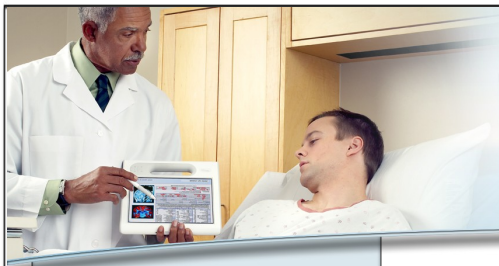

White Paper

Motion Computing®

Children's HOSPITAL
A Children's Healthcare Service

Children's Hospital Saves Estimated $2.7 Million by Switching to Motion Tablets

Overview

Region: Nebraska
Industry: Medical Practice

Customer Profile
Established in 1948, Children's Hospital is a 142 bed non-profit organization that serves a regional population of 2.5 million in 6 states. Children's Hospital in Omaha is a leader in pediatric healthcare services in Nebraska.

Business Situation
A study showed that fewer pediatric patients are harmed when a clinical physician is on hand. While not a problem at Children's particularly, they wanted to ensure that the highest level of care was provided to their patients yet they lacked the proper technology to facilitate a truly mobile workflow.

Solution
Children's Hospital found the perfect balance of mobility and capability with the Motion C5 MCA, providing numerous benefits over their existing technology in the process and in the end enabling the level of care they desired.

Benefits and Results

- Low cost of technology ownership
- Increases mobility
- Increases access to information
- Improves nursing experience
- Patient relations improvements

"I don't have to go to the computer to validate information, it's right there and when questions about an order come up I have quick access to references."

Registered Nurse at Children's Hospital

In an effort to further improve care at their facility, Children's Hospital identified that a mobile clinical workflow would help to raise the level of care provided to its patients. The goal was to streamline and enhance their clinicians access to information providing pharmacist value-added time with the rounding team.

Working within a formal clinician usability study methodology developed by Motion, Children's piloted the use of the Motion C5 mobile clinical assistant (MCA), with Eclipsys Sunrise Pharmacy™ pharmacy information solution and other case specific applications.

After the study concluded, Children's Hospital chose the C5 MCA as the cornerstone in their efforts to improve their workflow and provide the highest level of care to their patients.

ECLIPSYS®
The Outcomes Company®

intel Health

"Overall, I would have to say this is a very useful device."

Children's Hospital in Omaha

Established in 1948, Children's Hospital is a 142 bed non-profit organization that serves a regional population of 2.5 million in 6 states. Children's Hospital in Omaha is a leader in pediatric healthcare services in Nebraska.

Children's is an innovator in adopting healthcare IT solutions that can improve care and enhance clinical workflows. In 2005, Children's created a three-year IT strategic plan to achieve a paperless documentation environment. The implementation of an integrated electronic medical record (EMR) is based on Eclipsys Sunrise Clinical Manager in Children's inpatient environment. To date, Children's inpatient areas are computerized, inclusive of physician order entry on several units. In pursuit of the plan and implementation, Children's has incorporated a number of devices, as well as wireless connectivity, to support this endeavor. In the PICU, desktop solutions were available to pharmacist for access and documentation.

Applications used by Children's pharmacists

Eclipsys Sunrise Clinical Manager

- Order Entry
- Patient Lists

Eclipsys Sunrise Pharmacy

- Medication Order Entry
- Patient Medication Profile Review
- Patient LAB/Document Review
- Print Medication Labels
- Document Pharmacy Notes

"Drips" Excel Spreadsheet

- Drip Rate Calculation
- Kinetics Calculation

Abacus- TPN Order Entry

- Enter TPN Orders
- View TPN Information
- Print TPN Order Labels

Intranet- Lexicomp / Virtual Library

- Query drug information DB
- Check IV Compatibility Reference
- Check Drug Interactions
- Print Medication Information Sheets

The Importance of the Clinical Pharmacist to the Care Team

Pediatric patients are particularly susceptible to medication errors. One reason for this is because the actual volume of medication given in pediatric dosages is so small that a minor error in amount may look insignificant in a syringe (Koren & Haslam, 1994; Lasar, 2002). In a study conducted at two children's teaching hospitals, 101,022 medication orders were examined. Of these, 479 were incorrectly ordered and 27 were potentially lethal (Koren & Haslam, 1994). The idea that 27 children could have died from preventable medication errors is unacceptable.

Holdsworth, et al. (2003) concluded that children harmed by medication errors were more likely to be transferred to another facility or discharged to home health care. This study indicated that harmful medication errors occurred at a rate of 6/100 admissions and 7.5/1000 patient days with 24% judged to be serious or life threatening. Studies have indicated that pharmacist input during the rounding process can decrease the rate of preventable harmful medication errors up to 78% by their consultation in dosing-related changes and additional drug therapy recommendations. Their input has also contributed to reducing cost and decreasing length of stay (Kaushal et al., 2001; Kucukarslan et. al, 2003; Leape et. al, 1999; Terceros, Chahine-Chakhtoura, Malinowski, & Rickley, 2007). The valuable contribution made to the rounding process by clinical pharmacists was demonstrated in a study conducted in the ICU of a large urban teaching hospital when 99% of the recommendations made were accepted by the physicians (Leape et al., 1999).

The goal of Children's Hospital in Omaha was to keep the clinical pharmacist with the care team during rounding in order to derive the maximum benefits for both the patients and the facility from the specialized knowledge of these members of the healthcare team.

Workflow Issues

The Eclipsys Sunrise Clinical Manager and Sunrise Pharmacy solutions provide substantial benefits, such as those associated with electronic order entry, which expedites medical treatment and plan of care. However, the pharmacy rounding process in the PICU necessitates real-time, point-of-care information. As a major contributor to discussion, the pharmacist's input is valued not only for drug therapies, but also for laboratory screening, pain management, and treatment contraindications. The pharmacist is also in competition for computer access with other members of the health care team; thus they might have to wait to access needed data or leave the rounding team to access another workstation. Another cause of pharmacist frustration is the length of time it requires to log-in to the fixed PC as the workstations are set up for nursing quick access and limited in number, thus resulting in a three step

"The enhanced mobility is great."

process for the pharmacist to access Sunrise Pharmacy once a PC was available.

After consultation with clinical pharmacists, Children's leadership and Motion's clinical informatics specialists, a new workflow was designed.

Preparing for Change

Children's wanted to create a more mobile workflow that would enable pharmacists to easily access and input patient information in real-time at the point of care. In preparation, Children's undertook a study to identify how the Motion C5 mobile clinical assistant, a tablet PC designed specifically for clinicians in a mobile workflow could improve workflow, satisfaction and care delivery. Children's had used and evaluated a series of device alternatives ranging from fixed PCs and moveable carts, to ultra mobile tablets and PDAs. Each was compared on the basis of support for specific clinician workflow requirements, application vendor integration and support, clinician acceptance and cost of ownership.

The study utilized a clinician usability study methodology developed by Motion Computing, which uses a structured approach and a clinician-centric model to choreograph the introduction of technologies within workflow and practice patterns, instead of requiring clinicians to conform their practice to constraints imposed by technology limitations. Children's leadership, the pharmacy team, and Motion formulated a set of performance improvement goals, metrics and specific hypotheses.

Major objectives in connection with the study were to:

- Increase time spent by pharmacist in PICU patient rounds to 90%
- Increase pharmacist productivity/efficiency by 15%
- Increase pharmacist satisfaction by 15%

The study was conducted at Children's Hospital on the 2nd floor Pediatric Intensive Care Unit. Motion conducted direct observational research at the PICU. These teams documented:

- The ratio of devices available to clinicians on the unit
- Pharmacist and PICU rounding workflow process as well as patient and information flow patterns
- Data access and input requirements by clinical discipline, location, modality, and data type

Motion designed a series of study parameters that would scientifically examine baseline, target, and actual performance measures across multiple input variables. Baseline measures were recorded focusing on time/motion data such as frequency and time required per login and the time of absence from rounding with the PICU team. Additional baseline measures of pharmacist satisfaction were measured using a formal Likert scale survey in which pharmacists were asked to rate how strongly they agreed or disagreed with a statement. Children's and Motion collaborated to optimize design of the hospital's wireless network so that it more fully supported anywhere, anytime mobile access to information on lightweight devices such as the C5.

Enhancing Workflows with Technology

For the study, Children's modified its device provisioning model so that the pharmacist participating in the PICU rounds received a Motion C5 MCA for the duration of his or her shift. The MCA resulted from a fundamentally new reference design established by Intel® based on extensive ethnographic research. Motion then combined its composite clinician research and mobile healthcare device design expertise with Intel's reference model in designing and developing the Motion C5. The C5 MCA was created to meet the unique demands of mobile clinicians. The C5 provides a sure-grip handle, a sealed case for easy cleaning and disinfecting, a lightweight design for portability, a 10-inch screen for easy viewing clinical information with minimal scrolling, rugged construction that minimizes the impact of dropping the device, and pen and stylus input so clinicians can enter text and navigate the software without being tied to a keyboard. The C5 also includes features such as integrated barcode and RFID readers for patient identification and/or electronic medication administration, an integrated camera, and built-in Wi-Fi* and Bluetooth* for interfacing with clinical devices. Clinical care leaders were among many in the industry who provided input into the design of the C5.

Methodology and Results

After staff training and implementation of the new Motion C5 units, a clinician observer from Motion collected data recording the number and length of time the pharmacist had to leave the rounding team to access data well as the amount of times and length that it took to access Sunrise Pharmacy. Time away for the PICU rounding team was defined as any time the pharmacist was out of hearing range or had their back to the team. Pharmacist completed an online survey regarding their satisfaction with the mobile point-of-care solution with the C5 MCA in comparison to their workflows using the PCs at the nursing stations.

"I don't have to go to the computer each time I want to validate something."

A total of three pharmacists per shift were observed during the study. It must be noted that there was an abnormally low census during the week of baseline data capture which may have overstated the 82.6% baseline measure of how much time pharmacists were spending with the PICU rounding team prior to introduction of the C5.

Goal 1: Enhance efficiency, quality of clinical decision making and collaboration with PICU team by increasing pharmacist time spent in PICU patient rounds to 90%

During baseline data collection, it was noted that the use of a desktop PC to access the real-time patient data resulted in the pharmacist's absence from the PICU Care Team a total of 37 minutes of the total of 213 minutes of observation time and led to missed opportunities to provide expert clinical input on two separate occasions.

The length of time spent away from the PICU rounding team went from 37 minutes to 4 minutes after implementation of the C5 MCA, an improvement of 16.29% (Figure 2). With the ability and the portability of the C5 MCA, pharmacists were able to provide valuable input with the medical team regarding patient therapies. Thus, the PICU team could base its decisions on more accurate, up-to-date information, with the potential to recognize developing problems sooner. Due to the abnormally low census during the baseline data collection, Children's believes the 82.6% figure may overstate the average pre-study time that pharmacists spent with care team indicating the final results may be conservative and understate the actual improvements.

Goal 2: Increase Pharmacist productivity/efficiency by 15%

The average log-on time for the stationary PC workstations was 55 seconds. Direct observations during the study indicated nine (9) separate logins during PICU rounds. This added to the pharmacist anxiety of missing vital collaboration time with the team. The necessity of repeated number of log-ins led to a high frustration rate, as well as decreased productivity and efficiency. After implementation of the Motion C5, the following productivity and efficiency measures were recorded:

- The number of log-ons decreased by 78% as the pharmacist had a dedicated device instead of a shared model.
- The new workflow decreased the time waiting for log-on process by 87%. The average log-on time for fixed workstations was 55 seconds. This was due to auto log-on to Sunrise Clinical Manager requiring the pharmacist to wait to manually log on to the Sunrise Pharmacy application. This was reduced to 32 seconds average with the Motion C5 as it was configured to a pharmacist specific log on rather than a nursing specific log on.
- The number of times computer access unavailable to pharmacist was completely eliminated equaling a 100% improvement.

Using the Motion C5 enhanced the pharmacists' relationship with technology in several important ways:

- Pharmacists had a lightweight, portable device that was theirs to use for the entire PICU rounding workflow process. They gained unimpeded access to patient information and no longer had to contend or complete with other clinicians for access to a device. The time and consternation previously associated with searching for an available desktop PC could be spent focused on the patient's condition and collaborating with the PICU medical team. Above all, they could recommend changes, verify medication orders, and access information from any location within the PICU including while walking or standing with the care team.

- Since the C5 was a personal rather than a shared-access device, the pharmacist remained logged into their C5 MCA as they participated in the PICU rounds. Instead of having to log in to Sunrise Pharmacy each time they needed to access information on a device, each pharmacist reduced his or her need to log in from 9 to 1-2 times during the PICU rounding process.

- The devices were truly mobile, and the pharmacist often carried them throughout their shift and hospital in a variety of settings where they could not easily access other devices. This additional agility and mobility improved pharmacist productivity and satisfaction.

Goal 3: Improved Pharmacist satisfaction with rounding process by 15%

The enormous responsibility of ensuring accurate administration of medications for pediatric patients in an intensive care environment cannot be understated. Pharmacists provide their expertise in a number of medical therapies, such as dosing recommendations, laboratory testing, pain management, and identification of treatment contraindications. In this critical environment, pharmacists' anxiety and frustration in their ability to access and validate information is a factor the Motion C5 MCA can help eliminate. Collectively, these issues adversely affected pharmacist satisfaction.

Pharmacist satisfaction increased in all areas when comparing the Motion C5 to a stationary

workstation. There was an increase in pharmacist satisfaction by 15%.

Pharmacists preferred the C5 MCA to the PC workstations on overall mobility, work pace, ease of data entry with the pen, and access to needed information from anywhere on the PICU unit. One hundred percent of the respondents were satisfied or extremely satisfied with the Motion C5 in terms of its flexibility to provide them with anywhere/anytime access to view clinical information while rounding.

Benefits and Improved Total Cost of Ownership

Children's completed a simple cost of ownership comparison of upfront acquisition costs, annual operating expense, forecasted annual failure rate and practical useful life of the Motion C5 MCA compared to COWs and fixed desktop PCs previously acquired. The total cost ownership (TCO) of computer assets throughout its lifecycle is defined as the time of acquisition to disposal.

Extrapolated over a 3-year useful life and assuming a 300 unit device deployment, the Motion C5 MCA was found to cost $2.27 million less to purchase and maintain compared to COWs.

A summary of the study's specific findings include:

- Pharmacist time spent with the PICU rounding team members increased from 82.60% to 98.89%, allowing for more patient case specific discussion and multi-disciplinary collaboration.
- A preliminary finding suggests an increase of 15% productivity and efficiency within the Pharmacy rounding workflow.
- The number of required log-ons decreased by 78%.
- The time waiting for log-ons decreased by 87%.
- Pharmacist satisfaction increased by 16.67% in relation to the rounding workflow.

By thoughtfully applying technology to improve workflow, healthcare leaders can create new ways to improve clinical decision-making while optimizing clinicians' time and expertise. Product innovations such as Intel's MCA reference design and Motion Computing's C5, combined with meaningful collaboration from leading clinical system vendors such as Eclipsys, can support healthcare institutions in achieving positive and lasting change.

"It's lightweight, which is awesome and I think the handle was a great idea."