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Electronic Visits For Common Acute Conditions: Evaluation Of A Recently Established Program

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ABSTRACT Asynchronous interactions between patients and providers through patient portals (called e-visits in this article) have the potential to increase access to care and reduce the time requirements for some office visits. We performed a retrospective chart review for nonemergent acute care of adults in the period December 2015–July 2017 at the Medical University of South Carolina. Most patients in the 1,565 e-visits were female (80.2 percent) and ages 18–44 (55.3 percent). Sinus problems (38.1 percent) were the most common complaint. There were some unresolved e-visits (6.4 percent), with patients ages sixty-five and older and those with diarrhea or skin problems having a higher likelihood of their e-visit being unresolved, compared to other groups. The majority (81.5 percent) of in-person follow-ups did not result in diagnosis changes. More than 90 percent of the 665 patients surveyed after an e-visit reported a positive experience. Most patients (92 percent) reported that the e-visit had replaced an in-person visit. Further evaluation of the factors associated with unresolved visits could guide the development of treatment algorithms that could improve the quality of care in, and the cost-effectiveness of, e-visits for acute common conditions.

The Health Resources and Services Administration defines *telehealth* as “the use of electronic information and telecommunications technologies to support and promote long-distance clinical health care, patient and professional health-related education, public health and health administration.”¹ In 2013 the market for telehealth generated revenue of \$9.6 billion, which represented growth of 60 percent from 2012. The telehealth market is expected to have an approximately 32 percent compound annual growth rate from 2013 to 2018.² Various modalities of direct-to-patient care delivery via telemedicine are used today, including video visits, store and forward of data, and remote patient monitoring.

One promising method for direct patient care is through asynchronous written electronic vis-

its through a secure electronic portal (called e-visits in this article). Typically, a patient logs into an e-visit platform or goes through a patient portal in an electronic health record (EHR) and answers a set of clinical questions related to a specific symptom or complaint. Once the information is complete, the provider is notified and responds with a diagnosis and treatment recommendations through the portal at a later time. While some e-visit programs exist for chronic care issues, most current programs are designed to address acute conditions.³

Telemedicine has grown from an office- or hospital-based interaction model to a direct-to-consumer interaction model based on mobile technology. Because of this and the benefits that e-visits offer to patients and health systems, e-visit programs have expanded.⁴ Benefits include convenience, lower cost, and less travel

and time spent waiting,⁵ as well as the potential to interact with one's primary care provider or that person's office staff instead of an emergency department (ED) or urgent care. While e-visits offer many advantages, concerns exist and may limit uptake of the approach by providers, patients, or health care systems. Some of these concerns involve privacy and security, while others center on cost of the technology and lack of reimbursement.^{6,7}

As telemedicine has expanded and larger health care providers and payers have offered these services to their clients, some of these fears have been assuaged. Issues regarding quality of care with e-visits, including concern about the accuracy of the diagnosis and whether e-visits resolve medical concerns without additional in-person care, are being studied.⁷⁻⁹ Still, there is limited research evaluating care after e-visits are completed. Some studies suggest that virtual visits and in-person visits have similar follow-up rates, but that virtual visits result in fewer lab tests and less imaging—which indicates similar quality with less testing for virtual visits.¹⁰ Other concerns raised about e-visits are the inability to perform a physical exam and follow reasonable standards of care in the diagnosis and treatment of some specific conditions, as well as the need to ensure that the patients are integrated into a medical home to ensure adequate coordination and continuity of care. Addressing these concerns is vital to understanding the safety and cost-effectiveness of implementing e-visit programs.

This study aimed to evaluate an e-visit program in a US academic medical center setting. We included quality indicators for the e-visits: specifically, patient follow-up and unresolved encounters. We present self-reported data on patient satisfaction and experience with the e-visit program as a supplement to the quantitative data. Although the literature on the patient experience with telehealth programs is very limited, that experience provides an important perspective on the ongoing development and improvement of these programs.³

Study Data And Methods

SETTING AND CONTEXT The Medical University of South Carolina (MUSC) started an acute care e-visit program in December 2015. Initially, patients with one of five common clinical conditions were eligible for an e-visit, but the program was quickly expanded to cover over thirty acute care conditions. An e-visit is initiated when a patient logs into a patient portal, Epic's MyChart. The patient chooses the e-visit condition that matches their symptoms and fills out a

condition-specific questionnaire. Once the questionnaire is complete, the provider reviews it and responds to the patient with a treatment plan. In addition to completing the questionnaire, patients update their medical histories, current medications, allergies, and pharmacy information, which the provider also reviews. Patients who have a "red flag" symptom (such as chest pain, passing out, or not urinating for twenty-four hours) automatically receive a message asking them to be seen in person and do not complete the e-visit. (A sample questionnaire is in online appendix A1.)¹¹ E-visits in the program cost \$25 out of pocket because they are not covered by insurance or other payers. Patients are not charged for any e-visit that could not be completed by the provider.

E-visits are completed by local MUSC providers practicing specifically in emergency medicine and primary care—medical doctors, nurse practitioners, and physician assistants. South Carolina includes telemedicine within the scope of practice for all three types of practitioners. However, MUSC takes an extra step and requires all of the e-visit providers to receive telemedicine privileging through its internal credentialing committee.

Since not every primary care provider does e-visits, the system does not allow a patient to choose to have an e-visit with their own provider. The patient does have the ability to select their provider's medical group. In that scenario, the e-visit would be routed to a provider who does e-visits and is within that medical group. A patient also has the ability to select "first available provider," which routes the e-visit to the emergency medicine providers. This is the only option for patients who have not been seen by a MUSC primary care provider.

STUDY DESIGN We performed a retrospective chart review of e-visits submitted by adults (those ages eighteen and older) in the first eighteen months of the acute e-visit program (December 2015–July 2017). Self-reported demographic characteristics including age, race, and sex were assessed, along with the frequency of e-visits and type of condition. We also assessed follow-up within two weeks after the e-visit for the same condition by telephone or email, a second e-visit, or an in-person visit. The time spent providing e-visits was averaged from the EHR time-stamp data.

Unresolved e-visits were defined as having no charge by the provider, and we divided such visits into three categories, according to what the provider said about not charging: patient presentation was too complicated, the response time was too long, and no reason documented or other. For the unresolved e-visits, we looked in the

EHR to see whether the patient had any follow-up within two weeks for the same condition. In addition to descriptive statistics, we used chi-square tests to compare resolved and unresolved e-visits and to determine the need for in-person follow-up visits, evaluating differences across patient factors (such as age and sex) and conditions.

To simplify our analyses, we divided e-visits into groups: skin problems (for example, jock itch, allergic skin reaction, rash, eczema, and ringworm), musculoskeletal (for example, back pain or gout attack), sexually transmitted infection, and miscellaneous (for example, prescription refill, heartburn, and seasonal allergies), as shown in appendix A2.¹¹ Nongrouped conditions were urinary problems, vaginal discharge/irritation, sinus problems, influenza, and diarrhea. We used patients' ZIP codes to determine whether they lived in a rural or nonrural area, based on the criteria of the Centers for Medicare and Medicaid Services. Unverified ZIP codes were placed in an "unknown" category. A chi-square test was performed to examine the relationship between resolved versus unresolved e-visits and

rural versus nonrural areas. A logistic regression was calculated that predicted resolved versus unresolved e-visits, adjusting for age, sex, condition, and rurality. (A more detailed description of this analysis is in appendix A3.)¹¹ All analyses were performed using SPSS software.

Finally, we assessed patients' satisfaction with the e-visit process via an emailed survey after the completion of the e-visit. Questions included whether their problem had been addressed by the e-visit, if they would use the service again or recommend it to others, and if e-visits had not been available, where they would have sought care. A second follow-up survey was sent via email two weeks after the e-visit encounter to assess the improvement of the e-visit problem and the need for follow-up. These surveys were collected in the period February 2016–May 2018.

LIMITATIONS Our study had a number of limitations. First, follow-up of the e-visit program was assessed via EHR review. The health system includes hospitals, EDs, specialty clinics, and primary care practices in which follow-up could be assessed, but any follow-up outside of the system could not be assessed. A small percentage of respondents to the patient survey noted having followed up for the same problem that was addressed in their e-visit. The percentages from the EHR review and respondents' reports were similar (4.4 percent and 8 percent, respectively) but not identical.

Second, the response rate for the patient survey (19.7 percent) was low and could have included self-report bias, since patients might have said that they would have sought care elsewhere if they found the e-visit useful even if they actually would not have gone elsewhere. This still gave us additional data not available in the EHR.

Finally, confidence intervals within the logistic regression were wide because of the small sample of unresolved visits and condition types.

Study Results

E-VISITS OVERALL Over the period December 2015–July 2017, 1,565 e-visits were submitted by adult patients. Most of the patients were female (80.2 percent), white or Caucasian (85.0 percent), and ages 18–44 (55.3 percent) (exhibit 1). The most frequently requested e-visit types included sinus problems (38.1 percent), urinary problems (16.7 percent), skin problems (14.1 percent) and vaginal irritation or discharge (10.1 percent). Providers spent a median of five minutes completing each e-visit encounter (data not shown).

UNRESOLVED E-VISITS Of the 1,565 submitted e-visits, 100 (6.4 percent) were not charged by the provider and thus were considered unre-

EXHIBIT 1

Demographic characteristics of patients who initiated treatment at the Medical University of South Carolina (MUSC) through an e-visit, December 2015–July 2017

Characteristic	Number	Percent
Sex		
Female	1,255	80.2
Male	310	19.8
Age (years)		
18–44	865	55.3
45–64	603	38.5
65 or older	97	6.2
Race		
White or Caucasian	1,330	85.0
Black/African American	203	13.0
Asian	16	1.0
Other	16	1.0
E-visit condition		
Sinus problems	596	38.1
Urinary problems	261	16.7
Skin problems	220	14.1
Vaginal irritation or discharge	158	10.1
Influenza	114	7.3
Miscellaneous	83	5.3
Musculoskeletal	65	4.2
Diarrhea	41	2.6
Sexually transmitted infection	27	1.7
Rurality		
Rural	49	3.1
Nonrural	1,466	93.7
Unknown	50	3.2

SOURCE Authors' analysis of data from MUSC's electronic health records and the rural ZIP code area criteria of the Centers for Medicare and Medicaid Services. **NOTE** There were 1,565 patients.

solved. Age and sex were significant factors for unresolved e-visits, with higher proportions for males than females (10.6 percent versus 5.3 percent) and patients ages sixty-five or older than younger patients (14.4 percent versus 5.3 percent and 6.6 percent for the two younger groups) (exhibit 2). Unresolved e-visits also differed significantly from resolved visits by e-visit condition. Diarrhea and skin problems were the individual conditions that had the highest proportion of unresolved visits in bivariate analysis (24.4 percent and 16.8 percent, respectively). A logistic regression was performed to predict the relationship between having an unresolved e-visit and age, sex, e-visit condition, and rurality. The specific reference groups were female patients, patients ages 18–44, and patients with sinus problems. We used the latter as a reference group because it was the most common e-visit condition and the least likely to be unresolved. In the multivariate logistic regression, male patients (odds ratio: 1.81; 95% confidence interval: 1.10, 2.97); patients ages sixty-five or older (OR: 3.58; 95% CI: 1.73, 7.37); and patients with diarrhea (OR: 14.43; 95% CI: 5.74, 36.22), vaginal irritation or discharge (OR: 5.07; 95% CI: 2.14, 11.98), or skin problems (OR: 9.50; 95% CI: 4.90, 18.40) were more likely to have unresolved e-visits (for a more detailed description of this analysis, see appendix A3).¹¹

Of the 100 e-visits that were not charged, the most frequently observed reasons were because the patient’s complaints and symptoms were too complicated and they needed to be seen in person (90.0 percent) and response time was too long (5.0 percent), with no documentation of the reason for not charging also accounting for 5.0 percent of the visits. The median response time (from submission by the patient to the provider’s responding to the e-visit) was sixty minutes. For patients with documentation of “response time too long,” the response time averaged 19.4 hours (data not shown).

E-VISIT FOLLOW-UP Of the 1,465 e-visits that were resolved, 141 (9.5 percent) had a follow-up for the same condition within two weeks. The follow-up types included an office visit (65 e-visits; 4.4 percent of all resolved e-visits), email or telephone call (68; 4.6 percent), and a repeat e-visit (8; 0.5 percent). There was no difference in likelihood of in-person follow-up by age, sex, or condition type. Most patients (81.5 percent) who had an in-person follow-up did not have a change in diagnosis. Of the e-visits with a diagnosis change, influenza was the most common condition diagnosed in the e-visit to be differently diagnosed during the in-person follow-up (80.0 percent; $p = 0.002$) (data not shown).

PATIENT SATISFACTION SURVEY Responses in

the 665 completed patient satisfaction surveys demonstrated high patient satisfaction and ease of use for e-visits (exhibit 3). If e-visits had not been available, 49 percent said that they would have sought care in a physician’s office, and 42 percent said that they would have visited an urgent care center, ED, or retail health clinic (data not shown). Nine percent stated that they would not have sought care at all.

TWO-WEEK FOLLOW-UP SURVEY After the initial e-visit, 217 patients completed a two-week follow-up survey. Most of these patients reported that their initial problem had improved (95 percent) and they had not been seen by a medical provider regarding the same problem from the e-visit (92 percent) (exhibit 4). Of the eighteen respondents who stated that they had been seen, eleven had sought care in a physician office and seven in an ED or in either an urgent care or a retail clinic.

Discussion

In our analysis of the e-visit program at MUSC for adults presenting with specific acute symptoms, we found that most e-visits could be completed by the provider and took minutes for the provider to complete, and most patients required no follow-up. This indicates that the presenting issue was appropriately treated and resolved. Unresolved visits accounted for a small proportion of the visits and were more likely to occur

EXHIBIT 2

Unresolved e-visits to the Medical University of South Carolina (MUSC), by patient’s sex, age, and condition, December 2015–July 2017

	Number of unresolved visits	Percent unresolved within category
Sex***		
Female	67	5.3
Male	33	10.6
Age (years)***		
18–44	46	5.3
45–64	40	6.6
65 or older	14	14.4
E-visit condition****		
Sinus problems	13	2.2
Urinary problems	7	2.7
Skin problems	37	16.8
Vaginal irritation or discharge	11	7.0
Influenza	3	2.6
Miscellaneous	14	16.9
Musculoskeletal	4	6.2
Diarrhea	10	24.4
Sexually transmitted infection	1	3.7

SOURCE Authors’ analysis of data from MUSC’s electronic health records. **NOTES** There were 100 unresolved visits. Total numbers of e-visits for each category and characteristic are in exhibit 1. *** $p < 0.01$ **** $p < 0.001$

EXHIBIT 3

Results of patient satisfaction survey of Medical University of South Carolina (MUSC) e-visit users, February 2016–May 2018

	Number	Percent
Based on your experience with this e-visit, how likely are you to use this service again?		
Definitely or probably will	620	93.2
Might or might not	17	2.6
Probably or definitely will not	28	4.2
My e-visit was easy to complete		
Strongly agree or agree	649	97.7
Neutral	1	0.2
Strongly disagree or disagree	15	2.2
The e-visit provider was able to address what was bothering me today		
Strongly agree or agree	626	94.2
Don't know	7	1.1
Strongly disagree or disagree	32	4.7
Would you recommend the MUSC e-visit to others?		
Yes	630	94.7
No	35	5.3

SOURCE Authors' analysis of data from MUSC's patient satisfaction survey. **NOTES** The patient satisfaction survey was sent to patients after the e-visit was complete and the provider had signed off. There were 665 respondents.

among male patients and patients ages sixty-five and older. Previous studies have shown somewhat higher follow-up rates for asynchronous programs.^{7,8,12} We believe that follow-up is lower in this program because e-visits were limited to conditions for which a structured e-visit questionnaire was available, and the visits were performed within a comprehensive health system. This allowed providers access to patients' medi-

EXHIBIT 4

Results of two-week follow-up patient satisfaction survey of Medical University of South Carolina (MUSC) e-visit users, February 2016–May 2018

	Number	Percent
Has the problem improved?		
Yes	206	95.0
No	11	5.0
Have you been seen by a medical provider since your e-visit for the same problem?		
Yes	18	8.0
No	199	92.0
Where were you seen?		
Doctor's office	11	61.1
Emergency department	3	16.7
Urgent care or retail clinic	4	22.2

SOURCE Authors' analysis of data from MUSC's two-week follow-up patient satisfaction survey. **NOTES** Patients who completed the patient satisfaction survey and indicated that they would be willing to complete a follow-up survey received the follow-up survey. There were 217 respondents to the follow-up survey, 18 of whom responded that they had been seen by a medical provider and thus were able to answer the third question, "Where were you seen?"

cal records and primary care providers, as e-visit encounters were routed to them via the common EHR system. Of the e-visit patients who received in-person care, most did not have a change in diagnosis, which signals that these e-visits led to appropriate⁸ diagnosis and treatment without additional in-person visits. This is consistent with the results of previous studies.⁹ Similarly, patients reported having their condition treated appropriately, with limited need for in-person follow-up. We acknowledge that some follow-up occurred outside of our system (4.4 percent measured versus 8 percent self-reported) that could not be fully assessed. However, the 8 percent follow-up rate was lower in our study than rates found in previous studies of virtual visits, where follow-up was as high as 28 percent.¹⁰

To maximize effectiveness, e-visit programs should try to decrease the number of unresolved e-visits. This could be done through continuous quality improvement methods that identify characteristics associated with unresolved e-visits. Although the unresolved e-visit rate in this study was low (6.4 percent), some groups had higher rates. Older patients, male patients, and patients with certain conditions were more likely to have unresolved e-visits. This may be due to greater complexity of presentation or higher need for a physical exam to establish a diagnosis. Compared to younger patients, older ones may be less comfortable using technology to meet their health care needs, which may lead them to provide less information through the e-visit questionnaires.¹³ We found that e-visits were more likely to be requested by women than men and younger people than older ones, which is consistent with results of other studies.¹⁴ As this e-visit program is limited to adults with specific acute complaints, further research is needed to assess the outcomes for younger patients and e-visits for chronic illnesses and the costs to the patient associated with in-person follow-up.

We hypothesize from the survey data that e-visit programs focused on specific acute complaints can save health care dollars. These e-visits seemed to replace office visits, as opposed to being provided in addition to in-person care, and resolved the patient's condition. Previous studies have shown variations on this finding, with some showing reductions in cost,¹⁵ no change in the number of face-to-face visits,¹⁶ and increases in utilization and costs.¹⁷ Our results expand the current research and suggest improvement in value and utilization. For instance, 49 percent of patients stated that they would have gone to their physician's office for a visit if they had not had access to e-visits. Perhaps most useful in terms of policy is the finding that an additional 42 percent would have gone to

an ED or either an urgent care center or retail health clinic for the presenting issue. It is possible that some people who indicated that they would have had an in-person visit would have actually called or emailed the office instead of going in. This would be consistent with findings from studies on nurse telephone triage, which report that 50–75 percent of calls can be managed without in-person visits.¹⁸ Still, by having a robust acute e-visit program, these patients were able to get high-quality care without the added expense of an in-person office, urgent care, or ED visit or an unreimbursed phone call and were able to get care within a system that included their primary care providers.

Policy Implications

For institutions considering starting or expanding a telemedicine program that includes e-visits, this study shows that patients are willing to use these services and engage with the health system via this newer technology. For health care systems, payers, and particularly patients, our data provide evidence that the quality of care provided by acute e-visits is within the standards of in-person care. The facts that few patients who completed e-visits required in-person follow-up and that most e-visits were resolved without an in-person visit suggests that for specific acute conditions, structured e-visits can generally replace in-person visits when integrated into a health system that provides access to patients' medical records and primary care providers. The

high resolution rates seen in our study may be due to having structured questionnaires, which also probably affected the short time it took providers to review and answer the e-visits. Access to the patient's health record and connection to their primary care providers may also have had an impact. This suggests that to be efficient, new programs should ensure that appropriate questionnaires are available, focus on conditions that can be appropriately treated through e-visits, and identify when additional resources may be needed to evaluate certain conditions. This process of improvement could ensure that e-visits are cost-effective and provide value to health systems, payers, and patients.

Conclusion

For adults with certain acute complaints, e-visits provide an alternative to in-person visits. The e-visit program at MUSC appeared to provide high-quality care, as demonstrated by high patient satisfaction, limited need for follow-up for the same complaint, and low likelihood of a change in initial diagnosis when follow-up occurred. Men and older people were more likely than women and younger people to have unresolved e-visits. E-visit programs continue to grow as telemedicine expands, and continuing to assess these programs and how they function in the larger health care setting will be important as policy and practice seek to address new methods for providing patient care. ■

NOTES

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