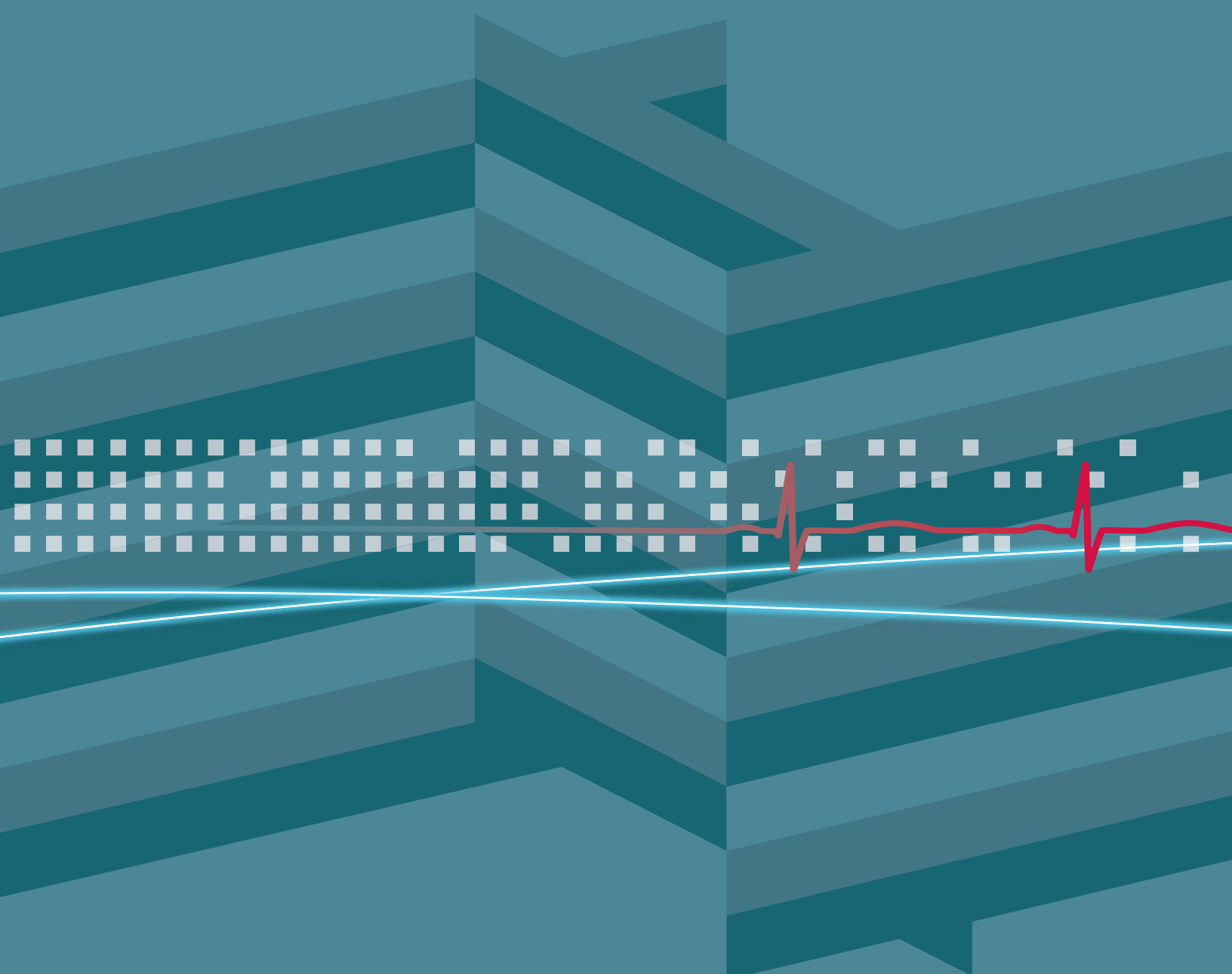


# Evidence-Based Practice for Telemental Health July 2009



**American Telemedicine Association**

Quality Healthcare Through Telecommunications Technology



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**AMERICAN TELEMEDICINE ASSOCIATION**

**EVIDENCE-BASED PRACTICE FOR TELEMENTAL HEALTH**

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## 1. 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 document is an educational tool to aid practitioners in meeting the practice guidelines set forth in companion document, ATA's Practice Guidelines for Videoconferencing-Based Telemental Health. The Evidence Based document provides the reader with an analysis of current published literature and documents qualitative and qualitative research focused on video-conferencing based mental health services and telemedicine/telehealth. The document does not serve the purpose of outlining what should or should not be done by a mental health practitioner, but, does provide reference and support for decision making in developing and providing telemental health services. Interested practitioners and/or telehealth organizations shall refer to ATA's Practice Guidelines for Videoconferencing-Based Telemental Health for the specific methods with which to comply with the published standards and guidelines for telehealth and telemental health.

## **2. 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 strongly advised to document in the patient record information adequate to explain the approach pursued.

## **3. GUIDELINE DEVELOPMENT PROCESS**

The telemental health videoconferencing guideline project was initiated in 2006. A volunteer member of the Telemental Health (TMH) Special Interest Group (SIG) was appointed to chair the project at the 11<sup>th</sup> ATA Annual Meeting. A working group of clinicians, health care staff and health administration personnel was formed from the ATA membership. During the first year the group decided on limiting the scope of the project to interactive videoconferencing, addressing administrative, clinical and technical issues, deciding on the general format and beginning the literature search. Working group membership changed over the course of the guideline development. A literature search was conducted in November 2006 using PUBMED while committee members were also encouraged to search familiar literature, textbook and personal contacts for additional entries. Search terms used were:

telemedicine or interactive television or teleconferencing or teleconsultation or teleconsultations or video phone or videoconferencing or mental telehealth or telemental health or telepsychiatry or tele psychiatry or telepsychology or tele psychology or interactive videoconferencing or tele hypnosis or tele hypnosis or telepsychotherapy or tele psychotherapy or telecounseling or tele counseling or telenursing or tele nursing

Querying the broad terms led to approximately 9,300 listed articles. Approximately 5,300 articles were attributed to the word telemedicine alone and therefore most of the listed articles were non-telemental health in origin. Evidence tables were constructed according to the telemental health application, and consisted of setting, diagnostic interview, consultation-liaison, disposition, psycho-education, pharmacotherapy, individual psychotherapy, group psychotherapy, restraint/seclusion, incarceration,

evaluation, family, substance abuse, geriatrics, child & adolescent, nursing, and psychology. Evidence tables for clinical applications included the headings of setting, bandwidth, interactive video technology used, outcome and sample size when available. Articles in the evidence table were classified according to the quality of the evidence; e.g. randomized clinical trial, longitudinal study, case report, etc. Members of the group wrote the initial sections of the guidelines based on their area of expertise. The sections were then consolidated into the first draft, which was sent to three consultants. An editorial committee was formed with the chair and co-chairs to review the consultant input and make initial changes to the document. A second draft was then sent to 12 expert reviewers (clinicians and other stakeholders in the field of telehealth or mental health). The editorial committee then reviewed, discussed and made changes to the draft based on reviewer feedback and the document was sent to a second set of 9 expert reviewers. The editorial committee again reviewed, discussed and made changes to the third draft document. The fourth draft document was forwarded to the ATA standards and guidelines committee for review. The editorial committee reviewed, discussed and made changes to the fourth draft document. A public comment period of 60 days was open for comments on the fifth draft document. Final revisions were made and the document was approved by ATA's Standards and Guidelines Committee, and was forwarded to the ATA Board of Directors for final approval and publication.

#### **4. INTRODUCTION**

Telemental health, like telemedicine<sup>1</sup>, is an intentionally broad term referring to the provision of mental health care from a distance. The prefix “tele” can refer to geographical, time, or even circadian distance when providing care across time zones. Telemental health (TMH) includes mental health assessment, treatment, education, monitoring, and collaboration. Patients can be located in hospitals, clinics, schools, nursing facilities, prisons and homes. TMH providers and staff include psychiatrists, nurse practitioners, physician assistants, social workers, psychologists, counselors, primary care providers and nurses. Thousands of clients and patients have experienced access to mental health care via telemental health technologies. The goal of the telehealth provider is to eliminate disparities in patient access to quality, evidence-based, and emerging health care diagnostics and treatments. General information regarding telemental health can be found in review articles<sup>2,3,4,5,6</sup> practice parameters<sup>7</sup> and textbooks<sup>8,9</sup>.

Mental health professionals and practitioners continue to develop new ways to leverage technology to provide services to those needing expert care. This best practice recommendation document focuses on two-way, interactive videoconferencing as an alternative medium for clients and patients to directly engage with their mental health providers. The use of other modern technologies such as virtual reality, electronic mail, remote monitoring devices, chat rooms, and web-based clients were considered but these technologies are not currently included. There was little published literature on asynchronous methods for providing telemental health services at the time the document was written. The primary goal of the guideline is to distill the evidence from the published literature on interactive videoconferencing into a pragmatic reference for those engaged or about to engage in providing interactive TMH care. A secondary goal is to develop a clinical coding system for TMH clinical recommendations. Like other areas of telemedicine there is a growing, yet still limited amount of rigorous scientific research upon which to draw conclusions and set public policy for the use of telemental health. As the telemedicine field advances, researchers are striving to meet scientific standards and provide more guidance concerning evidence-based telemedicine practice in the future<sup>10, 11</sup>. When guidelines, position statements, or standards exist from a professional organization or society such as (but not limited to) the American Psychiatric Association<sup>12</sup>, American Psychological Association<sup>13</sup> or National Association of Social Workers<sup>14</sup>, the guidelines, position statements, or standards shall be reviewed and incorporated into practice.

In response to the needs and requests of providers, organizations and the ATA membership interested in or engaged in telemental health activities, the TMH SIG formed a committee to develop evidence based TMH guidelines. The broad nature of the mental health field along with an unlimited number of ways to

use technology in mental health services led the committee to limit this guideline to interactive video conferencing applications.

Appreciating the broad range of providers and settings involved in TMH, a method for coding the literature upon which the practice recommendations in this document are based was developed. When feasible the relevant published data were organized by patient age, types of treatment, treatment setting and provider specialty. When reviewing the literature and formulating the recommendations, the following confidence ratings were used: considerable confidence, reasonable confidence, and limited confidence based on a specific application [for more detail see next section, clinical coding methodology]. The use of the rating scale is in line with the confidence rating structures used by other organizations (e.g., the American Psychiatric Association) and is familiar to mental health clinicians. However, in order to allow for the broad range of videoconferencing equipment used and disparities in bandwidth availability, the recommendations are subject to specific application situations. Thus a second coding variable was introduced to identify the technology used. The purpose of the second coding variable was to be inclusive and appreciative of the technical and social performance of all interactive videoconferencing technologies currently in use and to not exclude niche populations or applications. It is anticipated and hoped that the coding system will encourage more specific descriptions of the technology used for future TMH interactive videoconferencing research and methods publication.

## **5. CLINICAL CODING METHODOLOGY**

Mental health clinicians refer to clinical guidelines when in need of evidence based recommendations and/or expert consensus regarding mental health diagnosis, medication and psychotherapy treatments, levels of appropriate care and social support information. TMH as a communication medium between provider and client/patient introduces an additional layer of variables into mental health care provision (e.g., effect of bandwidth, resolution and display size on the assessment and/or treatment interaction). The purpose of TMH evidence-based practice document is two-fold, 1) to provide evidence based recommendations and/or expert consensus regarding the effects of a particular video communication technology on the mental health diagnostic and treatment process, and 2) provide evidence based recommendations and/or expert consensus when TMH may be uniquely suited to enhance diagnostic clarification and/or treatment provision.

Three technological variables (bandwidth, resolution, and display size) are each believed to significantly influence the video interaction with mental health clients/patients. A TMH clinical recommendation coding scheme must be flexible enough to allow for a variety of video communication scenarios and yet be limited enough in classification to be readily understood. Bandwidth, using the H.264 video compression standard<sup>15</sup>, is classified in this guideline as high ( $\geq 256$  kbps), medium ( $\geq 128$  kbps but  $< 256$  kbps) and low ( $< 128$  kbps). Display size is the diagonal measurement of the non-anamorphic picture. Video resolution will be referenced to High Definition (HD) and while Common Intermediate Format (CIF) and Source Input Format (SIF) will be considered equivalent standard definition (SD) formats. One-quarter CIF (QCIF) and one-quarter SIF (QSIF) are sometimes used on videophones.

The Evidence-Based Practice for Telemental Health utilizes a letter (A, B, C, D) and number (1, 2, 3) format. The letter indicates minimum requirements for bandwidth, display size, and resolution for a particular VTC (video tele-conference) application, and the number indicates the level of clinical confidence for that application. Bandwidth, display size, and resolution parameters must all be met for the particular video application code to apply. For example, sufficient research and expert consensus may provide a clinical confidence recommendation of 2 for cognitive therapy conducted at high bandwidth on a room-sized standard definition display, which would be coded as [B2], but may provide a clinical confidence recommendation of 3 if conducted via an analog videophone, and thus be coded as [D3]. This does not mean that a particular mental health application via analog videophone will always score lower,



but rather that sufficient consensus or evidence-based data to support a higher clinical rating for the application was not supported in the literature. Clinicians are free to determine on a case by case basis, what evidence is relevant and how to proceed when little or no evidence exists. Ultimately, serving the patient safely and accurately is the goal of using any technology or method not well supported in the literature. The final decision rests with the clinician. The coding scheme is summarized below:

Video Application Coding:

A - High Bandwidth; Resolution HD; Display  $\geq 16$ "

B - High Bandwidth; Resolution  $\geq$  SD; Display  $\geq 26$ "

C - Medium Bandwidth; Resolution  $\geq$  SD; Display  $> 16$ "

D - Low Bandwidth; Resolution  $\geq$  QCIF/QSIF to CIF/SIF; Display  $< 16$ "

Clinical Confidence Recommendations:

1 - with considerable confidence

2 - with reasonable confidence

3 - may consider depending on the particular clinical objective and application used

## 6. EVIDENCE

### a. Mental Health Evaluations

#### 1. Setting

**a. Outpatient.** The majority of telemental health has been conducted in the outpatient setting<sup>16,17,18,19,20</sup>. Access to care has been the driving force, both geographically for rural communities and for the underserved in urban environments. Community mental health centers and medical clinics frequently lack enough clinicians, including child services and psychiatrists. It has been demonstrated that patients can be reliably assessed, diagnosed, and treated with pharmacology and psychotherapy in outpatient clinics with a variety of videoconferencing equipment and communications protocols [B1, C2, D3]. School-based programs have been increasing in number as convenient locations for patients, parents, and school officials to participate in mental health-related prevention, assessment, and care<sup>21,22,23,24</sup>. These natural settings are ideal locations to reach children and adolescents with mental health, developmental, and behavioral issues [B/C2, D3]. Other natural or innovative settings not usually considered for mental health services can reach at-risk and needy adults, such as women in shelters. There has been minimal published literature regarding the usefulness of telepsychiatry assessment in the emergency room<sup>25</sup>, so more work describing how telemental health consultation can help emergency room clinicians is needed. Likewise, further published work is needed regarding assessments, pharmacotherapies, and psychotherapies delivered in the patient's residence via home telehealth technologies.

**b. Inpatient.** Reports of inpatient care in general psychiatric units have been limited to consultative psychiatric services<sup>26</sup> and experimental investigations of acceptance<sup>27</sup> and diagnostic instrument accuracy<sup>28</sup>. One report of inpatient gero-psychiatric unit demonstrated patient and family satisfaction and perceived benefits with the telepsychiatry service<sup>29</sup>. While inpatient psychiatric care may be amenable to telehealth technologies, there has been little investigation describing the routine assessment or treatment on acute inpatient psychiatric units [B/C3] or for consultative psychiatry [B/C3]. One report indicated that inpatients with bipolar disorder, manic, had favorable opinions and engaged easily in videoconferencing assessments<sup>30</sup>. Uniqueness of assessment and treatment via videoconferencing has been

considered to play a beneficial role. Whether uniqueness continues to have such a beneficial effect needs to be seen as telemental health becomes more commonplace. Despite many articles and activity involving geriatrics, there were limited evidence-based outcome data on the provision of psychiatric services to geriatric patients in nursing facilities.

**c. Physical Surroundings.** Evidence is limited regarding the furnishing of either provider or patient offices<sup>31</sup>, although various program guidelines mention the importance of furnishings<sup>32</sup>. The literature states that as with in-person assessments, rooms used for telemental health should be safe, adequately lighted, and provide comfortable seating, with interruptions from electronic devices mitigated. Privacy, considered the ability to keep auditory and visual interactions from being seen or heard beyond the designated participants, is considered essential. VTC privacy features should be available to both the provider and patient. Privacy features should include audio muting, video muting, and the ability to easily change from public to private audio mode. Additionally, units should have features to improve the video clarity (e.g., brightness and contrast) and audio controls to adjust microphone and speaker volumes to reduce technology-based interruptions. All VTC-related features at the originating sites should also be controllable by the provider at the distant site. Providers should consider wearing pale solid colors such as blue, because patterned and striped clothing requires more bandwidth to update a more dynamic picture and may be distracting or disturbing to the patient.

## 2. Diagnostic Interview

**a. Provider-Patient Relationship.** Establishing rapport and a therapeutic alliance is as important in interactive videoconferencing as it is in face-to-face (FTF) care. Rapport allows for the patient to be more forthcoming with past and current history, cognitive experience, emotional experience, and symptoms. Good rapport leads to a therapeutic working alliance where the patient and provider engage cooperatively in a treatment plan to cure, manage, or mitigate unhealthy symptoms, behaviors, and emotional states. There is significant evidence that patients quickly adapt and establish rapport with their teleprovider<sup>33,34</sup> and are able to provide information via TMH as they would in person<sup>35,36</sup>. Clinicians should note that patients may present differently via telemental health, such as being more courteous or meticulous about their appearance<sup>37</sup>. It is also imperative for the clinician practicing mental health from a distance to have cultural competency in the population he or she is serving<sup>38,39</sup>. Adjusting to the medium may also require flexibility and creativity in conferring empathic gestures. Use of VTC appears to have minimal effect on the therapeutic working alliance [B/C2, D3]. There also is anecdotal evidence that for some disorders (e.g., post traumatic stress disorder, agoraphobia, and eating disorders), VTC may provide some “distance” that allows the patient to feel safer and in control of the therapeutic situation<sup>40,41</sup>. Another important consideration for video-based telemental health is gaze angle. Gaze angle is the angle between the participant’s local camera and where the participant looks at the distant onscreen participant (eye contact). The vertical location of the participant on the screen will affect gaze angle. Gaze angles of approximately 5 to 7 degrees are imperceptible to most people<sup>42,43</sup>.

**b. Diagnosis.** Establishing rapport and rendering a good diagnostic assessment are paramount during the initial session(s) with clients/patients. Effective treatment planning begins with an accurate diagnosis. The diagnosis is what enables the provider to refer to evidence and expert consensus-based treatments for that particular culmination of unhealthy emotions, thoughts, and behaviors. There is a fair amount of literature regarding VTC diagnostic assessments demonstrating their acceptance, utility, and accuracy in clinical

practice<sup>44,45,46,47,48,49,50</sup>. Limitations of VTC such as indirect eye contact due to camera-monitor placement need to be considered in assessing mental status. Adult diagnostic assessments conducted via VTC are comparable to FTF [B1, C2, D3]. While technical variables introduced by VTC assessment include bandwidth and display size, clinical VTC experience is another variable that should be appreciated. Providers who have significant experience using VTC for diagnostic assessments have little issue with the validity of diagnostics performed at medium bandwidth, while providers with less experience may encounter some difficulty (e.g., motion artifacts). This is an example where additional factors, in particular circumstances, may cause the recommended clinical confidence rating to increase or decrease. A wide range of patient diagnoses and settings lend to the generalization of accurate diagnostic assessments via VTC. There are limited data supporting diagnostic accuracy or utility at low bandwidth<sup>51,52</sup>.

**c. Disposition.** Disposition planning, typically from an inpatient or day hospital mental health or substance abuse program, has been reported as part of program descriptions, both while reporting on other videoconferencing applications and as a particular focus of telemental provision<sup>53</sup>. One study, involving child and adolescent telepsychiatry indicated the importance of clear recommendations, involvement of local care providers, availability and stability of local agencies and cooperation of the client and guardian as key to successful implementation of teleprovider recommendations<sup>54</sup>. Coordination between levels of care may be a particularly beneficial application to improve continuity and adherence to care<sup>55</sup>, particularly for suicidal or potentially aggressive patients who may need emergent interventions including pharmacotherapy. Continuity of care was particularly effective between a rural long-term care facility for dementia and an urban academic acute psychiatric hospital<sup>56</sup>. VTC also has been used to screen and coordinate transfer of patients to and from general inpatient units to a high acuity inpatient unit<sup>57</sup>. The use of videoconferencing in patient disposition planning between levels of mental health care is beneficial [B/C2, D3]. The attendance of the patient, when practical, is strongly encouraged and may help with patients who have propensity to splitting behavior.

#### **d. Psychiatry Specific.**

**1. Medication Management.** There are descriptions of telepsychiatry programs and collaboratives<sup>58</sup>, clinical trials, and case reports where medication management is an integral part of the care provision, outcome, and satisfaction of the VTC service<sup>59,60,61</sup>. There is little information regarding the effect of medication management via videoconferencing, although one retrospective study reported a trend toward prescribing more medications via videoconferencing<sup>62</sup>. Telepsychiatry, including medication management, has been the principle driving force of providing access to specialty care for remote and underserved populations. Access to psychiatric medication management, practiced in compliance with state regulations, in a timely manner and in keeping with local telemedicine protocols, is a particularly significant benefit of telemental health [B/C2, D3]. Most telepsychiatry programs use a combination of telephonic or facsimile ordering for remote sites and most are moving toward electronic prescribing. RCTs and case studies of VTC to increase adherence to mental health regimens have also been described<sup>63,64</sup>.

**2. Medical Conditions.** Psychiatry often does not require the hands-on physical assessment that other areas of medicine require. The lack of physical exam as a component of care has made videoconferencing particularly well suited for psychiatry. Provisions for routine or emergent local medical management, however, should be

included in any local operating procedure or protocol. Consultations for inpatients should be reviewed by the telepsychiatrist via remote health record access or facsimile.

**3. Procedures and Laboratory Studies.** Ordering and receipt of results of pertinent laboratory studies *should* be outlined in any local operating procedure or protocol. Like medical consultations, laboratory or procedure results *should* be reviewed by the telepsychiatrist via remote health record access or facsimile. Telepsychiatry consultants need to have access to relevant clinical data as if they were seeing the patient in person.

**e. Psychological Assessment.** The most common psychology-related evaluation is in relation to the diagnostic interview and the use of diagnostic rating scales as part of this process. Two other categories of psychological assessment are personality assessment and intelligence or cognitive assessment.

**1. Diagnostic Instruments and Scales.** A good deal of investigation has examined psychiatric assessments that are based on clinician interview, such as the Brief Psychiatric Rating Scale (BPRS)<sup>65,66</sup> or psychiatric interviews based on the Structured Clinical Interview for the Diagnostic and Statistical Manual<sup>67</sup>. There is some support for the reliability and validity of VTC in the administration of the Brief Psychiatric Rating Scale, possibly depending on bandwidth<sup>68,69</sup> [B2,C/D3]. Comparability between face-to-face and VTC also is demonstrated for the Hamilton Depression Rating Scale for depression<sup>70,71</sup> [B2].

One study demonstrated that BPRS ratings based on verbal report are more reliable than symptoms requiring visual observation<sup>72</sup>. Similarly, a largely positive study comparing teleconference to face-to-face found lesser reliability for the Scale for the Assessment of Negative symptoms using a bandwidth of 128 kbps<sup>73</sup>.

Remote diagnostic consultation has been widely applied as a way to provide expert opinion for patients in underserved areas. Most studies have demonstrated feasibility and satisfaction, but fewer reliability and validity studies have been conducted<sup>74</sup>. Two studies<sup>75,76</sup> demonstrated high reliability in the administration of the Structured Clinical Interview for DSM-III-R.

**2. Personality Assessment.** To the best of our knowledge, there has not been any examination of the use of telemedicine in personality assessment. One reason for this may be challenges to using paper-and-pencil measures at remote sites, although adjunctive technologies such as web-based measures may assist with this in the future. There is no information about projective testing over VC, possibly because of the decreased use of such measures in traditional face-to-face practice.

**3. Neuropsychological Assessment.** Neuropsychological assessment is a subtype of psychological assessment. It is most commonly performed by asking patients to perform cognitively oriented tasks such as remembering a list of 20 words or counting backwards from 100 by 7s. Much of the research on remote neuropsychological assessment demonstrates feasibility<sup>77,78</sup>. Patients can understand the tasks they need to complete and then do so through video teleconferencing (VTC). Many studies also demonstrate comparability of scores between remote and face-to-face assessment<sup>79,80</sup>. However, some research also demonstrated differences on test scores<sup>81,82,83</sup>. Cognitive assessments examined and validated include the CAMCOG<sup>84</sup>, the MMSE<sup>85</sup>, The National Adult Reading Test, and the Adult Memory and Information Processing Battery<sup>86</sup>. One study

found that scores were comparable for expressive word knowledge tasks but varied widely for tests of visual-spatial processing.

It appears that VTC neuropsychological assessment is possible and often valid [B/C/D3]. However, it is recommended that research begin to develop new norms so that the thresholds used for impairment are valid when compared with face-to-face administration<sup>87</sup>. Until this is accomplished, remote neuropsychological assessment will be able to provide a broad indication of areas of impairment, but may lack the same degree of resolution that face-to-face assessment provides. In addition, specific cognitive tests, such as those testing visual-spatial processing, may need to be modified for VTC administration.

**f. Psychiatric Nurse Practitioner, Physician Assistant, and Psychiatric Nursing Specific.**

Psychiatric Nurse Practitioners are educated and prepared to provide the full complement of psychiatric services, including primary mental health care services<sup>88</sup>. It is quite reasonable to assume that psychiatric mental health nurses working in clinical areas, both rural and urban, could benefit from telehealth care. However, a review of literature shows few published randomized clinical trials (RCTs) seeking answers to innovative care provided through videoconferencing, telephone and other telehealth technologies<sup>89,90,91,92,93,94,95,96,97,98,99</sup>.

**g. Social Work/Counselor Specific.** The literature is limited regarding the use of interactive videoconferencing by social workers, although many articles may reference social workers in the broader term of therapists<sup>100</sup>. There are no clinical trials or research in the use of videoconferencing specifically by social workers. Often, rural sites have social workers providing therapy and working in concert with urban specialists, often psychiatrists, to provide treatment to their clients. Social workers, like other mental health providers, often have mixed levels of exposure, experience, perceptions, and attitudes about the use of telemedicine technologies, but realize the need to understand and participate in the use of such modalities for their client populations<sup>101,102</sup>.

Literature addressing substance abuse treatment by a telehealth addictions counselor was only represented by two original articles<sup>103,104</sup>, both of which demonstrated positive results. It is understood that many patients treated by telemental health for other mental disorders also have co-morbid substance abuse issues and illnesses. VTC cognitive assessments of persons with a history of alcohol use disorders were similar to face-to-face assessments; participants were satisfied with the videoconferencing examination<sup>105</sup>. More research data will be necessary to determine the risks and benefits of treating the substance abuse population before specific recommendations can be made.

**b. Ongoing Mental Health Care.**

**1. Psycho-Education.**

Providing psycho-education via video is a broad area. Grand rounds and case presentations to mental health and non-mental health providers has been a burgeoning area of educational benefit for years. This guideline will limit its focus to direct mental health teaching to patients<sup>106</sup>, education directly or indirectly to on-site providers as part of the clinical consultation<sup>107</sup>, and clinical supervision<sup>108,109,110</sup>. Teleconsultation to providers in rural practices is thought to help through specialist collegial support, bringing the latest information from academic centers and reducing the isolation of rural providers. Mental health knowledge and skills imparted to rural providers have been beneficial [B/C2,D3], with

some limitations<sup>111</sup>. While imparting knowledge via VTC consultation was mentioned in a number of papers, there have been little forthcoming data on actual mental health patient outcomes. Supervision and training of mental health physicians, therapist trainees, and physician assistants has been demonstrated to be beneficial<sup>112,113,114,115,116</sup>.

## **2. Individual Psychotherapies.**

As in the face-to-face setting, therapists using VTC come from a range of theoretical orientations and use a variety of psychotherapeutic strategies. Standard practice guidelines for therapy should guide psychotherapy services within the telemedicine setting. Guidelines concerning evidence-based practice and empirically supported treatments may be particularly relevant as therapies are adapted to new contexts such as VTC<sup>117,118,119,120</sup>. Even in the in-person environment, research into applications and outcomes of these psychotherapies is an ongoing challenge in today's evidence-based and often managed mental health care environment. There are several publications describing case reports and clinical trials of individual psychotherapy conducted via VTC. Supportive<sup>121</sup>, exposure<sup>122</sup>, cognitive behavioral<sup>123,124,125,126</sup>, and hypnosis<sup>127</sup> have all been reported. There were two case reports of Eye Movement Desensitization and Reprocessing therapy conducted via video<sup>128,129</sup>. Psychotherapy via VTC has included the treatment of bulimia nervosa, panic disorder, agoraphobia, obsessive compulsive disorder, depression, and post traumatic stress disorder, as well as ability to provide culturally sensitive expertise<sup>130,131,132,133,134,135,136</sup>. Therapist's adherence and competence in the practice of manualized cognitive behavioral therapy via VTC has proven effective<sup>137</sup>. Psychotherapy appears to be amenable to the VTC communication medium [B/C2,D3], with the majority of the individual psychotherapy VTC literature describing cognitive behavioral therapy applications [B/C2, D3]. There are no specific recommendations to exclude types of psychotherapy to be utilized via telemental health VTC. As previously mentioned, some mental disorders, e.g., eating and trauma disorders, may benefit in their treatment from the geographic and/or interpersonal distance patients/clients may experience while engaged in psychotherapy via VTC<sup>138,139</sup>. Future research will provide guidance on the best person-setting-therapist matches for the various VTC contexts.

## **3. Group Psychotherapies.**

Similar to individual psychotherapies, there are many different types and approaches to group psychotherapy in both inpatient and outpatient settings. Standard practice guidelines for group therapy should guide VTC services<sup>140,141,142,143</sup>. Multipoint videoconferencing offers the possibility to provide small numbers of patients in rural areas with the opportunity to attend outpatient groups that are more homogeneous and stable in nature. Witson mentioned in his earliest reports of video group therapy that the dynamics of the group depended more on the therapist and the makeup of the group than using VTC as the treatment medium<sup>144</sup>. Multipoint groups could be particularly advantageous for patients suffering trauma<sup>145</sup>, eating disorders, or other diagnoses or circumstances that are potentially isolating [B/C/D3]. While this may be a very powerful tool, there is limited published literature regarding videoconferencing group therapy. There were two clinical trials comparing videoconferencing to in-person group therapy for veterans with PTSD. One study involved a coping skills group<sup>146</sup> and the other a cognitive behavioral therapy group<sup>147</sup>. Satisfaction between group participants, level of retention of information, and attendance were similar. Future research will provide guidance about the best group therapy applications within the VTC context.

#### **4. Marital and Family Psychotherapy.**

Marital and family therapies could be considered specialized types of group therapy because sessions involve the interaction of two or more clients with a therapist(s). Like group therapy, the more members involved, the greater the likelihood that all members may not be physically co-located. Standard practice guidelines for marital and family therapy should be consistent with applications in the VTC context<sup>148</sup>. While there were no published research trials of family therapy conducted via VTC, there were a few articles describing unique applications, benefits, and limitations utilizing videoconferencing technologies. There is evidence that the use of TMH family therapy with inpatients may be particularly beneficial for the patient and may reduce the length of stay<sup>149</sup>. It was suggested that some patients may feel safer expressing themselves in session when communicating with family members via video<sup>150</sup>, while other families/members may experience extended family sessions as not “real”<sup>151</sup>. Two articles pointed out that the transmission delay they experienced was helpful to the therapy process as it made clear when family members talked over one another and were not demonstrating adequate listening skills<sup>152,153</sup>. Telemental health family therapy via a satellite connection proved helpful to this family in resolving their deeply held conflicts<sup>154</sup>. While there are limited data regarding family therapy via videoconferencing, early reports indicate excellent acceptance and primarily beneficial outcomes [B/C3].

There also are reports of medical teams using videoconferencing to communicate with the families of children recovering from or dealing with severe medical illness<sup>155,156,157,158</sup>. These sessions did not involve mental health therapists, but were mental health as well as somatic in nature. There also are reports of the benefit and support nursing home residents experienced through videoconferencing with their families<sup>159</sup>.

#### **c. Populations of Special Focus.**

##### **1. Geriatrics.**

The elderly population may benefit significantly from improved access to specialty mental health care that can be provided via videoconferencing<sup>160,161</sup>. Many elderly individuals have multiple health problems in addition to mental health problems; the medical problems may complicate or even precipitate mental health problems. Thus, the elderly often are high users of health services and often present complex issues.

For any elderly individual, accessing necessary care can present many challenges, from the frequency of visits for needed care to transportation for such care. For the rural geriatric patient, the challenges are greatly increased. The frequency of need for and the cost of transportation to the nearest urban area, which may be quite distant, can be prohibitive, even if the individual is insured for the actual care. For many, the cost and complexity of planning and locating such care in busy, traffic-intense urban centers are overwhelming. Many simply do without.

The trend toward accessing basic care in the home setting via simple videoconferences over video phones or computers is a welcome tool for increasing accessibility, especially for those who have mobility limitations or transportation limitations. Connecting local hospitals, health care clinics, nursing homes, and mental health facilities to remote specialists via high quality, secure videoconference connections is a technology that is now available and the number of such partnerships is increasing.

However, the literature on geriatric telemental health is quite sparse. There have been relatively few controlled studies of outcomes in the geriatric population<sup>162,163</sup>. There have been case studies and opinion essays<sup>164,165</sup> while some literature involves psychometric instruments<sup>166</sup>, usually involving patients in long-term care facilities. There is some limited evidence-based support for the provision of psychiatric services to geriatric patients in nursing facilities [B/C/D3].

The concept of increasing accessibility of care via videoconferencing seems obvious and appealing. Further study must be done to provide reliable evidence. Such studies must also specifically address the challenges the elderly face in dealing with videoconferencing. Sensory deficits, especially visual and auditory, can impair their ability to successfully interact over a videoconference connection<sup>167</sup>. The patient end must have large monitors, good audio capabilities, and high bandwidth and video resolution to make sure there is a large and clear picture connecting the elderly patient/client to the care giver.

Another challenge for this age group is the prevalence of dementia, with deficits in cognitive capability and often accompanied by psychiatric symptoms such as depression and delusions. The elderly are the least likely to be familiar with new technology and, with dementia as an added factor, it can theoretically be a challenge to assure that the interaction with the service provider is understood to be real rather than just a figure on a television or a hallucinatory experience. An additional issue is that any videoconferencing approach must include all appropriate aspects of a full diagnostic evaluation. One article developed a protocol for diagnosing Alzheimer's disease utilizing videoconferencing<sup>168</sup>. The geriatric patient often has multiple medical problems, many of which affect their cognitive/behavioral state, and thus deserves a full workup, including all appropriate laboratories, radiologic, and other diagnostic procedures.

## **2. Children and Adolescents.**

Recommendations for child and adolescent telemental health (CATMH) build on information and recommendations presented above for telemental health (TMH) with adults. Throughout this document the term “parents” refers to the youth’s primary caretakers, regardless of whether they are biological parents, adoptive parents, or legal guardians. The terms “youth” and “young people” refer to mixed samples of children and adolescents. When specific developmental groups are intended, the terms “toddlers,” “preschoolers,” “children,” and “adolescents” are used. The guidelines are applicable to the evaluation and treatment of youth from preschool to 18 years old and developmentally impaired young adults up to 21 years old with emotional and behavioral difficulties.

CATMH programs have been successfully implemented in multiple diverse settings such as pediatric clinics<sup>169</sup>, community mental health centers<sup>170</sup>, rural schools<sup>171,172</sup> urban daycare<sup>173</sup>, corrections<sup>174</sup>, and private practice<sup>175</sup>. CATMH is applicable with youth of minority ethnicity, such as African-American<sup>176</sup>, Hispanic<sup>177</sup>, Hawaiian<sup>178</sup>, Native American,<sup>179,180</sup> and Alaska Native<sup>181</sup> youth.

- a. Evaluations.** VTC procedures for the evaluation and treatment of youth 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. The following recommendations are in addition to the evidence listed for adults.



## 1. Setting.

**a. Physical Surroundings and Staffing.** Families should be informed during scheduling to prepare their children for a VTC appointment. The room is positioned and remote camera control is available so the practitioner is able to view and adequately observe children's motor skills as they move about the room, play, and separate from their parents<sup>182,183</sup>. A table may provide a surface for the child to draw or play while the parent relates the history, but it 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.

**b. Outpatient.** The literature on CATMH is sparse. Published work has predominantly described care in outpatient settings<sup>184,185,186,187,188</sup>. Most of these studies have measured parent and provider satisfaction<sup>189,190,191,192</sup> and have found that parents and providers are very satisfied with CATMH care. Although satisfaction does not equate to efficacy, it does imply acceptability and informs directions for future work<sup>193</sup>. Other reports have described successes and challenges of program implementation<sup>194,195,196,197</sup>. One recent study described improvements in children's affective states and oppositional behaviors after CATMH<sup>198</sup>.

No absolute inclusion or exclusion criteria for CATMH have been established. Applications of CATMH have been described across most developmental groups and diagnostic categories [B/C1]. School-aged children comprise the modal treatment group, similar to usual outpatient care<sup>199,200,201,202,203,204,205</sup> but children as young as 3 years old have been evaluated and treated<sup>206,207,208</sup>. Thus, diagnosis is not a determining factor in deciding to treat a youth through CATMH. Rather, it is providing a system of care in the patient's community that matches the services the telepsychiatrist will deliver and resources at the patient site to help manage challenging youth that best determines inclusion or exclusion for CATMH. Their care and the clinical procedures used in CATMH should follow the practice parameters developed by the American Academy of Child and Adolescent Psychiatry.

**c. Inpatient.** There are no reports of CATMH in inpatient settings, nor any indication as to whether any work is being done in this area. However, CATMH may be helpful to inpatient settings needing child and adolescent psychiatric consultation [B/C/D3]. Such units may be predominantly staffed by pediatricians or family physicians who then receive teleconsultation from a psychiatrist.

**d. Other Settings.** One advantage of CATMH is the ability to readily reach youth in rural naturalistic settings such as schools<sup>209,210</sup> or in distant residential sites such as corrections<sup>211</sup>, and long term treatment centers<sup>212,213</sup>. VTC-mediated meetings can be especially helpful in bringing together youth at the residential setting with family and professionals in the youth's home community for treatment planning<sup>214</sup> [B/C2, D3]. One caveat is that adolescents in correctional settings may not be forthcoming if accompanied to the CATMH session by correctional staff. When afforded appropriate privacy and time alone with the telepsychiatrist, incarcerated youth express high satisfaction with their telepsychiatric care<sup>215</sup> [B/C2].

## 2. Diagnostic Interview.

**a. Provider-Patient Relationship.** The teletherapist must establish a therapeutic alliance not just with the youth, but also with the parent and other participating adults, and must work within the parent-child relationship. Satisfaction data indicate that parents readily establish rapport with their teletherapist<sup>216,217,218</sup>, thereby suggesting that VTC does not interfere with the therapeutic alliance [B/C2, D3].

Emerging information from work with adults suggests that a more casual clinical style optimize rapport<sup>219,220,221</sup> and this is likely true for youth as well [B/C2]. When working with youth with cognitive limitations<sup>222,223</sup> or with youth of different cultural backgrounds, a more casual style could be problematic and the technological limitations might make it difficult to distinguish clinically relevant issues. Thus, it is important to adjust communication to patients' needs [B/C2].

Because youth are evolving their interpersonal sensitivities and skills, but do not have access to the usual nuances of interpersonal relatedness, the teletherapist must devise ways to engage youth. Rapport-building can be facilitated by showing the youth how to use the remote control to obtain a close-up of the teletherapist or scan the teletherapist's room to make it appear more real or to demonstrate the picture-in-picture box in the corner of the monitor to obtain a close-up view of himself/herself or his/her parents<sup>224,225,226,227</sup>.

**b. Assessment and Diagnosis.** It seems intuitive that higher bandwidth should provide the most accurate clinical assessment, but there are no data to support this assumption. Bandwidth and resolution must be sufficient to detect subtle aspects of the mental status examination, such as tics, dysmorphia, or abnormalities in relatedness [B/C2].

Recent encouraging results suggest that diagnoses made in CATMH are reliable and valid<sup>228,229</sup>. The accuracy and relevance of assessment conducted through VTC is further supported by the success of functional behavioral analysis of developmentally impaired young children in leading to effective classroom interventions<sup>230</sup>.

The American Academy of Child and Adolescent Psychiatry (AACAP) Practice Parameters for the Psychiatric Assessment of Children and Adolescents<sup>231</sup> recommends that some time is spent interviewing the youth alone. In general, teens and older children with good impulse control, adequate verbal skills, and the ability to separate are amenable to interview alone [B/C2, D3]. Younger, developmentally impaired, or impulsive youth need a modified approach, likely including an adult in the room, e.g., a staff member at the clinic [B/C2]. Such decisions should be individualized to the youth.

The recommendation for a traditional play session with younger children<sup>232</sup> may be challenging. One approach includes observing the child interacting with a staff member in either a free-form or structured play session. Some limited direct play with the child may be possible over the telemonitor. For example, while parents provide history, children often enjoy drawing pictures and sharing them with the teletherapist. The teletherapist also may receive the picture electronically, via fax or a document reader. Another possibility, although not yet explored, is that the child might draw on an electronic tablet that could be immediately transmitted via VTC.

The teletherapist can then build on the child's actions by exploring the themes present in the pictures. Similarly, the teletherapist can develop a play scenario or story together with the child, or use puppets to facilitate play over the telemonitor. Sometimes the therapist may work with on-site personnel or parents to facilitate these interactions. Some time in a play session should be incorporated into the assessment and the treatment as indicated and tolerated [B/C3].

CATMH has been reported with preschoolers as young as 2.5 to 3 years old<sup>233,234,235,236</sup>. The AACAP Practice Parameter for the Psychiatric Assessment of Infants and Toddlers<sup>237</sup> recommends multidisciplinary sources of information regarding the child's functioning in multiple settings. The parameter recommends direct observation of the child during his/her interactions with parents and preferably with an unfamiliar adult. Another recommendation is that the psychiatrist has direct interaction with the child. This interaction can be accomplished while the child remains in a room with a parent and/or a staff person [B/C2]. Some preschoolers can be directly engaged over the monitor, e.g., by asking them to point to body parts, to demonstrate skills such as counting, or to talk about his/her pets. However, it is helpful to have an adult present with the child to provide input regarding a very young child's level of attunement, pleasure in the interaction, or spontaneity in play.

**c. Disposition and Continuity of Care.** The needs assessment conducted prior to the establishment of a CATMH practice identifies collaborating clinicians and system-of-care so that the teletherapist will have a clearly defined role within the youth's treatment and know whose assistance to elicit as need arises<sup>238</sup>. The community should have the resources to follow up recommendations by the telepsychiatrist<sup>239</sup>. Ongoing treatment of unstable youth may only be possible in a community with a comprehensive system of care that can provide appropriate wraparound services<sup>240</sup>.

## **b. Treatment.**

**1. Medication Management.** Expert pharmacotherapy is the most frequently requested CATMH service<sup>241,242</sup>. Various methods have been employed to provide medication management, including: a) the telepsychiatrist consults to the referring primary care physician (PCP) who prescribes; 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 are established and communicated to all parties regarding the method for obtaining initial prescriptions and refills and reporting adverse effects. CATMH sites located in non-medical or non-mental health sites, such as schools or shelters, may not be able to provide medication service and/or will need considerable modifications to usual practice, particularly for controlled substances such as stimulants.

**2. Psychotherapy.** Standard of practice guidelines should be followed in psychotherapy evaluation and treatment with children<sup>243,244</sup>. As described with telepsychiatry, standard of care consultation with the child's primary care provider or the child's medical home is encouraged when possible. Ongoing psychotherapy requires time alone with the youth. How to accomplish ongoing individual therapy in CATMH has not been systematically studied, but individual case reports of therapy with youth have been described<sup>245,246,247,248,249</sup>. The only therapy outcome study<sup>250</sup> showed comparable improvements with cognitive behavioral therapy supporting a role for CATMH in

psychotherapy with youth [B/C2]. A telepsychiatry counseling service to juvenile detention facilities suggested an improved rate of family and behavioral goals attainment<sup>251</sup>. In general, teletherapists may attempt to engage in therapy adolescents and older children with good verbal skills who are not aggressive, severely oppositional, or otherwise dysregulated [B/C2].

### **3. Seclusion and Restraint.**

Reduction in the use of seclusion and restraint has been a priority of providers, facilities, and the Substance Abuse and Mental Health Services Administration. One clinical trial looked at the use of videoconferencing in place of in-person assessment following restraint and seclusion of pediatric patients at a private hospital<sup>252</sup>. Remote assessment was felt to be rapid and reliable.

### **4. Emergency Assessments.**

Emergency evaluation of patients with mental health disorders may be an area of particular value to emergency departments, especially in remote geographic locations. Emergency evaluations are defined as evaluations that require assessment of patients where there are questions of imminent risk of harm to self or others or where acute psychosis is present. Useful VTC software features such as remote unit startups, auto answering, and camera power controls should be included when selecting a VTC unit for emergency assessment. Psychiatrists are often contacted by phone to consult on patients in the emergency room who have been seen by the emergency room physician, mental health professional, or paraprofessional and disposition is in question. The psychiatrist also may consult in person the following day when patients thought to need admission by the emergency room providers are still in the emergency room due to lack of inpatient beds. Consultation by psychiatrists via interactive video may provide the expertise to determine disposition, e.g., outpatient or day hospital treatment, more quickly and reduce the length of emergency room stays for patients with mental health issues. When patients are located in remote areas this also may eliminate the need to transfer patients to regional or urban hospital centers, disrupting their lives even more. There are a few papers discussing emergency telepsychiatry. Two papers describe outcomes for patients who received emergency telepsychiatric evaluations and remained as outpatients<sup>253,254</sup>. There also are descriptions of performing emergency evaluations or secondary opinions on patients already admitted<sup>255,256,257</sup>, providing medical clearance in the emergency room for psychiatric patients<sup>258</sup>, and a set of emergency management guidelines<sup>259</sup>. Special attention should be given to determining how assessment and disposition by videoconferencing can safely meet the needs of suicidal and aggressive patients<sup>260</sup>.

### **5. Involuntary Commitments.**

Commitments involve both clinical and legal issues. Patients thought to be in imminent danger of harming themselves or others are assessed by providers according to State regulations and can be involuntarily admitted to a medical facility. These acute admissions are time-limited so that a legal hearing can be coordinated and a judge will render a decision whether to continue the involuntary admission or release the patient. Often legal hearings are avoided when patients change their decision and sign a voluntary admission request. While it is believed that involuntary commitments and legal hearings are being done in the United States via videoconferencing, little is mentioned in the literature. There is a case report of using videoconferencing to complete a psychiatric assessment under the mental health act in Australia for involuntary admission and use of depot antipsychotic medication<sup>261</sup>. Using VTC to interview

patients for this combined clinical/legal proceeding would depend on local laws and the local administrative law judge.

## **6. Incarcerated.**

Telemental health, like other applications of telemedicine, has been one of the earliest routine applications of telehealth. The main driving force behind this is access, especially of the pre-trial populations detained in the nation's jails. Jails typically have high suicide rates due to their role in acute incarceration, risks of substance withdrawal, and social consequences. Additionally, on-site mental health care is usually only available at the larger jail complexes. Getting the patient transported to an appropriate provider is encumbered by costs, staffing levels, and safety concerns. Monies saved in escort costs are used to purchase VTC equipment, pay for administrative coordination, and provide on-site nursing or ancillary clinical staff attendance at videoconferencing appointments. Telepsychiatry treatment has been provided to both jails<sup>262,263,264</sup> and prisons<sup>265</sup>. There has been limited discussion regarding the use of forensic telepsychiatry<sup>266</sup>. Two studies investigated the use of VTC for forensic evaluations; the resultant inter-rater reliabilities were good to excellent<sup>267,268</sup>. Several studies have proven acceptability<sup>269</sup> and limited clinical evidence of effectiveness with the incarcerated population [B2,C/D3]. Because detained persons are a vulnerable population, teleproviders should be confident that incarcerated patients are referred for videoconferencing evaluation appropriately rather than solely to avoid costs.

## **6. SUMMARY**

This document was prepared in response to the needs and requests of providers, organizations and the ATA membership interested in or engaged in telemental health activities, for the development of evidence based telemental health guidelines. The broad nature of the mental health field along with an unlimited number of ways to use technology in mental health services led the committee to limit this evidence based document to interactive video conferencing applications. Appreciating the broad range of providers and settings involved in TMH, recommendations are organized by patient age, types of treatment, treatment setting and provider specialty. The coding system was developed to encourage more specific descriptions of the technology being used in TMH interactive videoconferencing research and methods publication. It provides recommendations based on clinical confidence derived from the published literature, committee members and expert reviewers. The committee hopes the users of this document will benefit from the recommendations, literature references, and the development of a clinical/technical coding system. The document structure and headings were selected in anticipation that users will note the clinical applications that are in most need of additional evidence based research and perhaps select these areas as a focus of future research.

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