OR-Dashboard at Massachusetts General Hospital

The Operating Room of the Future (ORF) Project

OR-Dashboard was initially developed for the ORF at Massachusetts General Hospital. Pioneered by the Center for the Integration of Medicine and Innovative Technology (CIMIT), the ORF is a living laboratory that explores new technology platforms and systems of care for performing minimally invasive surgical procedures. Accurate data capture and analysis, multidisciplinary teamwork, and thoughtful integration of technology are the building blocks in this environment that optimizes patient safety and comfort, staff satisfaction, and financial efficiency.

The ORF, with its parallel workflow, is characterized by a unique set of factors that called for development of a real-time patient system. With Small Business Innovation Research (SBIR) funding from the US Army, LiveData and MGH collaborated in implementing this system for the ORF. The groundbreaking research led to development of what became known as LiveData OR-Dashboard now used in hospitals across the US.

ORF Factors Influencing Development

- **Case Mix**: Minimally invasive procedures and single-team operations are the norm.

- **OR Throughput**: Higher throughput compared to typical operating rooms due to improvements in workflow processes. This calls for improved information flow, free and complete communication between team members, and robust systems to ensure timely data transfer.

- **OR Layout**: Includes a separate induction room. Because the patient is unconscious when entering the operating room, patient data from the induction room must be conveyed to staff in the OR.

- **Location Tracking**: Equipped with an RFID tracking system for automatic detection and display of staff and patient location and movement around the ORF.

Core Functionality

LiveData offered MGH a vendor agnostic, full disclosure system providing complete capture of perioperative data from a diverse set of devices and information systems. OR-Dashboard integrated data from the following medical devices and healthcare information systems.

- **Real-Time Physiologic and Device Data Capture**: Physiologic data from GE and Philips monitors and device data from Draeger, Aspect Medical, KARL STORZ, and InstruMed are automatically acquired, integrated, and projected onto a single, unified display. Data from a number of sources and vendors are displayed on the same axis, allowing for a powerful visual representation of intervention, device state, and physiologic response. Physiologic information is also archived for future retrieval and audit. Additional device integration includes the BIS monitor and surgical insufflator. Device data sources are automatically detected on a case by case basis and then displayed if successfully detected.

- **Information System Integration**: Data from scheduling, nursing, anesthesia, and allergy information systems populates appropriate fields on OR-Dashboard without human intervention or duplicative data entry. LiveData integrates information from a number of clinical information systems including anesthesia information management systems from Draeger, the Epic OpTime system, Cerner's CoPath, proprietary hospital information systems, and additional information sources such as the Radianse RFID location tracking system.

- **Automatic Event Detection**: LiveData system tracks case status by integrating a number of different data sources, making appropriate changes based on the stage of the case, status of the patient, and readiness of the system. For instance, the dynamic panel displaying Setup, Time Out, and Intraoperative information progresses automatically based on the stage of the case, as determined by a combination of data from

nursing information sources, a location tracking system, and anesthesia information systems. This ensures that the appropriate contextual information is displayed at all times during the perioperative process.

Workflow Functionality

The team at MGH selected to highlight three primary aspects of the perioperative process that form the dynamically progressing panels on the screen, automatically advancing the display based on events that have occurred.

Case Setup

- The first panel displayed to the OR team.
- Particular importance due to the physical layout of the room--it provides a convenient way to relay information from the custom Nursing Perioperative Assessment report that occurs in the induction room to the main operating room.
- Highlights case-specific information as well as information and verification that the assessment has been completed in the induction room.

Time Out

- Displays a Time Out checklist based on MGH's specific Time Out procedures.
- Provides additional checks to reinforce Time Out performance and documentation.
- Automatically documents when the Time Out was performed.
- Information such as the physiologic data and staffing list remains on display.

Intraoperative

- Represents the bulk of the perioperative process in the operating room.
- Process milestones are logged throughout the case, staff are listed automatically from the active RFID location tracking system.
- Physiologic real-time waveforms and trend data are recorded and displayed.
- Information pertaining to special nursing notes and post-operative care, including the discharge plans and location and presence of family members or other loved ones, is highlighted.