The purpose of this paper is to provide the current position of the American Occupational Therapy Association (AOTA) regarding the use of telerehabilitation technologies by occupational therapists and occupational therapy assistants\(^1\) to provide occupational therapy services, based on the existing research. This document examines the research and issues related to telerehabilitation for evaluation and intervention, telemonitoring, practitioner qualifications, ethics, and regulatory issues and reimbursement. Occupational therapy practitioners\(^2\) are the intended audience for this document, although others involved in supervising, planning, delivering, and paying for occupational therapy services also may find it helpful.

Telecommunication has prompted the development of an emerging model of health care delivery called *telehealth*, which involves providing health care, health information, and health education across a distance, using telecommunications technology…It allows physicians, nurses, and health care specialists to assess, diagnose, and [provide interventions to clients] without requiring both individuals to be physically located in the same place. (Center for Telehealth and E-Health Law, 2010, para. 1)

*Telerehabilitation* within the larger realm of telehealth is the application of communication technology for supporting rehabilitation services (Russell, 2007). On the basis of this definition, telerehabilitation includes the application of evaluation, preventative, diagnostic, and therapeutic services via two-way or multipoint interactive telecommunication technology. Occupational therapy practitioners can use telerehabilitation as a mechanism to provide services at a location that is physically distant from the client, thus allowing for services to occur where the client lives, works, and plays, if that is needed or desired. Telerehabilitation also allows occupational therapy practitioners to use new technologies to provide interventions through alternative methods such as through virtual reality. Key terms related to telerehabilitation and telehealth are defined in Appendix A.

As in other health care fields, the use of telehealth and telerehabilitation is expanding. Research to measure its effectiveness and utility by professionals in a variety of health care fields is ongoing. This paper includes an overview of some of the research that is relevant to the use of telerehabilitation for providing occupational therapy services. This paper also highlights some of the current topics being discussed regarding the use of telerehabilitation for providing occupational therapy services.

**Telerehabilitation in Evaluation and Intervention**

In general, the use of telerehabilitation to conduct evaluations depends on real-time two-way or multipoint observation, communication, and interaction between the practitioner and the client.

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\(^1\)The *occupational therapist* is responsible for all aspects of occupational therapy service delivery and is accountable for the safety and effectiveness of the occupational therapy service delivery process. The *occupational therapy assistant* delivers occupational therapy services under the supervision of and in partnership with the occupational therapist (AOTA, 2009).

\(^2\)When the term *occupational therapy practitioner* is used in this document, it refers to both occupational therapists and occupational therapy assistants (AOTA, 2006).
The use of telerehabilitation to conduct evaluations has expanded in recent years. Although the traditional telephone system continues to be a low-cost alternative for effectively conducting interview assessments by various health care professionals (Cooper et al., 2002; Shaw, Dreyer, & Wittman, 2001; Winters, 2002), the proliferation of advanced communication technologies has broadened the possibilities of conducting evaluations using new and more sophisticated technology. Studies have described the use of telerehabilitation in areas that are of concern to occupational therapy such as evaluation and consultative services for wheelchair prescription (Barlow, Liu, & Sekulic, 2009; Schein, Schmeler, Brienza, Saptono, & Parmanto, 2008; Schein, Schmeler, Holm, Saptono, & Brienza, in press), neurological assessment (Savard, Borstad, Tkachuck, Lauderdale, & Conroy, 2003), lower-limb amputation care or ulcer management (Rintala et al., 2004), and early childhood intervention (Cason, 2009; Heimerl & Rasch, 2009). Schmeler et al. (2009) also details the use of assistive technology via telerehabilitation for clinical and vocational applications.

Clinical reasoning guides the selection and application of appropriate telerehabilitation technology necessary to evaluate client needs and environmental factors. As part of their clinical reasoning, occupational therapists should consider the appropriateness of the use of telerehabilitation to ensure the safe and effective delivery of occupational therapy services that are appropriate for the client’s needs and context. Reliability of telerehabilitation technologies for providing safe and effective occupational therapy services is one important factor when deciding to use telerehabilitation for assessing the client’s ability to engage in specific occupations and activities and for administering specific assessments. In addition, occupational therapists should consider the reliability of the particular assessment when considering using it to conduct an evaluation via telerehabilitation. Studies have investigated the reliability of using telerehabilitation with such assessments as the Functional Reach Test and European Stroke Scale (Palsbo, Dawson, Savard, Goldstein, & Heuser, 2007); the Kohlman Evaluation of Living Skills and the Canadian Occupational Performance Measure (Dreyer, Dreyer, Shaw, & Wittman, 2001); and the FIM, the Jamar Dynamometer, the Preston Pinch Gauge, the Nine Hole Peg Test, and the Unified Parkinson’s Disease Rating Scale (Hoffman, Russell, Thompson, Vincent, & Nelson, 2008).

Occupational therapists also need to consider the client’s diagnosis, implementation issues (e.g., technology available to client), impact on and choice of the client, and the ability to measure outcomes when considering using telerehabilitation to conduct an evaluation. Because of the evolving knowledge and technology related to telerehabilitation, occupational therapists should review the latest research to remain current about the appropriate use of telerehabilitation for conducting evaluations. The occupational therapist may determine that a face-to-face evaluation is required for some clients.

When planning and providing interventions via telerehabilitation, Scheideman-Miller et al. (2003) reported that the appropriateness and maintenance of the technology and the sustainability of participation by the client are important factors to consider. As related to occupational therapy interventions, some factors to consider include technology availability and options for the occupational therapy practitioner and the client; the safety, effectiveness, sustainability, and quality of interventions provided exclusively through telerehabilitation or in combination with face-to-face interventions; the client’s choice about receiving interventions via telerehabilitation;
the client’s outcomes; the client’s perception of quality of life and services provided; reimbursement; and state and federal legislation regarding interstate usage.

**Technology Used in Telerehabilitation**

*Virtual Reality*

Occupational therapy practitioners can integrate virtual-reality options when conducting evaluations and providing interventions via telerehabilitation. Virtual reality has the capacity to allow for creation and control of three-dimensional built environments. Because of this capacity, virtual reality offers evaluation and intervention options that are not available with traditional occupational therapy approaches (Schultheis & Rizzo, 2002). For example, virtual reality can be used to provide occupational therapy interventions for people with cognitive impairments. Virtual reality allows for controllable input stimuli and gradual modifications to the environment, which have been shown to support generalization of knowledge. Using virtual reality during the initial stages of the intervention may provide increased safety compared to real-world situations (Strickland, 1997). Telerehabilitation using virtual reality also is being examined for its effectiveness in enabling people to compare the difference between their desired level of occupational engagement and their current functional status following a stroke (Brewer, Fagan, Klatzky, & Matsuoka, 2005; Merians et al., 2002). Virtual reality as part of telerehabilitation also is being used to evaluate and determine home accessibility using three-dimensional construction of the architectural features of the environment (Kim & Brienza, 2006; Kim, Brienza, Lynch, Cooper, & Boninger, 2008). The potential effectiveness of using virtual environment as part of the assessment and training of powered wheelchair users also has been demonstrated (Harrison, Derwent, Enticknap, Rose, & Attree, 2002).

In addition, a remote console telerehabilitation system (ReCon) including virtual reality designed by the University of Medicine and Dentistry of New Jersey now provides occupational therapists the tools necessary to conduct a client’s rehabilitation session in real-time from a distant location (Lewis, Boian, Burdea, & Deutsch, 2005). This system provides occupational therapists with three-dimensional representations of the client’s movements, virtual reality–based exercise progress, and motor performance updates (Lewis et al., 2005; Lewis, Deutsch, & Burdea, 2006). Telerehabilitation combined with virtual reality has been used to provide feedback and information remotely as part of occupational therapy intervention (Merians et al., 2002), to distract people from physical pain, and to improve their adherence to therapy exercises (Hoffman, Patterson, & Carrogher, 2000).

*Telemonitoring*

Occupational therapy practitioners also can use telemonitoring as part of telerehabilitation to monitor a client’s adherence to the intervention program, and progress toward achieving desired outcomes. It also can be used to track and respond to follow-up issues. For example, occupational therapy practitioners providing telerehabilitation can take advantage of self-monitoring analysis and reporting technology (SMART) to monitor a client’s occupational performance within the home and community. SMART technologies that are wireless allow the occupational therapy practitioner to provide services within varied environments, without restricting the client’s movements within those environments. SMART technologies provide information that allows an offsite occupational therapy practitioner to assess performance and
modify services and the environment. These technologies also enable occupational therapy practitioners to understand the real-life occupations and performance challenges of the client and to plan appropriate interventions. As a result, occupational therapy practitioners can tailor environmental accommodations for clients with physical limitations or can develop individualized technology-based cueing systems for clients with cognitive disabilities so that they can live more independently.

The Gator Tech Smart House (Mann & Milton, 2005) developed at the University of Florida provides an array of SMART technologies that monitor and cue clients remotely. Examples include the SmartShoe (Naditz, 2009), which determines fall risk by analyzing walking behavior patterns in the client’s own environment and sending the information to a remote site. Similarly, home exercise programs can be monitored remotely using a haptic (touch-sensitive) control interface to track individuals’ hand position while providing resistive forces remotely (Popescu, Burdea, Bouzit, & Hentz, 2000). Use of smartphones and personal data assistants (PDAs) allow for remote ongoing support of persons with cognitive disabilities within natural environments. Tang and Venables (2000) utilized smartphones to deliver rehabilitation interventions remotely by using wireless Internet or Intranet access and by providing frequent prompts and cues regarding when and how to complete daily living occupations. Gentry (2008; Gentry, Wallace, Kvarford, & Bodisch-Lynch, 2008) implemented use of PDAs, labeling them “cognitive orthoses,” for cueing persons with traumatic brain injury and multiple sclerosis regarding how and when to complete daily life occupations. Wireless technologies such as these are expanding opportunities for occupational therapy practitioners to implement telerehabilitation interventions where persons live, work, and play and to provide services throughout the day rather than only within the occupational therapy clinic.

Appendix B provides case examples of how occupational therapy practitioners use telerehabilitation to support health and participation in occupations.

Practitioner Qualifications and Ethical Considerations

AOTA asserts that the same ethical and professional standards that apply to the traditional delivery of occupational therapy services also apply to the delivery of services received via telerehabilitation. Occupational therapy practitioners should refer to the Occupational Therapy Code of Ethics and Ethics Standards (AOTA, 2010a). As stated in this document, occupational therapy practitioners are responsible for ensuring their individual competence in the area in which they provide services. Occupational therapy practitioners may use various educational approaches to gain competency in using telerehabilitation when providing occupational therapy services. Occupational therapy practitioners may learn about telerehabilitation as a part of entry-level education or may participate in continuing education to acquire expertise (Theodorus & Russell, 2008).

The Specialized Knowledge and Skills in Technology and Environmental Interventions for Occupational Therapy Practice (AOTA, 2010b) describes the knowledge and skills necessary for entry- and advanced-level practice in technology. They should have a working knowledge of the hardware, software, and other elements of the technology they are using and have technical support personnel available should problems arise (Schopp, Hales, Brown, & Quetsch, 2003).
They should utilize evidence, mentoring, and continuing education to maintain and enhance their competency and provide best practice interventions.

Occupational therapy practitioners are to abide by state licensure laws and related occupational therapy regulation regarding the use of telerehabilitation (Cwiek, Rafiq, Qamar, Tobey, & Merrell, 2007). At this time, occupational therapy practitioners are to abide by the licensure and regulatory requirements in the state where they live and the state where the client is located in order to provide services.

Occupational therapy practitioners are to abide by Health Insurance Portability and Accountability Act (HIPAA, P.L. 104-191) regulations to maintain client confidentiality of all records and interactions, including the use of telerehabilitation to send or receive data. This also includes using HIPAA-compliant channels such as encrypted portals. Occupational therapy practitioners are to consult with their practice setting’s privacy officer or legal counsel or to consult with independent legal counsel if they are in independent or other practice outside of an institutional setting to ensure that their telerehabilitation practices are consistent with HIPAA regulations. Examples of ethical considerations related to telerehabilitation are outlined in Table 1.

Table 1. Ethical Considerations and Strategies for Practice in Telerehabilitation

<table>
<thead>
<tr>
<th>ETHICAL CONSIDERATIONS</th>
<th>STRATEGIES FOR ETHICAL PRACTICE</th>
</tr>
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<tbody>
<tr>
<td>Fully inform the client regarding the implications of a telerehabilitation approach vs. a face-to-face occupational therapy approach.</td>
<td>Use a written informed-consent procedure, with opportunity for the client to ask questions about the provision of the telerehabilitation services.</td>
</tr>
<tr>
<td>Abide by laws and scope of practice related to licensure and provision of occupational therapy services using telerehabilitation.</td>
<td>Before providing telerehabilitation services, become familiar with the laws that relate to the provision of services using communication or other technologies, such as communication requirements that prohibit recording conversation over telephone systems without the individual’s permission.</td>
</tr>
<tr>
<td>Adhere to professional standards.</td>
<td>Study and apply occupational therapy standards of practice when using telerehabilitation to provide occupational therapy service. Take responsible steps (e.g., continuing education, research, supervision, and training), and use careful judgment to ensure one’s own competence. Review existing literature to weigh the benefits and potential for client harm when considering using telerehabilitation to provide occupational therapy services.</td>
</tr>
</tbody>
</table>
Understand and abide by approaches that ensure confidentiality is not compromised as a result of using distance technologies.

Become fully informed of technological security concerns with providing telerehabilitation, and utilize security approaches consistent with HIPAA for the transmission of all health-related information. Maintain the confidentiality of all verbal, written, electronic, augmentative, and nonverbal communications to conform to HIPAA standards.

Understand and adhere to procedures if there is any compromise of security related to health information.

Report any breach of security to an appropriate health privacy officer, or seek guidance of an independent legal counsel.

Assess the effectiveness of telerehabilitation interventions within specific practice areas by consulting current research and conducting ongoing monitoring of client response.

Continually monitor the effectiveness of interventions, and consider alternative approaches, including traditional face-to-face approaches and/or referral to another provider, if the telerehabilitation services do not appear to be effective. Maintain knowledge of current research about effectiveness.

Recognize the need to be culturally competent in the provision of services via telerehabilitation, including in language and ethnicity issues that could affect the quality and outcomes of services provided.

Understand the issues of cultural competence, and consider them when deciding if a telerehabilitation approach is appropriate for a particular client.

### Funding and Reimbursement

Reimbursement is an important consideration that often influences the delivery of occupational therapy services. Currently, reimbursement for telerehabilitation is limited and variable. Beginning January 1, 1999, Medicare reimbursement was authorized for certain services to be provided as telehealth services in rural areas that have professional shortages. This provision, enacted in the Balanced Budget Act of 1997 (P. L. 105-33), represented Medicare’s first national reimbursement policy for telehealth services (Cepelewicz, 1998; Health Care Financing Administration, 1998; U.S. Department of Health and Human Services Health (DHHS), Resources and Services and Administration, 2003). However, as of this writing, occupational therapy practitioners are not yet listed as an eligible provider under Medicare reimbursement for telehealth services. It is recommended that occupational therapy practitioners providing telerehabilitation services review “Chapter 15. Covered Medical and Other Health Services” within the *Medicare Benefit Policy Manual* (DHSS, Centers for Medicare and Medicaid Services, 2009), as the manual provides definitions, conditions of payment, and eligibility criteria for telehealth services.

Medicaid reimbursement is available at the discretion of each state, because it is subject to specific requirements or restrictions within a state. Often, states must obtain approval from the federal government for implementation of telerehabilitation or telehealth within their Medicaid...
programs. It is recommended that occupational therapy practitioners contact their state Medicaid or other third-party payers to determine the guidelines for reimbursement of telerehabilitation services. Occupational therapy practitioners also are encouraged to contact the Veteran’s Administration and other grantors regarding reimbursement options. When billing occupational therapy, practitioners must distinguish between actual occupational therapy services that require the skills of an occupational therapist or occupational therapy assistant and telerehabilitation services that do not require this skill level.

Summary

As telerehabilitation services continue to grow as a complement to traditional face-to-face services, there is an increasing need to develop guidelines and health care policy for appropriate use, reimbursement, legal and ethical ramifications, and cost. There is a significant need for occupational therapy practitioners to document, research, and publish on the effectiveness of evaluation, consultation, intervention, and follow-up services provided via telerehabilitation technologies and to determine how to best integrate telerehabilitation technology into various practice settings and home environments. Occupational therapy practitioners using telerehabilitation methods must adhere to the Occupational Therapy Code of Ethics and Ethics Standards (AOTA, 2010a), maintain the Standards of Practice for Occupational Therapy (AOTA, 2010c), and comply with state regulations to ensure their competencies as practitioners and the well-being of their clients.

References


9


**Additional Resources**

Canadian Occupational Therapy Association, [http://www.caot.ca/](http://www.caot.ca/)


Rehabilitation Engineering Research Center for Telerehabilitation, [http://www.rerctr.pitt.edu](http://www.rerctr.pitt.edu)

*Telemedicine and e-Health*, [www.liebertpub.com/TMJ](http://www.liebertpub.com/TMJ)

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Adopted by the Representative Assembly Coordinating Council (RACC) for the Representative Assembly.

Revised by the Commission on Practice 2010

This revision replaces the 2005 document Telerehabilitation Position Paper (previously published and copyrighted in 2005 by the American Occupational Therapy Association in the American Journal of Occupational Therapy, 59, 656–660).

To be published and copyrighted in 2010 by the American Occupational Therapy Association in the American Journal of Occupational Therapy, 64 (November/December).

Appendix A. Glossary of Terms

bandwidth—A measure of the amount of data that can be transmitted over a network connection.

haptic technology—A tactile feedback technology that takes advantage of a user’s sense of touch by applying forces, vibrations, and/or motions upon the user.

occupational therapy—A profession that supports health and participation in life of people through engagement in occupations (AOTA, 2008).

privacy officer—A position or office that responds to concerns over the use of personal information, including medical data and financial information. It includes regulations but is not limited to legislation concerning the protection of patient medical records (e.g., HIPAA).

protocol—in telepractice, a written document specifying standard operating policies and procedures for application of computer and information technologies to the delivery of services.

real time—Data acquisition, processing, transmission, and presentation of patients/patient data are all occurring simultaneously. The term means there is synchronous (i.e., live) communication between the parties at either end of the telecommunications link.

teleconsultation—Standard “face-to-face” telemedicine model using interaction videoconferencing between a provider (and client) and a rehabilitation expert to gain access to specialized expertise.

telehealth—The use of electronic information and telecommunications technologies to support long-distance clinical health care, patient and professional health-related education, and public health and health administration.

telehealth technology—The hardware and software used in, as well as the overall process of, doing telemedicine and telerehabilitation.
**telemedicine**—The use of medical information exchanged from one site to another via electronic communications to improve patients’ health status.

**telepractice**—Service delivery characteristic of a particular profession, preformed by means of telehealth technology rather than traditional face-to-face methods.

**telerehabilitation**—The provision of rehabilitation services such as occupational therapy, physical therapy, and speech–language therapy using telehealth technology.

**virtual reality**—A computer-simulated environment of the real world.

### Appendix B. Case Examples

<table>
<thead>
<tr>
<th>CASE DESCRIPTION</th>
<th>TELEREHABILITATION USE</th>
<th>OUTCOME</th>
</tr>
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<tbody>
<tr>
<td>Lisa</td>
<td>Lisa meets with her occupational therapist in clinic for initial evaluation. During the evaluation, Lisa learns additional strategies for incorporating the use of her right hand to perform her farm work. She is fitted for a functional electrical stimulation (FES) orthosis that she can use at home once it is programmed in the clinic. Twice each week, Lisa meets with her occupational therapist via computer, using a Web camera and online video software. Initially, the occupational therapist assesses Lisa as she performs work chores via virtual reality. As Lisa continues to make progress, the occupational therapist instructs her as to how to more effectively use her right hand for completion of ADLs and actual farm chores.</td>
<td>Lisa is able to make functional gains with using her right hand for everyday occupations. She reports that she is able to rely less on compensatory strategies and use her right hand more easily, especially while completing ADLs. Lisa achieved these outcomes with only 2 trips to the clinic and without therapist travel.</td>
</tr>
</tbody>
</table>

Lisa is a 70-year-old woman who has difficulty performing her daily occupations because of a stroke that left her with right-sided weakness. Although she had learned compensatory techniques for completing activities of daily living (ADLs), instrumental activities of daily living (IADLs), and work, she still wants to increase the use of her right hand, particularly for tasks related to managing her farm. Lisa learned of a program in a nearby community using new technology that might be beneficial for those with hemiparesis; however, the clinic is 2 hours from her home.
| José | On the basis of an analysis of José’s daily routines, the occupational therapist programs a smartphone to provide reminders to José to perform his daily occupations at home and work. The occupational therapist then teaches José’s family how to remotely monitor his ADL and IADL performance, his safety within his home environment, his medication routine, and the temperature and security of his apartment. | The simple motion detectors in combination with a software program allow the family to determine whether or not José is maintaining his daily routine. Using a portable smartphone with automated messages; visual cues; and a secure, wireless Internet connection allows José to be successful in multiple environments and social settings. The assistive device of a smartphone does not “stick out,” as many of friends also use their smartphone to help remind them of appointments |
| Angela | Angela has trouble traveling and sitting for long distances. She and her mother meet with an occupational therapy generalist face-to-face at a nearby clinic. Concurrently, an occupational therapist who has expertise in wheeled mobility participates in an occupational therapy session remotely using a secure videoconferencing | After interviewing Angela and her mother and observing Angela navigate in her current chair, the remote occupational therapist recommends the appropriate power wheelchair and power seat functions. Upon approval from the insurance company, the remote occupational therapist uses the videoconferencing system to |

**José**

is a 25-year-old man with traumatic brain injury following a motor vehicle accident that occurred 1 year ago. He has participated in vocational rehabilitation and outpatient occupational therapy for the past 6 months. He continues to struggle with cognitive aspects of occupations that require initiation and short-term memory. These difficulties negatively affect his ability to complete his job as a school custodian and his ability to complete his ADLs and IADLs. The cognitive difficulties also negatively affect his social interactions. José recently moved into his own apartment. José greatly values his independence and living in his own place. His family checks on him frequently, but they are concerned about his safety due to a few recent incidents he encountered at home and work.

**Angela**

is a 10-year-old girl with a complicated medical history that includes spina bifida. She is significantly limited in her ability to be mobile in the home and community. Although she utilizes a basic power wheelchair to drive around town and attend her family activities, it is in poor
condition and too small for her. Angela cannot adequately reposition herself or properly perform a weight shift due to decreased upper-extremity strength and range of motion.

| condition and too small for her. Angela cannot adequately reposition herself or properly perform a weight shift due to decreased upper-extremity strength and range of motion. | system. The remote occupational therapist provides consultation to the local occupational therapist, Angela, and her mother about seating system frames, bases, and accessories; policy implications and funding mechanisms; and wheeled mobility and seating options. | monitor the delivery, evaluate the fitting, and provide feedback and advice to Angela regarding utilization within the community and home. Angela has benefitted from the provision of services without traveling a long distance. The local practitioner gained additional knowledge about wheeled mobility and seating options. |