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For more information contact:

**Institute for Ergonomics, The Ohio State University**

**Phone: 614-292-4565**

**Email: [ergonomics@osu.edu](mailto:ergonomics@osu.edu)**

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## Strategies Could Make for Safer Shift Changes at Hospitals

COLUMBUS, OHIO - As hospitals across the United States develop policies to prevent worker fatigue and ensure patient safety, a study at The Ohio State University has identified key strategies that might make the job easier.

Culled from high-risk environments as diverse as a railroad dispatch center and the NASA Johnson Space Center, the strategies address the most critical time during any workday, the shift change, when incoming and outgoing workers have to exchange information and hand-off important duties.

Shift changes have become even more important for hospitals since the Accreditation Council for Graduate Medical Education instituted new rules in July 2003 cutting back residents' workload to 80 hours per week and giving them one day off in seven.

Systems engineers at Ohio State are examining the situation, with the idea that a safe and efficient hospital can be run on a shift basis just like other businesses, said Emily Patterson, a visiting researcher at Ohio State's Institute for Ergonomics.

“When research showed that extreme fatigue was causing medical residents to make errors, one of the arguments against letting them work shorter hours was that patients may not get continuity of care,” Patterson said. “But there are other high-risk industries that already have a shift mind set. They could have forced people to work longer hours for continuity's sake, but they didn't. We looked at those industries to see what they could teach health care.”

She and her colleagues watched workers change shifts at NASA Johnson Space Center, two Canadian nuclear power plants, a railroad dispatch center in the U.S., and an ambulance dispatch center in Toronto. Hundreds of hours of observation yielded common strategies for safety and efficiency, which the authors report in the current issue of the *International Journal for Quality in Health Care*.



Dr. Emily Patterson

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Of the strategies they identified, Patterson highlighted four as especially important:

- Face-to-face verbal update with interactive questioning. In all four industries, the outgoing employee met with his or her replacement before leaving. That allowed for quick verbal and non-verbal (gesturing) communication of the previous shift's events, and gave the incoming employee the opportunity to ask questions.
- "That strategy may seem obvious, but healthcare workers don't often see their replacements, just because of the way the work has been designed," Patterson said. "Yet the attitude we encountered from these other industries was, 'how else would you do an update?'"
- Unambiguous transfer of responsibility. The person who is taking responsibility should know that they are responsible, but everybody else should know it, too. At the ambulance dispatch center, for instance, everybody knew that incoming dispatchers hadn't officially taken over until they plugged their headphones into the control desk. In fact, one dispatcher felt that it was "almost insulting" for an incoming person to plug in headphones before the outgoing person had officially transferred responsibility, because it was "a sign of taking over."
- Make it clear to others at a glance which personnel are responsible for which duties at a particular time. In each industry studied, the outgoing person always maintained responsibility until the handoff of duties was complete, and he or she would stay to work through any crisis that emerged during the handoff.
- Overhear others' updates. Employees besides the incoming and outgoing ones can benefit from hearing others discuss the current state of events. They can also speak up when they hear information that isn't correct, to help prevent errors during the next shift. At Johnson Space Center, for instance, all the employees overhear these exchanges on a continuous audio feed.

The last item highlights one of the potential benefits of shift changes, according to study co-author David Woods, a professor in the Institute for Ergonomics and co-director of the Cognitive Systems Engineering Lab at Ohio State.

"Changeovers can bring dividends," he said. "They offer opportunities to catch mistakes. If you handle them badly, however, things can fall through the cracks. You can have a discontinuity of care. But the problem isn't the changeover itself, it's just that you need new techniques to do the changeover better."

One dividend: the incoming employee often has a fresh perspective. "The outgoing person may have been working on a problem for a while, and they've fixated on only one possible solution. One way to break that fixation is to bring in a new person," Patterson said.

"So these strategies can do more than just make shift changes possible, they can also improve operations overall," she continued.

The researchers were surprised by two findings.

First, even though experts have suggested that incoming employees should read back information that was given to them to prevent misunderstandings, none of the businesses in the study followed this practice.

And second, rather than discuss a standard list of items during every changeover -- to make sure nothing was missed -- the employees preferred to pick and choose topics depending on what they deemed most important.

Technology may help hospitals adopt some of these strategies, Patterson said. Some medical residents now carry personal digital assistants (PDAs). Nurses could benefit from a similar system, with outgoing nurses passing PDAs with audio and text notes to incoming nurses. The PDA would then be a clear signal of who was on or off-duty -- fulfilling another one of the strategies for good shift changes.

The study was sponsored by the Department of Veterans Affairs (VA). Patterson was supported by a VA Health Services Research and Development Merit Review Entry Program award. Other co-authors on the paper included Emilie Roth of Roth Cognitive Engineering in Boston, Renée Chow of the University of Toronto, and José Orlando Gomes of the Federal University of Rio de Janeiro.

For more information, contact Dr. Emily Patterson (614-688-3938; [patterson.150@osu.edu](mailto:patterson.150@osu.edu)) or Dr. David Woods (614-292-1700; [woods.2@osu.edu](mailto:woods.2@osu.edu))

Written by Pam Frost Gorder (614-292-9475; [gorder.1@osu.edu](mailto:gorder.1@osu.edu))

### **Emily S. Patterson, PhD**

Dr. Patterson is a Research Physical Scientist at the VA Getting at Patient Safety (GAPS) Center at the Cincinnati VAMC and a Visiting Researcher at the Institute for Ergonomics at The Ohio State University. Her research has covered a wide variety of issues in human-human-technology interaction in complex systems, mainly in the domains of health care, intelligence analysis, space shuttle mission control, and human-computer interaction design.

### **David D. Woods, PhD**

With nearly 25 years of experience diagnosing the factors behind human error, Dr. Woods has conducted extensive research on how people interact with computers to make decisions in high-risk environments. His work has won awards for improving the safety of automated cockpits. In addition, he is a member of the National Research Council committee that is helping NASA and the Federal Aviation Administration plan the country's next-generation air transportation systems. Dr. Woods received his PhD in Cognitive Psychology from Purdue University.