

Changes in Provider Attitudes Toward Telemedicine

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Abstract

A longitudinal study was conducted in which the pre- and post-telemedicine encounter attitudes of healthcare providers were compared in order to ascertain whether and how experience with telemedicine changes their attitudes toward telemedicine. Attitudinal changes of providers who had used telemedicine previously were compared to those experiencing telemedicine for the first time. Data were gathered from the providers in two telemedicine programs located in Georgia and Nebraska. Both used real-time videoconferencing and peripheral devices to conduct telemedicine consultations. A total of 87 providers completed questionnaires just prior to and immediately after each telemedicine encounter in their respective programs. The questions focused on the expected impact of telemedicine on their productivity and ability to prescribe treatment. A 3-point scale was used to measure the responses. More than three quarters (79.3%) of the providers did not change their attitudes subsequent to the use of telemedicine. There was no significant difference between first-time users and those who had experience ($p = 0.392$). The shift in attitude in the minority ($n = 18$) of providers who did change their minds after the telemedicine encounter was more positive among those who used telemedicine for the first time as compared to those with experience. Contrariwise, those with experience became more negative ($p = 0.025$). This finding suggests that experience with telemedicine results in more positive attitudes that may not be realized in subsequent interactions with the technology.

Key words: provider attitudes, longitudinal study, first-time users, experienced users

Introduction

Policymakers have criticized the American healthcare system for spiraling costs, quality of service, and inaccessibility. For many people in the United States and around the world, healthcare is often restricted by a shortage of trained personnel, distance, poverty, or lack of awareness of the service options. One of the suggested solutions for the problems of cost, quality, and access is telemedicine. For the purposes of this study, a telemedicine system is defined as *an integrated, typically regional, healthcare network offering comprehensive health services to a defined population through the use of telecommunications and computer technology*.¹

Ultimately, the use of telemedicine for patient diagnosis, treatment, and support depends on the willingness of clinicians and other healthcare providers. Bashshur et al. found in 1995 that clinician willingness to use telemedicine is related to their attitudes regarding telemedicine and their prior experiences with it.² Missing from the literature, however, is an exploration of whether or not those attitudes change after using telemedicine. More recently in their investigation of factors associated with successful telemedicine systems, May et al. discovered that clinician predisposition toward using telemedicine was one of the factors necessary for regular employment of that system, along with a sponsoring organization, structural legitimacy, and cohesive network.³

A key problem restricting the use of telemedicine is that there is very little information on how using this healthcare network system specifically changes the attitudes of healthcare providers. There have been numerous studies of the attitudes of healthcare providers toward telemedicine that are exploratory and cross-sectional in nature.⁴⁻⁶ However, a longitudinal design is needed to adequately explore specific aspects of changes in attitudes with telemedicine. Those studies reported in the literature incorporating a longitudinal design have primarily addressed only a single type of provider or service such

as pathologists,⁷ a renal unit,⁸ or an oncology service⁹ as their focus and/or had a small sample size.¹⁰

This study was subsequently designed to determine whether there is a difference in the (1) frequency of change in attitudes between first-time and experienced users of telemedicine, and (2) direction of change in attitudes between these two groups.

Methods

Data for this study were obtained from the responses of healthcare providers associated with two different telemedicine systems. In one of those systems, the data collection period for this study coincided with the initial deployment of the telemedicine services. In the other system, some hub sites had been operational before the study period. That situation provided an excellent opportunity to obtain data to compare the attitudes of new users of telemedicine to those who had previously used telemedicine.

The study population consisted of two groups between January 1995 and March 1997: (1) physicians who utilized the Medical College of Georgia Telemedicine Center ($n = 50$), and (2) healthcare providers who utilized the mid-Nebraska Telemedicine Network ($n = 37$). The healthcare providers for both studies were self-selected in that they chose to both utilize the telemedicine system and complete the questionnaires required for the study. Both telemedicine systems utilized real-time videoconferencing with on-site coordinators to assist providers in the use of the equipment.

The two systems differed on several primary aspects. First, the Nebraska system evaluation study was begun at the initiation of the telemedicine technology in 1995, while Georgia system had been operational as a pilot program with one remote site since November of 1991. Second, state law in Georgia did not allow for nonphysician healthcare providers to function as primary care providers, while Nebraska allowed physician assistants and nurse practitioners to refer patients via telemedicine. Third, the Georgia system could be typified as a top-down approach in that the legislature in that state authorized and funded the system, after which the rural facilities were contacted and the telemedicine system was established. In contrast, the Nebraska system was funded through a grant requested by the Good Samaritan Hospital Foundation in Kearney with the explicit support of the rural facilities in the grant application. Finally, the Georgia system had a large teaching hospital and medical school at its hub site, while the Nebraska system's hub was a large community hospital, but not a medical college.

The research instruments and the data were made available by Professor Rashid Bashshur while serving as Professor of Health Management and Policy at the School of Public Health. He also serves as the Director of Telemedicine at the University of Michigan

Health System. Baseline information regarding previous telemedicine experience, attitudes, and demographic data was collected just prior to the first telemedicine consultation during the study period via the pre-encounter form. Immediately following the telemedicine encounter, the postencounter questionnaire was completed.

The targeted provider subjects were asked two questions addressing their attitudes regarding the expected impact of telemedicine on their (1) ability to prescribe treatment, and (2) overall productivity (Table 1). Each of these questions had three possible responses: (1) decline, (2) stay the same, or (3) improve. The pre- and postencounter responses to these questions were compared. Providers were placed into one of three categories as a result of these comparisons: (1) shift toward improve, (2) no change, and (3) shift toward decline. A pre- to postshift in attitude for one or both questions, whether slight or marked, resulted in a provider being identified as one who changed their attitudes. For example, a provider who marked "stay the same" on the pre-encounter form and "improve" on the postencounter form was identified as a "shift toward improve" case. The identical result occurred with a provider who marked "decline" on the pre-encounter form and "improve" subsequent to the telemedicine experience. Therefore, if a provider changed his or her level of attitude on one or both of the questions, they were identified as an "expectation-changing" case. Of the 238 providers who used telemedicine during the study period, complete questionnaires were available for 87 (36.6% response rate) for one or both attitude questions. Table 1 depicts the numbers of providers who responded to each of the two attitude questions.

The dataset was separated into two groups: those who had used telemedicine prior to completing the study pre-encounter form, and those who had not. There was no statistically significant difference in frequency between the two groups on the basis of location (Nebraska

Table 1. Numbers of Respondents with Complete Pre- and Postencounter Forms Utilized in Analysis

	NUMBER OF PROVIDERS WHO ($N = 87$):	
	COMPLETED PRE- AND POSTENCOUNTER QUESTION ON THE ABILITY TO PRESCRIBE TREATMENT EXPECTATION	COMPLETED PRE- AND POSTENCOUNTER QUESTION ON THE OVERALL PRODUCTIVITY EXPECTATION
First-time users	55	54
Experienced users	31	29
Total	86	83

or Georgia), age, gender, practice type (solo or group), or category of provider. Healthcare providers were designated as belonging to one of six categories. The first category (Remote) consisted of all those providers located at an offsite location away from the study's central telemedicine site: Kearney for the mid-Nebraska Telemedicine Network or Augusta for the Medical College of Georgia. This group included nurse practitioners, family practitioners, physician assistants, obstetrician/gynecologists, pediatricians, general internists, general surgeons, a psychiatrist, and registered nurses. Those healthcare providers located at the central site were considered to be consultants, and were further placed into one of five categories: (1) psychiatrists, (2) surgeons, (3) internists, (4) other physician, and (5) nonphysician consultants. *Table 2* provides the number of each type of provider: remote or consulting.

Between first-time users ($n = 56$) and experienced users ($n = 31$) of telemedicine, the number of providers whose responses shifted in a negative direction was compared to the number of providers whose responses shifted in a positive direction. Fisher's exact test was used to test for significant differences.

Results

Table 3 outlines attitude outcomes by the two types of users: first time and experienced. This table combines the results of the two questions asked of providers: the expected impact of telemedicine on their (1) overall productivity, and (2) ability to prescribe treatment. If a provider changed their attitude on either or both of the questions, he or she is identified as a "Changed" case within the body of the table.

A chi-square test was performed to determine whether first-time users of telemedicine changed their attitudes more or less than experienced providers. The answer was no. First-time users were no more likely to shift their attitudes than were those who had used telemedicine before ($p = 0.392$).

The results of the data regarding the 18 providers who changed their attitudes were investigated further. The number of providers who changed for one or for both questions of attitude toward "improve" was compared to those who shifted toward "decline." For the purposes of analysis, the data reflect the number of providers with shifts in their attitudes, not the number of attitudes that changed. This comparison also excluded those providers who did not change their attitudes. A Fisher's exact test for significance was completed on the resulting figures. The results of this statistical analysis are presented in *Table 4*.

A total of 22 providers' attitudes changed in the study after using telemedicine. Results of the Fisher's exact analyses revealed that first-time users of telemedicine were more likely to change their attitudes toward "improve" than were those who had previous experience with the technology ($p = 0.025$).

Table 2. Demographic Characteristics of Study Population

	NUMBER OF PROVIDERS WHO HAVE:	
	NOT USED TELEMEDICINE BEFORE (N = 56)	PREVIOUS EXPERIENCE WITH TELEMEDICINE (N = 31)
Location		
Nebraska	30	7
Georgia	26	24
Age		
<30 years	6	2
31-49 years	42	21
50+ years	8	8
Gender		
Male	39	20
Female	17	11
Provider category		
Remote site	19	14
Psychiatry ^a	5	6
Surgery ^b	6	3
Internal medicine ^c	16	6
Other specialty ^d	7	4
Non-MD consultant ^e	3	2
Practice type		
Solo	10	6
Group	25	12
Other	20	13
Missing response	1	0

^aIncluded psychiatry and psychology.

^bIncluded neuro, orthopedic, plastic, and vascular surgery.

^cIncluded cardiology, endocrinology, oncology, hematology, urology, pulmonology, rheumatology, gastroenterology, and neurology.

^dIncluded dermatology, allergy, ophthalmology, pathology, ear-nose-throat, infectious disease, and emergency medicine.

^eIncluded physical therapy, occupational therapy, speech pathology, and dietitian.

Table 3. Number of Providers by Experience with Telemedicine and Attitude Outcome

	ATTITUDE OUTCOME		TOTAL
	NO CHANGE	CHANGED	
First-time users	43	13	56
Experienced users	26	5	31
Total	69	18	87

Pearson χ^2 $p = 0.392$, one-sided.

In summary, there is no difference between first-time and experienced users of telemedicine in the frequency of change in their attitudes. There is, however, evidence of a difference in the direction of change between the two groups when attitudes change. First-time users were more likely to shift their attitudes in a positive direction. Providers who have experience with telemedicine may also change their attitudes, but in a negative direction. In other words, providers who have not used telemedicine before are more likely to indicate “improve” when asked about the expected impact of telemedicine subsequent to their encounter as compared to experienced users.

Discussion

Providers who were using telemedicine for the first time did not change their attitudes more frequently than those who had used it before. However, when providers did change their attitudes, the direction of the change was significantly different between first-time and experienced users ($p = 0.025$). Providers who were new to telemedicine were more likely to shift toward a higher level of attitude after using it. Providers who had experience with telemedicine and changed their attitudes were just as likely to increase their attitudes as decrease them.

An explanation for this significant finding is that providers who have not used telemedicine may be wary of the technology, the process, comfort level with using it, or ability to make clinical decisions with it. Their attitudes are based on what they have heard or read about telemedicine. The theory of planned behavior,¹¹ the technology acceptance model,¹² and innovation diffusion theory¹³ all attempt to predict intent to use a new technology using factors such as perceptions of technology characteristics, opinions of others, and self-perception.¹⁴ The attitudes may be set fairly low for telemedicine. It comes as a pleasant surprise to these first-time users when (1) the technology performs well, (2) there are no logistical imperfections, and (3) they are able to effectively practice clinical care.

At the same time, some providers with prior experience with telemedicine changed their attitudes toward the system. Of those expe-

rienced providers who changed their responses, half of the attitudes were lowered (three of six). Several possible explanations exist. One may be that the attitudes were unrealistically high. The provider's first experience with telemedicine might have proceeded so well that it would have been difficult for any subsequent encounter to match it. Respected peers might have been so enthusiastic about the benefits of telemedicine that a higher (perhaps unrealistic) level of attitude might have resulted in the mind of the experienced provider.

Another possible reason for those results may be that the second experience was not as positive as the first. The case may have been more demanding or complex. The support staff may not have been as capable or friendly. The equipment may not have functioned as well.

A third possible explanation for a lowering of attitudes was that this was the provider's first encounter with the study telemedicine program in Nebraska or Georgia. A different system or type of telemedicine, perhaps during medical school or while practicing in another location, may be the basis of their experience. The attitudes, if that were the case, might have been built on a different set of system-based circumstances. The elimination of this possible confounding variable in relation to attitudes for the encounter is the basis for further research.

The empirical evidence that this study provides regarding the change of attitudes after use of telemedicine toward a more positive perspective for first-time users of telemedicine is unique to the literature.

Summary and Conclusion

In summary, the majority of providers ($n = 69$; 79.3%) do not change their attitudes after using telemedicine. In addition, there is no difference between first-time and experienced users of telemedicine as to whether or not they will change their attitudes. However, when change did occur, there was evidence of a difference in the direction of change of attitudes among first-time and repeat users of telemedicine. Those providers who are new to telemedicine are more likely to increase their attitudes with experience. When those who have had previous experience with telemedicine change their attitudes, it is just as likely to be in either direction.

There are several implications for this finding. First, it is important to communicate to providers clearly and realistically the possibilities and potential of telemedicine. Second, those who have not experienced the system for themselves appear to have the capacity to improve their attitude after a telemedicine encounter more than those who have experienced telemedicine. If their initial attitudes of telemedicine were higher, more providers might be willing to utilize telemedicine in providing patient care, thereby realizing the potential of increasing access to healthcare. Third, once providers have experience with telemedicine, they may revise their attitudes based upon what they just experienced,

Table 4. Number of Provider Attitudes That Change on Comparison of Pre- and Postencounter Responses

		SHIFT TOWARD DECLINE	SHIFT TOWARD IMPROVE	TOTAL
Have you used telemedicine before?	No	3	13	16
	Yes	3	3	6
Total		6	16	22

Fisher's exact test of significance (two-sided) = 0.025.

regardless of what their previous experience had been. This openness to change reinforces the necessity of ensuring a smoothly functioning telemedicine system for each and every encounter.

The significant results from this study provide insight and direction for those planning to implement a telemedicine system or for those charged with increasing the utilization of an existing system. Explicit recognition of the different attitudes of types of providers will enable system planners to tailor their systems to ameliorate concerns and facilitate expected advantages. Meeting with provider groups separately and creating communications specifically targeted to those audiences would be more effective than treating all providers alike. Identifying opinion leaders and maintaining their vocal support will be critical for the success of a system. The findings also indicate that first-time users of telemedicine are somewhat cautious in their attitudes. The consistent support of opinion leaders will therefore be important for generating more pre-encounter enthusiasm. However, of utmost importance in the early adoption phase is that the users have positive experiences every time the system is used to avoid disappointments with the efficiency and efficacy of the system. Highly recommended as well would be to obtain the best and most reliable equipment possible. In addition, support staff members who are not only competent but also personable to interact and troubleshoot are needed in order to maintain the high attitudes and satisfaction level of the provider users.

Healthcare providers are the individuals who determine the frequency of use of telemedicine. The finding that healthcare providers can change their attitudes toward telemedicine with each and every encounter in a negative direction suggests that it is important to establish and maintain an extremely well-functioning system. It is essential, therefore, that organizations that which are considering implementing a telemedicine system understand provider concerns and attitudes. Resources need to be allocated by the organization sponsoring telemedicine for reliably functioning equipment with high resolution and transmit speed, well-trained support personnel, initial mentoring and training programs, and convenient location. Unless a high level of commitment to ensuring optimal treatment and productivity outcomes can be maintained, it may be appropriate to not offer telemedicine services.

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Disclosure Statement

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