AMERICAN TELEMEDICINE ASSOCIATION

PRACTICE GUIDELINES FOR VIDEOCONFERENCING-BASED TELEMENTAL HEALTH

Telemental Health Standards and Guidelines Working Group

Co-Chairs:

Brian Grady, MD
Kathleen Myers, MD, MPH
Eve-Lynn Nelson, PhD

Writing Committees:

Evidence-Based Practice for Telemental Health
Norbert Belz, MHSA RHIA, Leslie Bennett, LCSW, Lisa Carnahan, PhD, Veronica Decker, APRN, BC, MBA, Brian Grady, MD, Dwight Holden, MD, Kathleen Myers, MD, MPH, Eve-Lynn Nelson, PhD, Gregg Perry, MD, Lynne S. Rosenthal, PhD, Nancy Rowe, Ryan Spaulding, PhD, Carolyn Turvey, PhD, Debbie Voyles, Robert White, MA, LCPC

Practice Guidelines for Videoconferencing-Based Telemental Health
Peter Yellowlees, MD, Jay Shore, MD, Lisa Roberts, PhD

Contributors:

Working Group Members [WG], Consultants [C], Reviewers [R], Telemental Health Special Interest Group Chairs [MH], ATA Standards and Guidelines Committee Member [SG], ATA Staff [S]

Nina Antoniotti, RN, MBA, PhD [Chair, SG]
Ron Mazik [R]
Richard S. Bakalar, MD [SG]
Dennis Mohatt [R]
Norbert Belz, MHSA RHIA [WG]
Kathleen Myers, MD, MPH [Co-Chair, WG]
Leslie Bennett, LCSW [WG]
Eve-Lynn Nelson, PhD [Co-Chair, WG]
Jordana Bernard, MBA [S]
Hon S. Pak, LTC MC USA [SG]
Anne Burdick, MD, MPH [Vice Chair, SG]
Gregg Perry, MD [WG]
David Brennan, MSBE [SG]
Antonio Pignatiello, MD [R]
Sharon Cain, MD [R]
Terry Rabinowitz, MD [C]
Lisa Carnahan, PhD [SG, WG]
Lisa Roberts, PhD [Chair, MH, C]
Jerry Cavallerano, PhD, OD [SG]
Lynne S. Rosenthal, PhD [SG, WG]
Robert Cuyler, PhD [R]
Nancy Rowe [WG]
Veronica Decker, APRN, BC, MBA [WG]
Jay H. Shore, MD, MPH [Vice Chair, MH, C]
Kenneth Drude, PhD [R]
Ryan Spaulding, PhD [WG]
Sara Gibson, MD [R] Lou Theurer [SG]
Brian Grady, MD [Co-Chair, WG
Christopher Thomas, MD [R]
Tom Hirota, DO [SG] Carolyn Turvey, PhD [WG]
Dwight Holden, MD [WG] Doug Urness, MD [R]
Barbara Johnston, MSN [C]
Debbie Voyles, MBA [WG]
Thomas J. Kim, MD, MPH [C]
Tannis Walc [R]
Mark Koltek, MD [R]
Robert K. White, MA, LCPC [WG]
Elizabeth Krupinski, PhD [SG, C
Jill Winters, PhD, RN [SG]
Jonathan Linkous, MPA [S]
Peter Yellowlees, MD [C]
Liz Loewen, RN, BFA, MN [R]

AMERICAN TELEMEDICINE ASSOCIATION

Practice Guidelines for Video-Based Online Mental Health Services

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Preamble

The American Telemedicine Association (ATA), with members from throughout the United States and throughout the world, is the principal organization bringing together telemedicine practitioners, healthcare institutions, vendors and others involved in providing remote healthcare using telecommunications. ATA is a nonprofit organization that seeks to bring together diverse groups from traditional medicine, academia, technology and telecommunications companies, e-health, allied professional and nursing associations, medical societies, government and others to overcome barriers to the advancement of telemedicine through the professional, ethical and equitable improvement in health care delivery.

ATA has embarked on an effort to establish practice guidelines and technical standards for telemedicine to help advance the science and to assure the uniform quality of service to patients. They are developed by panels that include experts from the field and other strategic stakeholders and designed to serve as both an operational reference and an educational tool to aid in providing appropriate care for patients. The guidelines and standards generated by ATA will undergo a thorough consensus and rigorous review, with final approval by the ATA Board of Directors. Existing products will be reviewed and updated periodically.

The practice of medicine is an integration of both the science and art of preventing, diagnosing, and treating diseases. Accordingly, it should be recognized that compliance with these guidelines will not guarantee accurate diagnoses or successful outcomes. The purpose of these standards is to assist practitioners in pursuing a sound course of action to provide effective and safe medical care that is founded on current information, available resources, and patient needs. The practice guidelines and technical standards recognize that safe and effective practices require specific training, skills, and techniques, as described in each document. The resulting products are properties of ATA and any reproduction or modification of the published practice guideline and technical standards must receive prior approval by ATA.

If circumstances warrant, a practitioner may responsibly pursue a course of action different from the guidelines when, in the reasonable judgment of the practitioner, such action is indicated by the condition of the patient, restrictions or limits on available resources, or advances in information or technology subsequent to publication of the guidelines. Nonetheless, a practitioner who uses an approach that is significantly different from these guidelines is strongly advised to provide documentation, in the patient record, that is adequate to explain the approach pursued.

This guidelines document focuses on interactive video-conferencing based mental health services and telemental health/telehealth. The document is a companion document to ATA's Evidence-Based Practice for Telemental Health, an educational tool to aid practitioners in meeting these practice guidelines.

Scope

These guidelines are designed to serve as both a consensus operational best practice reference based on clinical empirical experience and an educational tool to aid practitioners in providing appropriate telehealth care for patients. The term telehealth indicates an inclusion of all health professionals, ranging from medicine to mental health, to educators, and to nurses. The use of telehealth also refers to the broader scope of e-health and distance education. Telemental health therefore, is the practice of mental health specialties at a distance. The practice of medicine is an integration of both the science and art of preventing, diagnosing, and treating diseases. It should be recognized that adherence to these guidelines will not guarantee accurate diagnoses or successful outcomes. The purpose of these guidelines is to assist practitioners in pursuing a sound course of action to provide effective and safe medical care that is founded on current information, available resources, and patient needs. The guidelines are not meant to be unbending requirements of practice and they are not designed to, nor should they be used, to establish a legal standard of care. The American Telemedicine Association advises against the use of these guidelines in litigation in which the clinical decisions of a practitioner are called into question.

The primary care or managing practitioner is responsible for the decision about the appropriateness of a specific procedure or course of action, considering all presenting circumstances. An approach that differs from the ATA guidelines does not necessarily imply that the approach varied from the standard of care. If circumstances warrant, a practitioner may responsibly pursue a course of action different from these guidelines when, in the reasonable judgment of the practitioner, such action is indicated by the condition of the patient, restrictions or limits on available resources, or advances in information or technology subsequent to publication of the guidelines. Nonetheless, a practitioner who uses an approach that is significantly different from these guidelines is advised to document in the patient record information to explain the approach pursued.

Introduction

Telemental health is one of the most active applications of telehealth rendered in the United States. Mental health is particularly suited to the use of advanced communication technologies and the internet for delivery of care. By using advanced communication technologies, mental health professionals are able to widen their reach to patients in a cost-effective manner, ameliorating the maldistribution of specialty care. The following Guidelines are designed to aid

in the development and practice of coherent, effective, safe and sustainable telemental health practices. Establishing guidelines for telemental health improves clinical outcomes and promotes informed and reasonable patient expectations. When guidelines, position statements, or standards from a professional organization or society such as (but not limited to) the American Psychiatric Association[1], American Psychological Association[2] or National Association of Social Workers[3] exist, it is advised that mental health professionals review these documents and incorporate them into practice.

Telemental health, like telemedicine, is an intentionally broad term referring to the provision of mental health and substance abuse services from a distance. This guideline focuses on two-way, interactive videoconferencing as the modality by which telemental health services are provided. In the future, additional sections will be added to address the use of the internet and other asynchronous or social relationship environments for interactions between mental health professionals and their patients and families. The use of other modern technologies such as virtual reality, electronic mail, remote monitoring devices (home telehealth store and forward technology), chat rooms, and web-based clients are not included in this version of the telemental health guidelines.

The ATA provides the core standards for telemedicine operations and provides overarching guidance for administrative, clinical, and technical standards (http://www.americantelemed.org/i4a/pages/index.cfm?pageid=3311). The Practice Guidelines for Videoconferencing-Based Telemental Health covers all areas, reflecting the basic component processes associated with most telemental health consultations. The telemental health guidelines give further detail to these core standards in relation to the specialty area. This section of the guideline contains requirements, recommendations, or actions that are identified by text containing the keywords “shall,” “should,” or “may.” “Shall” indicates that it is required whenever feasible and practical under local conditions. “Should” indicates an optimal recommended action that is particularly suitable, without mentioning or excluding others. “May” indicates additional points that may be considered to further optimize the telemental health care process.

A glossary of terms, references to literature, and informative web sites are included at the end of the document.

Application for the Practice of Telemedicine

a. Clinical Applications

Currently, the point of delivery for telemental health services is as varied as the type of services that are being provided. Sites include hospitals, emergency rooms, community mental health centers, clinics, physician offices, nursing homes, assisted living facilities, prisons, schools, and patient homes. With careful planning, telemental health services can significantly impact the quality, timeliness, and availability of services in almost any mental health care delivery system.[4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18]

Scope of Services

Clinical applications of telemedicine encompass diagnostic, therapeutic, and forensic modalities across the lifespan. Common applications include pre-hospitalization assessment and post-hospital follow-up care, scheduled and urgent outpatient visits, medication management, psychotherapy and consultation.

Clinical Interviews

Telemental health interviews may be conducted between physicians in consultation, between a physician and another health care provider (e.g., a case manager, clinical nurse practitioner or physician assistant), or between mental health professionals and a patient. Other persons, such as another health care provider or family member, may also be present in a patient interview. The Telemental health interview may be an adjunct to periodic face-to-face contact or may be the only contact; and is typically supported by additional communications technologies such as faxed or emailed consultation information or transmission of an electronic medical record.

Emergency Evaluations

Many programs across the United States provide emergency evaluations by telemedicine successfully with minimal support staff and standards in place at the patient site. Emergency evaluations for psychiatric hospitalization can be conducted via telemedicine, and usually will require additional personnel to provide physical control of the environment and possibly the patient, for patient safety. Situations such as a patient who is suicidal, homicidal, or suffering from dementia or acute psychosis may require additional personnel in the room in addition to family members. In general, adequate support staff or responsible family members shall be present at the remote site in order to safely care for the patient. If other alternatives are immediately available to meet the patient's needs without transfer, services are preferred to be provided on-site and in-person. In the event that support staff and family members are not present, the telemental health provider **must** make a determination whether immediate

intervention is deemed necessary for patient safety. [19, 20, 21, 22] Special attention shall be paid to the enhanced need for privacy and confidentiality and every attempt to preserve the patient's right to privacy shall be employed.

Case Management

In large distributed systems where multi-provider case management is needed, videoconferencing allows collaboration between all the involved clinical participants regardless of distance. Clinical treatment plans can be developed with input from experts who would not otherwise be available.[23, 24, 25, 26]

Clinical Supervision

Supervision of trainees (residents or interns) at a distant site can facilitate both training and patient care. Supervision may be done either in real-time with the supervisor present via videoconferencing, or, when appropriate, by the use of store and forward technology.[27] Supervising practitioners shall comply with state and federal requirements for in-person supervision for residents and other practitioners whose positions are federally or state funded.

b. Non-Clinical Applications of Videoconferencing

Distance Learning

Videoconferencing technologies for education encompass a broad range of applications. These include, but are not limited to, point-to-point applications, such as physician-to-physician, physician-to-patient, or multipoint sessions such as a classroom setting where a teacher is at one site and the "pupils" are at other multiple remote sites. Distance learning modalities can be used for off-site mentoring to teach new techniques, or multi-site transmission of "grand rounds" conferences and continuing medical education (CME) events. These can be streamed via the internet or transmitted a number of ways including point-to-point circuits and the public Internet (if transmitting protected health information or other sensitive information via the public internet, AES encryption or a virtual private network (VPN) ***shall*** be used to secure the transmission).[28, 29] Distance education modalities can also be used for clinical care of patients, e.g. patient teaching regarding medications, therapies, or compliance with treatment plans.

Research

Telemedicine has been applied as an effective and reliable means of gathering research data from clinical populations. Telemental health enables multi-site and remote acquisition of information via in-person interviews or direct observation, as well as providing a simple means of archiving patient-provider interactions in video format for later scoring and evaluation. All requirements for human subjects research ***shall*** be applied to the use of telemental health for

research purposes, especially when research involves the use of video or audio taping of the telemedicine conversations. Attention ***shall*** be paid to issues of confidentiality and informed consent, ensuring that patients who are involved in research trials via telemedicine understand consent is for the purposes of research and not for receiving care via telemental health. Efforts ***shall*** be made to ensure that patients receiving telemental health services are aware that telemedicine conversations will be recorded only with their consent.[30]

Administration

Interactive two-way audio-visual communication between distant hospitals, clinics, schools, and justice centers is an effective means of providing administrative services and support and helps organizations to achieve cost savings in large or geographically dispersed systems. Any discussion of protected health information ***shall*** be secured through use of a private, point-to-point circuit, an ISDN connection, or AES encryption or a virtual private network (VPN) ***shall*** be used for transmissions via the public internet.

Guidelines for the Practice of Telemental Health

Any organization or provider considering the use of telecommunications equipment for the purpose of providing mental health or substance abuse care to a remote site ***shall*** have in place prior to initiating such a service a set of Standard Operating Procedures or Protocols that ***shall*** include (but are not limited to) the following administrative, clinical and technical specifications.

The guidelines ***shall*** specifically describe roles, responsibilities (i.e., daytime and after-hours coverage), communication, and procedures around emergency issues. The degree of involvement of the telemental health provider will vary greatly between remote sites and be determined by legal issues, local resources, and staffing available to the clinic.[31]

a. Standard Operating Procedures/Protocols

Telemental health organizations and providers ***shall*** ensure that appropriate staff is available to meet patient and provider needs before, during, and after telemental health encounters of all types. Organizations and practitioners ***shall*** have agreements in place to assure licensing, credentialing, training, and authentication of patients and practitioners as appropriate and according to local, state, and national requirements.

Telemental health organizations and practitioners ***shall b***e aware of the enhanced requirements for privacy and confidentiality that is afforded to patients receiving mental health care. In the United States, additional state regulations for privacy, confidentiality and patient rights apply above and beyond requirements in place for general health care interactions.

Telemental health organizations and practitioners ***shall*** have billing and coding processes in place that share information across systems for the purposes of payment that do not risk exposure of mental health patients' personal health information.

Telemental health organizations and practitioners ***shall*** determine processes for documentation, storage, and retrieval of telemental health records. Specific descriptions ***shall*** be in place that address who can have access to the records. Most organizations institute a higher level of security on mental health patients' records than on other patients' records.

Patients receiving mental health and substance abuse services are afforded a higher degree of patients' rights as well as organizational responsibilities. Telemental health organizations ***shall*** be aware of these additional responsibilities and ensure that they are achieved.
Telemental health organizations and practitioners ***shall*** have in place policies and procedures that address all aspects of administrative, clinical, and technical components regarding the provision of telemental health and ***shall*** keep the policies and procedures updated on an annual basis or more often as needed.

Telemental health organizations and practitioners ***shall*** have in place a systematic quality improvement and performance management process that complies with any organizational, regulatory, or accrediting, requirements for outcomes management. The quality improvement indicators ***shall*** address the critical components of providing telemental health services and ***shall*** be used to make programmatic and clinical changes.

Telemental health organizations and practitioners ***shall*** comply with the specific consents to treat and for medication administration that apply to the area of mental health. Although no special consents are needed to use telemental health to serve patients, additional layers of consent are required during the course of treatment of persons with mental health conditions. Procedures ***shall*** be in place between organizations and telemental health practitioners for the purposes of obtaining and sharing consents for mental health treatment and services.

Telemental health professionals ***shall*** be aware of who has regulatory authority and any and all requirements (including those for liability insurance) that apply when practicing telehealth in another jurisdiction (eg. Across state lines), with particular attention to the additional responsibility that might apply in mental health encounters.

b. Clinical Specifications

- The telemedicine operation and its health professionals ***shall*** ensure that the standard of care delivered via telemedicine is equivalent to any other type of care that can be delivered to the patient/client, considering the specific context, location and timing, and relative availability of in-person care.

- Health professionals ***shall*** be responsible for maintaining professional discipline and clinical practice guidelines in the delivery of care in the telemedicine setting, recognizing that certain modifications may need to be made to accommodate specific circumstances.

- Any modifications to specialty specific clinical practice standards for the telemedicine setting ***shall*** ensure that clinical requirements specific to the discipline are maintained.

- Health professionals providing telemedicine services ***shall*** have the necessary education, training/orientation, and continuing education/professional development to insure they possess the necessary competencies for the provision of quality health services.

1. General Telemental Health Practice Issues

- ***Exam Inclusion Criteria/Scope***: The inclusion of cases for a telemental health consult is at the discretion of the referring and consulting clinicians. There are no absolute contraindications to patients being assessed using telemental health.[32]

- ***Consult Request Data:*** Information ***shall*** be available to the consulting practitioner that meets legal and regulatory requirements for referral and that provides supportive and data to the practitioner in preparation for evaluating the Telemental health patient, and for on-going patient management. Procedures ***shall*** be in place between organizations and practitioners for sharing patient mental health information.

- ***Cultural Competency:*** The clinician practicing telemental health ***should*** have cultural competency in the population he or she is serving at a distance.[33, 34] Cultural influences may be different between the patient and the practitioner sites and means of assessing the difference and notifying the practitioner shall be in place.

- ***Cognitive Testing:*** Cognitive testing may be provided via telemedicine but ***may*** need to be modified for use via video. Organizations administrating cognitive testing via videoconferencing ***shall*** be aware of the properties of the individual test instrument, how it may be impacted by videoconferencing, and potential needed modifications. Computer-based testing ***may*** be provided at the patient location and results securely transmitted to the telemental health practitioner for scoring and interpretation. On-site testers are appropriate to be used for cognitive testing and telemental health organizations ***shall*** have in place arrangements for the use of ancillary staff to administer cognitive testing and the sharing of results with the telemental health provider.[24,35,36,37,38,39,40]

- ***Videoteleconferencing (VTC):*** The following guidelines are recommended to ensure the safety of patients and also accurate diagnosis, appropriate intervention, and supportive ongoing care.

  All persons in the exam room at both sites ***shall*** be identified to all participants prior to the consultation room. Disclosing persons who are attending the consultation ***shall*** be done by panning each end of the consultation with the video camera or at a minimum, announcing the presence of individuals present and asking the patient's permission for additional persons to be in the room. Permission from the patient is not required if safety concerns mandate the presence of another individual or if the patient is being legally detained, but should be encouraged by the practitioner.

  Clinical History/Results**:** The sharing of clinical history and results ***shall*** comply with established legal and regulatory requirements. Telemental health organizations and practitioners shall have agreements in place that outline the procedure for securely sharing such clinical history and results. Laboratory or procedure results ***should*** be reviewed by the telemental health consultant via remote health record access or facsimile. Telemental health consultants need to have access to relevant clinical data as if the patient were being seen in person. Electronic prescribing ***should*** be used where available.[40, 41, 42, 43]

  Reports**:** As with any consultation, there ***shall*** be a traceable record of the teleconsultation at both the referring and consulting sites. The practitioner at a minimum shall have documentation including pertinent and required aspects of the clinical encounter, and the patient site shall have documentation that a telemental health visit occurred with the patient. The consultant's opinion and any services that were ordered or performed ***shall*** also be documented in the patient's medical record and communicated by written report to the requesting physician or other appropriate source (e.g., physician assistant, nurse practitioner, doctor of chiropractics, physical therapist, occupational therapist, speech-language therapist, psychologist, social worker, lawyer, insurance company) as required by professional conduct, legal, or regulatory requirements. Recommended language for the consultant includes "Based on the video images and history provided, my impression is as follows." Verbal communication with referring practitioners, or other pertinent entities may be given and written records of the interaction ***shall*** be kept according to legal and regulatory requirements at least at one site (referring and/or consulting). Reports may be faxed, mailed or electronically sent after the interaction has ended and ***should*** be done using secure methods. A consultant report ***shall*** include at a minimum the diagnosis and/or differential diagnoses, a summary of the findings, and recommended management.

  Psychotherapy: Standard practice guidelines for therapy ***shall*** direct psychotherapy services within the telemedicine setting. Evidence-based practice and empirically supported treatments ***shall*** be followed and adapted by the telemental health

practitioner as appropriate for videoconferencing. Persons engaged in providing psychotherapy services ***shall*** be aware of their professional organizations positions on telemental health and incorporate the professional association standards whenever possible.

Medication Management: Expert pharmacotherapy is the most frequently requested telemental health service[44, 45] and various methods have been employed, including: a) the telepsychiatrist consults to the referring primary care or managing physician (PCP) who prescribes the medications; b) the telepsychiatrist works with a mid-level professional at the patient site who writes the prescriptions; and c) the telepsychiatrist directly prescribes. In this last scenario, clear procedures ***shall*** be established and communicated to all parties regarding the method for obtaining initial prescriptions and refills and reporting adverse effects. Pharmacotherapy ***shall*** comply with the APA and AACAP[46] practice parameters.

2. Psychiatric Emergencies

Psychiatric emergencies can be experienced in a telehealth visit similar to an in-person visit. Provisions for routine or emergent local medical management ***shall*** be included in any local operating procedure or protocol. The following specific recommendations were adapted from a previous set of published clinical guidelines on emergency telepsychiatry.[47]

a. Administrative Issues: A patient site assessment ***shall*** be undertaken that includes obtaining information on local regulations and emergency resources, identification of potential local collaborators to help with emergency management. Emergency protocols ***shall*** be created for all telepsychiatry clinics with clear explanation of roles and responsibilities in emergency situations, determination of outside clinic hours emergency coverage, and guidelines for determining at what point other staff and resources should be brought in to help manage emergency situations.

b. Legal Issues: Clinicians ***shall*** be familiar with local civil commitment regulations and have arrangements where possible to work with local staff to initiate/assist with civil commitments.

c. General Clinical Issues: Clinicians ***shall*** *b*e aware of the impact of telepsychiatry on provider's perception of control over the clinical interaction, and how this might impact provider's management. Clinicians ***shall*** *b*e aware of safety issues with patients displaying strong affective or behavioral states upon conclusion of a session, and how patients may then interact with remote site staff.

3. Special Groups

a. Children: Children generally respond very positively to videoconferencing consultations.[48] VTC procedures for the evaluation and treatment of youth ***shall*** follow the same guidelines presented for adult with modifications to consider the developmental status of youth, such as motor functioning, speech and language capabilities, and relatedness. When legally required, families ***shall*** be informed when a telehealth appointment is scheduled for their child, in order to prepare their child for a VTC appointment.

a. The room at the originating site (patient site) ***should*** be large enough to include the youth and a parent, and one to two other individuals and to allow the camera to scan an area large enough to adequately observe children's motor skills as they move about the room, play, and separate from their parents.[49, 50]

b. A table ***should*** be available to provide a surface for the child to draw or play while the parent relates the history, but the table ***should*** not interfere with communication or viewing the youth's motor skills. Some simple toys ***should*** be provided both to occupy the child and to allow assessment of skills and ***should*** be selected based on age-appropriateness and child safety standards.

c. The care and the clinical procedures used with children ***should*** follow the practice parameters developed by the American Academy of Child and Adolescent Psychiatry.

b. Elderly Populations*:* Sensory deficits, especially visual and auditory, can impair the ability to interact over a videoconference connection.[51] Clinics ***shall*** consider the use of technologies that can help with visual or auditory impairment. The geriatric patient often has multiple medical problems, many of which affect cognitive/behavioral state, require appropriate laboratory, radiologic, and other diagnostic procedures. The inclusion of family members ***should*** be undertaken as clinically appropriate and with the permission of the patient. Interviewing techniques shall be appropriate for a patient who may be cognitively impaired, or find it difficult to adapt to the technology.

c. Rural Populations: Clinicians working with patients from rural or frontier issues ***shall*** be aware of issues unique to working with rural populations via telehealth.

a. Clinicians ***shall*** discuss firearm ownership, safety, sanctioned use of firearms and meaning of firearms to patients in rural areas. Clinicians ***shall*** be

prepared to negotiate with patients over firearm disposition, and consider involvement of patients' families as appropriate.

b. Clinicians ***shall*** be sensitive of impact of disclosures made during emergency management on patient confidentiality and relationships in small communities.

c. Clinicians ***shall*** consider including families in emergency treatment situations where possible and clinically appropriate, while also assessing and be attentive to exacerbation of family tensions in small communities.

d. Clinicians ***shall*** assess substance issues, be familiar with local resources for substance use assessment and treatment, and be prepared to play a more active role in substance use treatment.[52, 53]

4. Ethical Consideration

Although telemedicine is not a practice in and of itself, practicing at a distance creates a unique relationship with the patient that requires attention to and adherence to professional ethical principles. An organization or health professional that adheres to ethical telemedicine principles ***shall:***

a. Incorporate organizational values and ethics statements into the administrative policies and procedures for telemedicine

b. Be aware of medical and other professional discipline codes of ethics when using telemedicine

c. Inform the patient of their rights and responsibilities when receiving care at a distance (through telemedicine) including the right to refuse to use telemedicine

d. Provide patients and providers with a formal process for resolving ethical questions and issues that might arise as a result of a telemedicine encounter

e. Eliminate any conflict of interest to influence decisions made about, for, or with patients who receive care via telemedicine.

c. Technical Specifications

Videoconferencing is a communications tool that has made possible the recreation of clinical, consultative, and educational settings regardless of the geographic location of participants. A wide array of equipment and standards-based software is available that can greatly enhance the capabilities and usefulness of the videoconferencing system. Telemental health users where available, practical and affordable ***should*** be able to, when cost-effective:

- Display static pictures, diagrams, or objects.
- View and share a computer desktop or applications.
- Play videos or CDs so people at other locations can see and hear them.
- Record meetings when clinically appropriate and with patient permission.
- Share information on a common white board or via computer files.

Other desirable features of a videoconferencing system include:

- Ease of use with minimum operator training.
- Have remote camera control so that a clinician can pan, tilt, and zoom (PTZ) the camera on the patient end for close-ups.
- Easy-to-understand visual cues to give user feedback on features selected.
- On screen messages to notify the user of such conditions as loss of far end video, incomplete or dropped connections, mute/unmute etc.
- Option to view the picture sent as well as the picture received simultaneously (known as 'picture-in-picture' or PIP).
- Audio at 7 kHz full duplex with echo cancellation (capable of eliminating room return audio echo), with easy-to-use mute function and volume adjustment.
- Standard computer and peripheral ports for transmission of data.
- Ability to operate at a bandwidth of 384 Kbps or higher.
- Capacity for software upgrades as improvements become available.

Currently, most videoconferencing takes place via digital telephone lines (ISDN) or over TCP/IP (utilizing a local area network (LAN), wide area network (WAN), or broadband Internet connection). Low bandwidth videophones are often found in home care programs, or in situations or areas where higher bandwidth connections are either unavailable or cost prohibitive. Satellite communications are increasingly being used in remote areas, whether for Internet connectivity, or direct satellite telephony. Conferencing can be established between just two locations (called point-to-point) or among a number of sites simultaneously (called multi-point).

High quality microphones and speakers ensure effective aural communication and ***should*** be used in telemental health consultations to ensure accurate interpretation of the patient's and provider's spoken communication. High-quality audio is essential to the success of telemental health services, capturing the nuances of conversation that are often vital in making appropriate diagnoses. Microphone type and placement are extremely important, as are the acoustical properties of the room used. Most flat "conference-style" microphones are adequate to pick up sounds around a table or in a room, as long as the microphones are placed on a hard, flat surface at desk or table-top level. Many will also work well if placed on a flat wall at about head level for a seated person. If no flat surface is available, or if patients may be active or agitated, an omni-directional microphone can be hung from the center of the ceiling. "Quiet" rooms (those with carpeting, soft furniture, acoustical treatments, or other sound absorbing characteristics) allow for better

intelligibility of transmitted speech.[54, 55 , 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66]

1. Transmission Speed and Bandwidth

Most telemental health programs use systems that transmit data at a minimum of 384 Kbps. Transmission speed ***shall*** be the minimum necessary to allow the smooth and natural communication pace necessary for clinical encounters. Research into the quality of data transmission has shown that viewers perceive a marked difference in quality between 128 and 384 Kbps, but report less noticeable difference between 384 and 768 Kbps, although the proportionate cost increase is often much larger at the higher transmission speed. The use of lower bandwidths is necessary in some locations due to lack of or expense of broadband access and the need to provide services to disparate and/or remote populations. The use of the Internet has gained popularity in recent years as a medium by which providers and patients can bridge the digital gap and remain connected.[67]

2. Image Storage, Retrieval and Transmission

a. ***Security****:* For telemental services provided within the United States, the United States Health Insurance Portability & Accountability Act (HIPAA)[68] and state privacy requirements ***shall*** be followed at all times to protect patient privacy. Privacy requirements in other countries ***shall*** be followed for telemental services provided in those countries. Telemental health services being provided across political boundaries ***shall*** be in conformance with privacy requirements in both locations. Network and software security protocols to protect privacy and confidentiality ***shall*** be provided as well as appropriate user accessibility and authentication protocols. Measures to safeguard data against intentional and unintentional corruption ***shall*** be in place during both storage and transmission.

b. ***Encryption*****:** Within the United States, HIPAA requires that encryption (128 bit) of Electronic Protected Health Information ***shall*** be addressed.[69] Consistent with HIPAA and good practice, video sessions ***shall*** be secured to the greatest practical extent.

c. ***Resolution:*** The resolution of the display monitor ***should*** match as closely as possible the resolution of the acquired image being displayed, or the originally acquired image resolution should be accessible using zoom and pan functions.

d. ***Interoperability:*** Interoperability of videoconferencing equipment has improved significantly in the past few years through a number of standards that have arisen in the industry. Most telecommunications standards are established by the International Telecommunications Union (ITU), an agency of the United Nations. Equipment ***shall*** be based on these standards which allow successful

conferencing regardless of platform or manufacturer. The ITU standards that ***shall*** be used comprise the H (video), G (audio) and T (data) series.

e. ***Videoconferencing with Personal Computers:*** Computers utilized for VTC ***shall*** comply with all facility, state, and federal regulations.

f. ***TCP/IP:*** There are continuing innovations in software protocols designed to assure consistently high quality signals (called "quality of service" or QOS) for videoconferencing systems using IP networks. The use of these protocols (which are usually implemented in the videoconferencing system itself) can significantly improve the quality of transmission over an IP network.

g. ***Integrated Services Digital Network (ISDN):*** Videoconferencing over ISDN is governed by the H.320 ITU standard, which includes a number of associated standards to control video, audio, and data flow. ISDN connections usually use a multiplexer (MUX) to aggregate 2-6 individual phone lines into a single high-bandwidth connection. As each line transmits at 64 kbps, a minimum of 6 lines ***should*** be used to ensure transmission at least at 384 kbps.

3. Physical Location/Room Requirements

a. ***Room Set-up:*** During a telemental health session, both locations ***shall*** be considered a patient examination room regardless of a room's intended use. Both sites ***shall*** be appropriately designed with audio and visual privacy and additionally the originating site ***shall*** have the ability to accommodate posture and movement visualization by the provider.[70] The ability to view written or drawn material ***should*** also be available. Rooms ***shall*** be designated private for the duration of the VTC and no unauthorized access shall be permitted. The organization ***shall*** take every precaution to ensure the privacy of the consult and the confidentiality of the patient. All persons in the exam room at both sites ***shall*** be identified to all participants prior to the consultation and the patient's permission ***shall*** be obtained for any visitors or clinicians to be present during the session.

b. ***Room Lighting:*** The room in which videoconferencing is used ***shall*** be well lit (150 ft candles at the patient is recommended), preferably using light sources as close to day light as possible (i.e., fluorescent day-light or full spectrum bulbs rather than incandescent). The room ***shall*** be comfortably lit for the patient and lit well enough for the provider to see the patient without shadows falling on the patient's face or other areas where clinical data is being displayed (such as lower extremities, hands, etc.). The lighting of the provider's space ***shall*** meet the same requirements in that the patient must be able to see the face of the provider with no shadowing. Daylight is often the softest and more comfortable light for the patient to view the clinician.

c. ***Backdrop:*** Backdrops behind the patient and provider ***should*** be clean and plain in color and not full of distractions such as office papers, book shelves, etc. Blue is an optimum color for backdrops as blue neither reflects or absorbs light, is a calming color, and helps to accentuate the area of interest.

d. ***Ergonomic Considerations*:** The comfort of the mental health professional undertaking the consultations ***should*** be considered to prevent fatigue and computer vision syndrome problems common with increased computer interactions.[71] *Gaze Angle:* Gaze angle is the angle between the near participant's camera and where the near participant looks at the onscreen far participant (eye contact). The vertical location of the far participant on the screen will affect gaze angle. Gaze angles of approximately 5 to 7 degrees are imperceptible to most persons[1,1]. Gaze angle ***should*** be as small as practical.

d. Administrative Issues

1. Organizations ***shall*** ensure the technical readiness of the telehealth equipment and the clinical environment.[72] Organizations providing telehealth services ***shall*** have processes in place to ensure the safety and effectiveness of equipment through on-going support and maintenance.[73, 74] Organizations providing telehealth services ***shall*** have policies and procedures in place to ensure the physical security of telehealth equipment and the electronic security of data.[75] Organizations ***sha*ll** have appropriate redundant systems and appropriate recovery procedures in place that ensure availability of the network for critical connectivity. Organizations ***shall*** ensure compliance with all relevant safety laws, regulations, and codes for technology and technical safety.[xiv, xv] Organizations ***shall*** have infection control policies and procedures in place for the use of telehealth equipment and patient peripherals.

2. Policy Related Steps to Optimize Telemental Health Practices

   It is critical to develop policies and procedures to ensure consistent implementation of telemental health program functions. Key policies that ***shall*** be addressed include:

   - Release of information and informed consent
   - Identifying all required patient information for a referral/consultation
   - A reliable process for communicating findings after consults
   - Ensuring privacy and confidentiality
   - Intake procedures and screening
   - Staff roles and responsibilities
   - Transmission of patient data
   - Use of electronic medical records
   - Appointment scheduling; synchronizing schedules at all sites
   - Transmission of prescriptions, lab orders and progress notes

- Evaluation and measurement of patient outcomes
- Quality improvement
- Safety
- Licensing, liability and malpractice insurance
- Continuous training

Appendix

A: Existing Digital Imaging Standards

This is not meant to be a comprehensive list of all existing standards, but rather provides a description of the standards most relevant to the practice of telemental health.

ITU-T: The International Telecommunications Union has established a series of standards (H.300) for VTC. It includes such sections as the H.320 series for circuit-switched, n x 64 (i.e., ITU-T); the H.323series: packet-switched/network, Internet Protocol; and the H.324: Plain Old Telephone Service (POTS).

Session Initiation Protocol (SIP): The Internet Engineering Task Force RFC 3261 also applies to VTC. SIP is a text-based protocol for initiating interactive communication sessions between users, including voice, video, chat, and virtual reality.

JPEG/TIF/WAV: Some of the most common compression methods used for still images include the following. The method used depends on the achievable compression ratio and the number and types of artifacts created during compression. *Lossless compression* allows for the reconstruction of the exact original data prior to compression without any loss of information. *Lossy compression* refers to methods that lose data once the image has been compressed and uncompressed. The level of compression and method used affect the amount of data loss and whether or not it is visually perceptible. The type and level of compression may vary depending on the type of exam. Different compression algorithms will achieve different compression ratios with varying degrees of artifacts. The choice of compression method and level should be reviewed periodically for each image and exam type, to insure that artifacts are not perceptible. It should be noted that lossy compression can affect the colors in an image.

- **JPEG (2000):** JPEG 2000 uses wavelet technology that allows an image to be retained without any distortion or loss. [71] File extensions for JPEG 2000 are either .jp2 or .j2c (traditional JPEG is either .jpg or .jpeg).

- **TIF:** Tagged Image File Format used for formatting and compressing images. It can be lossy or lossless. The file extension TIF is .tiff or .tif.

- **WAV:** A method of compression using wavelets transforms (mathematical functions that divide data based on frequency components). There are a variety of file extensions depending on the wavelet method used. It can be lossy or lossless.

HL7: Health Level Seven is one of several American National Standards Institute (ANSI) Standards Developing Organizations (SDOs) operating in the healthcare arena. Health Level Seven's domain is clinical and administrative data.[76]

US HIPAA: The United Sates Health Insurance Portability & Accountability Act of 1996 (Public Law 104-191)calls for improved efficiency in healthcare delivery by standardizing electronic data interchange, and the protection of confidentiality and security of health data through setting and enforcing standards.[77,78] It has rules for:

- Standardization of electronic patient health, administrative and financial data
- Unique health identifiers for individuals, employers, health plans and health care providers

- Security standards protecting the confidentiality and integrity of "individually identifiable health information," past, present or future.

JCAHO: The Joint Commission evaluates and accredits nearly 15,000 health care organizations and programs in the United States. An independent, not-for-profit organization, The Joint Commission is a standards-setting and accrediting body in health care. Since 1951, The Joint Commission has maintained state-of-the-art standards that focus on improving the quality and safety of care provided by health care organizations. The Joint Commission's comprehensive accreditation process evaluates an organization's compliance with these standards and other accreditation requirements. Joint Commission accreditation is recognized nationwide as a symbol of quality that reflects an organization's commitment to meeting certain performance standards. To earn and maintain The Joint Commission's Gold Seal of Approval™, an organization must undergo an on-site survey by a Joint Commission survey team at least every three years. (Laboratories must be surveyed every two years.)

B: Telemedicine/Telehealth Glossary

The following is a list of terms and definitions that are commonly used in telemedicine and telehealth. The list was assembled for the purpose of encouraging consistency in employing these terms in ATA related documents and resource materials. The list is not all-inclusive and may be augmented by specialty areas as deemed appropriate.

Application Service Provider (ASP): An ASP hosts a variety of applications on a central server. For a fee, customers can access the applications that interest them over secure Internet connections or a private network. This means that they do not need to purchase, install and

maintain the software themselves; instead they rent the applications they need from their ASP. Even new releases, such as software upgrades, are generally included in the price.

Asynchronous: This term is sometimes used to describe store and forward transmission of medical images or information because the transmission typically occurs in one direction in time. This is the opposite of synchronous (see below).

Authentication: A method of verifying the identity of a person sending or receiving information using passwords, keys and other automated identifiers.

Bandwidth: A measure of the information carrying capacity of a communications channel; a practical limit to the size, cost, and capability of a telemedicine service.

Bluetooth Wireless: Bluetooth is an industrial specification for wireless personal area networks (PANs). Bluetooth provides a way to connect and exchange information between devices such as mobile phones, laptops, PCs, printers, digital cameras and video game consoles over a secure, globally unlicensed short-range radio frequency. The Bluetooth specifications are developed and licensed by the Bluetooth Special Interest Group.

Broadband: Communications (e.g., broadcast television, microwave, and satellite) capable of carrying a wide range of frequencies; refers to transmission of signals in a frequency-modulated fashion, over a segment of the total bandwidth available, thereby permitting simultaneous transmission of several messages.

Clinical Information System: Relating exclusively to the information regarding the care of a patient, rather than administrative data, this hospital-based information system is designed to collect and organize data.

CODEC: Acronym for coder-decoder. This is the videoconferencing device (e.g., Polycom, Tandberg, Sony, Panasonic, etc) that converts analog video and audio signals to digital video and audio code and vice versa. CODECs typically compress the digital code to conserve bandwidth on a telecommunications path.

Compressed video: Video images that have been processed to reduce the amount of bandwidth needed to capture the necessary information so that the information can be sent over a telephone network.

Computer-based Patient Record (CPR): An electronic form of individual patient information that is designed to provide access to complete and accurate patient data.

Data Compression: A method to reduce the volume of data using encoding to reduce image processing, transmission times, bandwidth requirements, and storage space requirements. Some compression techniques result in the loss of some information, which may or may not be clinically important.

Diagnostic Equipment (Scopes, Cameras & Other Peripheral Devices): A hardware device not part of the central computer (e.g. digitizers, stethoscope, or camera) that can provide medical data input to or accept output from the computer.

Digital Camera (still images): A digital camera is typically used to take still images of a patient. General uses for this type of camera include dermatology and wound care. This camera produces images that can be downloaded to a PC and sent to a provider/consultant over a network.

Digital Imaging and Communication in Medicine (DICOM): A standard for communications among medical imaging devices; a set of protocols describing how images are identified and formatted that is vendor-independent and developed by the American College of Radiology and the National Electronic Manufacturers Association.

Disease Management: A continuous coordinated health care process that seeks to manage and improve the health status of a carefully defined patient population over the entire course of a disease (e.g., CHF, DM) The patient populations targeted are high-risk, high-cost patients with chronic conditions that depend on appropriate care for proper maintenance.

Distance Learning: The incorporation of video and audio technologies, allowing students to "attend" classes and training sessions that are being presented at a remote location. Distance learning systems are usually interactive and are a tool in the delivery of training and education to widely dispersed students, or in instances in which the instructor cannot travel to the student's site.

Distant Site: The distant site is defined as the telehealth site where the provider/specialist is seeing the patient at a distance or consulting with a patient's provider. (CMS) Others common names for this term include – hub site, specialty site, provider/physician site and referral site. The site may also be referred to as the consulting site.

Document Camera: A camera that can display written or typed information (e.g., lab results), photographs, graphics (e.g., ECG strips) and in some cases x-rays.

Electronic Data Interchange (EDI): The sending and receiving of data directly between trading partners without paper or human intervention.

Electronic Patient Record: An electronic form of individual patient information that is designed to provide access to complete and accurate patient data, alerts, reminders, clinical decision support systems, links to medical knowledge, and other aids.

Encryption: A system of encoding data on a Web page or e-mail where the information can only be retrieved and decoded by the person or computer system authorized to access it.

Firewall: Computer hardware and software that block unauthorized communications between an institution's computer network and external networks.

Full-motion Video: This describes a standard video signal that allows video to be shown at the distant end in smooth, uninterrupted images.

Guideline: A statement of policy or procedures by which to determine a course of action, or give guidance for setting standards (Loane & Wootton, 2002).

H.320: This is the technical standard for videoconferencing compression standards that allow different equipment to interoperate via T1 or ISDN connections.

H.323: This is the technical standard for videoconferencing compression standards that allow different equipment to interoperate via the Internet Protocol (see below).

H.324: This is the technical standard for videoconferencing compression standards that allow different equipment to interoperate via Plain Old Telephone Service (POTS).

Health Level-7 Data Communications Protocol (HL-7): This communication standard guides the transmission of health-related information. *HL7* allows the integration of various applications, such as bedside terminals, radiological imaging stations, hospital census, order entries, and patient accounting, into one system.

HIPAA: Acronym for Health Information Portability Act.

Home Health Care & Remote Monitoring Systems: Home health care is care provided to individuals and families in their place of residence for promoting, maintaining, or restoring health; or for minimizing the effects of disability and illness, including terminal illness. In the Medicare Current Beneficiary Survey and Medicare claims and enrollment data, home health care refers to home visits by professionals including nurses, physicians, social workers, therapists, and home health aides. Using remote monitoring and interactive devices allows the patient to send in vital signs on a regular basis to a provider without the need for travel.

Informatics: The use of computer science and information technologies to the management and processing of data, information and knowledge.

Integrated Services Digital Network (ISDN): This is a common dial-up transmission path for videoconferencing. Since ISDN services are used on demand by dialing another ISDN based device, per minute charges accumulate at some contracted rate and then are billed to the site placing the call. This service is analogous to using the dialing features associated with a long distance telephone call. The initiator of the call will pay the bill. ISDN permits connections up to 128Kbps.

Interactive Video/Television: This is analogous with video conferencing technologies that allow for two-way, synchronous, interactive video and audio signals for the purpose of delivering telehealth, telemedicine or distant education services. It is often referred to by the acronyms – ITV, IATV or VTC (video teleconference).

Internet Protocol: The Internet Protocol (IP) is the protocol by which data is sent from one computer to another on the Internet. Each computer on the Internet has at least one address that uniquely identifies it from all other computers on the Internet. IP is a connectionless protocol, which means that there is no established connection between the end points that are communicating. The IP address of a videoconferencing system is its phone number.

Interoperability: Interoperability refers to the ability of two of more systems* to interact with one another and exchange information in order to achieve predictable results (*refers to more than technical systems) (Bergman, Ulmer and Sargious, 2001). There are three types of interoperability: human/operational; clinical; and technical (Canadian Society for Telehealth, 2001). Interoperability refers to the ability of two or more systems (computers, communication devices, networks, software, and other information technology components) to interact with one another and exchange data according to a prescribed method in order to achieve predictable results (ISO ITC-215).

ISDN Basic Rate Interface (BRI): This is an ISDN interface that provides 128k of bandwidth for videoconferencing or simultaneous voice and data services. Multiple BRI lines can be linked together using a multiplexer (see below) to achieve higher bandwidth levels. For instance, a popular choice among telehealth networks is to combine 3 BRI lines to provide 384k of bandwidth for video-conferencing. It should be noted that BRI services are not available in some rural locations. One should check with their telecommunications providers on the availability of BRI service before ordering videoconferencing equipment that uses this type of service.

ISDN Primary Rate Interface (PRI): This is an ISDN interface standard that operates using 23, 64k channels and one 64k data channel. With the proper multiplexing equipment the ISDN PRI channels can be selected by the user for a video call. For instance if the user wants to have a videoconference at 384k of bandwidth then they can instruct the multiplexer to use channels 1 through 6 (6 x 64k = 384k). This is important because the user typically pays charges based on the number of 64k channels used during a videoconference. The fewer channels used to obtain a quality video signal the less expensive the call.

JCAHO: Acronym for Joint Commission on Accreditation of Healthcare Organizations.

Lossless: A format of data compression, typically of an order of less than 2:1, in which none of the original data information is lost when the image is reproduced.

Lossy: A process of data compression at a relatively high ratio, which leads to some permanent loss of information upon reconstruction.

Medical/ Nursing Call Center: A call center is a centralized office that answers incoming telephone calls from patients. Such an office may also respond to letters, faxes, e-mails and similar written correspondence. Usually staffed by nurses, call centers provide basic health information and instructions to callers but do not provide an official diagnosis of conditions or prescribe medicine. Call centers act as an initial triage point for patients.

Mobile Telehealth: The provision of health care services with the assistance of a van, trailer, or other mobile unit in which the health care provider might provide patient services at a distance from a normal medical facility. Services may also be provided through mobile technologies that allow a mobile vehicle equipped with medical technologies to attach to an existing health care facility, such as mobile CT, MRI, or teledentistry.

Multiplexer (MUX): A device that combines multiple inputs (ISDN PRI channels or ISDN BRI lines) into an aggregate signal to be transported via a single transmission path.

Multi-point Control Unit (MCU): A device that can link multiple videoconferencing sites into a single videoconference. An MCU is also often referred to as a "bridge".

Multi-point Teleconferencing: Interactive electronic communication between multiple users at two or more sites which facilitates voice, video, and/or data transmission systems: audio, graphics, computer and video systems. Multi-point teleconferencing requires a MCU or bridging device to link multiple sites into a single videoconference.

Network Integrators: Organizations specializing in the development of software and related services that allows devices and systems to share data and communicate to one another.

Originating Site: The originating site is where the patient and/or the patient's physician is located during the telehealth encounter or consult (CMS). Other common names for this term include – spoke site, patient site, remote site, and rural site.

Patient Exam Camera (video): This is the camera typically used to examine the general condition of the patient. Types of cameras include those that may be embedded with set-top videoconferencing units, handheld video cameras, gooseneck cameras, camcorders, etc. The camera may be analog or digital depending upon the connection to the videoconferencing unit.

Peripheral Devices: Any device that is attached to a computer externally, i.e. Scanners, mouse pointers, printers, keyboards; and clinical monitors such as pulse oximeters, weight scales, are all examples of this.

Pharmacy Solutions: The use of electronic information and communication technology to provide and support comprehensive pharmacy services when distance separates the participants.

POTS: Acronym for Plain Old Telephone Service.

Presenter (Patient Presenter): Telehealth encounters require the distant provider to perform an exam of a patient from many miles away. In order to accomplish that task an individual with a clinical background (e.g., LPN, RN, etc) trained in the use of the equipment must be available at the originating site to "present" the patient, manage the cameras and perform any "hands-on" activities to successfully complete the exam. For example, a neurological diagnostic exam usually requires a nurse capable of testing a patient's reflexes and other manipulative activities. It should be noted that in certain cases, such as interview based clinical consultations such as Telemental Health or Nutrition Services, that a licensed practitioner such as an RN or LPN, might not be necessary, and a non-licensed provider such as support staff, could provide telepresenting functions.

RHIO: Regional Health Information Organization (RHIO) and Health Information Exchange (HIE) are often used interchangeably. RHIO is a group of organizations with a business stake in improving the quality, safety, and efficiency of healthcare delivery. RHIOs are the building blocks of the proposed National Health Information Network (NHIN) initiative at the Office of the National Coordinator for Health Information Technology (ONCHIT).

Router: This device provides an interface between two networks or connects sub-networks within a single organization. It routes network traffic between multiple locations and it can find the best route between any two sites. For example, PCs or H.323 videoconferencing devices tell the routers where the destination device is located and the routers find the best way to get the information to that distant point.

Standard: A statement established by consensus or authority, that provides a benchmark for measuring quality, that is aimed at achieving optimal results (NIFTE Research Consortium, 2003).

Store and Forward (S&F): S&F is a type of telehealth encounter or consult that uses still digital images of a patient for the purpose of rendering a medical opinion or diagnosis. Common types of S&F services include radiology, pathology, dermatology and wound care. Store and forward also includes the asynchronous transmission of clinical data, such as blood glucose levels and electrocardiogram (ECG) measurements, from one site (e.g., patient's home) to another site (e.g., home health agency, hospital, clinic).

Switch: A switch in the videoconferencing world is an electrical device that selects the path of the video transmission. It may be thought of as an intelligent hub (see hub above) because it can be programmed to direct traffic on specific ports to specific destinations. Hub ports feed the same information to each device.

Synchronous: This term is sometimes used to describe interactive video connections because the transmission of information in both directions is occurring at exactly the same period.

System/Network Integration: The use of software that allows devices and systems to share data and communicate to one another.

T1/DS1: A digital carrier or type of telephone line service offering high-speed data, voice, or compressed video access in two directions, with a transmission rate of 1.544 Mbps.

T3/DS3: A carrier of *45* Mbps.

TCP/IP (Transmission Control Protocol/Internet Protocol): The underlying communications rules and protocols that allow computers to interact with each other and exchange data on the Internet.

Telecommunications Providers: An entity licensed by the government (the Federal Communications Commission in the U.S.) to provide telecommunications services to individuals or institutions.

Teleconferencing: Interactive electronic communication between multiple users at two or more sites which facilitates voice, video, and/or data transmission systems: audio, graphics, computer and video systems.

Telehealth and Telemedicine: Telemedicine and telehealth both describe the use of medical information exchanged from one site to another via electronic communications to improve patients' health status. Although evolving, telemedicine is sometimes associated with direct patient clinical services and telehealth is sometimes associated with a broader definition of remote healthcare services.

Telematics: The use of information processing based on a computer in telecommunications, and the use of telecommunications to permit computers to transfer programs and data to one another.

Telementoring: The use of audio, video, and other telecommunications and electronic information processing technologies to provide individual guidance or direction. An example of this help may involve a consultant aiding a distant clinician in a new medical procedure.

Telemonitoring: The process of using audio, video, and other telecommunications and electronic information processing technologies to monitor the health status of a patience from a distance.

Telepresence: The method of using robotic and other instruments that permit a clinician to perform a procedure at a remote location by manipulating devices and receiving feedback or sensory information that contributes to a sense of being present at the remote site and allows a satisfactory degree of technical achievement. For example, this term could be applied to a surgeon using lasers or dental hand pieces and receiving pressure similar to that created by

touching a patient so that it seems as though s/he is actually present, permitting a satisfactory degree of dexterity.

Teleradiology and Picture Archiving and Communications Systems (PACs): The electronic transmission of radiological images, such as x-rays, CTs, and MRIs, for the purposes of interpretation and/or consultation. Digital images are transmitted over a distance using standard telephone lines, satellite connections, or local area networks (LANs). Teleradiology also is beginning to include the process of interfacing with the hospital information systems/radiology information systems (HIS/RIS) in the transport of digital images. PACs provide centralized storage and access to medical images over information systems.

Ultrasound: A device that uses high-frequency sound waves to examine structures inside the body. It can rapidly detect tumors and other abnormalities, often right in the physician's office.

Universal Service Administrative Company (USAC): The Universal Service Administrative Company administers the Universal Service Fund (USF), which provides communities across the country with affordable telecommunication services. The Rural Health Care Division (RHCD) of USAC manages the telecommunications discount program for health care.

Videoconferencing Systems: Equipment and software that provide real-time, generally two way transmission of digitized video images between multiple locations; uses telecommunications to bring people at physically remote locations together for meetings. Each individual location in a *videoconferencing* system requires a room equipped to send and receive video.

Videoconferencing: Real-time, generally two way transmission of digitized video images between multiple locations; uses telecommunications to bring people at physically remote locations together for meetings. Each individual location in a *videoconferencing* system requires a room equipped to send and receive video.

WiFi: Originally licensed by the Wi-Fi Alliance to describe the underlying technology of wireless local area networks (WLAN) based on the IEEE 802.11 specifications. It was developed to be used for mobile computing devices, such as laptops, in LANs, but is now increasingly used for more services, including Internet and VoIP phone access, gaming, and basic connectivity of consumer electronics such as televisions and DVD players, or digital cameras. (Wikipedia)

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