

Telerehabilitation

Definitions

Telerehabilitation is a term used to describe the provision of rehabilitation services at a distance using telecommunications technology as the service delivery medium¹. It is a subgroup of telehealth which is an umbrella term denoting all health care services, whether clinical or educational, which are delivered via telecommunications means. Telerehabilitation relates to the services delivered by a number of health disciplines including physiotherapy, speech pathology, occupational therapy, biomedical engineering and others and features all aspects of patient care including the patient interview, physical assessment and diagnosis, treatment, maintenance activities, consultation, education and training. The term telerehabilitation has become relative ubiquitous within the rehabilitation sciences disciplines, however there are exceptions such as the adoption of the term “telepractice” by the American Speech-Language-Hearing Association in 2001².

Conceptually, telerehabilitation is an alternate mode of service delivery of traditional rehabilitation services and should not be thought of as a new rehabilitation service in its own right. As such, the practice of telerehabilitation does not remove or alter any existing responsibilities for the provider of the rehabilitation service and providers must adhere to existing ethical codes of conduct, scope of practice, state and federal laws and individual discipline policies guiding practice. This document is concerned primarily with the provision of physiotherapy services at a distance via telecommunications technologies and therefore the use of the term telerehabilitation will be used to denote the delivery of professional physiotherapy services at a distance.

History

Telehealth services and practices have arguably been around for the better part of a century. Telerehabilitation, however is a remarkably new field which was fundamentally “created” in 1997 by the National Institute on Disability and Rehabilitation Research (U.S. Department of Education) who proposed a new Rehabilitation Engineering Research Center (RERC) in the area of so called “tele-rehabilitation.”³ The slow uptake of technology in the rehabilitation field is due to many factors. The need to often physically touch the patient for assessment and treatment purposes, and the need to objectively measure the physical performance of clients both present significant technical challenges for the developers of telerehabilitation technologies. These factors have surely contributed to the languid development of telerehabilitation services and technologies and only in the past decade or so with the development of more complex optical and sensor based technologies have these barriers started to erode.

Driving factors

The primary thrust behind the development of telerehabilitation services is the aspiration to provide equitable access to rehabilitation services, regardless of a client’s physical location. This is of major concern in Australia where, despite an increase in health expenditure in recent years, a lack of access to high quality health services for all remains^{4; 5; 6}. Access to rehabilitation services may be limited by a variety of factors including: physical distance from health facilities, a physical impairment preventing or restricting attendance at a local service, a lack of clinicians or specialists in a geographic area, lack of transportation, or the inadequate provision of resources in a geographical region. Contributing significantly to this problem in Australia is the significant difficulty in the recruitment and retention of rehabilitation professionals in non-metropolitan centers and rural and remote areas⁷. The provision of a service that is accessible in the home, can be delivered from any location (including metropolitan areas), is flexible and is equally therapeutic presents as an elegant solution to address these service delivery issues.

A number of other factors also present as advantages for telerehabilitation services. These include: (1)

the potential transportation cost and time savings from the perspective of both the health care system and the patient; (2) the continuity of patient care that can be achieved through the remote provision of services; (3) the heightened ability to control the timing, intensity and sequencing of the intervention; (4) the potential environmental impacts of reducing travel; and (5) other benefits such as the positive effects of rehabilitating a patient in their own social and vocational environment.

Telerehabilitation activity

Telerehabilitation applications have emerged using various technologies such as the videophone, hardware videoconferencing systems, personal computer (PC) based videoconferencing systems with dedicated software tools, sensors technologies and expensive, fully immersive virtual reality systems with and without patient feedback. Broadly speaking, the technologies used for telerehabilitation can be classified as: image-based telerehabilitation; sensor based telerehabilitation; and virtual environments and virtual reality telerehabilitation.

Image based technologies, such as those that employ videoconferencing, have the longest history in telerehabilitation and have been used in telerehabilitation research since the early 1990's⁸. There is a growing body of research to demonstrate that image based technologies can be successfully used for the remote diagnosis and management of clients and these technologies present as the most effective means for physiotherapists to provide services at a distance. This has led to the use of these technologies for routine client care in a number of public health service districts in Australia. Sensor based telerehabilitation utilizes sensor technologies such as tilt switches, accelerometers and gyroscopes to sample and quantify movement through three-dimensional space. Although considerable progress has been made in the interpretation of biosignals to produce clinically relevant information, it is surprising to note that there have been few attempts to integrate this information with telecommunication technologies for the remote measurement and rehabilitation of clients. This is likely to be an area of rapid development over the next few years. Virtual reality (VR) based telerehabilitation systems make use of configurable computer-generated three-dimensional virtual environments to elicit specific movement and motor responses by the client. The virtual environment can be displayed to the client via computer screen or fully immersive environments are possible with the use of head-mounted visual displays and haptic feedback devices. Physiotherapists are able to manipulate these environments to incorporate key rehabilitation concepts such as task repetition, feedback and motivation which have been demonstrated to result in the learning of new motor skills which translate to the real world. As computational power increases and the cost of technology decreases, home based VR systems for the remote rehabilitation of patients is an attractive concept that warrants further research.

Considerations

Telerehabilitation presents as a tool that may offer significant benefits to the physiotherapy profession, however a number of barriers and issues must be addressed before these technologies become an integral part of rehabilitation health care.

1. The traditional physiotherapy approach involves significant physical contact between the therapist and the patient making it difficult for some treatments to be applied online. A conceptual shift in thinking and a willingness to adapt some approaches will be required for the successful integration of telerehabilitation.
2. State-based registration presents as a significant barrier to telerehabilitation practice as practitioners are currently required to be registered in the state in which the patient resides. Remote consultations crossing state lines can be financially onerous due to the cost of initial application fees, annual renewal fees, and the need to satisfy the state's educational requirements⁹. Progressing to a national registration scheme would ameliorate this issue in Australia.

3. The current lack of comprehensive training for professionals in telerehabilitation applications constitutes a barrier to the inclusion of this service delivery model in health care. The future of telerehabilitation will depend on training at the undergraduate and postgraduate level in the appropriate use of technologies for telerehabilitation practice.

4. Many patients accessing rehabilitation services demonstrate significant levels of disability, particularly those requiring neuro-rehabilitation. The greater the level of disability (physical, cognitive, and communication), the more difficult it becomes to conduct a rehabilitation consult online. Adaptive technologies may yet need to be developed to facilitate telerehabilitation with these clients.

5. Reimbursement for telerehabilitation services is limited in health care systems throughout the world and remains one of the most significant barriers to the expansion of telerehabilitation in the private sector. Ongoing negotiation with insurers with the backing of efficacy research is required to ensure telerehabilitation services are financially feasible for providers.

6. In the age of evidence based practice, further research is required to crystallize the evidence base for telerehabilitation practice. Such research is critical to fuel the acceptance of these practices by professional, government, and health funding bodies. Clinical research is needed to set minimal technical specifications and standards, validate clinical protocols, investigate the effectiveness of clinical interventions, report client and clinician satisfaction, and establish the cost-effectiveness of telerehabilitation.

With the maturation of telerehabilitation technologies, and the rapid increase in the speed and quality of the telecommunication solutions they rely upon, we are entering an age where telerehabilitation consultations are not only feasible, but can be very effective in the remote management of clients. In response, several rehabilitation professions in the United States and Canada have recently drafted position statements for their members addressing issues such as clinical standards, ethics, professional licensing, liability and malpractice, privacy and confidentiality, and reimbursement^{10; 11}. Such steps seem prudent to ensure that high quality physiotherapy services are ensured in the digital age.

CIC direction

Support the development a set of clinical guidelines outlining minimal technical specifications and standards, clinical protocols, considerations and responsibilities be produced for use by the APA membership

Training services, resources and materials be developed to address the educational requirements of the membership

The CIC recommends that the APA engage in discussion with insurers regarding reimbursement for telerehabilitation services in Australia

The CIC recommends that the APA encourage and support telerehabilitation research by its members

Organizational Response

In line with many other professional bodies, the CIC recommends the APA produce a policy statement regarding the use of telerehabilitation technologies by its members

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