Summary of C5 MCA Study Results from Leading Hospitals

Alegent Health

Challenge: Alegent Health was relying on workstations on wheels (WOWs) and hardwired personal computers to input data throughout shifts.   The WOWs were shown to take up too much room (safety regulation concerns), were difficult to move, and were shared, which created device competition and required multiple, time-consuming logins. Devices were required with each medication administration meaning that nurses could potentially push the heavy device up to 80 times per room, per shift. Staff reported increased back and shoulder pain.

Other challenges associated with the WOWs include:
- Battery life/charging (batteries would go dead, sometimes without warning, causing loss of documentation)
- Access (hunt, gather, hoard)
- Wireless Issues
- Inconvenient (lock when away)
- Data latency
- Difficult to clean and disinfect

Solution: Alegent was looking for an effective mobile device for clinician input that was easy to use and clean, could be used for all applications, was ergonomically correct, sturdy and convenient.   Additionally, durability, long battery life, weight and ease of data entry played an important role in evaluating the C5. Approximately 20 nurses tested the Motion LE 1600 and C5 MCAs, integrated with the Siemens EMR solution for complete nursing mobility point of care documentation and medication administration using Siemens MAK (MedScan).

Results: Study results far exceeded the goals set. Up to 34% of preventable harmful medication errors occur at point of administration, and during the C5 study, clinicians identified 15 of 1853 "near misses". Additional results/feedback include:

- Ergonomics: lightweight, excellent (gripping/carrying), satisfaction with available input devices (pen, on-screen keyboard, external keyboard/mouse, built-in medication scanner)
- Visibility: good (some concerns about screen size)
- Decreased data input latency: Hours decreased to minutes
    - 62% improvement in user satisfaction with clinical documentation activities
    - 73% improvement in user satisfaction with ergonomics of solution
    - 42% improvement in point of care documentation

Medical University of South Carolina

Challenge: The Medical University of South Carolina (MUSC) is a free standing, academic medical center located in Charleston, SC. Comprised of three hospitals including a 596-bed adult hospital, a 156 bed children's hospital, and a 90-bed psychiatric hospital, MUSC provides a wide range of primary care and specialty services to over 33,000 inpatients a year. In early 2008, MUSC will open its newest hospital, a 156-bed cardiovascular and digestive disease hospital. MUSC is also home to a 500-physician practice plan and educates health profession students from six colleges including medicine, nursing, pharmacy, dental medicine, health professions and graduate studies. MUSC employs nearly 10,000 staff and educates 3,000 students a year.

The clinical care component of MUSC's mission is to provide high quality, cost effective patient care in a safe environment. To aid in accomplishing this goal, MUSC is currently implementing a host of clinical applications including McKesson's Horizon Expert Documentation system known internally as ClinDoc for nursing documentation and Horizon's AdminRx for bar coding medication administration. Computerized provider order entry (CPOE) will follow in 2008.

Solution: Earlier this year, MUSC partnered with McKesson, Motion and Intel to develop a mobility solution for clinical documentation and bar code medication administration. The key drivers for this project included updating clinical information systems with advanced technology to enable continued improvements in quality, safety, and efficiency and to support MUSC's effectiveness in complying with outside regulatory agencies and accreditation standards. MUSC's overarching goal is to optimize patient care by streamlining workflow for clinicians and improving staff satisfaction. MUSC also hopes to differentiate itself in the market, and aid in the recruitment and retention of the best and most talented staff and students. Finally, the results of this collaboration will further promote MUSC's tri-part mission of clinical service, education, and research.

MUSC's initial goals for the project were to (1) improve the efficiency and accuracy of patient documentation, (2) optimize workflow, and (3) increase clinician (nurse and physician) satisfaction.

Results: Five nurses were trained by an MUSC faculty researcher to conduct an observation study of patient care technicians as they made their scheduled vital signs rounds. The nurse observers made note of the time the vital signs were taken, time documented in patient's medical record, and the accuracy of the vital signs recorded. A total of 270 patient observations were made in three different stages: (1) paper based environment, (2) ClinDoc with fixed device in hallway, (3) ClinDoc with C5 affixed to Motion C5. Preliminary results indicate a decrease in the transcription error rate from 25% to 7% when documenting at the point of care using the Motion C5, and the amount of time difference from when vitals were taken to when they were available in the patient's record dropped from an average of over 9 minutes (in stage 2) to less than 30

seconds with the Motion C5 devices (stage 3). Both set of preliminary results are statistically significant at the p<.05 level.

Phased roll-out of Horizon clinical documentation, bar code medication administration software and the Motion C5 MCA is currently underway throughout MUSC.

Johns Hopkins University School of Nursing

Challenge: Current studies are revealing that HIT, when implemented without a strong understanding of the information needs, workflow of users, and attention towards human-centered design, are actually increasing medical error instead of reducing it as planned. It is important that clinicians and system developers work in concert to assure that new technologies are designed to support workflow and do not encourage technology "workarounds" which, in of themselves, may increase the chance of medical error. Additionally, it is important when hospital organizations consider deploying new technologies, they have an understanding of adoption across the organization. Johns Hopkins was interested in understanding if mature nurses, often responsible for management functions, would accept and adopt the mobile point of care computing solution as rapidly as the younger nursing staff.

Solution: With this trend in mind, Johns Hopkins, Motion and Intel arranged a study to evaluate the usability of the C5 MCA in a 137 bed simulated nursing lab setting. The goal of the study was to evaluate the usability, manageability, and satisfaction when experienced nurses used the C5 device in a simulated environment performing three normal clinical work processes. These included intake assessment of a newborn, documentation of wound assessment using the C5 built-in digital camera, and a medication administration exercise using the C5 bar-code scanner.

Results:

- 85% rated the C5 as easy to use
- Built in digital camera highly rated and judged to be significant contributor to:
    - Real time, objective documentation
    - Reducing time spent in documenting abstract and subjective text description of visual observations
- Bar code scanner viewed as:
    - Enhancement to care delivery efforts
    - Extremely beneficial particularly due to design as "all in one" device
- Importance of portability and workflow supported HIT
    - Easily incorporated by nurses into workflow – "new age clipboard"
    - 90% cited enhanced mobility by C5 very important
- 90% of sample rated ease of cleaning and disinfection as an efficiency gain and as an important care-related feature
- 85% rated C5 as important to:
    - Helping improve nursing practice
    - Increasing efficiency
- Intuitiveness of C5 ranked highly, particularly by experienced nurses
    - Experienced users were older nurses: average age 45

University of California, San Francisco Medical Center

Challenge: UCSF has an extensive EMR program, with access through desktop PCs and COWs. Limited portability of workstations impeded workflow and limited information access, making it difficult to fully utilize the EMRs' potential to improve care delivery. Additionally, the user log ins required to comply with security standards were consuming a significant amount of nursing effort and time, leading to frustration.

Solution: UCSF collaborated with GE Healthcare, Intel Corporation and Motion to develop a solution around the Motion C5 MCA. The new clinical workflow incorporates the Motion C5 along with GE's DINAMAP patient vital sign collection devices and the GE Centricity Enterprise EMR. Data was collected and clinicians surveyed to assess attitudes toward the device and overall solution.

Results: Enabling convenient, efficient information access and data entry at the point of care, the Motion C5 – integrated with a robust technical infrastructure and healthcare applications, can improve workflow, efficiency and satisfaction and increase the accuracy and timeliness of clinical data. Nursing satisfaction increased in all areas where comparing the experience of C5 to COWs and desktop PCs.

- Significant improvement in nurse productivity and clinical documentation accuracy.
- 60% reduction in time consumed by vital signs documentation, saving each clinician 30 minutes
- Clinical data latency was reduced by more than two hours
- 80% reduction in the number of data items that needed to be transcribed thereby reducing the potential for transcription error
- Reduction in average number of time-consuming clinician logins from 42 to 12 per shift
- 20% increase in point of care charting beyond the automated vitals sign acquisition

Children's Hospital in Omaha

Challenge: Children's of Omaha has deployed the Eclipsys Sunrise EMR and provided access through desktop PCs and COWs. However, access to fixed devices in the PICU impeded workflow processes, making it difficult for clinical pharmacists to fully optimize the EMR's potential. Clinical pharmacists in the PICU are a valuable resource in helping to ensure accuracy of drug selection and dosing, reduce costs and length of stay.

Solution: Children's collaborated with Motion to explore a new mobile device that would meet the needs of pharmacists in an acute care environment, while they conducted rounds with the PICU team. Children's tested the Mobile C5 MCA wth Eclipsys Sunrise Medication Manager (SMM), along with other use case specific applications. The team believed that this could streamline workflow, allowing the pharmacist to spend value-added time with the rounding team. The C5 was incorporated into pharmacist rounding workflow with the PICU team for medication order verification entry.

Results: Data recorded during the study indicates substantial improvements in pharmacist time spent with the multidisciplinary PICU care team resulting in improvements to both clinician productivity and overall satisfaction. There was a significant decrease in required log ins, and pharmacists reported that it was clinically valuable to have access to information for order verifications and electronic references as questions were presented. 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 discussions and multi-disciplinary collaboration time during the rounds.
- 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.