Understanding How People Work Will Create Safer Systems

by Matthew Grissinger, RPh

Today, it is widely recognized that system failures cause errors and that well-designed systems and technology offer the best chance for preventing errors. But, has our growing attention to systems and technology caused us to overlook interventions that can improve human cognitive function? Although we are beginning to better understand health care systems, have we devoted equal attention to understanding how the human mind operates and to the conditions that adversely affect its functioning? Have we done enough to identify stress-producing aspects of complex systems and steps to help people cope with them? Do we consider how personal beliefs, values, and attitudes influence performance? Tony Grasha, PhD, Professor of Psychology at the University of Cincinnati, recently studied cognitive functions and psychosocial factors that affect the accuracy of outpatient pharmacists. His research recommends using tools that can enhance memory and sensory input while taking into account environmental factors and organizational dynamics, such as supervisory practices, as well as personal qualities such as demeanor, patience, ability to manage stress, and interpersonal relationships. Here’s a sampling of what he found with specific interventions:

**Periodic Self-monitoring and Deferred Verification:** Errors were reduced by 21% when pharmacists periodically monitored themselves to detect errors. Each subsequent check identified 95% of errors that were missed during a prior check. However, mistakes were detected less frequently as the amount of continuous time spent on the specific activity increased. Therefore, taking a short break or changing to a different task before self-monitoring increases effectiveness.

**Light and Magnification:** Errors were reduced by 16% when pharmacists were given a high-intensity task light and a magnification lens to read prescriptions.

**Copyholders:** Errors were reduced by 24% after attaching a device to the computer monitor to hold prescriptions closer to eye level, to improve the visual angle during order entry.

**Alerts:** Posting alerts in strategic locations with 30 error-prone products reduced errors with these products by 71% and potentially significant occurrences by 45%. Errors with non-targeted drugs also were reduced by 56% simply through heightened error awareness.

**Exaggerated Product Labels:** Errors were reduced by 35% after affixing the product sleeves with exaggerated, non-conventional type fonts so that sections with drug names/doses were easier to read.

**Workload:** Pharmacists who made more vulnerable to making mistakes under low workload conditions when they had just shifted from high activity. Boredom, reduced task focus, and disruptions in personal work rhythms made it hard to focus on tasks, even though pharmacists with both low and high workloads were equally concerned about their performance and motivated to do well. There are, of course, limits to human performance, so a single standard is unlikely, because people have different thresholds.

**Breaks:** Pharmacists who perceived that break times were adequate and available made fewer errors and detected more errors during self-monitoring.

**Supervision:** Pharmacists who made fewer errors had supervisors who fostered appropriate autonomy and were perceived as being democratic, facilitative, and helpful in setting goals. Pharmacists who made more errors had supervisors who were perceived as overly autocratic and punitive. Supportive supervisors who interacted well with their staffs lowered stress levels and allowed staff to better focus on tasks at hand.

**Feedback and Goal-setting:** Pharmacists who received constructive feedback about errors from the research team, and who established goals to enhance error detection, were able to improve their ability to detect and prevent errors by 103%. After two weeks, pharmacists were asked to set a goal to either maintain their current performance or improve their ability to detect mistakes. Even in the control group in which no feedback was provided, those who set a goal to maintain current performance increased error detection by 22%. Instead of comparing one’s performance to others, establishing personal improvement goals, combined with constructive feedback about errors proved quite beneficial. Interestingly, pharmacists ranked feedback and goal-setting among the most effective strategies investigated by the researchers. These interventions are not uniquely suited to pharmacists alone. The same cognitive factors influence all people in all environments. Although differences in specific facilities, processes, and individual makeup can influence the success of these interventions, they are widely applicable in a broad context.

According to Grasha, ongoing understanding about how people react to systems and integrate them into their mental structures will enable us to find new ways to enhance workflow, physical work spaces, sensory input, and memory; identify new applications for technology; and improve training for supervision, conflict resolution, and stress management. In the long run, such interventions will lead to increased professional satisfaction, workforce retention, enhanced efficiency and productivity, and improved patient care and safety.

**REFERENCE**