



Identifying the variation in process and practice across units and disciplines up front was key to our success. Through this analysis, we realized software flexibility was required to design a system that met our documentation needs. //



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## A case study from Siemens: **Cincinnati Children's Hospital Medical Center (CCHMC)**

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At Siemens, we see a way to deliver outcomes that result from truly efficient workflow. Outcomes that improve your bottom line. Outcomes that lead to a level of care that feels exceptional to the patient and the care provider. It's what we're doing, right now, across the entire healthcare continuum. This case study is just one example of the value of integrating medical technology, IT, management consulting, and services—in a way that only Siemens can.

/// We were committed to our vision of blending information technology with process improvement to help achieve our goal of providing the highest quality healthcare. //



— Brian R. Jacobs, MD, associate professor of pediatrics and project director for the Integrating Clinical Information System (ICIS)  
Cincinnati Children's Hospital Medical Center

## CCHMC wins 2003 Davies Award with use of Siemens Solutions

### Situation

Cincinnati Children's Hospital Medical Center (CCHMC) is a 373-bed tertiary care pediatric hospital providing state-of-the-art care to children from throughout the U.S. and the world. As the children's hospital with the third largest funding from the National Institutes of Health, CCHMC is the only pediatric center to receive the Pursuing Perfection Grant from the Robert Wood Johnson Foundation in 2001, and its research foundation is one of only eight in the nation focusing on pediatric care. Among pediatric institutions nationwide, CCHMC ranks among the top five nationally in surgical procedures and outpatient visits. In FY 2002, CCHMC serviced more than 711,290 patient encounters. Staff includes 1,045 physicians and 1,750 nurses and allied health professionals.

As part of its vision to be the leader in improving child health, CCHMC initiated an organizational redesign of its care delivery process in 2001. CCHMC believed entry of all orders via a provider-driven computerized



ordering process would enhance patient care and reduce turnaround times for tests and results while aligning with clinicians' workflow. "We were committed to our vision of blending information technology with process improvement to help achieve our goal of providing the highest quality healthcare," said Brian R. Jacobs, MD, associate professor of pediatrics and project director for the Integrating Clinical Information System (ICIS) at CCHMC. This combination of technology and process re-engineering helped the institution achieve several of its strategic objectives:

- Optimize patient safety
- Dramatically improve consistency and efficiency in care
- Maximize regulatory compliance



- Enhance provider, patient, and family satisfaction
- Give care providers advanced pediatric-specific clinical decision support
- Implement a Computerized Provider Order Entry (CPOE) project owned by clinicians
- Provide cost-effective care and maximize revenue capture

team drove Clinical Documentation design. CPOE and Clinical Documentation were implemented throughout the entire hospital system in just 8 months. More than 250 standardized order sets were approved and built into ICIS (including evidence-based guidelines for common diagnoses), and 1,335 unique users were assigned write orders privileges. Seamless integration and real-time

# proven outcomes

## Implementation

CCHMC planned to adapt the principles of Six Sigma process improvement in a collaborative approach toward implementing ICIS. Initial analysis of the clinical workflow began in 2000. "Identifying the variation in process and practice across units and disciplines up front was key to our success. Through this analysis, we realized software flexibility was required to design a system that met our documentation needs," said Terri A. Price, RN, BSN, Director of Clinical Systems, Patient Services. CCHMC's existing INVISION® system from Siemens Medical Solutions Health Services Corporation would provide the flexibility to support the transition from paper to electronic maintenance of patient information.

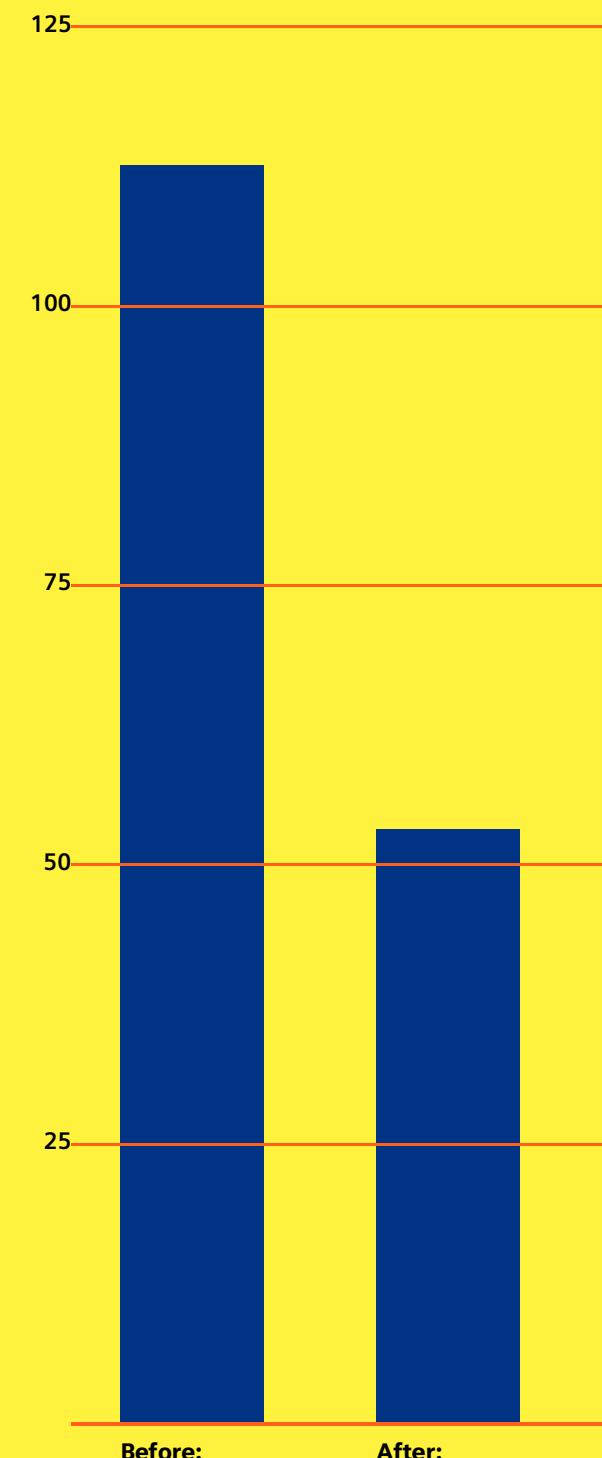
Implementation was accomplished with approximately 20 percent technology innovation and 80 percent process re-engineering. Advanced clinical applications, including Clinical Documentation, Lifetime Clinical Record®, Enterprise Access Directory®, Rules Engine, Med/IV Charting, and CPOE, were added. Physicians drove design of the CPOE module, while a multidisciplinary nursing

communication among ADT, laboratory, and radiology systems were provided via Siemens OPENLink™ integration engine.

Computer-generated worklists are now used in shift-to-shift report and workflow management, and point-of-care documentation is available via portable and mobile devices. All applications are accessible from a single user interface — Siemens browser-based NetAccess™ — and users have secure remote access.

Training and education were accomplished through an internal public relations campaign, role-based training, just-in-time training, and blended methodologies. Feedback from users has resulted in system enhancements and additional functionality. "We started touting the benefits of this technology to the clinical staff well in advance of implementation," explained Dr. Jacobs. "A phased approach was adopted to give the staff time to learn and adjust to new procedures, and 24x7 support was available after each phase of the implementation. Now we find that it is a key recruiting and retention tool for physicians and nurses."

## Results Achieved through Use of CPOE



With Siemens solutions, CCHMC dramatically reduced its medication turnaround time by 52%.

## Results

With ICIS, CCHMC has delivered a leading-edge, browser-based clinical system to its physicians and clinicians throughout the inpatient hospital setting. Physicians enter patient orders directly into the clinical system, which has built-in sophisticated dose checking and predefined order sets specific to each physician's clinical specialty. These tools help physicians improve the safety and efficiency of patient care while creating minimal disruption for the clinician. "In the past, many clinicians relied on memory when deciding on dosing specifics, which can put patients' safety at risk. With CPOE from Siemens, the proper guidelines and rules are only a touch of a button away, elevating the level of clinical decision support in our hospital. Our patients feel safer knowing that there is an electronic system of checks and balances in place to help ensure their safety and provide the best possible care," said Dr. Jacobs.

Likewise, nurses enter online the child's clinical information, such as vital signs, nursing assessment information, and plans of care, which are then accessible to the physician from within the hospital or even from home. ICIS also empowers the patients and their families in the care delivery process by providing them with current information during care team rounds.

CPOE has resulted in the creation of complete, legible, unambiguous orders containing specific drug name, dose, route of administration, frequency, duration, physician name, and contact information. In addition, CCHMC has eliminated the order transcription process and reduced the number of clinician pages and phone calls needed to clarify orders. There have been no reported adverse drug events attributable to transcription in CCHMC units active with CPOE.

CCHMC is also experiencing more rapid notification and earlier enactment of patient care orders. With the use of wireless devices during rounds, orders are written earlier in the day, resulting in discharges occurring earlier in the day.

CCHMC has also deployed a single-source Medication Administration Record and hospital-approved, consensus-based order sets. A shift-to-shift pain assessment application has resulted in near 100 percent compliance with pain assessment documentation requirements defined by state regulatory agencies.

Among the other significant results of the implementation are:

- A 35 percent reduction in medication errors
- A 24 percent reduction in verbal orders for controlled substances
- Order transmission to the pharmacy has been reduced by almost one hour per order (or set of orders), improving overall medication administration cycle time by 52 percent
- Turnaround time for a STAT CXR to be obtained in the ICU has been reduced by 10 minutes, and availability of clinical data (indication and history) to the radiologist for interpretation of the radiograph has been improved by 75 percent
- Increased Joint Commission on Accreditation of Healthcare organizations (JCAHO) compliance with signing of verbal orders and allergy documentation
- Significant improvement in consistency of care for those diseases and diagnoses for which order sets are available
- Elimination of repetitive data entry and redundant documentation

The project successfully used a planning methodology focused on process improvement as the driver for IT decisions, a physician-

driven project team, and clinician-driven design teams. 24x7 support and rapid response to user feedback along with a sense of ownership by unit staff was also key to CCHMC's success. User satisfaction surveys have shown widespread acceptance of the ICIS among clinicians.

For its efforts in implementing ICIS, CCHMC was named the only winner of the 2003 Nicholas E. Davies Award of Excellence for Healthcare Organizations sponsored by the Healthcare Information and Management Systems Society (HIMSS). CCHMC is the first pediatric hospital to win the prestigious honor. It has also been recognized with the 2002 Silver CASE Award from the Child Health Corporation of America, and Dr. Jacobs received the 2003 Association of Medical Directors of Information Systems (AMDIS) Award for excellence and special achievement in applied medical informatics.

#### Future

A multidisciplinary group of physicians, nurses, pharmacists, and consultants within CCHMC continues to examine the impact of CPOE and Clinical Documentation on patient safety, clinician efficiency, user satisfaction, and cost-effectiveness.

The next phase of ICIS includes the expansion of the CPOE and Clinical Documentation systems to the hematology-oncology units and ancillary providers. Other targeted projects include the ICIS interface to pharmacy, and expansion to research patients, cardiac cath, outpatient dialysis, and sleep study. System enhancements will be designed to improve patient safety, care efficiency, regulatory compliance, and cost effectiveness.

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CCHMC was the first pediatric hospital to win the prestigious honor that is sponsored by HIMSS.

