



Disease Management and Quality Improvement Report

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Case Study: Award-Winning Benchmark for Technology Implementation Cincinnati Children's Blends Electronic Documentation, Order Entry and Decision Support

By Lee Reeder, Editor

Cincinnati Children's Hospital Medical Center (CCHMC) learned in late August that it had been named the 2003 winner of the Nicholas E. Davies Award of Excellence for achievement in implementing electronic medical records. (See more about the award in the box on page 2.) The organization is the first children's hospital to win the award. Its system, implemented between April and December 2002, has reduced medication errors by 35 percent, decreased verbal orders by more than 50 percent and has eliminated transcription errors.

Cincinnati Children's Hospital Medical Center is a 324-bed tertiary care children's hospital serving a primary area with more than a half-million children in southern Ohio, northern Kentucky, eastern Indiana and western West Virginia as well as secondary referral areas from 42 states and 31 countries. In addition to the main campus, there are 15 off-site clinics. Among comparable pediatric institutions in the United States, Cincinnati Children's ranks second in the number of surgical procedures, second in the number of outpatient clinic visits, fourth in the number of emergency department visits and fourth in the number of inpatient admissions.

In fiscal year 2002, the organization experienced 577,310 outpatient visits, 86,774 emergency department visits, 20,303 inpatient admissions and 11,717 home care visits. The institution employs more than 1,000 physicians, 1,750 nursing staff and thousands of allied health professionals.

Cincinnati Children's is the only pediatric center to have received a Pursuing Perfection grant from the Robert Wood Johnson Foundation. The Cincinnati Children's Hospital Research Foundation, which was founded in 1931, is a nationally recognized pediatric research institution. The hospital's Davies Award application states that scientists with the foundation have been credited with discoveries that include the oral polio vaccine, the first practical heart lung machine that made open heart surgery possible, and discovery of key ingredients of surfactant that are used around the world to save thousands of infants.

The organization's award-winning system is a comprehensive approach called the Integrating Clinical Information System, or ICIS. It includes browser technology-based systems, computerized clinical order entry, clinical documentation, electronic medication and intravenous charting, a rules engine, and lifetime electronic clinical records. The system is the product of years of work by clinical leaders and a host of interdisciplinary teams within the organization.

"This is an environment where people like us can actually hope to get things done. In other places we'd get squashed by the politics. In this culture people expect the leadership to do the right thing. In fact you get dinged for not doing the right thing."

Neil Johnson, M.D.
Medical Director of Information Services
Cincinnati Children's Hospital Medical Center

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Award-Winning Benchmark for Technology Implementation (cont...)

In its application for the Davies Award, the institution explained why its ICIS is worthy of the award, “We believe Cincinnati Children’s is the first healthcare system to combine technological innovation with an industry standard process improvement approach in addressing strategic institutional goals.”

Project Director for Computerized Clinical Order Entry Brian Jacobs, M.D., and others in his organization prefer to call the order entry piece of the system clinical order entry (COE) rather than computerized physician order entry, because it is employed by a variety of caregivers in the organization. Jacobs is chair of both the Pharmacy and Therapeutics Committee and the Prescribing Task Force of the Medication Safety Committee for the organization.

The stage began to be set as far back as 1995, when a new strategic plan called for an ambitious expansion, upgrade and restructuring of information services within the organization. In its application for the award, the organization explained this evolution as follows:

“In 1995, CCHMC was running legacy systems for patient accounting inpatient management from Shared Medical Systems (now Siemens). These systems supported functions such as charge capture and billing. Islands of automation existed within clinical departments to support the laboratory, radiology and pharmacy. There was little integration and no central information technology strategy to prepare the organization for the 21st century. In 1995 CCHMC developed a strategic plan with the help of a consulting firm that resulted in creation of the CIO position and in 1996 began to

About the Nicholas E. Davies EMR Recognition Program Award of Excellence

The following is the description of the award as published by its sponsor, the Health Information Management Systems Society (HIMSS):

Background

Dr. Nicholas E. Davies was an Atlanta-based physician committed to the ideal of improving patient care for better health information management. He was a member of the Institute of Medicine Patient Records Study Committee, which coined the term “computer-based patient record.” Dr. Davies was chairperson-elect of the American College of Physicians. In April 1991, he was tragically killed in a plane crash with Sen. John G. Tower of Texas. His ideals live on in the Davies EMR Recognition Program.

Objectives

The Nicholas E. Davies EMR Recognition Program, sponsored by HIMSS, encourages and recognizes excellence in the implementation of the EMR systems. The program recognizes healthcare provider organizations that successfully use EMR systems to improve healthcare delivery. Program objectives are to: promote the vision of EMR systems through concrete examples; understand and share documented value of EMR systems; provide visibility and recognition for high-impact EMR systems; and share successful EMR implementation strategies.

Application Process

The Davies recognition program is modeled after the Malcolm Baldrige award, in that it requires staff in the healthcare system applying for the award to assess and document their progress and accomplishments against a framework for thinking about the process of implementing an EMR. Applying for the Davies award is a two-step process. First, applicants are asked to complete a short threshold application. Organizations that appear to be in an appropriate stage of implementation are then encouraged to submit a full application. Guidelines defining the content and format of the final application are provided to all applicants. Designed by industry experts, these guidelines provide educational value to any healthcare organization embarking on the implementation of an EMR.

Evaluation Process

The final application is evaluated along four themes: management—the organizational aspects of EMR implementation; strategy, planning, project management and governance; functionality—delivered by the EMR to meet the organizational objectives and the needs of patients and end-users; technology—technical design and architecture that enabled the EMR to deliver the required functionality and performance; and value—concrete return on investment as well as intrinsic value derived from the implementation of the EMR.

Source: HIMSS

Award-Winning Benchmark for Technology Implementation (cont...)

establish the capital budget for new systems infrastructure.

“In the ensuing years between 1996 and 1999 the Information Services Department grew from approximately 25 to almost 100 employees. Additionally, clinical experience and knowledge within the information services department has grown. Today, CCHMC prefers that each of its clinical systems analysts have a clinical background. There are currently eight clinicians working as analysts in the Information Services Department. Patient Services (nursing) has also assembled a team of seven clinicians to focus on clinical informatics project implementations and education. CCHMC uses a multidisciplinary and shared ownership approach to project governance. Physicians, nurses, other clinicians, information technology experts and members from finance, medical records, and legal services all participate in the design and implementation phases of clinical informatics projects.”

Cincinnati Children’s began looking into implementing a COE system in February of 2000. Jacobs said that one of the biggest drivers was finding a way to produce clear, concise orders. “Our major concern was the long-standing issues—not just here but throughout the country—of physicians writing illegible, ambiguous, incomplete orders, without dating, timing or putting the name and appropriate contact information, along with all of the medication and non-medication errors that were related to that,” Jacobs said.

A year earlier, the organization had conducted a study scrutinizing all of the medication orders on a single patient care unit during a two-week period. The multidisciplinary team conducting the

“I’m sure there will come a point when enough people have what we have—that is, efficient computerized order entry—then there will be a mandate by JCAHO and others, and the insurance companies will only deal with people who have these systems and can prove quality.”

Neil Johnson,
Medical Director of Information Services

study found that the amount of errors was significant, and that 7 percent of those errors had significant potential to cause adverse events. Previous information from the Child Health

Advocacy Initiative had noted that 50 percent of these types of errors would result in increased monitoring, 31 percent would alter vital signs, 13 percent would cause temporary harm and 6 percent would cause permanent harm to a patient.

Jacobs said that in improving quality throughout the organization, COE began to assert itself as a major solution. “When we met in multidisciplinary groups here in the hospital in the Patient Safety Committee and the Medication Safety Committee, it was fairly clear that the next major leap for us, in order to improve patient safety, was to implement a computerized order entry program,” Jacobs said. “Given the fact

Figure 1: Task Forces and Teams

The following teams and task forces were formed to implement the ICIS:

- COE Design Team
- Clinical Documentation Design Team
- Interdisciplinary Information Technology Committee
- Live Planning Task Force
- Device Task Force
- ICIS Education Team
- Downtime Minimization Task Force
- Biometric/Single Sign-on Team
- Support Team—Blue Coats
- Wireless Infrastructure Team
- Volume/Stress Testing Task Force

These groups' efforts resulted in the creation of the Patient Care and Access Process Initiatives (PCAPI), which became the framework for the creation and implementation of the ICIS.

Award-Winning Benchmark for Technology Implementation (cont...)

that prescribing error is the largest source of errors in the medication administration cycle, and medication safety represents the most important area of all of the things we do in patient safety, it was a no-brainer for us that if we were going to make major strides in that area, this is the place we need to do that.”

Jacobs said that there were also some external driving forces, including the 1999 Institute of Medicine report on medical errors titled, *To Err is Human: Building a Safer Health System*, and the initiatives of the Leapfrog Group. “Our board and CEO were well-versed in those issues, and when we brought the need for computerized order entry and documentation to them from the grassroots level, they were already seeing some of the pressures nationally as well,” Jacobs said.

Medical Director of Information Services Neil Johnson, M.D., said that although the Leapfrog Group has turned out not to be quite as powerful as people once thought and a deadline for implementation of COE systems has been extended by approximately three years, COE will become a yardstick for consumers and purchasers. “I’m sure there will come a point when enough people have what we have—that is, efficient computerized order entry—then there will be a mandate by JCAHO and others, and the insurance companies will only deal with people who have these systems and can prove quality.” Johnson added that back in February 2000, Children’s officials assumed that they were under that pressure of a three-year deadline for implementing a COE system. “That turned out to not be sustainable across the board,”

Johnson said. “We made it in the time we said we would, but many hospitals have not.”

However, being ahead of the curve is not always easy. An example is compliance with the National Patient

“Even if you only reduce one medication error that harms a patient each year, trying to calculate what that benefit actually is worth to the institution is a very difficult thing to do.”

Brian Jacobs, M.D.,
Project Director for COE

Safety Goals of the JCAHO, which are largely written based on how the vast majority of the hospital industry conducts its daily patient care work. “When you realize that only about 3 percent of hospitals nationally have moved to an integrated electronic health record, a lot of the JCAHO Patient Safety Goals have been written keeping the written record in mind,” Jacobs said. “One of the challenges we face as an electronic institution is how do we comply with those goals when many of them were shaped around the paper order and paper documentation. Some of it is applicable and some of it is not.”

Being in the forefront also begs a definition, because many institutions who may claim to have a COE system, may have something much less than what an organization such as Cincinnati Children’s Hospital would consider to be one. Johnson said his CEO has asked why a lot of organizations claim to have full COE systems, but his hospital is the one that has won the Davies Award. “A lot of institutions, pediatric and otherwise, claim they have CPOE,” Johnson said, “However, it’s like claiming you have transport. Do you have a Mercedes or do you have a bicycle?”

Johnson said he has seen CPOE “systems” that are nothing more than electronic fax messaging systems for orders going from one point to another. “What we have is a far different animal from that,” he said. “I think it would be useful if the industry had some definitions about what you need to have in place before you are able to claim that you have CPOE. So when Dr. Jacobs says 3 percent have CPOE he means that 3 percent have the suite of features that is necessary to even approach the IOM’s requirements.”

Johnson said the following were the three internal driving forces behind implementing such a system:

1. Patient safety
2. Institutional operational efficiency
3. Patient and peer satisfaction

In its application for the Davies Award, the institution outlined nine strategic objectives in creating its system:

1. Optimizing patient safety
2. Optimizing consistency in care
3. Improving clinician and patient care efficiency
4. Maximizing regulatory compliance
5. Enhancing provider, patient and family satisfaction
6. Providing cost-effective care
7. Improving education of staff and trainees
8. Enhancing research productivity
9. Strengthening performance improvement activities

Award-Winning Benchmark for Technology Implementation (cont...)

A major reason that organizations such as Children's are in the minority in the industry is the cost of COE systems. From fiscal year 2000 through fiscal year 2002, Cincinnati Children's spent \$5.3 million on the implementation of the ICIS, which includes COE. "Everybody is always looking for a comment on the return on investment, and I wish I could give some dollar figures on that," Jacobs said. "It's tough, but, for example, even if you only reduce one medication error that harms a patient each year, trying to calculate

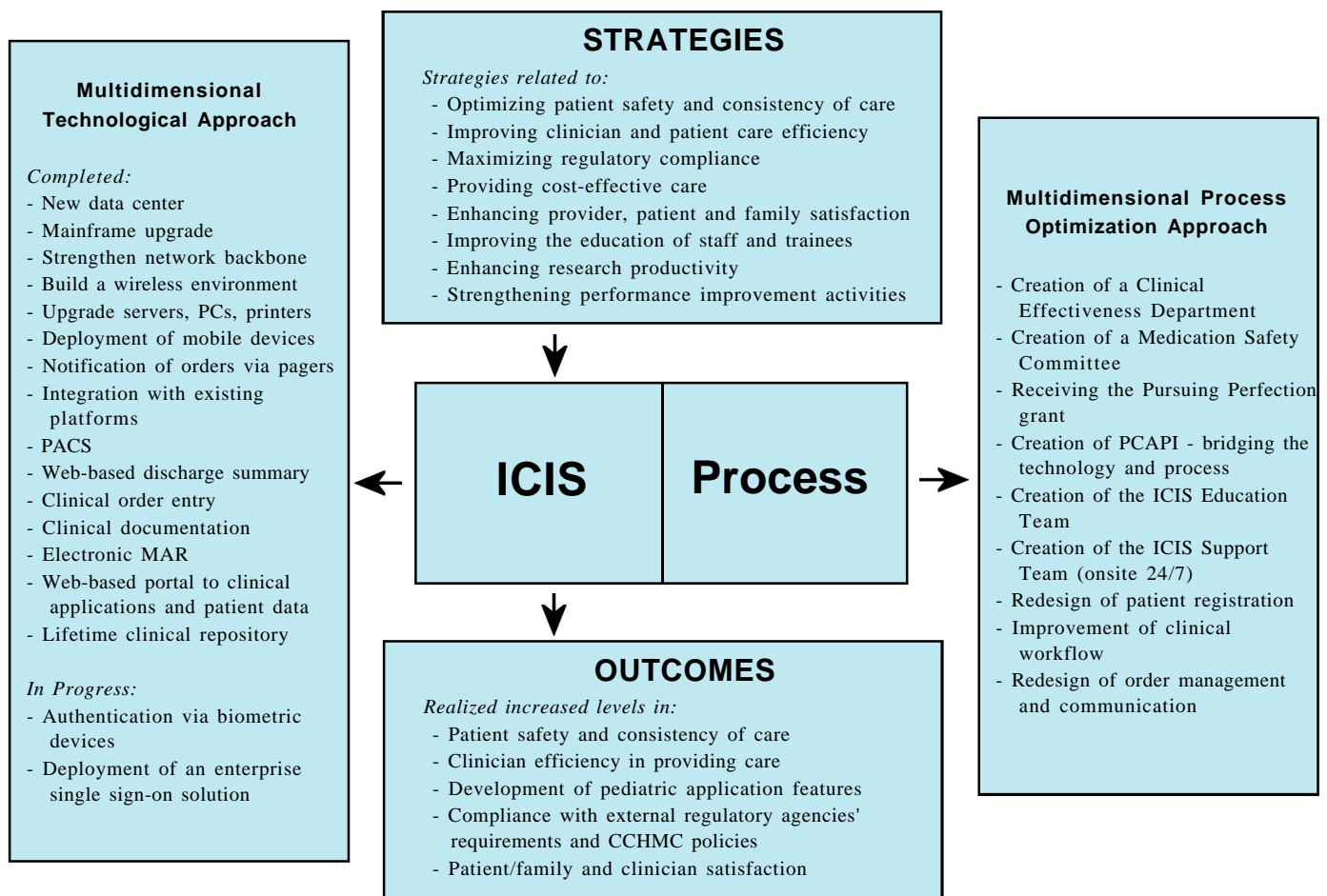
what that benefit actually is worth to the institution is a very difficult thing to do."

Children's is no stranger to significant expenditures on technology. Johnson was in charge of implementing the hospital's filmless picture archive communication system (PACS) in 2000. The hospital is also now creating a \$5 million digital operating room. "We're doing that because it's the right thing to do to stay ahead and to be a leader," Johnson said. "But that's not to say that we say, 'It's a good idea so let's do it,' and we don't keep track of the money. Sometimes we've had to put

a financial stopper on some of the things we've wanted to do because there were other needs in the hospital. So we're financially disciplined. We do separate infrastructure information systems like CPOE and PACS from things like buying an MRI scanner or opening a new OR, where there is a chargeable patient billing issue."

Johnson said on the infrastructure information systems, the return on investment calculation has to be much looser than for other items. "What's the saving in one less lawsuit a year?"

Figure 2: Combining Technology and Process Reengineering



The combined ICIS technological and Six Sigma approach at Cincinnati Children's Hospital Medical Center was successfully used to address the strategic initiatives of the institution. Technology and process reengineering were merged to achieve the goals of the organizational strategies. (Source: CCHMC Davies Award application.)

Award-Winning Benchmark for Technology Implementation (cont...)

Johnson asked. “How can you quantify that?”

Jacobs said that a mindset was already in place in the leadership at Children’s that allowed for buy-in for the COE system. “Our institution is very interested in patient safety, and this was one thing that was going to give us a major bang for the buck in terms of making patient care safer,” Jacobs said.

The organization conducted a study in 2000 to determine how many of the handwritten orders were incomplete. This could include a missing date or time, an illegible drug name, or a missing dose or route of administration. They found that 57 percent of handwritten orders were incomplete. “When you show that kind of information to the executive level, they’re appalled by that,” Jacobs said. “When you show them a whole sheet of orders and you ask them to read it to you and they can’t make out anything, it makes sense, even without affixing a dollar value to it, that we have to fix this problem. The best way to move ahead in fixing that problem was to completely eliminate the written order.”

This move was especially critical in an organization in which most of the patients are children. “One of the challenges we have with children is that we have children that weigh anywhere from one pound to 300 pounds,” Jacobs said. “It’s very difficult to write orders here in a standardized way—a capsule, a tablet an amp, a vial—as you would in an adult-based hospital. All of our medication dosing is weight-based. Because of that wide range of variability it’s very easy, in the written order without any decision support, to make a tenfold error. A tenfold error for a one- or two-kilogram baby can be fatal.” He

said those kinds of errors are not made as commonly in adults, because doses are fairly standardized and weight differences among adults are not as great.

“A lot of institutions, pediatric and otherwise, claim they have CPOE. However, it’s like claiming you have transport. Do you have a Mercedes or do you have a bicycle?”

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Jacobs, who is also an associate professor of pediatrics for the University of Cincinnati, actually worked with staff on three issues simultaneously to create an effective, comprehensive system: the COE system itself, basic nursing documentation, and

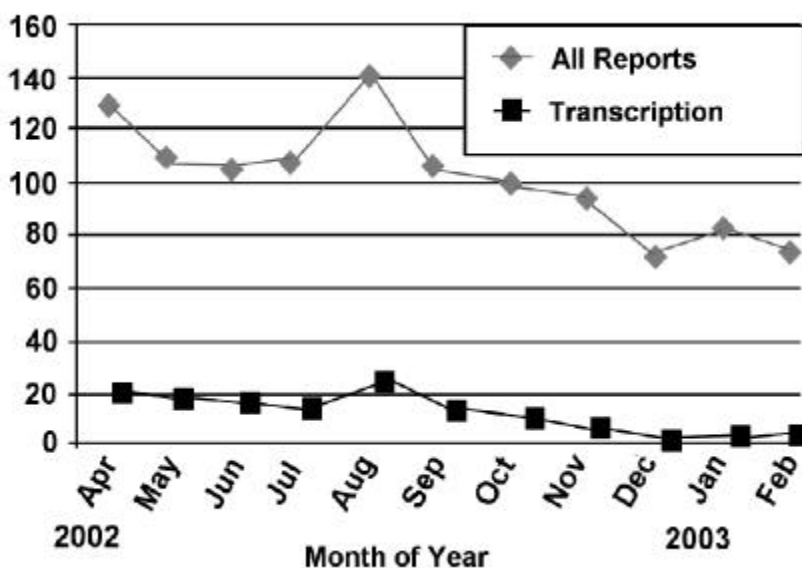
an electronic medication administration record (MAR). Johnson said that unlike many hospitals, Children’s implemented its COE system with all four of these elements. “The nurses and

Dr. Jacobs said that it doesn’t make sense to do COE throughout the house, then get around to nursing documentation next year, then get around to electronic MAR like other places have done,”

Johnson said. “We did all three applications unit by unit by unit, and I think that was a much smarter way to do it.”

The implementation of ICIS took place unit by unit over an 8-month period until the ICIS was implemented

Figure 3: Reduction in Medication Error Reports



This figure shows the reduction in medication error reports since April 2002 when ICIS was implemented on the first patient care unit. The top line (diamond) shows that all reports have dropped by approximately 35 percent, while transcription error reports have been nearly eliminated. (Source: CCHMC Davies Award application.)

Award-Winning Benchmark for Technology Implementation (cont...)

in all of the units in the hospital. “Dr. Jacobs and his team went to the first two units and spent a huge amount of time,” Johnson said. “The first two units were very difficult and went very close to the edge. But they had such a superb organization that they pulled it off. Then those two units were fairly happy. Then the next two units they went to were much easier.” He said that each time the implementation got progressively easier, mostly because there were nurses from other, fully implemented units that could be brought over to help.

Staff participation in the process was one of the major elements of success in the implementation at Children’s, according to Jacobs. In its application for the Davies award, the writers stated that user non-acceptance of the system was the greatest risk to the ICIS project. “We’ve been very proactive in getting the physicians and nurses involved in the design as well as the rollout and implementation of the system,” Jacobs said. “We did not just roll it out and say, ‘Here, you must use this.’ So doctors and nurses were well-versed in what we were about to roll out well in advance of when it was rolled out.”

Jacobs also credited the method of implementation. “The other thing I think was successful here is the fact that we did this unit by unit as opposed to a big bang implementation,” he said. “I just don’t think that we, or any organization for that matter, is able to support a big bang implementation, because it is so labor-intensive to get them over the first week or so.”

The application for the Davies Award states that four key steps were taken to help ensure user acceptance:

“No longer does the doctor have to walk away from the terminal to find some old chained-down formulary or look up a policy on paper in a rack somewhere that’s too old to find, or log out and go onto the Internet. It’s all right there at the clinician’s fingertips.”

Brian Jacobs, M.D.,
Project Director for COE

- Multidisciplinary ICIS users were invited to join one of two design teams for COE and clinical documentation, and they were compensated for their active involvement.
- The consulting firm Healthcare Innovative Solutions was hired for

their Six-Sigma-based project management and implementation services.

- The organization began a robust internal and external public relations campaign to tout the merits of the ICIS.
- A careful risk analysis was conducted in choosing the initial pilot units for the system.

Inclusion was also a major part of the effort. For example, the task force set up to facilitate clinical documentation performance improvement was made up of registered nurse representatives from all of the patient care delivery units along with ancillary care providers from Social Service, Child Life, Respiratory Therapy, Nutrition, Home Care, Laboratory, Speech, Transport,

Radiology Lite: A Valuable Beginning Step

The first experience that the organization's caregivers got with what the new system would be like was when Radiology Lite was rolled out in February 2001 in the ICU/CICU units and then three months later throughout the organization. This order entry application was created to address a very low compliance rate of legible completion of written orders for radiology exams. Radiology Lite provided valuable information on physician workflow for the development of ICIS. According to the Davies Award application, this limited implementation helped the organization reach six objectives:

1. Introduced ordering clinicians to ICIS with the incorporation of this new model into their workflow.
2. Improved the turnaround time for stat, portable radiographs.
3. Provided The Radiology Department with complete, legible orders with clinical indication for the study along with primary and secondary clinician contact information.
4. Promoted system acceptance among the physicians.
5. Validated the ICIS/COE system design to the analysts involved in the COE development.
6. Confirmed the need to closely assess the impact of electronic order entry on processes for the order writer, service provider and bedside caregiver.

Table 1: Desired Strategic Objectives and Approaches Taken to Accomplish Them

(Source: CCHMC Davies Award Application)

Optimizing Patient Safety and Consistency in Care

| Desired Outcome | Approach |
|--|--|
| Assuring complete legible orders and legible documentation | Elimination of illegible, incomplete orders through the implementation of COE; all departments are trained on the viewing of patient orders and documentation. |
| Provide identifiable physician contact information | Every order is automatically populated with the pager number of the ordering physician or the nurse practitioner. |
| Decreasing use of verbal orders | Physicians have access to patient data and ability to write orders from any remote location; the workflow is supported by the use of portable, wireless devices. |
| Elimination of transcription errors | Concurrent implementation of electronic MAR with COE eliminated transcription errors. |
| Minimizing risk of misdosing medications | Dose range checking: includes patients of all ages, including those under 30 days of age. The reference formulary database comprises top 97% of medications used at CCHMC including all high-risk medications, alerting the clinicians if certain ranges are exceeded; absolute values are defined for predefined drug categories; all weight fields contain edits that calculate whether the patient is between 3rd to 97th percentile for age on the growth chart to alert the clinician to possible error in entering dosing weights. |
| Standardization of care for common diagnoses | Creation of over 220 pediatric specific (number increasing weekly) and inclusion of evidence-based guidelines. |
| Access to most up-to-date clinical resources | Links to online resources, which are consistently updated so that decision support resources are the most current, such as CCHMC's formulary, Children's Oncology Group, Micromedix, Clinical Effectiveness Guidelines, Policies, etc. |
| Improved pharmacy order management | Alerts to staff on orders approaching expiration, both in the ordering pathways and in the medication documentation pathways; the clinician is notified 24 hours in advance of drugs approaching expiration allowing timely review of orders; alerts on the charting of expired or discontinued medications. |

Clinician and Patient/Family Satisfaction

| Desired Outcome | Approach |
|--|--|
| User-friendly and highly accessible methods for communication between the ICIS end-users and the technical and leadership team | Every screen in the system provides a link for the user to provide instant (non-urgent) feedback, recommendation and suggestions for system or process changes to the implementation and leadership team through e-mail; the e-mail is monitored 24/7 by the ICIS support team and second level of support (technical staff, project director and project managers). |
| Eliminate patient and family frustration related to redundant questions by various care providers seeking the same clinical/historical information | Eliminated the need to ask family the same questions repeatedly, as data is readily stored in the lifetime clinical repository and is available real-time to all authorized care providers |

Award-Winning Benchmark for Technology Implementation (cont...)

Occupational Therapy and Physical Therapy.

A major part of the implementation effort, as one might expect, was

education. The application for the Davies award outlines the following three education-related strategies of the organization during implementation:

“1. **A public relations campaign** initiated approximately 18 months prior to the ICIS implementation. The goal of the campaign was to infiltrate and saturate the

Table 1: Desired Strategic Objectives and Approaches Taken to Accomplish Them (cont...)

| Clinician Efficiency | |
|--|--|
| Desired Outcome | Approach |
| Eliminating the inefficiencies associated with admitting the patient into the computer system in a timely manner | New processes were defined to preregister patients and place them in a temporary bed assignment in the computer to allow for standard preadmit orders and post-operative orders to be placed prior to patient arrival; this new reengineered process supports the most effective management of patient flow, eliminating delays in care initiation. |
| Eliminating redundant documentation | Concurrent implementation of clinical documentation; single entry communicates data such as allergies or weights to all appropriate clinicians; admission history from other admission within last 180 days pulls forward to allow for updates rather than complete reentry of data. |
| Accessibility of patient data from any location | With the concurrent implementation of clinical documentation and COE on a common platform, patient-specific data is available from any PC within CCHMC; community MDs also have access to display of patient data from their community offices, resulting in time savings from 30 minutes to two hours per day due to elimination of phone calls, avoiding hospital trips when patients were discharged, etc. |
| Accessibility of reference data | Direct links to the specific medication in the formulary from the ordering screen, to specific policies relating to the specific order (i.e., restraint policy, med administration policies, etc.). |
| Minimize need for order clarification | Patient pertinent information associated with the order is required at the point of order entry, such as clinical information for radiological procedures, significant clinical history, required indications for use of non-formulary meds, M.D. consults, etc. |
| Shift the initiation of care to earlier in the day | Use of wireless devices during rounds supports the order writing at the bedside in real-time. |
| Improved efficiency of caregivers -- direct communication of orders | Automatic paging of respiratory orders to covering therapist; automatic paging for stat, portable x-rays; setting new visual triggers for new order in the clinical documentation pathways; new policies implemented to support the checking of the electronic orders (i.e., nursing must verify the system for new orders at a minimum every two hours). |
| Minimize time required for the management of patient data | Intake and output automatically calculates the cumulative totals and fluid balance; creation of computer-generated work lists used in shift to shift report and workflow management throughout the day. |
| Improving the use of chart audits and data collection for process improvement activities, clinical effectiveness monitoring and system effectiveness | Create various reports to monitor system efficiency and staff compliance with the clinical documentation (i.e., monitoring of alerts usefulness, order utilization by hour/day, device utilization tracking, time spent on order writing per clinician, dose range checking triggering a clinician response, association of clinician fatigue post-calls and order writing, pain assessment and reassessment compliance, etc.) |

Table 1: Desired Strategic Objectives and Approaches Taken to Accomplish Them (cont...)

Maximizing Regulatory Compliance

| Desired Outcome | Approach |
|---|--|
| Improve compliance with signed verbal orders | Physician census displays include a count of number of unsigned orders; verbal orders update to patient list for the physicians who gave the orders and remain active on the list until the orders are cosigned by the ordering physician or other authorized clinicians. |
| Timely documentation of patient data | Alerts and reminders triggered at the point the patient is selected to inform the nursing staff of the pain assessment and reassessment post-intervention, and completion of admission history if not initiated or completed within 24 hours of admission date/time; edits to ensure correct recording of weights; automatic charging for durable medical equipment upon the IV assessment and enteral pumps based on tube feeding orders. |
| Eliminate inappropriate use of verbal orders on narcotics | Piloting the placement of narcotic orders from home with the pain management team; weekly monitoring of verbal orders for narcotics via system reports; staff education to increase awareness regarding hospital policies. |
| Eliminate generic logons and sharing of IDs | New security policies were defined, holding users accountable for the security of their logons and passwords; defined in a centralized process for obtaining system access; currently in process of assessing the technical requirements for installing biometric devices for authentication as part of a single sign-on enterprise solution. |

Pediatric-Specific Initiatives

| Desired Outcome | Approach |
|---|---|
| Standardization of patient care through use of clinically approved order sets | Over 220 pediatric-specific orders that span across diagnoses and care of patients of all developmental ages; currently developing 142 additional order sets to support the Blood Marrow Transplant and Hematology/Oncology unit. |
| Weight-based dosing | Created CCHMC-specific weight-based dosing alerts to include premature infants through adulthood. |
| Age weight checks | Alert to clinician when recorded weight falls outside the 3rd to 97th percentile on the growth curve based on age in months to cover all age groups; minimizes risk that weight is documented in pounds rather than kilograms. |
| Ordering related to developmental age of patient | Nurse-to-nurse communication orders allow nurse to select orders that are based on the developmental age of the patient (i.e., infant toddler, school-age, adolescent, adult). |
| Documentation related to developmental age of patient | Admission history, pain assessment and the nurse-to-nurse care orders are tools that allow clinicians to tailor documentation to the developmental age of the patient. |
| Optimized nutrition orders | Nutrition orders are inclusive of diets for patients of all ages, from premature formulas to adult selections. |
| Access to pediatric reference sources | When ordering a medication, link directly to that CCHMC formulary page for that specific medication; links to Health Topics (patient/family education topics). |

Award-Winning Benchmark for Technology Implementation (cont...)

organization with information highlighting the benefits afforded by ICIS.

2. **Role-based training** was structured to the user-specific content, yet offered the flexibility to combine various modular training contents to be unique to user educational needs. The strategy minimized staffing disruptions and maximized learning.

3. **Just-in time training** was used throughout the development of training schedules and coordinated with the staged implementation plan for patient care areas. Training included unit-specific processes identified by the live planning teams that were analyzing the integration of ICIS use into workflow.”

To augment education and improve user satisfaction, the functions of the traditional IT help desk had to be greatly expanded. This required hiring and training entry level people to improve response time to technical questions from users. These employees are known as Blue Coats, and their goal is to respond within 15 minutes to user questions left on voicemail about ICIS. There is also a shared support pager system that is used for more urgent requests. According to the Davies Award application, “The Blue Coats were instrumental in gaining compliance with the surgeons in placing inpatient post-operative orders in ICIS from the surgical suite.” During the first six months of ICIS implementation, Blue Coats were stationed full-time in the operating

room and worked side-by-side with surgeons.

Usability testing was also a key approach used during the implementation process. Clinicians from units that were approaching ICIS implementation sent representatives to

“With this computerized order entry system, that written MAR and the transcription to that written MAR are eliminated, so that the order itself automatically populates that electronic MAR—there is no secondary transcription.”

Brian Jacobs, M.D.,
Project Director for COE

perform usability testing of ICIS. This testing identified critical shortcomings in ICIS that were remedied by the addition of new systems and changes in existing systems.

The ICIS is available on every terminal in the hospital and is used for anything related to patient care. Jacobs explained some of the capabilities of ICIS. “When you open up the terminal, it opens up to a standard log-in screen called ‘ICIS,’” Jacobs explained. “That is the screen by which you enter into anything that has to do with patient care, whether it be ordering, documenting the care that you’ve provided, or looking at their medication administration record. It also links clinically to a lot of other applications. For example, while I’m ordering a drug on a patient I’m able to link out to formulary information about that drug, I can search the drug on the Internet, I can look at a policy related to it, I can see the lab result of the last level on that drug, and I can even link to an x-ray report.”

Some computers, which are on mobile carts, have changed the way physicians in the organization conduct their rounds. “We didn’t coin this term,

but we call it advanced clinical decision support at the clinician’s fingertips,” Jacobs said. “So no longer does the doctor have to walk away from the terminal to find some old chained-down formulary or look up a policy on paper in a rack somewhere that’s too old to find, or log out and go onto the Internet. It’s all right there at the clinician’s fingertips.” He said also that if patients or family members have questions, the caregiver can just turn the screen around, and show them the latest lab results, for example.

According to Jacobs, the organization has been able to reduce medication errors by 35 percent since they implemented the system. Jacobs said that a significant number of these are transcription errors. He said that the traditional paper-based order and transcription process is associated with approximately 15 percent of all medication errors made in healthcare organizations. “With this computerized order entry system, that written MAR and the transcription to that written MAR are eliminated, so that the order itself automatically populates that electronic MAR—there is no secondary transcription,” Jacobs said.

The organization also generates reports from its system to help gauge its patient safety efforts. For example, every Monday, the organization generates a report regarding unsigned verbal orders. The organization has a policy that such orders need to be signed within seven days. “Historically, our rate of unsigned verbal orders was very high and we had difficulty with that over the years, as do many institutions,” Jacobs said. Recent reports show that Cincinnati Children’s Hospital processes an average of 17,000 orders

Award-Winning Benchmark for Technology Implementation (cont...)

per week. Now, only approximately 2,000 of those orders, or 11 percent, are verbal orders. “That means the physicians are entering the orders directly, by themselves into the computer about 90 percent of the time, and the rest are given to the nurses, who are entering them into the computer,” Jacobs said. “So with the electronic solution in place, we have been able to reduce our verbal orders dramatically and we have been able to dramatically reduce our unsigned verbal orders as well.”

For the core pieces of COE, MAR and documentation, Children’s chose solutions from Siemens that are part of its Invision suite. Other parts such as order sets, policies and procedures, and discharge summaries are on homegrown software, and the organization links to other vendors for various aspects of ICIS. However, Johnson and Jacobs emphasized that the commercial system an organization chooses is not the main point. “The members of the Davies committee who came here for the final review kept reiterating that the Davies Award is not given for excellence in implementing a commercial system,” Johnson said. “They’re more interested in what the institution does with it.” Johnson said that Jacobs and the rest of the leadership behind ICIS are always hungry to get more valuable data and analysis out of the system.

“Be it PACS or clinical order entry or whatever, because of the structure, leadership, and project management we have here and the integrated cooperation among nursing, ourselves and IT, we claim that we could have put in three or four different systems from the big four or five manufacturers

and we would have been equally successful,” Johnson said. “Providing that you’re with one of the big four or five that actually have the strength to

“This isn’t just a Brian Jacobs, Neil Johnson thing—this is a whole institutional effort. From the nurses taking care of patients to the resident physicians and all the way up the ladder, everybody plays a role in the success of this.”

Brian Jacobs, M.D.,
Project Director for COE

produce the software that does the work, then 80 percent of the job is leadership, implementation, project management and people like Dr. Jacobs.” Johnson also emphasized that the culture of the organization is vital. He said this includes physician involvement. He and Jacobs are two of eight physicians in his organization who, in cooperation with IT and nursing, are leading the medical side of IT implementation.

The award will be presented at HIMSS annual conference in Orlando in late February. Jacobs is quick to put the credit where it is due. “This isn’t just a Brian Jacobs, Neil Johnson thing—this is a whole institutional effort,” he said. “From the nurses taking care of patients to the resident physicians and all the way up the ladder, everybody plays a role in the success of this.”

Johnson said that other organizations might be interested in having him and Jacobs, “do the same magic there.” He said that in many organizations, it would not work, because success took a certain culture and a committed team of hundreds along with several driven champions, and those conditions just do not exist everywhere.

In his familiar realm of PACS, Johnson is invited by pediatric hospitals to consult with them on why their implementations of the digital radiology systems are not working. Johnson has three initial conditions for making such a trip. “I’ll say, O.K., I want an hour with the CEO and an hour with the CFO and an hour with the CIO,” he says. “They say: ‘Dream on. They’re not even in the same building. We couldn’t get an hour with the CEO for you.’ And I say, ‘That’s why you failed with PACS, and I’m not coming.’”

Johnson agreed with Jacobs that the environment has to be right for such a project. “The institutional attitude, leadership, CEO view, and everything on down are very inspirational,” Johnson said. “This is an environment where people like us can actually hope to get things done. In other places we’d get squashed by the politics. In this culture people expect the leadership to do the right thing. In fact you get dinged for not doing the right thing. You’re expected to know the industry, and you’re expected to propose and fight for things that you know you should be doing, like CPOE, and you should not give in and should keep at it. In a lot of places you get in trouble for doing that, but here you get in trouble for not doing that.”

Johnson added, “We never want to be in the react mode in information systems in this hospital.”

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