TELEHEALTH

The purpose of this paper is to provide the current position of the American Occupational Therapy Association (AOTA) regarding the use of telehealth by occupational therapists and occupational therapy assistants to provide occupational therapy services. This document describes the use of telehealth within occupational therapy practice areas, as described in the existing research. Additionally, occupational therapy practitioner qualifications, ethics, and regulatory issues related to the use of telehealth as a service delivery model within occupational therapy are outlined. Occupational therapy practitioners are the intended audience for this document, although others involved in supervising, planning, delivering, regulating, and paying for occupational therapy services also may find it helpful.

Telecommunication and information technologies have prompted the development of an emerging model of health care delivery called telehealth, which involves health care services, health information, and health education. AOTA defines telehealth as the application of evaluative, consultative, preventative, and therapeutic services delivered through telecommunication and information technologies. Occupational therapy services provided by means of a telehealth service delivery model can be synchronous, that is, delivered through interactive technologies in real time, or asynchronous, using store-and-forward technologies. Occupational therapy practitioners can use telehealth as a mechanism to provide services at a location that is physically distant from the client, thereby allowing for services to occur where the client lives, works, and plays, if that is needed or desired (AOTA, 2010a). An Overview of Telehealth Technologies is included in Appendix A. Telerehabilitation within the larger realm of telehealth is the application of telecommunication and information technologies for the delivery of rehabilitation services. Key terms related to telehealth and telehealth technologies are defined in Appendix B.

Use of Telehealth Within Occupational Therapy

Occupational therapy practitioners use telehealth as a service delivery model to help clients develop skills; incorporate assistive technology and adaptive techniques; modify work, home, or school environments; and create health-promoting habits and routines. Benefits of a telehealth service delivery model include increased accessibility of services to clients who live in remote or underserved areas, improved access to providers and specialists otherwise unavailable to clients, prevention of unnecessary delays in receiving care, and workforce enhancement through consultation and research among others (Cason, 2012a, 2012b). By removing barriers to accessing care, including social stigma, travel, and socioeconomic and cultural barriers, the use of telehealth as a service delivery model within occupational therapy leads to improved access to care and ameliorates the impact of personnel shortages in underserved areas. Occupational

1The 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).

2When the term occupational therapy practitioner is used in this document, it refers to both occupational therapists and occupational therapy assistants (AOTA, 2006).
therapy outcomes aligned with telehealth include the facilitation of occupational performance, adaptation, health and wellness, prevention, and quality of life.

Telehealth has potential as a service delivery model in each major practice area within occupational therapy. Note that given the variability of client factors, activity demands, performance skills, performance patterns, and contexts and environments, the candidacy and appropriateness of a telehealth service delivery model “should be determined on a case-by-case basis with selections firmly based on clinical judgment, client’s informed choice, and professional standards of care” (Brennan et al., 2010, p. 33). See Appendix C for applications and evidence supporting the use of telehealth within occupational therapy practice areas.

**Evaluation Using Telehealth Technologies: Tele-Evaluation**

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; Dreyer, Dreyer, Shaw, & Wittman, 2001; Winters, 2002), and advanced communication technologies have broadened the possibilities for conducting evaluations. Studies have described the use of telehealth 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, 2010; Schein, et al., 2011); neurological assessment (Savard, Borstad, Tkachuck, Lauderdale, & Conroy, 2003), adaptive equipment prescription and home modification (Sanford et al., 2007), and ergonomic assessment (Baker & Jacobs, 2013).

Clinical reasoning guides the selection and application of appropriate telehealth technologies necessary to evaluate client needs and environmental factors. Therapists should consider the reliability and validity of specific assessment tools when administered remotely. Researchers have investigated the reliability of assessments such 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 et al., 2001); and the Functional Independence Measure, 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) and found these tools to be reliable when administered remotely through telehealth technologies. In some cases, an in-person assistant, such as a paraprofessional or other support person, may be used to relay assessment tool measurements or other measures (e.g., environmental, wheelchair and seating) to the remote therapist during the evaluation process.

When choosing a telehealth model for conducting an evaluation, occupational therapists need to consider the client’s diagnosis, client’s preference, access to technology, and the ability to measure outcomes when using that model. The occupational therapist may determine that an in-person evaluation is required for some clients. Because of the evolving knowledge and technology related to telehealth, occupational therapists should review the latest research to remain current about the appropriate use of telehealth technologies for conducting evaluations.
**Intervention Using Telehealth Technologies: Teleintervention and Telerehabilitation**

A telehealth model of service delivery may be used for providing interventions that are preventative, habilitative, or rehabilitative in nature. When planning and providing interventions delivered with telehealth technologies, 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 telehealth or in combination with in-person interventions; the client’s choice about receiving interventions by means of telehealth technologies; the client’s outcomes, including the client’s perception of services provided; reimbursement; and compliance with federal and state laws, regulation, and policy, including licensure requirements (Cason & Brannon, 2011).

**Consultation Using Telehealth Technologies: Teleconsultation**

*Teleconsultation* is a virtual consultation that includes the

- Expert provider and client,
- Expert provider and local provider with the client present, or
- Expert provider and local provider without the client present.

Teleconsultation uses telecommunication and information technologies for the purpose of obtaining health and medical information or advice.

Teleconsultation has been used to overcome the shortage of various rehabilitation professionals across the United States. For example an occupational therapist or prosthetist can remotely evaluate and adjust a client’s prosthetic device using computer software with videoconferencing capability and remote access to a local clinician’s computer screen despite the physical distance between the expert and client (Whelan & Wagner, 2011). Similarly, Schein et al. (2008) demonstrated positive outcomes associated with teleconsultation between a remote seating specialist and a local therapist for evaluating wheelchair prescriptions. The Veterans Health Administration is using teleconsultation for veterans with traumatic brain injuries in a process that involves interactive videoconferencing technology and Web-based management systems (Girard, 2007). In the practice area of pediatrics, Wakeford (2002) used videoconferencing technologies to consult on play performance in children with special needs.

Practitioners should contact state professional licensure boards in their state as well as in the state where the client is located for further clarification on policies related to teleconsultation before rendering services. Some states do have consultation and licensure exemption provisions, although application of the consultation and licensure exemption provisions to facilitate temporary (i.e., consultative) interstate occupational therapy practice using telehealth technologies has not been established (Cason & Brannon, 2011).
Monitoring Using Telehealth Technologies: Telemonitoring

Occupational therapy practitioners can use telehealth technologies to monitor a client’s adherence to an intervention program, assist a client in progressing toward achieving desired outcomes, and track and respond to follow-up issues and concerns within a client’s natural environments. For example, the Gator Tech Smart House (Mann & Milton, 2005) developed at the University of Florida provides an array of self-monitoring analysis and reporting technology (SMART) technologies that monitor and cue clients remotely. Examples include the SmartShoe (Naditz, 2009), which determines fall risk by analyzing walking behavior patterns in a client’s own environment and sends the information to a remote site. Similarly, home exercise programs can be monitored remotely using a haptic (touch-sensitive) control interface to track a client’s hand position while providing resistive forces remotely (Popescu, Burdea, Bouzit, & Hentz, 2000).

Tang and Venables (2000) used 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. Wireless technologies such as these are expanding opportunities for occupational therapy practitioners to implement interventions using telehealth technologies where clients live, work, and play and to provide services throughout the day rather than only within the occupational therapy clinic.

Appendix D provides case examples of how occupational therapy practitioners use telehealth technologies to support health and participation in occupations.

Practitioner Qualifications and Ethical Considerations

AOTA asserts that the same ethical and professional standards that apply to in-person delivery of occupational therapy services also apply to the delivery of services by means of telehealth technologies. Occupational therapy practitioners should refer to the Occupational Therapy Code of Ethics and Ethics Standards 2010 (AOTA, 2010b). As stated in this document, occupational therapy practitioners are responsible for ensuring their individual competence in the areas in which they provide services. In addition, Principle 1B of the Code and Ethics Standards states that “Occupational therapy personnel shall provide appropriate evaluation and a plan of intervention for all recipients of occupational therapy services specific to their needs” (AOTA, 2010b, p. 9). This requirement reinforces the importance of careful consideration about whether evaluation or intervention through a telehealth service delivery model will best meet the client’s needs and is the most appropriate method of providing services given the client’s situation.

Clinical and ethical reasoning guides the selection and application of appropriate telehealth technology necessary to evaluate and meet client needs. Occupational therapy practitioners should consider whether the use of technology and service provision through telehealth will ensure the safe, effective, appropriate delivery of services. To determine whether providing occupational therapy by means of telehealth is in the best interest of the client, the occupational therapist must consider the following:

- Complexity of the client’s condition
- Knowledge, skill, and competence of the occupational therapy practitioner
• Nature and complexity of the intervention
• Requirements of the practice setting
• Client’s context and environment.

Additionally, the American Telemedicine Association’s *A Blueprint for Telerehabilitation Guidelines* outlines important administrative, clinical, technical, and ethical principles associated with the use of telehealth (Brennan et al., 2010). Occupational therapy practitioners may use various educational approaches to gain competency in using telehealth technologies. They may gain an understanding about basic telehealth service delivery model and telehealth technologies as a part of entry-level education (Standard B.1.8; ACOTE, 2012) or may participate in continuing education opportunities as clinicians to acquire expertise in this area (Theodorus & Russell, 2008). Examples of ethical considerations related to telehealth are outlined in Table 1.

The *Specialized Knowledge and Skills in Technology and Environmental Interventions for Occupational Therapy Practice* document (AOTA, 2010c) describes the knowledge and skills necessary for entry- and advanced-level practice in technology. Practitioners 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 use evidence, mentoring, and continuing education to maintain and enhance their competency related to the use of a telehealth service delivery model within occupational therapy.

**Supervision Using Telehealth Technologies**

State licensure laws, institution-specific guidelines regarding supervision of occupational therapy students and personnel, the AOTA *Guidelines for Supervision, Roles, and Responsibilities During the Delivery of Occupational Therapy Services* (AOTA, 2009), and the *Occupational Therapy Code of Ethics and Ethics Standards* (2010) (AOTA, 2010b) must be followed, regardless of the method of supervision. Telehealth technologies may be used within those guidelines to the extent that they take into account the unique characteristics of telehealth supervision, to support students and practitioners working in isolated or rural areas (Miller, Miller, Burton, Sprang, & Adams, 2003; Hubbard, 2000). However, practitioners engaged in telehealth supervision should be cautious when relying on legal or other standards that were not necessarily established with telehealth supervision in mind. Factors that may affect the model of supervision and frequency of supervision include the complexity of client needs, number and diversity of clients, skills of the occupational therapist and the occupational therapy assistant, type of practice setting, requirements of the practice setting, and other regulatory requirements (AOTA, 2009). Supervision must comply with applicable state and federal practice regulations, state and federal insurance programs, relevant workplace policies, and the *Occupational Therapy Code of Ethics and Ethics Standards* (2010) (AOTA, 2010b).

**Legal and Regulatory Considerations**

Occupational therapy practitioners are to abide by state licensure laws and related occupational therapy regulation regarding the use of a telehealth service delivery model within occupational therapy (Cwiek, Rafiq, Qamar, Tobey, & Merrell, 2007). Given the inconsistent adoption and
nonuniformity of language regarding the use of telehealth within occupational therapy, it is incumbent upon the practitioner to check a state’s statutes, regulations, and policies before beginning to practice using a telehealth service delivery model. Typically, information may be found on state licensure boards’ Web sites. The absence of statutes, regulations or policies that guide the practice of occupational therapy by means of telehealth delivery should not be viewed as authorization to do so. State regulatory boards should be contacted directly in the absence of written guidance to determine the appropriateness of using telehealth technologies for the delivery of occupational therapy services within their jurisdictions. In addition, the policies and guidelines of payers should be consulted. At this time, occupational therapy practitioners are to comply with the licensure and regulatory requirements in the state where they are located and the state where the client is located (Cason & Brannon, 2011).

Occupational therapy practitioners are to abide by Health Insurance Portability and Accountability Act (HIPAA, 1996; Pub. L. 104–191) regulations to maintain security, privacy, and confidentiality of all records and interactions. Additional safeguards inherent to the use of technology to deliver occupational therapy services must be considered to ensure privacy and security of confidential information (Watzlaf, Moeini & Firouzan, 2010; Watzlaf, Moeini, Matusow, & Firouzan, 2011). 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 the services they provide through telehealth are consistent with protocol and HIPAA regulations.

**Funding and Reimbursement**

It is the position of AOTA that occupational therapy services provided with telehealth technologies should be valued, recognized, and reimbursed the same as occupational therapy services provided in person. At this writing, Medicare does not list occupational therapy practitioners as eligible providers of services delivered through telehealth technologies. However, AOTA supports the inclusion of occupational therapy practitioners on Medicare’s approved list of telehealth providers. The U.S. Department of Defense and Veteran’s Health Administration use occupational therapy practitioners for select telehealth programming.

Opportunities for reimbursement exist through some state Medicaid programs; insurance companies; and private pay with individuals, school districts, agencies, and organizations. Medicaid reimbursement is available at the discretion of each state, because it is subject to specific requirements or restrictions within a state. It is recommended that occupational therapy practitioners contact their state Medicaid or other third-party payers to determine the guidelines for reimbursement of services provided through telehealth technologies.

When billing occupational therapy services provided by means of telehealth technologies, practitioners must distinguish the service delivery model, often designated with a modifier (Cason & Brannon, 2011). However, regardless of whether the services are reimbursed or the practitioner is responsible for completing paperwork related to billing, the nature of the service delivery as being performed through telehealth should be thoroughly documented.
Summary

Telehealth is a service delivery model that uses telecommunication technologies to deliver health-related services at a distance. Occupational therapy practitioners are using synchronous or asynchronous telehealth technologies to provide evaluative, consultative, preventative, and therapeutic services to clients who are physically distant from the practitioner. Occupational therapy practitioners using telehealth as a service delivery model must adhere to the Occupational Therapy Code of Ethics and Ethics Standards (2010) (AOTA, 2010b), maintain the Standards of Practice for Occupational Therapy (AOTA, 2010d), and comply with federal and state regulations to ensure their competencies as practitioners and the well-being of their clients.

Occupational therapy practitioners must give careful consideration as to whether evaluation or intervention through a telehealth service delivery model will best meet the client’s needs and provide the most appropriate method of providing services given the individual’s situation. Clinical and ethical reasoning guides the selection and application of appropriate telehealth technology necessary to evaluate and meet client needs.

References


Additional Resources


Center for Telehealth and e-Health Law (CTel), http://ctel.org/


Rehabilitation Engineering Research Center for Telerehabilitation, www.rerctr.pitt.edu

Telehealth Resource Centers, http://www.telehealthresourcecenter.org/


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for

The Commission on Practice
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Table 1. Ethical Considerations and Strategies for Practice Using Telehealth Technologies

<table>
<thead>
<tr>
<th>Ethical Consideration</th>
<th>Strategies for Ethical Practice</th>
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<tr>
<td>Fully inform the client regarding the implications of a telehealth service delivery</td>
<td>“Occupational therapy personnel shall: Establish a collaborative relationship with recipients of service, including families, significant others, and caregivers in setting goals and priorities throughout the intervention process. This includes full disclosure of the benefits, risks and potential outcomes of any intervention; the personnel who will be providing the intervention(s) and/or any reasonable alternatives to the proposed intervention.” (Principle 3A) &lt;br&gt; “Obtain consent before administering any occupational therapy service, including evaluation, and ensure that recipients of service (or their legal representatives) are kept informed of the progress in meeting goals specified in the plan of intervention/care.” (Principle 3B)</td>
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<td>model versus an in-person service delivery model.</td>
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<td>Abide by laws and scope of practice related to licensure and provision of occupational</td>
<td>“Occupational therapy personnel shall comply with institutional rules, local, state, federal, and international laws and AOTA documents applicable to the profession of occupational therapy.” (Principle 5)</td>
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<td>therapy services using telehealth technologies.</td>
<td></td>
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<tr>
<td>Adhere to professional standards.</td>
<td>“Occupational therapy personnel shall: Provide occupational therapy services that are within each practitioner’s level of competence and scope of practice (e.g.,</td>
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<tr>
<td>Understand and abide by approaches that ensure that privacy, security, and confidentiality are not compromised as a result of using telehealth technologies.</td>
<td>“Occupational therapy personnel shall comply with institutional rules, local, state, federal, and international laws and AOTA documents applicable to the profession of occupational therapy.” (Principle 5)</td>
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<tr>
<td>Understand and adhere to procedures if there is any compromise of security related to health information.</td>
<td>Report any breach of security to an appropriate health privacy officer, or seek guidance of an independent legal counsel.</td>
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<td>Assess the effectiveness of interventions provided through telehealth technologies by consulting current research and conducting ongoing monitoring of client response.</td>
<td>“Occupational therapy personnel shall refer to other health care specialists solely on the basis of the needs of the client.” (Principle 1I) “Reevaluate and reassess recipients of service...” (Principle 1A)</td>
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</table>
Recognize the need to be culturally competent in the provision of services via telehealth, including language, ethnicity, socioeconomic and educational background that could affect the quality and outcomes of services provided.


Appendix A. Overview of Telehealth Technologies

**Synchronous Technologies: Videoconferencing**

*Synchronous technologies* enable the exchange of health information in *real-time* (i.e., live) by interactive audio and video between the patient or client and a health care provider located at a distant site. Several options for videoconferencing are available; they include voice over the Internet protocol (VoIP) services, mobile videoconferencing systems, “plain old telephone service” (POTS), videoconferencing, and high-definition television (HDTV) technologies (see Table A1).

VoIP services use a computer, special VoIP phone, or traditional phone with adapter to convert voice into a digital signal that travels over the Internet (Federal Communications Commission, 2010). Integrated with video software, VoIP provides a mechanism for Internet-based videoconferencing. Similarly, mobile videoconferencing uses a mobile device (e.g., smartphone, electronic tablet) with videoconferencing capabilities to transmit audio and video over a wireless or cellular network. POTS videoconferencing primarily uses an analog telephone line or landline to support audio and video transmission through a videophone or specialized equipment connected to a television. HDTV videoconferencing requires an HD television, console, HD
camera, remote control and high-speed broadband connection at both locations. Unlike the
technologies described above and marketed for consumer use, telehealth networks use high-end
videoconferencing technologies (e.g., Polycom, Tandberg) and fiberoptic telephone lines (e.g.,
T1 lines) or high-speed Internet to connect sites.

Advantages of VoIP, mobile, POTS, and consumer HDTV technologies include service
provision within the context where occupations naturally occur (e.g., home, work, community),
minimal infrastructure requirements, and lower costs for equipment and connectivity (e.g.,
residential service plan, data plan). Disadvantages may include privacy, security, and
confidentiality risks; lack of infrastructure (e.g., limited access to high-speed
Internet/Broadband; inadequate bandwidth for connectivity); recurring expense (e.g., residential
service plan, data plan); diminished sound or image quality; and technological challenges
associated with end-user experience and expertise with videoconferencing technology (Cason,
2011; see Table A1).

Asynchronous Technologies
Telehealth applications that are asynchronous, commonly referred to as “store-and-forward” data
transmission, may include video clips, digital photographs, virtual technologies, and other forms
of electronic communications. With asynchronous technologies, the provider and client are not
connected at the same time. Potential applications for asynchronous telehealth technologies
within occupational therapy include home assessments and recommendations for home
modifications that are based on recorded data of the home environment; recommendations for
inclusion of ergonomic principles and workstation modifications that are based on recorded data
of the work environment; and secure viewing of video segments for evaluation and intervention
purposes.

Technologies That May Be Synchronous or Asynchronous
Telemonitoring Technologies
Occupational therapy practitioners providing services through telehealth technologies 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. These
technologies provide information that allows an offsite occupational therapy practitioner to
assess performance and modify services and the environment and 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.

Virtual Reality Technologies
Virtual reality (VR) typically refers to the use of interactive simulations created with computer
hardware and software to present users with opportunities to engage in environments that appear
and feel similar to real-world objects and events (Sheridan, 1992; Weiss & Jessel, 1998). Although typical use of VR technologies does not constitute a telehealth service delivery model, live data (synchronous) streamed to a remote occupational therapy practitioner or recorded data (asynchronous) used by an occupational therapy practitioner to monitor and adjust a client’s course of treatment would constitute the use of VR technologies within a telehealth service delivery model. Occupational therapy practitioners can use a telehealth service delivery model with VR technologies when conducting evaluations and providing interventions. A remote console telerehabilitation system (ReCon, Rutgers University, Rutgers, NJ) incorporating VR technology provides occupational therapy practitioners with three-dimensional representations of the client’s movements, VR-based exercise progress, and motor performance updates (Lewis, Boian, Burdea, & Deutsch, 2005; Lewis, Deutsch, & Burdea, 2006). Telehealth 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 therapeutic exercises (Hoffman, Patterson, & Carrougher, 2000).

Further, VR provided through telehealth technologies is effective in enabling people to compare the difference between their desired level of occupational engagement and their current functional status after a stroke (Brewer, Fagan, Klatzky, & Matsuoka, 2005; Merians et al., 2002; Rand, Katz, & Weiss, 2009; Rand, Weiss, & Katz, 2009), using virtual environments as part of the assessment and training of users of power wheelchairs (Harrison, Derwent, Enticknap, Rose, & Attree, 2002), and evaluating and determining home accessibility using three-dimensional construction of the architectural features of the environment (Kim & Brienza, 2006; Kim, Brienza, Lynch, Cooper, & Boninger, 2008).

Low-cost video capture gaming systems (e.g., Nintendo Wii, Sony PlayStations’s EyeToy and MOVE, XBOX-360 Kinect) were not developed specifically for rehabilitation, but they offer an easy-to-set up, fun, and less expensive alternative to the expensive VR systems (Rand, Kizony, & Weiss, 2008). Although typical use of gaming systems does not constitute telehealth, live data (synchronous) streamed to a remote occupational therapy practitioner or recorded data (asynchronous) used by an occupational therapy practitioner to monitor and adjust a client’s course of treatment would constitute a telehealth application of the devices.

Table A1. Telehealth Technologies

<table>
<thead>
<tr>
<th>Technology Type</th>
<th>Examples</th>
<th>Considerations</th>
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<tbody>
<tr>
<td>Synchronous</td>
<td>Voice over Internet protocol software</td>
<td>Confidentiality (security, privacy)</td>
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<td></td>
<td>Mobile videoconferencing</td>
<td>Integrity (information protected from changes by unauthorized users)</td>
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<td></td>
<td>Consumer high-definition television videoconferencing</td>
<td>Availability (information, services)</td>
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<td></td>
<td>“Plain old telephone service”</td>
<td>Cost–benefit ratio</td>
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<td></td>
<td>Videoconferencing</td>
<td>Socioeconomic considerations</td>
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<td></td>
<td>Telehealth network with commercial videoconferencing system</td>
<td>Leveraging existing</td>
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<tr>
<td>Asynchronous</td>
<td>• Virtual reality (VR) technologies (with live-streaming data to remote practitioner)</td>
<td>infrastructure (equipment and personnel)</td>
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<td></td>
<td>• Technology connection requirements (e.g., broadband, T1 line)</td>
<td>• Sound and image quality</td>
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<td></td>
<td>• Equipment accessibility</td>
<td>• Equipment accessibility</td>
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<tr>
<td></td>
<td>• Provider and end-user comfort, experience, and expertise with technology</td>
<td>• Provider and end-user comfort, experience, and expertise with technology</td>
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<tr>
<td>Synchronous (interactive) or asynchronous (store-and-forward data)</td>
<td>• Video recording devices</td>
<td>• Video recording devices</td>
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<td></td>
<td>• Cameras (photographs)</td>
<td>• Cameras (photographs)</td>
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<td>• Devices enabling electronic communication</td>
<td>• Devices enabling electronic communication</td>
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<td></td>
<td>• Virtual reality technologies (with store-and-forward data to remote practitioner)</td>
<td>• Virtual reality technologies (with store-and-forward data to remote practitioner)</td>
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<td></td>
<td>• Telemonitoring technologies</td>
<td>• Telemonitoring technologies</td>
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<td>– Home monitoring systems/devices</td>
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<td>– Wireless sensors</td>
<td>– Wireless sensors</td>
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<td></td>
<td>• VR technologies</td>
<td>• VR technologies</td>
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<tr>
<td></td>
<td>– Remote use of VR systems/devices</td>
<td>– Remote use of VR systems/devices</td>
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### Appendix B. Glossary

**asynchronous**—A method of exchanging health information whereby the provider and patient or client are not connected at the same time; commonly referred to as “store-and-forward” data transmission and may include video clips, digital photographs, virtual technologies, and other forms of electronic communications.

**eHealth**—A broad term encompassing health-related information and educational resources (e.g., health literacy Web sites and repositories, videos, blogs), commercial “products” (e.g., apps), and direct services delivered electronically (often through the Internet) by professionals, nonprofessionals, businesses, or consumers. May also be written as e-Health or E-Health; sometimes used interchangeably with *health informatics*.

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

**health informatics**—Use of information technologies for health care data collection, storage, and analysis to enhance health care decisions and improve quality and efficiency of health care services.

**mHealth**—The delivery of health-related information and services using mobile communication technology (e.g., smartphone, electronic tablet, or other mobile devices).
**modifier**—A modifier used in conjunction with a *Current Procedural Terminology*, (American Medical Association, 2011) code to identify the type of technology used within a telehealth service delivery model. GT is the most common modifier; it indicates use of interactive audio and video telecommunications technology. The GQ modifier designates the use of asynchronous technologies; reimbursement for this modifier is limited.

**privacy officer**—A position or office that responds to concerns over the use of personal information, including medical data and financial information. It ensures adherence to regulations but is not limited to legislation concerning the protection of patient medical records (e.g., Health Insurance Portability and Accountability Act of 1996, Pub. L. 104–191).

**protocol**—A written document specifying standard operating policies and procedures for application of telehealth technologies in delivering services.

**synchronous**—A method of exchanging health information in real time (i.e., live) between the patient or client and a health care provider located at a distant site.

**telehealth**—The application of evaluative, consultative, preventative, and therapeutic services delivered through telecommunication and information technologies.

**telehealth technologies**—The hardware and software used in delivering services remotely by means of a telehealth service delivery model.

**telemedicine**—Medical services delivered through communication and information technologies.

**telerehabilitation**—The application of telecommunication and information technologies for the delivery of rehabilitation services.

**virtual reality**—A computer-simulated environment of the real world; can be coupled with telehealth technologies as part of a telehealth service delivery model.

**Appendix C. Applications of Telehealth Within Occupational Therapy Practice Areas**

**Children and Youth**

Evidence supports the use of a telehealth service delivery model to deliver appropriate early intervention and school-based services effectively and efficiently. Early intervention (EI) services, mandated by Part C of the Individuals With Disabilities Education Act (IDEA; Pub. L. 105–117), are designed to promote development of skills and enhance the quality of life of infants and toddlers who have been identified as having a disability or developmental delay (Cason, 2011). Telehealth technology supports delivery of early intervention services (Cason, 2009, 2011; Heimerl & Rasch, 2009; Kelso, Fiechtl, Olsen, & Rule, 2009).
Similarly, evidence supports the use of telehealth for the delivery of occupational therapy services within the school setting for evaluation and intervention (Gallagher, 2004) as well as for reintegration of students with traumatic injury following acute rehabilitation (Verburg, Borthwick, Bennett, & Rumney, 2003). Telehealth may be used within school-based interprofessional team models for wellness programming, including efforts to combat the obesity epidemic among children and for programming targeting prevention of violence among youth (Cason, 2012b). School-based occupational therapy services focus on helping children with disabilities participate in and, thus, benefit from the instructional program.

In addition to what has been stated, telehealth technology may provide another avenue for the occupational therapy practitioner to observe the child’s level of participation in a school setting without risk of altering the setting by being physically present. This unobtrusive observation strategy can allow the occupational therapy practitioner to consult with the teacher and offer strategies to alter the child’s level of participation (e.g., strategies to facilitate a child’s use of self-regulation skills, encourage appropriate interaction with peers, or facilitate the child’s physical participation in an instructional activity).

The potential benefit of this observation strategy is to ensure the maintenance of the day-to-day integrity of the classroom while providing the practitioner with an understanding of the specific sensory, cognitive, physical, and emotional demands placed on the child in the setting. This technology may also provide the ability to record observations that contribute to the therapist’s data collection during evaluation; this information can then be used as a baseline from which to support IEP teams in developing goals and objectives and measuring progress in the child’s level of participation in the setting. In rural or large urban school districts, this technology can assist the occupational therapy practitioner with more efficiently supporting multiple campuses that may be located across large distances, thereby facilitating the interprofessional team process as well as reducing costs incurred to allow a practitioner the time and transportation resources to support multiple campuses.

**Productive Aging**

The growing number of older adults in the United States creates opportunities for occupational therapy practitioners to use telehealth to promote health and wellness, prevention, and productive aging while reducing health care costs. The use of telerehabilitation to remotely monitor and provide self-management strategies to older adults who are chronically ill and living in their homes has been found to decrease hospitalizations and nursing home stays (Bendixen, Levy, Olive, Kobb, & Mann, 2009). Interactive videoconferencing technologies promote health and aging in place among older adults (Bendixen, Horn, & Levy, 2007; Harada et al., 2010; Hori, Kubota, Kihara, Takahashi, & Kinoshita, 2009). The use of home monitoring devices such as self-monitoring analysis and reporting technology (SMART) enable occupational therapy practitioners to remotely monitor clients’ occupational performance and provide recommendations for environmental modifications and interventions to support occupational performance (Mann & Milton, 2005).

**Health and Wellness**

Telehealth also supports health and wellness and prevention programming through assessment and management of obesity (Neubeck et al., 2009) and chronic diseases such as diabetes.
mellitus, congestive heart failure, and hypertension (Darkins et al., 2008; Steel, Cox, & Garry, 2011).

**Mental Health**

Opportunities exist for occupational therapy practitioners to use telehealth to promote participation and psychological and social functioning for clients within the home, at work, and in the community through engagement in meaningful occupations. Research demonstrates efficacy of telehealth as a delivery model for psychological and behavioral interventions among individuals with posttraumatic stress disorder (PTSD) and other mental health issues (Germain, Marchand, Bouchard, Drouin, & Guay, 2009; Gros, Yoder, Tuerk, Lozano, & Acierno, 2011).

**Rehabilitation, Disability, and Participation**

In the practice area of rehabilitation, disability, and participation, the use of a telehealth service delivery model promotes occupational performance, adaptation, participation, and quality of life for clients with polytrauma, neurological, and orthopedic conditions. Telehealth provides remote access to occupational therapy services through assessment of physical function and goal setting, integration of individualized exercise interventions, training in adaptive strategies such as environmental modifications and energy conservation, and consultation on durable medical and adaptive equipment (Chumbler et al., 2010; Sanford et al., 2007).

Published studies support the use of telehealth in improving functional outcomes with individuals with stroke (Chumbler et al., 2010; Hermann et al., 2010), survivors of breast cancer (Hegel et al., 2011), veterans with polytrauma (Bendixen et al., 2008), and individuals with traumatic brain injury (Diamond et al., 2003; Forducey et al., 2003; Girard, 2007; Verburg et al., 2003). Additional studies have used a telehealth service delivery model to evaluate activities of daily living and hand function in individuals with Parkinson’s disease (Hoffman, Russell, Thompson, Vincent, & Nelson, 2008), and other neurological impairments (Savard et al., 2003). Seating experts used telehealth to provide remote wheelchair prescription and consultation to individuals with neurological and orthopedic conditions (Barlow et al., 2009; Schein et al., 2010; Schein et al., 2011). In addition to positive clinical outcomes, evidence indicates a high level of practitioner and client satisfaction associated with a telehealth service delivery model (Kairy, Lehouz, Vincent, & Visintin, 2009; Steel et al., 2011).

**Work and Industry**

Schmeler, Schein, McCue, and Betz (2009) detailed the use of assistive technology via a telehealth service delivery model for clinical and vocational applications. Telehealth is also being used to support work through remote assessment and analysis of work spaces. Bruce and Sanford (2006) described using teleconferencing to complete remote assessments and discussed the need for a highly structured and comprehensive assessment tool to be able to complete remote assessments.

Backman, Village, and Lacaille (2008) developed the Ergonomic Assessment Tool for Arthritis (EATA) to evaluate the workplace for people with arthritis. The EATA was designed so that the worker could gather the data for the assessment without an expert visiting the work place. Pilot testing of the method indicated that workers could successfully gather the necessary information
for appropriate intervention identification (Baker & Jacobs, 2013). Baker and Jacobs (2010) developed a systematic two-step program, the Telerehabilitation Computer Ergonomics System (tele-CES). This systematic program will allow ergonomically trained health professionals to (1) remotely assess the computer workstation and (2) on basis of the assessment, generate explicit, participant-specific workstation modification recommendations. The recommendations will be easily implemented; reduce pain, discomfort, and fatigue; and eliminate barriers to productivity.

Appendix D. Telehealth Case Examples

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<th>Case Description</th>
<th>Use of Telehealth</th>
<th>Outcome</th>
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<td>Lisa is a 70-year-old woman who has difficulty performing her daily occupations because of a stroke resulting in right-sided weakness. Although she had learned compensatory techniques for completing activities of daily living (ADL), instrumental ADL, 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 people with hemiparesis; however, the clinic is 2 hours from her home.</td>
<td>Lisa meets with her occupational therapist in a clinic for the 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 orthosis that she can use at home once it is programmed in the clinic. Twice each week, Lisa meets with her occupational therapist by computer, using a Web camera and online video software. As Lisa continues to make progress, the occupational therapist instructs her in how to more effectively use her right hand for completion of ADL and farm chores.</td>
<td>Lisa is able to make functional gains in 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 ADL. Lisa achieved these outcomes with only two trips to the clinic and without therapist travel.</td>
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| Josh is a 35-year-old administrative assistant working at an urban university. He has been employed in this position for 5 years. Recently, he began experiencing discomfort in his neck, shoulder, and back areas. | Josh scheduled an appointment with an occupational therapist who had expertise in ergonomic workstation evaluation. During his initial contact with the occupational therapist, he requested that because of his busy schedule, he would prefer to have his evaluation conducted | Explicit workstation modification recommendations were provided by the occupational therapist by means of a telephone consultation with Josh. The recommendations included raising the notebook computer so that his head was
He reported this discomfort, which he associated with computer work, to his immediate supervisor.

The occupational therapist asked Josh to have photographs taken of him while working at his office computer workstation. The occupational therapist requested that the photographs be from multiple angles and then e-mailed to a secure platform, where the therapist would be able to review them. In addition, Josh was asked to keep a time log for a week into which he would input information on his activities along with when he experienced discomfort. A telephone consultation was arranged, during which the occupational therapist reviewed findings from the photographs along with the time log. Josh reported on the time log that he sat at his computer workstation 100% of the time during the work day. During this time, he multitasked by using a hand-held telephone while keying. It was observed from the photographs that Josh was using a notebook computer, which placed him in an awkward posture for computing.

not positioned in flexion or extension and that the monitor was about arm’s length away (closed fist) and using a keyboard and mouse as input devices. An adjustable keyboard tray was recommended for the keyboard and mouse. On the basis of data from the time log, the occupational therapist encouraged Josh to change his work behaviors by taking regular stretch breaks every 20 minutes. A second telephone consultation occurred within 2 weeks. Josh reported that his supervisor ordered the external notebook computer accessories and that this new workstation arrangement had reduced his discomfort.

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<td><strong>Angela</strong> 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 uses a basic power wheelchair to drive around town and attend her family activities, it is in poor condition and too small for Angela to use comfortably.</td>
<td>Angela has trouble traveling and sitting for long distances. She and her mother meet with an occupational therapy generalist in person at a nearby clinic. Concurrently, an occupational therapist who has expertise in wheeled mobility participates in an occupational therapy session remotely using a videoconferencing system. The remote occupational therapist 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 monitor the</td>
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her. Angela cannot adequately reposition herself or properly perform a weight shift because of decreased upper-extremity strength and range of motion. 

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. 
delivery, evaluate the fitting, and provide feedback and advice to Angela about use of the wheelchair within the community and home. Angela has benefited from services without the need to travel a long distance. The local practitioner gained additional knowledge about wheeled mobility and seating options.

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<td><strong>Ethan</strong> is a 55-year-old self-employed entrepreneur who has severe depression, anxiety, and isolation after head and neck cancer resection surgery. The surgery left one side of his face disfigured. He plans to have reconstruction surgery in the future. Meanwhile, Ethan has difficulties with eating, fatigue, facial–body image, depression, and pain. He lives alone and over 50 minutes away from the hospital/outpatient therapy clinic. Ethan was seen by an occupational therapist in the hospital and prescribed outpatient occupational therapy for his physical and mental impairments. Due to travel distance to the outpatient therapy clinic and anxiety associated with being seen in public, Ethan is interested in the option to continue his therapy at home through secure videoconferencing technology.</td>
<td>Ethan completed a telehealth participation screening and initial occupational therapy evaluation during his hospital stay. It was determined that he would continue with occupational therapy twice a week via telehealth using secure videoconferencing software and a Web camera within his home environment. During the biweekly occupational therapy sessions delivered via telehealth technologies, focus is on establishing a therapeutic wellness plan and implementing compensatory eating techniques, pain management and relaxation techniques, stress management, and engagement in progressive physical activities. Ethan completes a home program and a daily journal sent to him by his occupational therapist through electronic communications technology.</td>
<td>Ethan is able to manage his physical and mental impairments and is able to leave his house to purchase groceries and complete other errands in his community. His pain is tolerable, and breathing and stamina have improved to allow 20–30 minutes of physical activity after 6 weeks of occupational therapy delivered through telehealth technologies. Ethan continues his daily journaling. The occupational therapist will follow up with Ethan via telehealth technologies weekly until reconstruction surgery and again after surgery to make sure Ethan continues his wellness plan.</td>
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