Advancing Patient Safety Through Human Factors Engineering

It is in the best interest of healthcare providers to receive technology that has been thoroughly tested to ensure successful implementation into an existing environment. Additionally, the medical professional wants to be certain the new system will enable greater care to patients. With this in mind, one hospital has partnered with manufacturers to facilitate human factors engineering during the design of a new product.

By Izabella Gieras and Steve Ebben

When considering a technology purchase, hospitals often request a pre-purchase clinical trial. Although a short trial provides some feedback to the hospital about the equipment's operation, gaps in managing risk can still occur after successful implementation and user training.

Healthcare staffing ratios continue to be stretched and the reliance on technology as a care enabler has grown exponentially. As medical technology continues to grow more complex and its integration with care giving processes and information systems become more interdependent, human factors consideration in technology design is becoming more formal.

In addition to FDA requirements for manufacturers to demonstrate how they have anticipated potential technology user-errors, the business case for human factors provides manufacturers with greatly reduced liability exposure and speeds product development time-to-market.

To prevent potential use problems, William Beaumont Hospital, one of the highest-volume hospitals in the country, incorporates human factors testing in the technology management process used to evaluate medical technology for purchase.

A case study involving a wireless telemetry monitoring system, used in conjunction with two different communication systems, illustrates the evolution of human factors engineering (HFE) as a driver for technology developers. In early 2003, Beaumont used traditional technology evaluation methods (without robust HFE) to successfully deploy new centralized telemetry monitoring technology. However, by the end of the year, the Beaumont staff was experiencing challenging issues common to telemetry system users throughout the healthcare industry:

&#149 Sub-optimal communications between telemetry monitoring staff and nurses

&#149 Frequent alarm pages that desensitized nurses

&#149 Concern over patient safety

To address the problems, a multi-disciplinary team was established early in 2004. The group used a data-driven, user-centered approach to evaluate the need for process reengineering, new technology, risk management techniques, and/or other potential improvements. After extensive observation of staff using the telemetry

equipment and pagers/telephones, the project team helped telemetry technicians and nurses trial new communication technology. A two-way, voice-activated, hands-free communication badge replaced pagers/telephones. The protocol was streamlined.

Staff productivity increased and a renewed sense of teamwork flourished. By the conclusion of the study, results demonstrated reduced alarm response times&#151from 9.5 minutes to 39 seconds&#151a 93% improvement. The significant reduction in alarm response time had the potential to enhance patient survival rates and overall patient safety.

With the success of the telemetry monitoring project, and as a national leader in patient safety, Beaumont continues to incorporate human factors testing into all its technology evaluation and selection processes. Given this success, several technology developers have begun working with the Beaumont Technology Usability Center to speed development time and build superior technologies.

Additional Case Studies

Following is a list of other human factors engineering cases conducted by Beaumont.

Laboratory Equipment – Recommended process enhancements. Graphical user interface (GUI) maximized productivity. Risk assessment revealed a design flaw that allowed potential cross contamination of specimens. This discovery saved client significant lawsuit cost exposure.

Telemedicine – Forerunner in providing risk assessment and educational tools to FDA. Minimized risk of adverse patient impacts industry-wide.

Medication Pump – Human factors evaluation optimized medication pump interface and application in the clinical setting. Determined marketability of prototype pump for both home health and hospital markets. Marketability assessment used by client in negotiations to acquire new technology from another firm.

Orthopedic Devices – Epidemiological and device evaluation improved product features and functionality.

Incubators – Usability testing focusing on safety and ease of use, minimizing design costs and increasing customer satisfaction.

ONLINE

For additional information on the technologies and products discussed in this article, visit Beaumont Technology Usability Center online at www.beaumontusability.com [1].

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