the same day of the e-Visit. One was advised to go directly to the emergency department for a potential malignant hypertensive event. The other three all had symptoms that physicians considered severe enough to require immediate in-person visits, including severe cystitis, an acute urinary tract infection, and sinusitis with chest pain.

**Discussion**

One virtue of the e-Visit is its convenience to patients, who can submit the e-Visit from home or work, or have a medical concern addressed while traveling or on vacation. College students who wish to maintain healthcare providers at their parents' residence, or whose health insurance requires in-network care, are another group likely to find the e-Visit option useful. It also offers an alternative to the retail walk-in clinic model, in which patients can receive treatment for routine conditions, but from physicians or nurses with whom they have no relationship and who do not have access to their medical records. Patients in this e-Visit group clearly appreciated not having to travel to physician offices or trying to reach the doctor's office by telephone to discuss what they considered routine symptoms only requiring a prescription.

Outcomes from the e-Visit suggest that it is an appropriate alternative to the in-person visit. In self-reports of diagnosis and follow-up, over 90% reported their health problem was addressed: 53.7% received a diagnosis and prescription, 33.1% a diagnosis and plan for follow-up, and another 3.3% a diagnosis without need for follow-up. Only 10% of this initial cohort users felt their questions were not fully addressed in the e-Visit.

Beyond self-report, review of the electronic medical records of this cohort showed that only 16.9% had follow-up medical care within 7 days of the e-Visit. In a study of common medical conditions treated in retail clinics, physician offices, and urgent care clinics, the percentage of episodes with any follow-up visit was similar (16%, 15.1%, and 14.2%, respectively), suggesting that the e-Visit was similar to in-person care in addressing these common medical conditions.<sup>4</sup> The e-Visit was also efficient in identifying patients in need of more intensive care. Four patients were referred for immediate in-person care after review of symptoms reported in the e-Visit, including one emergency department admission.

These data suggest that the e-Visit is a reasonable way to treat the routine conditions targeted for this type of care. Most patients did not need to return for follow-up care and the e-Visit was efficient for identifying more serious health issues.

The e-Visit represents an important evolution of electronic communication with patients. An extensive early review examined computerized telephone screening, reminders, and follow-up but was limited to provider-initiated communication.<sup>5</sup> Newer Web-based technologies allow greater patient-initiated communication as well as reciprocal interaction between patients and physicians. The e-Visit demonstrates the new and still incompletely tapped potential of electronic communication in the medical encounter.

Our results are in accord with a number of studies of electronic messaging in clinical care. A study of a clinic messaging system found that patients who used the system appreciated the same features mentioned here for e-Visits: ability to use the system outside of office hours, not having to travel to the clinic, and no waiting time on the telephone.<sup>6</sup> In that study, the messaging system reduced the need for office visits but not telephone consultations. Notably, in 10% of the electronic contacts, physicians recommended an office visit. In our e-Visit cohort, by contrast, only four patients were recommended to have an office visit, a smaller proportion reflecting our restriction of the e-Visit to routine conditions.

One limitation of this research is absence of information from providers. We did not survey clinicians to examine their comfort or satisfaction with e-Visits. This is an important area for research, since some research suggests that physician workloads may be substantially increased by electronic messaging.<sup>7</sup> A second limitation is absence of data that would allow comparison of the e-Visit cohort to patients completing in-person medical visits for the same conditions. Given the self-selection of patients into the e-Visit cohort,

establishing the comparison group would be difficult. Still, this comparison would be valuable and would likely have to include the many nonmedical benefits reported by e-Visit users, such as savings in travel time for appointments and avoidance of work absenteeism.

To conclude, initial findings from the first UPMC e-Visit cohort, assessed both by patient interviews and review of electronic medical records, suggest that this modality offers benefit to patients in terms of access, speed, and convenience, without increasing the risk of inappropriate or incomplete care. The e-Visit should be compared to walk-in retail or urgent care models, which other research has shown to be effective both clinically and in cost relative to traditional in-office physician visits.<sup>4</sup>

## Disclosure Statement

No competing financial interests exist.

## REFERENCES

- Whitten P, Buis L, Love B. Physician-patient e-visit programs: Implementation and appropriateness. *Dis Manag Health Outcomes* **2007**;15:207-214.
- Tang PC, Black W, Young CY. Proposed criteria for reimbursing eVisits: Content analysis of secure patient messages in a personal health record system. *AMIA Annu Symp Proc* **2006**;764-768.
- Bergman D, Beck A, Rahm AK. The use of Internet-based technology to tailor well-child care encounters. *Pediatrics* **2009**;124:e37-e43.
- Mehrotra A, Liu H, Adams JL, Wang MC, Lave JR, Thygeson NM, Solberg LI, McGlynn EA. Comparing costs and quality of care at retail clinics with that of other medical settings for 3 common illnesses. *Ann Intern Med* **2009**;151:321-328.
- Bergmo TS, Kummervold PE, Gammon D, Dahl LB. Electronic patient-provider communication: Will it offset office visits and telephone consultations in primary care? *Int J Med Inform* **2005**;9:705-710.
- Balas EA, Jaffrey F, Kuperman GJ, Boren SA, Brown GD, Pinciroli F, Mitchell JA. Electronic communication with patients: Evaluation of distance medicine technology. *JAMA* **1997**;278:152-159.
- Katz SJ, Moyer CA, Cox DT, Stern DT. Effect of a triage-based email system on clinic resource use and patient and physician satisfaction in primary care: A randomized controlled trial. *J Gen Intern Med* **2003**;18:736-744.

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