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Use of a voice and video internet technology as an alternative to in-person urgent care clinic visits*

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Summary

This study aimed to determine the feasibility of patient-initiated online Internet urgent care visits, and to describe patient characteristics, scope of care, provider adherence to protocols, and diagnostic and therapeutic utilization. A total of 456 unique patients were seen via Internet-based technology during the study period, generating 478 consecutive total patient visits. Of the 82 patients referred for an in-person evaluation, 75 patients (91.5%) reported to the clinic as instructed. None of the 82 patients recommended for in-person evaluation required an emergency department referral, hospital admission or urgent consultative referral. We conclude that real-time online primary and urgent care visits are feasible, safe and potentially beneficial in increasing convenient access to urgent and primary care.

Keywords

Home telecare, Telecare, Telehealth, Telemedicine

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Introduction

The wide availability and convenience of Internet communication have led to its expanded use in clinical medicine.[1] Multimedia telemedicine has been described for a variety of specialties and applications, including psychotherapy,[2,3] visual diagnosis of skin lesions,[4–8] asthma, orthopedics,[9] heart failure,[10] hypertension,[11] diabetes,[12] and other chronic conditions.[13] To our knowledge, all prior studies of telemedicine have analyzed encounters with established patients, or those in which a provider or trained individual acts as an intermediary between the patient and another provider,[14,15] or the use of highly structured, asynchronous e-visits through a patient portal.[16–18]

Here we present the first description of the use of multimedia voice and video telemedicine in the provision of real-time primary and urgent care involving direct evaluation of new and return patients who self-initiated first contact with a healthcare provider through online scheduling at a private, neighborhood-based healthcare system in a large urban area.

The objective of this study was to determine the feasibility of this type of live, online visit by describing four aspects of practice: patient characteristics, scope of care, provider adherence to protocols, and diagnostic and therapeutic utilization.

Methods

The study design was a retrospective chart review of all Internet-based patient encounters conducted through the neighborhood healthcare system described below during a pilot period from October 11, 2011 through June 30, 2012.

ZoomCare® (ZC) is a privately held company that operates 24 neighborhood clinics in the Northwest United States, predominantly in Oregon. Clinical sites are staffed by physicians, nurse practitioners and physician assistants, all of whom are licensed and physically located in the state of Oregon. Services provided include primary and urgent care for illnesses and injuries, as well

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*Institutional Review Board Approval
This study was reviewed and received approval by the Oregon Health & Science University Institutional Review Board.

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as preventive care, pediatrics, care of chronic illnesses, physical therapy, mental health, and specialty care such as dermatology, cardiology, orthopedics, gastroenterology, and otolaryngology. The system bills commercial insurance for care provided and also accepts self-pay patients.

In addition to customary in-person visits, the clinics began in October 2011 offering a real-time internet-based visit service using a free proprietary voice-and-video-over-Internet protocol service (Skype®). Skype, in this context, is used as a videoconferencing tool, not to share electronic personal health information, and is therefore not subject to the HIPAA security rule.[19] Skype uses 256 bit encryption for its videoconferencing - greater protection than normal "landline" telephone communications. These Internet-based visits (herein online visits or telemedicine visits) are limited to patients age 18 or older who are currently present in the state of Oregon; all registrants verbally attest to being present in Oregon. The hours of online visits mirror the hours at the traditional clinics, namely 8AM to midnight. The online visits are scheduled for 15 minutes and are self-pay at a cost of $49 during the study period. (Insurance is not billed for online visits, as insurers in Oregon do not currently cover this type of visit.) Patients are given the option to schedule either an in-person or an online visit through the clinic website. Patients opting for an online visit select an available time slot and indicate the reason for the visit from a fixed list of 16 choices (Table 1A). Patients do not have the option to "write in" a symptom or condition for an online visit. If the patient's complaint is not on the list, an online visit is not provided and the patient must select an in-person visit.

Each patient scheduling via the website for online care receives a call from a clinic intake staff member to confirm the time of the online visit, patient age, location, reason for the visit, possession of appropriate photo identification, access to a web camera and functioning Skype account. Details of the registration process are captured in appendix 1.

The online clinical encounter begins when the provider contacts the patient via Skype®. Technical requirements for the visit are determined by the functional ability of the provider to perform a medically appropriate visit. If the image or voice are not satisfactory to the clinician, the visit is stopped and the patient is instructed to schedule in-person. The cost of the online visit is then applied to the cost of the in-person visit.

A written protocol exists for each of the 16 conditions or symptoms. Each protocol contains of list of "red flag" symptoms (see Table1B). Telephone intake staff and providers are trained to ask for these red flag symptoms. If a red flag symptom is elicited patients are excluded from the online visit and the patient is told to come to an in-person visit.

After the initial screening is completed, the provider obtains a focused complaint-based history, examines the patient visually via web camera video imaging, and determines a diagnosis and treatment plan. All providers are trained on written protocols that determine the required key historical elements and physical findings to be documented for each condition (see Table 1B). The patient may be asked to assist the remote provider in performing the examination (for example, by palpating the area of complaint to elicit tenderness). At any point in the visit, patients who are deemed to require assessment

Table 1. Sixteen choices for Skype® appointment and red flags for recommending in-person visit.

A. Online visits are limited to 16 chief complaints

List of chief complaints qualifying for online visits

1. Acne
2. Allergies
3. Cellulitis
4. Cold sores
5. Conjunctivitis ("red eye")
6. Cough
7. Headaches (minor)
8. Minor diarrhea
9. Minor sprains
10. Otitis externa ("swimmer's ear")
11. Rashes
12. Sinusitis
13. Sore throat
14. URI
15. UTI in females
16. Vaginal yeast infection

B. Sample Protocol: Urinary Tract Infection. This protocol example includes "red flag" symptoms and other key history elements.

Red flags indicative of a condition that requires in-person evaluation

- Flank (side) pain
- Vaginal Discharge
- Hematuria alone without dysuria or flank pain is concerning for malignancy
- Painful Intercourse
- Concern for STDs
- New sexual partners in the last 1 month

Need to know:

- Date of last menses, and if it was on time
- Method of birth control if applicable

Signs of Complicated UTI: any of these require in-person visit

- History of urinary tract infection in childhood
- History of acute pyelonephritis in the past year
- Documented relapsing UTI in the past year
- Three or more UTIs in the past year
- Previously identified uropathogen with multiple resistance
- Hospital acquired UTI
- An indwelling urethral catheter
- Recent urinary tract instrumentation
- Functional or anatomic abnormality of the urinary tract
- Recent antimicrobial treatment (within past month)
- Symptoms for seven or more days before seeking care

Request and document in the chart for all female patients that there is a need for:

- A home pregnancy test, and to return for an in-person visit if it is positive.

beyond the scope of the online visit (based on the established written protocols and the provider's clinical judgment), including need for a hands-on physical exam, are asked to come to the clinic to continue evaluation of the chief complaint in person. The cost of the online visit is applied to the cost of the in-person visit.

After the online visit, the patient can electronically view a visit summary and invoice. If the patient requires a prescription, it is faxed to the patient's preferred pharmacy. Prescriptions for controlled substances are not provided via online visits, with the exception of codeine-containing cough suppressant. Orders for any required laboratory testing or imaging are transmitted to a local laboratory or imaging center (which may include ZoomCare®). Any additional questions or follow up related to the visit can be initiated by the patient through the clinic's call center or via a secure online portal.

The study received institutional review board approval prior to beginning data extraction and analysis. Clinical and demographic data were extracted from the health system's data warehouse, which is linked to the system's electronic health record. The study data were further supplemented by information collected through direct chart review by one of the study personnel (HK). All records were assigned a unique coded subject identifier before being passed on to university researchers (PB, CF, DC, DG) for analysis. All records were coded so that no individual patient identity could be determined. Data analysis included demographic and clinical characteristics of the patient cohort, such as: age, gender, chief complaint, history of present illness, physical examination findings, final diagnosis, need for laboratory or radiographic studies, medications prescribed, and clinical outcomes of both online care and any subsequent in-person visits. To assure consistency in data preparation, one researcher (PB) performed an audit of 10 percent of the records for accuracy of data collected.

Frequency tables and descriptive statistics were generated. The Fisher's exact test was used to calculate p-values. All computations were done in R environment for statistical computing v. 3.0.2 (http://www.R-project.org). This study received no external funding.

Results

A total of 456 unique patients were seen via Internet-based technology, generating 478 consecutive total patient visits during the study period from October 11, 2011 through June 30, 2012. Female patients comprised 69.8% of the patient cohort. The most common demographic subgroup was females ages 30 to 39 years (31.7%), followed by females aged 40 to 49 (19.5%). See Table 2 for more detailed demographic data of all study patients.

Table 2 also presents various descriptive statistics of the online patient visits. Nearly all of the patients (435; 95.4%) used the Internet-based service only once, with 21 patients accounting for an additional 43 visits during the study period. Among the 478 encounters, 73.5% were conducted by physician assistants and the remainder by nurse practitioners. Forty-four percent of patients had previously received care through an in-person visit at ZoomCare® at least once prior to the online visit, and of those 28.9% had used commercial insurance during a previous in-person visit (Table 2).

The most common chief complaints for online visits were sinusitis (23.2%), UTI in females (20.0%), and rashes (12.5%). Cellulitis, otitis externa, and vaginal yeast infections each accounted for less than 2 percent of the total number of encounters. (Table 3)

Of the 478 Internet-based visits, 82 (17.1%) visits were aborted. These 82 unique patients were recommended for in-person evaluation. Three were stopped due to technical reasons only, such as poor Internet connection or image quality. The remainder of in-person referrals was based either on patients' meeting at least one formal "red flag" exclusion criterion (57 patients), or on provider judgment and expressed concern for a more complex diagnosis (22 patients).

Sore throat was the most common presenting complaint among all patients referred for an in-person evaluation (15.9%), followed by urinary tract infections in females (14.6%), rashes (14%) and sinusitis (14%). Though representing a very small percentage of the cohort overall, two out of three patients with otitis externa (66.7%) were recommended for in-person visits (Table 3).

Of the 82 patients whose online visit was aborted and who were referred for an in-person evaluation, 75 patients (91.5%) reported to the clinic as instructed (Table 4). Of these patients, 23 (31%) underwent laboratory studies vs. 2 (0.5%) of the 396 who completed online visits ($p < 0.001$). 58 of the 75 in-person visits (77.3%) resulted in a prescription vs. 358 (90.4%) of visits completed online) ($p = 0.002$) (See Figure 1). Table 4 shows the number and classes of medications prescribed by providers at the in-person visit vs. the online cohort. There was no difference in rates of imaging studies ordered during the online vs. in-person encounters (2.7% vs. 1.8% respectively).

No visits, either online or in-person visit, resulted in an emergency department referral, a hospitalization or a 911 call.

Among the seven patients who were referred for an in-person visit but who opted not to come in, five were later contacted by phone and were clinically well without further intervention, one had a subsequent clinic visit within the same system at which the initial complaint was confirmed as having resolved, and one was lost to follow up.

In order to determine if providers were appropriately following the written protocols for online visits, a random 20 percent sample of the 396 patients whose visits were completed online with no referral for an in-person visit were assessed for compliance with the written protocols. Analysis revealed that 88 percent of the sample appropriately met none of the formal criteria for an in-person referral. The remaining twelve percent of patients met at

Table 2. Demographics and descriptive statistics of patients and online visits

Gender						
Age	Female	%	Male	%	Total	%
below 30	36	7.9%	9	2.0%	45	9.9%
30 to 39	145	31.8%	62	13.6%	207	45.4%
40 to 49	89	19.5%	46	10.1%	135	29.6%
50 to 59	26	5.7%	13	2.9%	39	8.6%
60 to 69	22	4.8%	8	1.8%	30	6.6%
			Number of patients			% of total
Number of online visits						
1			435			95.4%
2			20			4.4%
3			1			0.2%
Total patients			456			
Established patients						
Yes			199			43.6%
No			257			56.4%
Total patients			456			
Has used insurance In the past						
Yes			132			28.9%
No			324			71.1%
Total patients			456			
			Number of online visits			% of total
Provider type						
FNP			127			26.6%
PA			351			73.4%
Total visits			478			
In-person visit recommended						
Yes			82			17.2%
No			396			82.8%
Total visits			478			
Compliance with recommended In-person visit						
Yes			75			91.5%
No			7			8.5%
Total visits			82			

least one formal criterion for in-person referral, but providers were allowed to exercise clinical judgment in their decision making for individual patients.

An audit of 10 percent of encounter records demonstrated 100% agreement between the initial chart review and data extraction with respect to patient demographics, chief complaint, final diagnosis, reason for referral for an in-person visit, and patients' compliance with the in-person visit recommendations.

Discussion

This is the first descriptive study of a real-time online visit system in which patients self-initiate primary and urgent care online and providers deliver *de novo* care to patients who are at home or in other remote locations, with more than half the patients having had no prior contact with the healthcare system providing the care, and no additional clinical information available at the time of scheduling other than the chief complaint.

Previous studies of online care or telemedicine have involved either established patients; or providers seeking consultative advice from specialists at a distant location[15,20]; or the use of an onsite professional intermediary who is present with the patient, to interpret symptoms and signs, or assist with hands-on physical examination,[14,21,22] or the use of highly structured, asynchronous e-visits through a patient portal.[16,17,18]

This study evaluated the feasibility and scope of *de novo* real-time primary care and urgent care-type visits

Table 3. Patient selected reason for online visits & percent referred in.

	Number of online visits	%	Recommended for in-person evaluation	%	% of all online visits
Acne	11	2.3%	0	0.0%	0.0%
Allergies	14	2.9%	3	3.7%	21.4%
Cellulitis	1	0.2%	0	0.0%	0.0%
Cold Sores	10	2.1%	0	0.0%	0.0%
Conjunctivitis	33	6.9%	6	7.3%	18.2%
Cough	40	8.4%	10	12.2%	25.0%
Minor Headache	10	2.1%	3	3.7%	30.0%
Minor Sprain	13	2.7%	0	0.0%	0.0%
Otitis Externa	3	0.6%	2	2.4%	66.7%
Rashes	60	12.6%	12	14.6%	20.0%
Sinusitis	111	23.2%	12	14.6%	10.8%
Sore Throat	43	9.0%	13	15.9%	30.2%
Upper Respiratory Infection	13	2.7%	5	6.1%	38.5%
UTI in females	96	20.1%	12	14.6%	12.5%
Vaginal yeast infection	5	1.0%	1	1.2%	20.0%
NA	5	1.0%	0	0.0%	0.0%
Total	478	100.0%	82	100.0%	

Table 4. Prescriptions, X-ray, and lab test orders by visit type.

	Online visit only	% of visits	completed through in-person visit	% of visits	Ratio of percent	p-value*
Total visits	396		75			
x-ray ordered	7	1.8%	2	2.7%	1.50	0.641
Lab ordered	2	0.5%	23	30.7%	60.57	<0.001
Rx written	358	90.4%	58	77.3%	0.86	0.002
Class of medication prescribed	Number of online visits resulting in Rx		Number of in-person visits resulting in Rx			
Antibiotic	284	71.9%	50	66.7%	0.93	0.406
Antihistamine	5	1.3%	3	4.0%	3.16	0.120
Cough suppressant	39	9.9%	15	20.0%	2.03	0.017
Nasal steroid	49	12.4%	9	12.0%	0.97	>0.999
Pain medication	15	3.8%	4	5.3%	1.40	0.522
Pther	180	45.6%	26	34.6%	0.72	0.099

*The Fisher's exact test.

delivered via a voice-and-video-over-Internet protocol. We were able to assess the feasibility of this type of online visit by answering several questions through this descriptive study: the demographic characteristics of patients using online visits in a community setting; the self-selected scope of care for which patients schedule a visit; the ability of healthcare professionals to successfully complete online visits and comply with protocols for these types of visits; the utilization of laboratory tests, radiology studies and prescriptions written during these visits; and the proportion of online visits that trigger recommendations for in-person visits based on protocols or providers' clinical judgment or need for a hands-on physical exam.

This study included the evaluation of the first 478 consecutive online visits in a community-based neighborhood health system. We found that the majority of visits performed were for straightforward, routine urgent care conditions, such as sore throat, UTI, rash, and sinusitis. Although the system specifically limited patients to select a reason for a visit from a prepared list of symptoms or conditions, a key question existed as to whether patients with more complex conditions would try to "sneak in" resulting in a significant proportion of acutely ill patients requiring higher level care. This does not appear to have happened. There were no urgent consultations, referrals to an emergency department, hospitalizations, or 911 calls

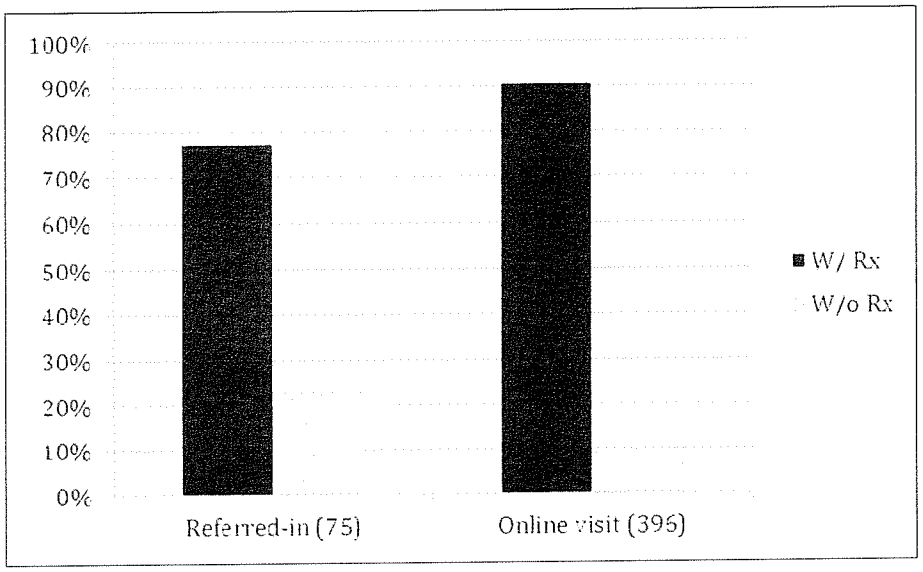

Figure 1. Proportions of visits resulting in a prescription. Numbers in parentheses are total visits.

among the 478 consecutive online visits nor among the subset of 82 patients whose online visit was stopped and who were sent for an in-person visit. This suggests that patients appropriately self-select for using this online service for appropriate conditions.

We demonstrated that visits via real-time voice-and-video-over-Internet protocol could be successfully completed with minimal technical difficulties. Only three of 478 Internet visits (less than 1%) had to be aborted because of technical reasons such as poor Internet connection and poor video quality.

We also demonstrated that providers successfully follow protocols for conducting Internet visits. In this study, providers appropriately recommended patients for immediate in-person visits based on protocol requirements. In total, 82 of 478 (17.2%) Internet visits were aborted and the patient was requested to come to an in-person visit. The most common reasons for aborting an Internet visit and recommending an in-person visit included patients' meeting at least one exclusion criterion that may indicate a more complex, potentially serious condition inappropriate for telemedicine (57 of 82 visits, or 77.3%). Providers referred an additional 22 patients to the clinic based on their professional judgment, including the perceived need for a hands-on physical examination. However, of these 82 visits recommend for in-person evaluation, none resulted in an emergency department referral, a hospital admission, or urgent consultative referral, and so likely could have been completed safely via the online visit.

Conversely, about 12% of the online visit cohort exhibited at least one "red flag" exclusion criterion but did not receive a recommendation for in-person care. We believe this mirrors the clinical judgment exercised by providers in more traditional settings where patient complaints are weighed in the context of the entire clinical encounter, including patient demographics, past medical history, risk factors and other considerations. For instance, not all patients complaining of chest pain warrant a full workup for acute coronary syndrome.

Significantly more patients in the group completing their visits online received prescriptions, compared to those whose visits were aborted and who were referred for in-person visits (90.4% vs 77.3%, $p = 0.002$). While we do not know the reason for this difference, it may reflect the ability of in-person providers to gain greater comfort with a watch-and-wait approach to conditions, perhaps based the ability to perform a more detailed exam. Alternatively, differences in patient expectations expressed in the two settings may have altered the rate of prescription medications.

About half of the prescriptions written in either group were for antibiotic agents. There were no differences in the proportion of Internet vs. in-person visits resulting in an antibiotic prescription.

The percentage of patients undergoing laboratory testing was also significantly different between online-only vs. referred-in patients (0.5% vs 30.7%, $p < 0.001$). This difference likely reflects selection bias, since patients sent for an in-person visit were specifically referred in because they met at least one "red flag" referral criterion, or due to the providers' concern for a more complex diagnosis, thus resulting in more testing in this cohort.

The strength of this study is that it analyzes patient demographics and provider actions in a real life active practice environment in a community setting in which the organization delivering care was able to perform both online visits and in-person visits.

Limitations of this study include the descriptive nature of the research as opposed to a randomized trial comparing intervention vs. control groups. Follow-up of patients reflected the real practice environment, in which some patients were lost to follow-up. No long-term follow-up of outcomes are presented in this study. No patient

satisfaction data captured during the study period. Safety was inferred by the nature of the presenting complaints, the final diagnoses and the documentation for patients referred in for in-person exams.

We conclude that real-time online primary and urgent care visits are feasible, safe and potentially beneficial in increasing convenient access to urgent and primary care. Telemedicine and other remote, electronically mediated medical visits are here to stay and will increasingly become part of routine care.[1] Online visits may offer the advantages of lower cost,[23] expansion of access to care in geographically remote areas or underserved populations,[24,25] and greater patient convenience.[26] Care models for telemedicine have been developed that indicate that online visits could effectively replace in-person evaluation for acute childhood illnesses.[27]

Internet-based care may also improve access to healthcare for populations in remote geographic regions, populations in long-term care facilities, and others for whom travel to a clinic would be difficult or unfeasible, or those who need hard-to-access specialists.[3, 7–9, 12, 28–32] The technology to perform online medical care has become ubiquitous, available on every personal computer, cell phone or similar device. Moreover, patients are becoming increasingly familiar and comfortable with Internet-based care.[33]

Providers, healthcare systems, state regulators, medical boards and insurers, including government payers, will need to accommodate this new model of delivering care. It is our hope that this study will help inform state licensing boards and independent accrediting bodies as to the clinical characteristics and feasibility of live telemedicine visits when evaluating standards for assuring value and quality of Internet-based care. Future research should focus on provider decision making, clinical outcomes and longer-term follow-up of patients who have online visits. A randomized trial of patients who choose online care compared to those who opt for traditional in-person visits would also be enlightening from the perspective of outcomes, cost and clinical effectiveness.

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Dr. DiPiero is the co-founder and co-owner of ZoomCare. Ms. Kum is an employee of ZoomCare. Dr. Brunett, Ms. Flores, Dr. Choi and Dr. Girard have no conflicts of interest (including relevant financial interests, activities, relationships, or affiliations). This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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Appendix 1: Registration process protocol

- Confirm patient is 18 years of age or older
- Obtain verbal confirmation the patient is in Oregon
- Possession of appropriate photo identification, which will be examined at the time of visit
- Confirm the patient is requesting care for one of the 16 conditions that qualify for online visit
- Confirm patient has a functioning Skype account
- Confirm we have the patient's Skype ID in Demographic Data
- Collect Credit Card
- Notify Patient they must accept the request to add ZoomCare clinic ID to their Skype contact list just before the call.
- Notify Patient to have ID on hand at beginning of the visit.
- Confirm patient will be calling from a computer with a web camera, not their phone.
- Inform: if Skype visit fails, patient can schedule in-person visit and the cost of the online visit shall be applied to the cost of the in-person visit.