

Conceptual Framework to Evaluate Health Care Professionals' Satisfaction in Utilizing Telemedicine

Timothy Law, DO, MBA; Cory Cronin, PhD; Kristin Schuller, PhD; Xia Jing, MD, PhD;
Douglas Bolon, PhD; Brian Phillips, MA, MEd

From the College of Osteopathic Medicine (Dr Law) and the Department of Social and Public Health at the College of Health Sciences and Professions (Drs Cronin, Schuller, Jing, Bolon, and Phillips) at Ohio University in Athens. Drs Law, Cronin, Schuller, and Jing contributed equally to the manuscript and thus share the first authorship.

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Address correspondence to
Xia Jing, MD, PhD,
Department of Social and
Public Health, 1 Ohio
University, Athens,
OH 45701-2942.

Email: jingx@ohio.edu

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Context: Several advantages of telemedicine have been reported, such as improved patient satisfaction, reduced costs, and broader access to specialists. However, most studies have focused on patient satisfaction with telemedicine services. A literature gap exists in evaluating health care professionals' (both referring and performing professionals) satisfaction in delivering telemedicine services. A clear picture of professionals' telemedicine satisfaction has the potential to improve care quality, care accessibility, and telemedicine adoption and to reduce overall health care costs.

Objectives: To develop a framework to evaluate health care professionals' satisfaction in delivering telemedicine services and to articulate the factors that can contribute to their satisfaction.

Methods: We developed an initial conceptual framework based on existing literature and the research team's expertise. The initial framework was validated by a convenience group of 12 osteopathic and allopathic physicians, and the framework was further revised and refined according to their input.

Results: The refined framework includes 5 main components (professionals' demographics, care settings, motivations, experiences, and overall satisfaction) that can contribute to health care professionals' satisfaction or dissatisfaction in delivering telemedicine services. Detailed itemization is provided under each component, including hierarchical organizations of the items, definitions, and potential value sets.

Conclusions: The refined conceptual framework may provide a comprehensive evaluation reference for measuring professionals' satisfaction in delivering telemedicine. Further customization according to the specific setting of telemedicine services is needed. This refined conceptual framework can also be used to identify areas that can be improved and to ultimately improve telemedicine services and care quality.

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Telemedicine is an evolving health care delivery mechanism. The term *telemedicine* is used to define "the provision of medical services across distance,"¹ "healing at a distance,"² or "the use of technologies to remotely diagnose, monitor, and treat patients,"² while the term *telehealth* is broader in scope and incorporates health education,^{1,2} online discussion boards and support groups, and internet-based health communications.² In this article, we use *telemedicine* to define the provision of

health care services from a care professional to a patient at a distance (though *telehealth* is retained when discussing articles that used that term).²

In 1993, the first survey of telemedicine programs identified 12 active programs across the United States and Canada, mostly consisting of interactive video. By 1998, hundreds of programs were classified as telemedicine,³ and as of 2013, more than half of hospitals utilized telehealth,¹ with more hospitals beginning to implement services.⁴ Health care policy has increasingly taken note of telemedicine, resulting in more than 200 telehealth-related state bills introduced in 2015 alone.⁵

Although there is some hesitation in the adoption of telemedicine from health care professionals and patients, telemedicine has numerous potential and perceived benefits. Benefits for the patient include less travel time, less travel burden, less missed work or school,² reduced costs, improved quality of care, reduced number of missed appointments,^{2,6} and increased access to professionals,⁷ especially specialty professionals for patients in rural areas.⁸⁻¹² For patients with chronic conditions, telemedicine has been found to promote medication adherence, thus reducing readmissions and decreasing morbidity and mortality,² improving access to follow-up care, and showing high patient satisfaction.^{11,13-16} For patients in rural areas, telemedicine can provide patients with access to care that otherwise may not be available to them.¹⁷⁻²⁰ Among the elderly population, telemedicine programs offered through home health allow easy access to care in the convenience of their own homes.^{21,22}

Telemedicine has been increasingly used within osteopathic medicine²³ and medical education.²⁴ Professionals who refer patients to telemedicine services and who perform telemedicine services and the patients who receive these services are at the center of telemedicine delivery. Health care professionals' satisfaction is as important as patient satisfaction in telemedicine delivery. Settings such as a maternity hospital,²⁵ a cardiology hospital,²⁶ intensive care units (ICUs),^{27,28} and primary care practices^{7,29} have found positive telemedicine satis-

faction among health care professionals. However, several studies have reported either no significant changes in both perceived and real job satisfaction by delivering telemedicine services^{30,31} or mixed results.³²

Further research is required to understand how health care professionals perceive the increasingly prevalent telemedicine programs. For example, Whitten and Love³³ noted that many of the studies they assessed were hampered by small sample sizes, limited durations, or a lack of an established survey instrument. Such research will be most effective, as noted by Whitten and Love,⁴ with a rigorously tested instrument built on an established understanding of satisfaction and constructed to comprehensively incorporate the many factors of telemedicine. The purpose of the present article was to devise a conceptual framework for measuring health care professionals' satisfaction comprehensively and systematically. The long-term goal is to identify the possible gaps in telemedicine services; these gaps can then be addressed to improve quality and efficiency of care delivered via telemedicine.

Methods

The development of this framework occurred over 3 phases: (1) initial framework development, (2) validation, and (3) revision. Development began at Ohio University in 2016. The interdisciplinary team was made up of individuals with expertise and experience in primary care delivery (including a physician who has provided telemedicine services to patients for more than 20 years), health informatics, health care policy, and health services administration. Because of the conceptual nature of this study, there was no institutional review board involvement.

Initial Framework Development

To initially explore, define, and understand the problem and to inform the development of the initial framework, we performed a comprehensive literature review. We searched PubMed in October 2016 using “telemedicine” and “personal satisfaction” as MeSH terms with no other inclusion or exclusion criteria; 20 articles

were returned, of which 2 were related to health care professionals' satisfaction. These initial literature search results revealed a gap in the literature. In June 2018, we expanded the search strategy to include "telemedicine" and "job satisfaction" as major MeSH terms. Thirteen additional articles were identified, with 8 focusing on health care professionals' satisfaction. We also included 8 additional related articles that the authors had previously noticed, read, and saved for future reference.

After identifying research relevant to current professionals' satisfaction in telemedicine, we developed the initial conceptual framework. The development process included several iterative in-person discussions, revisions, and referrals to literature to achieve consensus among the research team.

Validation and Revisions

We sought feedback from a convenience group of 12 physicians, both DOs and MDs, to validate our initial framework. We also compared our refined framework with the National Quality Forum's report *Creating a Framework to Support Measure Development for Telehealth*³⁴ and that report's identified domain of Clinician Experience as an additional validation tool. We then revised and refined the initial framework again to incorporate all of the feedback, which resulted in the proposed conceptual framework.

Results

Refined Conceptual Framework

Overall, the 12 physicians agreed that the initial framework we proposed was valid and comprehensive in measuring health care professionals' satisfaction with telemedicine. The physicians did not comment on the organization and main components of the framework. Most of their feedback referenced the evaluation items (such as frequency of telemedicine utilization) and more detailed potential value sets (eg, specify zip code for location).

The **Figure** represents the refined framework for measuring health care professionals' satisfaction with

telemedicine. We identified 5 components that influenced health care professionals' perception of satisfaction as it relates to telemedicine, as follows: (1) demographics (eg, professional's education/training), (2) care settings (eg, rural, urban), (3) experience (eg, in terms of technology), (4) motivation (eg, patient cost, time), and (5) overall satisfaction (which is influenced by each of the previous 4 components).

Compared with the National Quality Forum (NQF) report,³⁴ our framework covered all of the Clinician Experience-related concepts to telemedicine except "ability to obtain actionable information." Our framework covered "Access to Care" and "Cost," which are both covered in the NQF report,³⁴ and provided more comprehensive coverage on other aspects of health care professionals' satisfaction with telemedicine. For example, our framework covered detailed information about professionals' motivations, care settings, and demographic data.

Demographics

This component of the refined framework included personal factors that may influence a health care professional's utilization of telemedicine. Demographics considered characteristics such as age, gender, education/training, whether they live in an urban or rural area, specialty, years in practice, prior utilization of telemedicine, role as a referring or performing professional, and self-perceived technological abilities (**Table 1**).

Care Settings

The next component of the framework examined was the setting in which the care was provided and who received the care. By assessing setting, this conceptual model may not only help predict those with the need and desire to use telemedicine but also identify whom to target for further education on the benefits and ramifications of the technology. This part of the framework included measurements of type of practice setting and population served, rurality (urban, suburban, or rural), type of services provided, and type and amount of



Figure.

The main components and examples of relevant items that contribute to health care professionals' satisfaction in telemedicine care delivery in the refined conceptual framework.

technical support available ([Table 2](#)). The care settings have been identified as one of the confounding factors in the adoption of electronic medical records and telemedicine in some other studies.^{36,38}

Experience

The next component of the framework pertained to the professional's past experience with technology, which might be one of the possible confounders influencing their utilization (or lack thereof) of telemedicine. Access to software, hardware, and technical infrastructure were some of the basic elements in this component of the framework. The access to technical support staff

either in the office or by phone (whether locally or overseas) were delineated, as well as how it related to workflow at the point of care ([Table 3](#)).

Motivation

The penultimate component is health care professional motivation. Without the proper motivation to utilize or at least learn more about telemedicine, other parameters may have little to no impact on satisfaction. Measurements in this part of the framework included the obvious potential benefits to both the professional and the patient, such as reduced costs and improved access and efficiency ([Table 4](#)).

Table 1.
Health Care Professionals' Individual Characteristics That May Influence Their Satisfaction in Delivery of Telemedicine Services, as Proposed in the Conceptual Framework

Demographics of Professional	Potential Value Sets and Annotation
Biological Features	
Age, y	≤35; 36-45; 46-55; 56-65; >65
Gender ³⁵	Female; male; nondisclosed
Race ²⁹	White; African American; American Indian or Alaska Native; Native Hawaiian or Other Pacific Islander; Asian; multiracial
Ethnicity	Hispanic or Latino; not Hispanic or Latino
Acquired Features	
Education/training ³⁵	Medical student; resident; licensed physician (DO or MD); nonphysician: associate degree, bachelor's degree, master's degree, PhD
Additional license or credentials to practice telemedicine	Yes (please specify); no; not sure
Professional title ²⁹	Physician; nurse practitioner; physician assistant; other (please specify)
Location of residence ³⁵	Rural; suburban; urban; please specify state; please specify zip code
Specialty ²⁹	Family medicine; urgent care; occupational medicine; internal medicine; pediatrics; obstetric-gynecologists; behavioral health; specialists (please specify)
Practice experience, y ²⁹	≤5; 6-10; 11-20; 21-30; >30
Practice experience with telemedicine, y ³⁶	≤5; 6-10; 11-15; 16-20; >20
Frequency of telemedicine utilization	Daily (specify how many times); weekly (specify how many times); monthly (specify how many times)
Role during telemedicine services	Provides telemedicine services; receives telemedicine services; both
Experience with telemedicine	Current telemedicine user; previous telemedicine user; no practice with telemedicine but with patients who utilize telemedicine via other providers; other (please specify)
Attitude toward telemedicine	Anti-telemedicine; naive telemedicine; telemedicine fan; neutral; hesitation; prohibiting; supporting; infringing; other (please specify)
Technological competency	Beginner (eg, seek help in solving IT issues); middle level (eg, able to solve one's own IT issues); advanced (eg, tech savvy and able to help others solve IT issues)
Technology adoption type	Innovator; early adopter; early majority adopter; late majority; adopter; laggard
General confidence level in ability to provide quality medical care ³⁷	High; medium; low

Abbreviation: IT, information technology.

Satisfaction

At the heart of the conceptual model was the professional's overall satisfaction with and attitudes toward telemedicine. This part of the model assessed the professional's expectations, attitudes, and confidence

in the use of telemedicine (Table 5). A visual analog scale gauging professional expectations would be utilized in this part of the framework. The peer support available to each professional would be measured through directed questions. We would also

Table 2.
Care Settings That May Influence Health Care Professionals' Satisfaction in Delivery of Telemedicine Services, as Proposed in the Conceptual Framework

Care Setting	Potential Value Sets and Annotation
Practice Settings	
Type of professional setting ^{36,a}	Adult; pediatrics; inpatient; outpatient; critical access hospital; teaching academic hospital; system member hospital; single specialty group practice; multispecialty group practice; community health center; private for profit; private nonprofit; government-supported hospital; other (please specify)
Size of practice	Solo; 2-5 physicians; 6-10 physicians; >10 physicians
Size of hospital	≤25 beds; 26-50 beds; 51-100 beds; 101-200 beds; 201-500 beds; >500 beds
Locations	
Location of the practice ³⁸	Urban; suburban; rural; please specify state and zip code; if rural, specify distance to the closest hospital
Location of the hospital	Urban; suburban; rural; please specify state and zip code
Residential areas of patients who receive telemedicine services	Urban; suburban; rural; mixed; not sure
Telemedicine Services and Technical Support	
Technical support availability	Yes, in-house; yes, via contract; yes, other (please specify); no; not sure
Types of telemedicine technology utilized in practice	Email or voice messages; audio only; audio and video only; audio, video, and Web-enabled instruments (eg, digital stethoscope); other (please specify)
Types of telemedicine services provided	Teleconsultation (store and forward, real-time); remote patient monitoring; real-time video visit; emergency visit; routine visit; prescription refill; primary care visit; specialist visit; other (please specify)
Requires health care professionals (eg, physician, nurse, physician assistant) on the patient side	Yes; no; not sure
Availability of extra space and equipment for telemedicine services	Yes; no; not sure
Availability of scheduling for telemedicine services	Yes; no; not sure
Availability of expected assistance on the remote site	Yes; no; not sure

^a Response options overlap; more than 1 can be selected.

look into how satisfaction ties in with expectations of the devices available.

Discussion

Interpretation and Potential Use of the Conceptual Framework

Our refined framework included 5 components: demographics, care settings, experience, motivation, and overall satisfaction. The initial validation showed these

components and subcomponents were essential to evaluate health care professionals' satisfaction in delivering telemedicine. We believe that developing a conceptual framework is a necessary first step to systematically studying professionals' satisfaction with telemedicine. The framework will enable a future comprehensive and core reference for telemedicine utilization.

The potential use of the framework includes the following: (1) identifying existing gaps at the

Table 3.
Health Care Professionals' Technological Experience With Telemedicine, as Proposed in the Conceptual Framework

Technical Experience With Telemedicine	Potential Value Sets and Annotation
General expectations of telemedicine ²⁹	Please specify
Telemedicine training experience	Sufficient or not; effective or not; please specify
Software-related experience	Please specify; usability test
Hardware-related experience	Please specify
Internet connection experience	Please specify in regard to speed, smooth or freeze frequency, unexpected disconnection, reliable services ³⁵
Technical support staff	Please specify in regard to availability, effectiveness, costs
Quality of images and sounds while utilizing telemedicine ³⁷	Please specify

organizational level, technological level, and policy level during telemedicine care delivery; (2) developing strategies or seeking solutions to fill the gaps; (3) understanding the utilization of telemedicine and improving health care professionals' experiences; and (4) improving care quality and patients' experiences. Furthermore, evaluation results may help health care management teams, telemedicine products' suppliers/vendors, and policymakers to improve telemedicine care delivery. The intended audiences of this conceptual framework include health care organizations who would like to evaluate existing telemedicine services, telemedicine services vendors (eg, technical providers) who would like to get feedback from the telemedicine service users, potential adopters of telemedicine services, and researchers who engage in telemedicine evaluation.

Comparison With Existing Literature

In comparison with the summary from Langbecker et al⁴¹ on the "constructs commonly reported in telehealth research," our conceptual framework addresses all of their constructs, such as satisfaction, experience, technical quality, effectiveness, usefulness, and the effect on interaction. We noticed that most of the references used in that article⁴¹ are about patient satisfac-

tion. Although the authors recognize that "the same constructs measured at the patient level apply equally to clinicians,"⁴¹ there was no comprehensive measurement that focused on health care professionals. In our framework, we include "benefits to care quality" as a category to identify the clinical outcomes related to telemedicine, which is recognized as a defect in current existing satisfaction measures for telemedicine by the authors.⁴¹

Hoonakker et al³² focused on the motivation and job satisfaction of tele-ICU nurses. Our conceptual framework differs in that it separates health care professionals' experience, motivation, and satisfaction, whereas Hoonakker et al used a more task-oriented model. Our intention was to provide a comprehensive conceptual framework that evaluates professionals' satisfaction across areas, regardless of the department in which the telemedicine services are utilized (ie, ICU, primary care, or others). In addition, both Romig et al²⁸ and Engström et al³¹ provide more detailed measurements in satisfaction.

Limitations and Future Plans

This article reviews many possible factors that could affect a health care professional's satisfaction with telemedicine. As such, one of the next steps will be to

Table 4.
Health Care Professionals' Motivations Pertaining to the Utilization of Telemedicine, as Proposed in the Conceptual Framework

Professionals' Motivations	Potential Value Sets and Annotation
Benefits to Patients⁷	
Reduce patient costs ^{38,39}	Yes (please specify); no (please specify); not sure
Save patient time ¹⁶ in regard to travel, wait, and referral ^{33,39}	Yes (please specify); no (please specify); not sure
Improve patient satisfaction	Yes (please specify); no (please specify); not sure
Improve patient care accessibility ^{29,35,38} in regard to distance, specialty, and out-of-hour accessibility	Yes (please specify); no (please specify); not sure
Patient belief that telemedicine is acceptable/appropriate	Yes (please specify); no (please specify); not sure; if yes, patient's age group: ≤18; 19-35; 36-50; 51-65; >65; if yes, specify conditions
Patient-provider relationship	Improved (please specify); not improved (please specify); not sure
Benefits to Professionals⁷	
Time	
Preparation time (consultation set up time)	More efficient (please specify); neutral; less efficient (please specify)
More dedicated time with patients	More efficient (please specify); neutral; less efficient (please specify)
Less documentation time after consultation	More efficient (please specify); neutral; less efficient (please specify)
Less travel to work time	More efficient (please specify); neutral; less efficient (please specify)
More efficient (eg, see more patients or get more done utilizing telemedicine ³⁷)	Yes (please specify); no (please specify); not sure
Save time communicating with primary care providers (or specialists) ²⁹	Yes (please specify); no (please specify); not sure
Financial	
Actual reimbursement reflects expected reimbursement	Type of reimbursement: Medicare; Medicaid; private insurance; other government-provided insurance (please specify); other (please specify)
Patient-provider dynamic/relationship	Improved (please specify); not improved (please specify); not sure
Work-life balance	Yes (eg, flexible schedule ³³) (please specify); no (please specify); not sure
Communication ²⁹	Yes (please specify); no (please specify). Communication with patients or with other professionals, such as primary care providers (or specialists) or vice versa
Professionals' expansion of career length	Yes (please specify); no (please specify); not sure
Benefits to Care Quality^{29,36}	
Reduces medical errors	Yes (please specify); no (please specify); not sure
Improves health-related outcomes ^{29,37}	Yes (please specify); no (please specify); not sure
Provides safer care ³⁶	Yes (please specify); no (please specify); not sure
Other Benefits	
Initiative of telemedicine	Chose to utilize telemedicine or was told to utilize it
Documentation time	Shorter time; longer time; no change
Administration time	Shorter time; longer time; no change

Table 5.
Health Care Professionals' Overall Satisfaction With and Attitude Toward Telemedicine,¹⁸ as
Proposed in the Conceptual Framework

Satisfaction	Potential Value Sets and Annotation
Overall Satisfaction and Attitude Measures	
Favorite features in delivering telemedicine services ⁴⁰	Please specify the care setting and the services, open response (eg, consultation, monitoring, prescription refill)
Least favorite features in delivering telemedicine services ⁴⁰	Please specify the care setting and the services, open response (eg, consultation, monitoring, prescription refill)
Perception of care quality provided via telemedicine	Please specify the care setting and the services, open response (eg, consultation, monitoring, prescription refill)
Whether telemedicine can fit into the routine workflow ^{29,37}	Please specify the care setting and the services, open response (eg, consultation, monitoring, prescription refill); if not, what should be done to improve?
Expectations of Telemedicine	
Specify expectations of telemedicine	Please specify in terms of benefits to patients, to providers, and to care quality
Meet the expectations	Yes; no; not sure; please specify
Peer Support⁷	
Competitive advantages from peers	Yes; no; not sure; please specify
Insecurity in practice	Yes; no; not sure; please specify
Attitudes About Using Telemedicine	
When telemedicine services are provided via providers in supplemental specialties	Support; doubtful; against; neutral; not sure, please specify
When telemedicine services are provided via providers in similar specialties	Support; doubtful; against; neutral; not sure, please specify

conduct focus groups to inform strategic prioritization of the survey elements, identify task-specific details that need to be included, and aid our further validation of the conceptual framework. If we can obtain a sufficient sample size of respondents on the future survey, a screening correlation analysis between health care professionals' satisfaction and each measure/item identified by the conceptual framework will provide more objective evidence on the validation of each measure.

Our findings about health care professionals' satisfaction and telemedicine could be similar to other patient care technologies (eg, electronic health record systems). Although this conceptual framework focuses on utilizing telemedicine, the comprehensive coverage may provide a starting point to evaluate professionals'

satisfaction in utilizing other types of technologies during care delivery. Our long-term goal is to explore professionals' satisfaction across different types of care delivery technologies in addition to telemedicine and to detect and address possible gaps to improve care quality.

There were limitations in the validation of this conceptual framework, including use of a small convenience group and lack of representation of nonphysician health care professionals. In future studies, we will aim to recruit a larger and more representative sample. Considering our conceptual framework is intended to be used as a default collection of evaluation items, additional customization and evaluation are needed to assess feasibility and utility of the framework.

Additional limitations include lack of task-specific details in the framework and lack of objective measurement in the validation process.

Conclusion

We believe the refined conceptual framework can provide a comprehensive tool for measuring health care professionals' satisfaction in delivering telemedicine. Further customization of the framework according to the specific setting for telemedicine services may be needed. This refined conceptual framework can be used as a critical reference to evaluate health care professionals' satisfaction, to identify areas that can be improved, and to improve telemedicine services and care quality.

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Additional Information

Mr Phillips passed away when this project was conducted.

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