Automated reminding for everyday activities

Background: Prospective memory impairment, the inability to remember to do what you have to do and when you have to do it, is endemic in the population we study -- survivors of traumatic brain injury -- and equally serious and disabling in other cognitively impaired populations as well.

Investigations over more than a decade have shown in open clinical usage trials that clinic patients with mild to moderate chronic memory impairment have been able to make use of alarm-enabled scheduling software on commercially available handheld computers to compensate effectively for prospective memory impairment. Training requirements have proven to be limited (user interface modification has typically been more time-efficient), user reactions have ranged from positive to ecstatic ("a lifesaver"), and two thirds or more of users express the desire for continued device use following completion of clinical trials.

In controlled randomized studies supported by the NIDRR TBI Model Systems program in one instance, and more recently by a five-year multi-site NIDRR DRRP grant led by the University of Akron, PDA-generated reminder cues (an audible alarm plus a text message display) proved significantly more effective in increasing timely completion rates for assigned prospective memory tasks than did reminder cues recorded in paper-based "planners/organizers," long the standard in rehabilitation intervention, but in our data no more effective than non-intervention baseline conditions. Completion rate gains of up to 100% were seen both in adults with TBI, and in children with TBI and Intellectual Disability. Among adults with TBI, significant differences in task completion rates were also seen between devices running the Palm Operating System and those running Microsoft's Pocket PC Operating System.

Looking ahead:

- The goal of providing mobile technology for people with chronic cognitive disabilities has already partially been met. Technology development has, perhaps inevitably, outpaced our progress in utilizing it clinically in our populations of interest. Nonetheless, vigorous and creative ongoing development is needed both for "harvesting" emerging technologies for our clinical needs [e.g., remote communication, GPS], and for pushing development to address unmet needs [e.g., user interface features].

- Underutilization of existing reminder technology is, in our experience, as significant an issue as is unavailability of adequate technology. Underutilization appears to result from insufficient public visibility, from the [mis-] perceived costs of device acquisition, and from discomfort with device usage on the part of care-givers.

- Mobile technology for people with chronic cognitive disabilities is not a unitary problem. Different populations have different needs requiring different solutions. Serious strategic discussion is needed to achieve the right balance between targeted population-specific development on the one hand, and more integrated cross-population approaches that avoid work in isolation.

- We need to learn far more about the impact of device usage, on consumers, on caregivers, and on funders.

- We need to know more about programmatic factors contributing to sustained usage, and about the kinds of usage support necessary for maximizing effective usage. We need to know more about personal factors predictive of successful usage.

Wish list: Were I equipped with the right magic wand [more technology development needed?], I would establish a series of collaborating high-visibility regional centers with longer-term funding stability to address the mobile technologies goal. My magic centers would be multifaceted and extensively multidisciplinary, combining a vigorous clinical service/clinical laboratory component with sustained access to relevant populations and specialized caregivers, with an equally vigorous research and development component drawing on expertise in computer science, user interface design, and cognitive science. Nice idea, eh?

Murdo Dowds, October 2008