

Design Appeal: The Patient Perspective

Designing devices with the patient in mind means that the patient is more likely to have a better experience with a product—and more likely to continue using it.

Sherrie Conroy

No pain. More comfort. More attractive. And, how about more fun? This year's Medical Design Excellence Awards turned up more than a few winners that made appeal to the patient a top priority. One promises little or no pain for a traditionally terrifying dental injection. Others make the patient—or in one case, the patient's parent—feel more at ease. Some were designed to fit into the patient's home décor. And another simply makes the product fun so that the patient will stick with the therapy.

"Clearly, enhanced performance and patient experience is an appropriate and useful design opportunity, benefiting patients—and the company, if it is able to achieve a business advantage," says juror William Hyman, a professor of biomedical engineering at Texas A&M University.

Jurors attribute the trend to several factors. "Demands by users are being heard, in part, because of the shortage of nurses and similar caregivers," says juror Craig Jackson, PhD. Jackson is president of Hemosaga Diagnostics Corp. (San Diego). "Also, there is competitive pressure. If pricing is somewhat inelastic, then innovative features are necessary to make one product desirable over another," he says.

"The reason for the trend toward positive user experiences is that this topic is getting more attention among designers of all types of devices," says juror Molly Story. Story is president of Human Spectrum Design LLC.

"It might also be that FDA's requirement that medical device developers use a human factors process is causing them to pay more attention to the user experience in general," she says.

Overcoming the Fear of the Dentist

The Single Tooth Anesthesia (STA) system by Milestone Scientific Inc. (Livingston, NJ) addresses a long-dreaded dental fear. The system precisely controls the flow rate of the injection so that it can be maintained below the human pain perception level, resulting in an injection that the com-

pany says is "a truly painless experience to the patient." The initial intended use is for dentistry, but the company says that future versions will be suitable for medical injections and other medical applications.

"This product is patient friendly because it limits the area of the mouth that gets anesthetized, and the dentist controls the speed, and therefore the pressure, at which he inserts the anesthesia solution," says Story. "Both of these reduce the discomfort the patient experiences. The technological breakthrough is the feedback mechanism that communicates to the dentist how much pressure he is applying as he inserts the solution."

The system uses a computer-controlled sensing technology to deliver the anesthetic. Continuous audible and visual real-time pressure feedback allows the clinician to accurately identify a specific anatomic target for the injection based on the interstitial tissue pressure. According to the company, the STA system performs a dental injection that is typically very difficult and painful to perform when using a syringe. With the system, however, a single tooth can be anesthetized without producing numbness to the patient's lip, tongue, or other teeth.

"The innovation here was truly technical in that the pressure feedback system identifies the target tissue's location and thereby allows delivery of the drug with less pain and greater efficacy and localization," says Hyman.

Hyman notes that "the patient-friendly part" of the design is the actual reduction in pain and greater comfort, especially in the dental environment, which is not known



The STA system controls the flow rate of a dental injection so that pain is maintained below human perception.

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for patients enjoying their experience. "In a broader sense, a pain-free experience might lead to a more timely return for subsequent dental treatment, thereby contributing to individual and public health," he says.

A Warm and Fuzzy Experience

GE Healthcare's two infant warmers—the Panda iRes and the Giraffe—have a sleek, modern design that the company says appeals to clinicians and families alike. "Our Panda and Giraffe warmers are the result of five years of intensive research into customer, patient, and clinical needs in neonatal intensive care (NICU) and in well baby care," says Mike Genau, vice president, and general manager of GE Healthcare, Maternal & Infant Care.

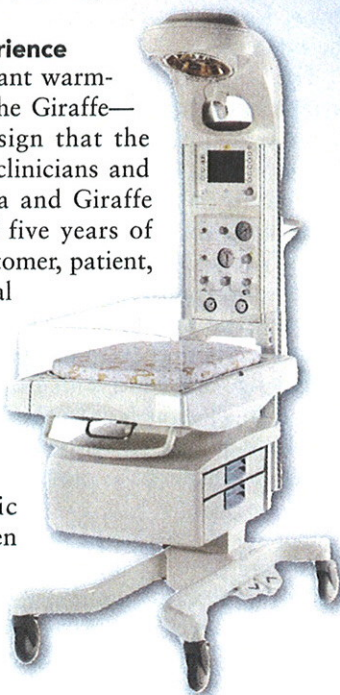
"The overall aesthetic of the GE warmers is open and friendly," notes juror Sandra Miller. "The monitoring is displayed with a simple user interface that is not frightening in appearance for parents who have enough to worry about if their baby is in the neonatal intensive care unit," she says. Miller is managing director of the Stanford Biodesign Program at Stanford University.

Another feature of the warmers is a rotating mattress—called the Baby Susan. It reduces the frequency and duration of procedural contact. "The Baby Susan helps decrease negative touches for the fragile NICU patient by allowing the clinician to position the baby with a rotating mattress," says Genau. "Our customers tell us that one of the most significant features of the Giraffe and Panda platforms is the hands-free alarm silence, allowing the clinician to silence alarms without touching the unit—which some studies suggest can be an area susceptible to contamination."

"GE's warmers were particularly impressive because they elegantly addressed interface issues for the multiple users encountered in labor and delivery and in the neonatal intensive care units: the newborn patient, healthcare providers, and the parents," adds Miller. Because the warmers have integrated the monitoring functionality normally addressed by other equipment, they also reduce clutter in the unit, a much-desired trait, she says. "It improves the newborn's experience with easier, friendlier handling."

Sonic the Hedgehog Meets Medical Devices?

A user-friendly feature of the Hand Mentor Pro Rehabilitation System is its video game-like patient interface. According to Kinetic Muscles Inc. (KMI), numerous games can be programmed to guide the patient through the



Full-color panels and trending are among many features designed to provide an optimum environment not only for patients, but also for caregivers and visiting parents.

rehabilitation steps. The interactive interface is designed to provide an entertaining treatment environment that stimulates patient effort and dedication during lengthy therapy sessions. The system promotes restoration of function in the wrist, hand, and fingers of stroke survivors and other neurological injury patients suffering from mild to moderate hemiplegia. The two-part system is designed for use under the guidance of occupational therapists.

"I think the Hand Mentor is a noble device that converts tedious physical therapy—repeated hand movement and stretching intended to reestablish good brain-to-hand communication after a stroke—into a more pleasing activity," notes juror Michael Wiklund, president of Wiklund Research & Design Inc. (Concord, MA). "The software associated with the mechanical device asks patients to perform object-tracking tasks that promise to improve hand function, but turns it into an encouraging game."

Ed Koeneman, founder and COO of KMI, talks about the user-interface development. "There are two groups of users that influenced the design of our device: stroke patients and their physical or occupational therapists. Extensive field testing of prototypes and early models were used to collect feedback from both groups. What we learned from the patients is that the therapy experience needed to be more interactive—more fun," says Koeneman. "What we learned from the therapists is that a short learning curve and a more automated method of monitoring patient progress were essential to widespread adoption of this product."

Koeneman explains that the key to successful neurological rehabilitation is extensive repetition. "But repetitious tasks can often be boring," he says. "The games in the Hand Mentor Pro are designed to engage the patient for long periods of time. [Patients] focus on the game, not on the therapy."

KMI has received positive feedback from the rehabilitation industry for its efforts. Barbara Feth, associate national director of therapy operations at HealthSouth, recently told the company, "What I like about KMI, compared with most other rehabilitation equipment companies, is that they listen to the patients and the therapists."

"The most important feedback that we can get is from our beta testers. We have a handful of therapy clinics that we work very closely with in order to get very candid feedback on new design features. We value the tough love that we get from their comments and critiques of our products. If something isn't just right, they let us know, and we listen and do something about it," says Koeneman.



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