Assistive Technology Outcomes Research and Clinical Practice: What Role for ICF?

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Background

Design of products and environments for people with disabilities falls along a continuum of research and practice areas for clinicians and engineers who work in the field of assistive technology (AT)(Vanderheiden, 1997). This continuum encompasses a range of devices and products that include: crutches, canes, walkers and wheelchairs that facilitate mobility; computer-based software and hardware that aid spoken and written communication; and relatively simple devices used for dressing, bathing, and eating (Cook & Hussey, 2002). Practitioners in the AT field include occupational and physical therapists, speech-language pathologists, special educators, rehabilitation engineers, prosthetists and orthotists, and information technologists.

The AT field has long sought a single conceptual model having *descriptive* and *predictive* functions that would serve a range of stakeholder audiences, including: researchers, practitioners, third-party reimbursement entities, end users, and educators. A useful *descriptive model* for the AT field would provide a taxonomy for characterization of *end users* of AT, *tasks* during which AT is being used, *AT device characteristics*, and *physical and social environments of AT use*. A useful *predictive model* would provide a basis for assessment and recommendation that would indicate *what devices* would be effective *for whom*, and *under what circumstances*. This paper describes an expansion of the ICF framework to include classification of devices, reimbursement models, and measurement tools in terms of ICF domains.

A Proposed Role of ICF in the Field of Assistive Technology

Several researchers have suggested (DeRuyter, 1997; Gray, Quatrano, & Lieberman, 1998; Jutai et al., 1996) that the ICF model of human function (World Health Organization, 2001) provides a useful framework for appreciating the overall context of AT outcomes research. The table on the following page summarizes this *gestalt* in terms of the ICF model domains, examples of AT devices that can facilitate functional performance in each domain, reimbursement models and their respective funding criteria, and measurement tools that are domain-specific and domain-spanning.

Strengths

The ICF model is useful for clarifying and distinguishing between areas of practice, which tend to be domain-specific in the United States due to the nature of third-party reimbursement practices. Using the expanded ICF model suggested in this paper, appropriate AT devices can be identified on the basis of functional need within each domain, which simultaneously places them in the context of a reimbursement model and tools for measuring the effectiveness, or 'outcome', of the AT device.

Limitations

As pointed out by Gray and Hendershot (2000), the principal limitation of the ICF model results from its lack of temporal and causal components, both of which are necessary in order to develop a model that would be useful for predicting outcomes, whether in terms of participation, cost, user satisfaction, quality of life, or other measure. The ICF classification does not suggest whether (or how), for example, mobility outcomes are supposed to influence the achievement of outcomes in Major Life Areas. Nor does it suggest how psychosocial factors are supposed to influence outcomes at any level (e.g., what psychosocial outcomes are necessary in order to achieve successful outcomes in Major Life Areas?). Much current research is concerned with the abandonment (or "discontinuance") of assistive devices (DeRuyter, Kennedy, & Doyle, 1990; Day & Jutai, 1996, 2002; Jutai, 1999, 2002; Riemer-Reiss, 2000; Scherer, 1993, 2000; Scherer & Galvin, 1996). It is vitally important to gain a better understanding of the factors that contribute to device nonuse and abandonment since these outcomes are suspected to compromise the long-term health and well-being of individuals who have a disability.

Another important limitation concerns the imprecision with which assistive technologies are to be coded using the ICF. For example, the code "e1151" is meant to be applied to "Assistive products and technology for personal use in daily living". This category subsumes an enormous diversity of assistive devices, without regard to whether the devices are designed to address a bodily dysfunction (e.g., breathing), an activity limitation (e.g., impaired mobility), or a participation restriction (e.g., environmental control unit). Coding with this lack of specificity would make this code useless for distinguishing device-outcome relationships relevant for sustaining life, improving function, improving health-related quality of life, and enhancing participation. There is a similar concern with the code "e1251" for "Assistive products and technology for communication". Along with technologies that

facilitate the exchange of information via a variety of media, this category includes assistive devices for hearing and vision. There do not appear to be separate ICF codes for sensory devices that may be used primarily for nonsocial purposes, such as mobility, orientation, and perception. The ICF framework for coding "Products and Technology" should be revised to accommodate contemporary perspectives on taxonomies for assistive device technologies.

Future Research

Fully integrating the ICF model into AT practice and outcomes research will require additional development in the form of a causal model or models that have a predictive function relating User, AT device, Task, and Environment. Given that each of these four elements is already part of the ICF framework, the ICF model offers a hierarchical classification structure upon which to build the desired causal model (Bickenbach, 1999).

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