

## Simulations Focus on Package Usability

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In October, Michigan State University (MSU) and Oliver-Tolas Healthcare Packaging debuted their new program, the Healthcare Packaging Immersion Experience (HcPIE). The event brought together healthcare professionals, medical packaging experts from Oliver-Tolas and MSU's School of Packaging, as well as educators from MSU's Learning and Assessment Center (LAC), which serves the Colleges of Human Medicine, Nursing, Osteopathic Medicine, and Veterinary Medicine.

Introduced as a pilot program to invited medical device packaging professionals, HcPIE focused on how sterile medical packaging is used in the operating room and in the emergency department. "With regard to medical packaging, the basic challenges facing medical device manufacturers remain fairly constant while the complexity of these challenges increases constantly," said Jane Severin, PhD, director of technology for Oliver-Tolas Healthcare Packaging. "This venue provides a collaborative approach to problem solving by linking packaging professionals, academia, suppliers, and healthcare practitioners to discuss packaging challenges and solutions."



Nurses opened medical device packages during MSU's operating room simulation, demonstrating aseptic product presentation.

Simulated procedures, employing life-like human patient simulators, enabled volunteer healthcare practitioners to open packaged medical devices as they would during actual procedures, revealing how packaging can ease—or hinder—aseptic presentation.

Before the simulations, MSU professors and guest presenters explained theories behind packaging design and aseptic presentation. "Packaging engineers tend to focus on product protection, but they also need to consider the user," explained Javier de la Fuente, M.S., a doctoral candidate at MSU's School of Packaging and codirector of Factor IDD, a design consultancy focusing on packaging and product design.

"Patients are living longer, but they are suffering longer, because there is no cure for aging," said de la Fuente, whose work focuses on aging. To better address aging, he suggested taking approaches similar to those that address disability. "Instead of fixing people, we need to fix the environment."

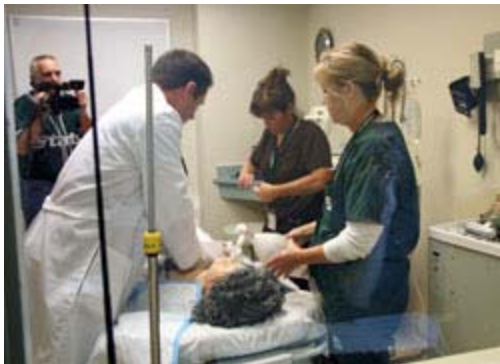
To do so, de la Fuente presented a model of human-package interaction theory that accounts for four factors: the user, the package, the task, and the context. As users in a given context perform a task with a package, they move through five stages: exposure, perception, encodation,

comprehension, and execution. Identifying problems with any of the factors at any of the stages could lead to a better understanding of how to improve packaging.

Understanding user needs is also in line with emerging concerns about sustainability, given the social dimension in the movement, added de la Fuente.

Easing product use through packaging could have some role in tackling a significant cause of death: adverse health events. Linda Williams, RN, a guest speaker from the VA National Center for Patient Safety (NCPS; [www.patientsafety.gov](http://www.patientsafety.gov)), pointed out that people have a 1 in 20 chance of dying from an adverse health event throughout their lifetime. She juxtaposed that statistic against a 2006 diagram from National Geographic (<http://ngm.nationalgeographic.com/2007/02/hearts/death-text>), which showed people have a 1 in 84 chance of dying from a motor vehicle accident in their lifetime, suggesting that adverse events appear to be a much bigger threat.

NCPS is working to prevent adverse events throughout the Veterans Health Administration and beyond, explained Seth Wolk, MD, a vascular surgeon with NCPS, and Thomas Bauld, PhD, a biomedical engineer with NCPS. Key to prevention is understanding the product use environment



A nurse struggles in the background to open a package during an emergency department simulation.

For instance, Williams, Wolk, and Bauld pointed out the challenging environment healthcare practitioners are working in. They are routinely fighting fatigue and working under limited lighting. They are often wearing ill-fitting gloves, making it difficult to perform tasks. Nurses have to open packages expeditiously while counting instruments and items like sponges. Products are often stored stacked together, partially obscuring labels.

“Product manufacturers can help,” said Williams. For instance, just offering “better ergonomics can help retain older nurses,” she added.

and developing products that meet user requirements, Bauld explained.

Attendees got the chance to witness such environments as they watched OR and ED simulations on-screen, while MSU instructors guided the attendees through simulations and provided post-event commentary. They were later joined by the volunteer professionals, who discussed packaging concerns in a panel-like environment.

During the first simulation, which was a mock hernia repair procedure, a nurse responsible for opening packages had difficulty with one, telling her colleagues: “Oops! I will have to get you another one!” And then another package caused her to pause: “I don’t know how to open this!”

Packages in particular that gave nurses trouble were sterile saline bottles (the closure appeared to be too difficult to open), the sheath around a Foley catheter (removing the sheath without contaminating the sterile field was a challenge), and a paper lidded package, which tore open diagonally as a nurse was opening a Penrose drain, potentially bringing the drain in contact with the nonsterile exterior.

Such packaging struggles complicate matters. “If you spend 20 minutes opening packaging and you are in a life-and-death situation, you risk patient life,” said Craig Gudakunst, MD, who participated in the OR simulation, told attendees. Gudakunst is assistant professor of general surgery, Department of Osteopathic Surgical Specialties, MSU College of Osteopathic Medicine.

Unclear opening features also slow up nurses. “I could not find a corner to open on the etube package [during the simulation],” recounted Melissa Gray, RN, faculty in MSU’s LAC. “I believe it was meant to be a corner peel, but you need the ability to get your thumb under the flap to open, and it needs to be at least the width of your thumb.”

Jean Fox, RN, from Ingham Regional Medical Center, who also participated in the simulation, agreed. “It is really important to have enough room to grip. The Foley catheter in particular was hard to open, because you have to try to peel it open while you try to keep the long package stable.”

Laura Bix, PhD, associate professor of MSU’s School of Packaging, later emphasized the importance of giving users enough area for a good grip. “Humans have three possible finger grips—tip pinch, lateral pinch, and key pinch. The key pinch, which is how humans would hold a key, is the strongest, most powerful grip.”

Gray added that “we really need the key grip to open packages aseptically.”

One out of every five procedures routinely present the panelists with a packaging complication that leads them to discard a product, they concurred. “The issue is not always a rip, but whether we can dispense an item aseptically,” explained Fox. “If we cannot pull out a device easily and we end up dropping it, we may have to open a new device, and the hospital eats the extra cost.”

The ED simulation showed that nurses are often doing complex, multiple tasks at once, such as opening packages while monitoring a patient’s vital stats and phoning for emergency assistance. “Having items packaged together may ease a procedure and save time,” said Barbara Tatro, RN, with Ingham Regional Center, who participated in the ED simulation. Nurses had become frustrated with respiratory masks and bag pumps that were packaged separately during the event.

Participant Steve Vance, MD, director of medical simulation at Synergy Medical Education Alliance, added that he prefers kits that include lidocaine. Otherwise, “I have to open up a multidose vial, and it takes more time to open up new packages.” He added that he also likes kits complete with gowns and gloves.

Anything that can save time is appreciated, the ED panel agreed. “Fifteen seconds can make a difference,” added Dr. Taylor Scott, director of Osteopathic Medical Curriculum, assistant professor, MSU’s College of Osteopathic Medicine, who as one of the event leaders helped narrate the simulations. The point was echoed by Nurse Melissa Gray, who commented on the time challenge nurses face when providing critical care to patients: “I really like packages like this one, which shows me evidence of a good seal prior to opening,” holding a VisiSeal pouch, an adhesive technology that allows the seal to be inspected when prepping the ED or surgical suite, when time is less critical.

Other speakers in the event included Bix, who spoke about health literacy, label comprehension studies, and security and medical devices; Severin, who spoke about sterile barrier and nosocomial infection, joined by Bix and Mary Kay Smith, RN, acting director, LAC; and Smith, who separately explained the principles of aseptic presentation and the difficulties in practicing it along with the emerging use of healthcare simulation in education.

Many of the principles that Smith cited relate to packaging. For instance, the principle, “Sterile objects that come into contact with nonsterile objects are considered contaminated,” means that if a medical device comes in contact with the outside of a package, nurses are taught to discard it because it could be considered nonsterile. Another principle, “Do not reach across a sterile field,” explains why nurses avoid reaching over an open package. Finally, the principle, “A sterile package past its expiration date may not be used,” explains why nurses routinely discard packages that are expired, have confusing expiration date formats, or are missing dates.

The event was sponsored by Glenroy Inc., DuPont, Multivac Inc., Constantia Flexibles, and BrandWatch Technologies.

The next HcPIE will be held October 5–6, 2011. For details, visit [www.egr.msu.edu/~sundarra/hcpie/index.html](http://www.egr.msu.edu/~sundarra/hcpie/index.html) or [www.oliver-tolas.com/HcPIE.php](http://www.oliver-tolas.com/HcPIE.php).

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