Field Report: Making Toilet Training Easier—a Novel Enuresis Alarm System

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More than 40 years after Azrin and Foxx (1971) developed an effective protocol for teaching individuals with intellectual and developmental disabilities to use a toilet, little is known about how to help non-specialists implement this protocol efficiently in community settings. Almost all research on the Azrin-Foxx method has taken place in specialized centers or clinics (Kroeger and Sorensen-Burnworth 2009) involved intensive programs (8 h a day or more; Rinald and Miranda 2012) or both.

Dan Mruzek, a psychologist and associate professor of pediatrics at the University of Rochester Medical Center, hypothesized that toilet training could become more accessible if it incorporated an easy-to-use manual and an unobtrusive enuresis alarm. An enuresis alarm consists of a sensor that is placed in an individual's underwear and connected with wires to a pager-size device that the student wears on his or her clothing (Fig. 1). When the sensor becomes wet, the device emits a sound or light, alerting the individual and his or her interventionists that the individual needs to go to the toilet. As such, it can facilitate toilet training by helping the individual associate the onset of urination with going to the toilet, while also reducing the need for interventionists to monitor the individual continually and schedule trips to the toilet every few minutes. However, alarms have been studied only in specialized or intensive programs. One factor that may limit their use outside of such programs is that commercially available alarms are designed for nighttime bed-wetting and may be bulky, uncomfortable, or otherwise difficult to deploy for daytime toilet training.

Every year, undergraduate seniors in the Department of Biomedical Engineering at the University of Rochester invite faculty to present proposals for a senior project. In 2009, Dr.

Mruzek spoke with the group about building a wireless moisture pager. A small team of senior undergraduate students took on the project and created a prototype. The next year, Steve McAleavey, an associate professor in the UR Department of Biomedical Engineering, collaborated with Dr. Mruzek on a successful application for funding through the UR Clinical and Translational Science Institute to improve the pager and pilot it with youth with IDD who did not urinate in the toilet independently, despite prior training attempts using standard behavioral procedures. During this pilot, Dr. Mruzek wrote a manual for school teachers and parents. The manual included directions for using the alarm, functional assessment of toileting difficulties, systematic prompt and prompt-fading strategies, and contingent reinforcement of urination in the toilet. Two of the three youths in the pilot were successfully toilet-trained, although results from the third participant were less clear. Classroom teachers implemented the behavioral procedures with a high level of fidelity and reported that the procedures were easy to use and appropriate for their students (Fig. 2).

Encouraged by the results of the pilot, Drs. Mruzek and McAleavey obtained new funding from Innovocracy, an organization that supports inventors who create products that have the potential to benefit the society (<http://www.innovocracy.com>).

Fig. 1 Wireless sensor, panty liner, and iPod

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Fig. 2 Parent and interventionist manuals for use with the wireless moisture pager

innovocracy.org). With this funding, a college sophomore at the University of Rochester, Dan Hassin, wrote an “app” for use with an iPod or other iOS device. The app provides time-stamped data on accidents, a reinforcement menu that parents or teachers can use when the child urinates in the toilet and a way to e-mail professionals to report progress, ask questions, or raise concerns. Dr. McAleavey refined the alarm system so that the sensor is linked by Bluetooth to the iOS device, and the battery lasts for about 6 months.

Next, Drs. Mruzek and McAleavey obtained support from the federally funded Autism Intervention Research Network for Physical Health (AIR-P) to streamline the intervention procedures into a four-session, outpatient parent training protocol and to standardize the study protocol. In this project, which is nearing completion at the time of this writing, they are working with investigators at Nationwide Hospital in Columbus, OH (led by Eric Butter), and Vanderbilt University (led by Whitney Loring) to perform a small randomized clinical trial of the intervention and protocol. If the

current project is successful, the investigators plan to seek funding for a larger trial that will provide more definitive evidence on the effectiveness of the intervention.

Drs. Mruzek and McAleavey also have plans for continuing to improve the alarm system. Their goals are to increase the range of the Bluetooth connection to the iOS device, add a graphing function, set up a “dry pants” reinforcement reminder, and include simple ways for caregivers to record successful urination in the toilet, “false alarms” (times when the alarm goes off even though the individual was dry), and “conversions” (times when the alarm goes off but the individual was able to get to the toilet in time to finish voiding).

Overall, the formulation of the alarm system and intervention has been a multi-year, iterative process. However, as Dr. Mruzek notes, “Not being toilet trained is a significant barrier to the inclusion of individuals with autism and other IDD into community settings, so we’d like to take the next steps needed to make effective toilet training increasingly available to these individuals and their caregivers.”

References

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