

Eye Care Providers' Attitudes Towards Tele-ophthalmology

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Abstract

Background: The rapid rise of e-health and remote care systems will likely change the practice patterns of ophthalmologists. Although telemedicine practices are thriving in many specialties of medicine, telemedicine for ophthalmology has been limited primarily to asynchronous care for diabetic retinopathy. The goal of this research was to evaluate perspectives on and familiarity with telemedicine among eye care providers at a large tertiary-care medical center via an anonymous, descriptive survey. **Results:** In total, 58 eye care physicians completed surveys (response rates of 86% for physicians-in-training and 49% for faculty physicians, respectively). Although a majority of both faculty and physicians-in-training were willing to participate in telemedicine services, trainees were more likely to be willing to interpret photographs than faculty ($p=0.04$). Most respondents (71%) indicated that they did not use telemedicine. Over half had received photographs (via phone or e-mail) for interpretation from referring physicians (54%) or patients (56%) within the past 3 months. A majority of providers (82%) would be willing to participate in telemedicine for consultations and for interpreting photographs, but a majority (59%) had low confidence in remote care for providing an opinion on patient care. **Conclusions:** Most eye care providers viewed telemedicine as part of the future of eye care but were concerned about the use of telemedicine. Although most providers did not practice telemedicine, over half of them were comfortable managing eye care consultations (including patients' photographs) via the Internet.

Key words: ophthalmology, telemedicine, mobile health, technology

Introduction

Eighty percent of visual impairment worldwide is preventable, yet 314 million people globally are visually impaired—resulting in functional loss and morbidity.¹⁻³ Remote eye care is one of the most promising solutions for millions of Americans with inadequate access to eye care services.⁴⁻⁷ Provider workforce limitations are a significant hurdle in many rural communities.^{6,8} When Americans develop ocular problems, they may go to general or urgent care clinics or emergency departments.^{9,10} In

addition, people with known eye disease or with risk factors for disease fail to seek recommended care.¹¹ As current technology evolves to permit widespread implementation of systems to evaluate and diagnose ocular disease, telemedicine holds promise to diagnose and manage a variety of eye conditions. With the rapid rise of e-health and remote care systems, we sought to gauge current practice patterns and willingness to adopt telemedicine in ophthalmology among eye care providers at a large tertiary-care medical center.

Materials and Methods

SAMPLE SELECTION

Eye care providers at the University of Michigan Kellogg Eye Center (Ann Arbor, MI) were asked to participate in the anonymous survey. Medical students, technicians, and staff were excluded from the survey.

SURVEY INSTRUMENT

The survey included questions about interest and comfort level with telemedicine, current use of telemedicine in clinical practice, and access to current telemedicine technology. The questions were based on focus group surveys of healthcare providers regarding telemedicine and barriers to use.¹² The survey also included demographic information about respondents, including number of years in practice and ophthalmic subspecialty. Response rates for faculty (ophthalmologists and optometrists) and physicians-in-training were calculated.

ANALYSES

Statistical analyses were performed with SAS version 9.3 software (SAS Institute, Cary, NC). Participant characteristics were summarized using frequencies and percentages for the categorical variables. Responses to telemedicine survey items were scored on a 4-point Likert scale, from "strongly agree" to "strongly disagree." The responses of trainees were compared with those of faculty. The responses of physicians currently using telemedicine were also compared with those currently not using telemedicine. Comparisons of proportions were made using two-sided Fisher's exact tests. Values of $p < 0.05$ were considered statistically significant.

The University of Michigan Institutional Review Board deemed this study exempt from regulation.

Results

Fifty-eight providers (18 trainees and 40 faculty) responded to the survey. The response rate differed significantly, with an 86% trainee response rate and a 49% faculty response rate ($p=0.003$). The variance between trainee and faculty response rate is difficult to interpret

as the 81 faculty members are both clinical (62%) and basic science (38%) faculty. Among the faculty respondents, years in practice ranged from 30.8% ($n=12$) in practice <5 years to 41.0% ($n=16$) in practice >15 years. There was a significant difference in years of practice between respondents and nonrespondents ($p=0.01$), with more of the senior faculty >15 years in practice completing the survey (Table 1). Providers from all major ophthalmic subspecialties participated. There was no significant difference in type of subspecialty practice of respondents and nonrespondents in the subspecialties at the Kellogg Eye Center ($p=0.15$) (Table 1).

The majority of respondents (71%) indicated that they did not use telemedicine. Over half had received photographs (via the Internet or e-mail) for interpretation from referring physicians (54%) or directly from patients (56%) within the past 3 months. There was no difference between faculty and trainees in the percentage receiving online consultations from providers ($p=0.64$) or patients ($p=0.52$). A majority of providers (82%) said they would be willing or extremely willing to participate in telemedicine for requesting or receiving consultations and for reading or interpreting photographs. Overall, the trainees and faculty did not differ significantly in their willingness to participate in telemedicine opportunities (consultation with subspecialty, reading and interpreting fundus photographs, receiving consultations; $p>0.1$ for all comparisons), except that trainees were

significantly more likely to be willing to read or interpret external eye photographs than faculty (76.5% versus 38.9%; $p=0.04$).

Respondents overwhelmingly indicated that telemedicine was underutilized in ophthalmology (91%). When asked, "How do you feel that the availability of eye telemedicine would affect your practice?," the majority (60%) believed it would have a positive effect on their practice, 20% a neutral effect, and 20% a negative effect. The majority of respondents (59%) had low confidence in using remote screening for making decisions on appropriate eye care. Most providers (68%) were not comfortable with discussing patient care based solely on remote evaluations and photographs.

Discussion

Providers across specialties use telemedicine to improve access to care for underserved communities.⁵⁻⁷ However, any new method to deliver care must maintain quality, delivery, and cost of care while improving access.⁵ Providers and patients are concerned about the impact of many changes in the healthcare system. Telemedicine programs are one modality that will change healthcare delivery. Respondents to our survey demonstrated mixed attitudes toward telemedicine and mixed opinions on the feasibility of implementing telemedicine into routine clinical practice. Providers indicated that telemedicine was underutilized but were concerned about their role. A large survey of physicians about telemedicine knowledge and beliefs highlighted the fact that nonusers of telemedicine were more likely than users to believe that face-to-face interactions were necessary for an adequate examination.¹³ Nonusers were also more likely to be concerned about the practical convenience of using telemedicine. These results are not surprising given that nonusers will have a bias against a foreign way of healthcare delivery.

What is more surprising is that some studies show that provider attitudes toward telemedicine do not change after using telemedicine.^{14,15} Furthermore, a survey of adopters and nonadopters of telemedicine indicated that referring providers will continue their referral patterns and are not likely to change their practice.¹⁶ Providers have varied perceptions of telemedicine, and the ease of implementation of a telemedicine program will influence its ultimate effectiveness and reach. Creating diverse provider champions for ophthalmic telemedicine across subspecialties and creating efficiency measures that facilitate telemedicine in an outpatient clinical settings will be instrumental for providers to invest in telemedicine practices.

Ophthalmology providers continue to view telemedicine for this specialty as only the asynchronous (store-and-forward) approach used for diabetic retinopathy screening. To date, there are limited practices in ophthalmology performing synchronous telemedicine. One concept is to use synchronous telemedicine for consultation with outside emergency departments with limited access to eye care services.

Eye care providers in an academic medical center have distinct opinions about telemedicine compared with other providers; however, it is likely academic environments will be the place where new

Table 1. Composition of Faculty Respondents and Nonrespondents to the Survey

COVARIATE, VALUE	FACULTY RESPONSE PROFILE			P VALUE
	RESPONDED	DID NOT RESPOND	TOTAL	
Total	39 ^a	42	81	
Years in practice				0.0107 ^b
<5	12 (30.8)	23 (54.8)	35 (43.2)	
5-10	6 (15.4)	11 (26.2)	17 (21.0)	
11-15	5 (12.8)	3 (7.1)	8 (9.9)	
16+	16 (41.0)	5 (11.9)	21 (25.9)	
Subspecialty				0.1497 ^b
General	5 (12.8)	14 (33.3)	19 (23.5)	
Cornea/oculoplastics	11 (28.2)	7 (16.7)	18 (22.2)	
Pediatrics	5 (12.8)	2 (4.8)	7 (8.6)	
Glaucoma/neurology	8 (20.5)	5 (11.9)	13 (16.0)	
Retina	5 (12.8)	9 (21.4)	14 (17.3)	
Contact lens	5 (12.8)	5 (11.9)	10 (12.3)	

Data are number (%).

^aOne respondent was reclassified as a nonrespondent because of missing data for "Years in practice" and "subspecialty."

^bBy Fisher's exact test.

forms of telemedicine programs will begin as they have the infrastructure to implement large-scale programs. We felt it was appropriate to gauge the opinions and background of the providers in our center prior to starting a program. These survey questions were not taken from a validated instrument, as none existed, which may limit the validity of the responses. As this survey was intended to be a hypothesis-generating tool, its results provide guidance for designing larger qualitative evaluations.

The majority of respondents would be willing to participate in telemedicine applications, such as requesting or receiving consultations and interpreting external eye and fundus photography. Although eye care providers view telemedicine as increasingly important in future practice, our survey also reveals that providers are not comfortable with or confident in current telemedicine applications and are not convinced that current modalities provide sound, valid, and safe ways to assess need for eye care. Advocates of telemedicine need to develop practical and validated protocols for ophthalmic diseases if they seek to change eye care providers' practice patterns and opinions.

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