ABSTRACT

The healthcare industry has historically focused information system expenditures on financial systems. Finally, enabling the practice of clinicians through information systems is beginning to be viewed as a strategic initiative for hospitals and health systems. Vendor applications are now better able to support clinician workflow. Infrastructure is better able to support mobile devices, which bring information to the bedside. Implementation of nursing applications provides a unique opportunity to redesign inefficient and redundant documentation, thereby enabling greater efficiency. Healthcare organizations can jump-start nursing automation by setting a finite and clear tactical plan for initiatives to be rolled out within a year in a single location. The single location enables the organization to experience how well the initiatives integrate to support optimal delivery of care. This article explores nursing information technology initiatives planned to be deployed at a 1,000-bed teaching facility through the use of a Nursing Unit of the Future.

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The healthcare industry has historically focused information system expenditures on financial systems. Today, more of a focus is being placed on clinical systems that can help facilitate quality care at a lower cost. There are also great societal demands for medical safety and privacy. There are increasing pressures on healthcare organizations to not only monitor the care that is given but to “demonstrate with statistical data that patient safety, the quality of patient care and the cost-effectiveness of this care is constantly being analyzed and acted upon.”

In the face of such forces, there is a need to transform the patient experience and remove costs from the delivery of care; the most important tool will be information

KEYWORDS

Nursing  Direct patient care  Modeling
Nursing unit of the future  Nursing technology
focus: clinical informatics

Technology. Healthcare information technology vendors are now better able to support clinical functionality. Implementation of clinician information systems, after review and redesign of processes and roles, provides a unique opportunity to achieve lasting changes in care.

Perspective and Opportunities

Traditionally, information technologies to support nursing have not been a high priority in the industry. Historically, nurses have been early adopters of innovative direct patient care technologies such as point-of-care testing devices, telemetry with auto paging, clinical monitoring systems, nurse locator systems, communication devices and clinical data repositories.

However, there has not yet been a focus on using information technologies in the nursing process to decrease the cost of care through information efficiencies. Nurses who are at the point of care have a unique influence over the delivery of care and the resulting cost.

Because of technological advances and a higher number of workers comfortable with technology, the healthcare industry has begun to see increased clinician demand for automated applications. Clinicians are increasingly entering the workforce with strong computer skills and an appreciation for instant access to information. Nurse recruiters are reporting that new nursing graduates are asking if their organizations are using electronic documentation tools or an electronic medical record. Entry-level workers appreciate the value of accessing, sharing and synthesizing information. For some, using a paper chart is equivalent to using a card catalog to search for information on a research topic—like stepping back in time twenty years.

As a result of the nursing shortage, organizations are asking nurses to do things differently because there are not enough caregivers in the workforce from which to access needed resources. Because of the lack of professors for nursing programs, this trend will not be reversed soon. These deficiencies, together with an ever-aging population and a shortage of pharmacists, cardiologists, anesthesiologists and endocrinologists, will force changes in the delivery of care. Information technology has great promise to enable these changes. “The real value of using connectivity is in rethinking and changing how things get done—not just at what speed they get done.”

But, where does an organization begin?

Nursing Unit of the Future

The Cleveland Clinic Foundation (CCF) is in the process of implementing an electronic medical record in its hospital, which has more than 1,000 beds. In this multi-year project, the need to enhance nurse access to information technology, electronic documentation and exposure to mobile devices before full implementation of the EMR became apparent. Leadership made the decision to provide such access and exposure in a Nursing Unit of the Future.

Jon Burns, Senior Executive and Regional CIO of the Cleveland Clinic Foundation Information Technology Division, states, “It is extremely critical that our caregivers understand, support and drive technology decisions that impact the care delivery process and their workflow. The Nursing Unit of the Future offers both nursing and information technology professionals a laboratory for clinical and technology scenario creation which we otherwise would be unable to model in a production environment.” The purpose of the unit is:

• To provide a way for the Cleveland Clinic Foundation to experience innovative information technologies before the implementation of the inpatient electronic medical record.

• To develop optimal practices to be rolled out to the entire Division of Nursing.

The Cleveland Clinic Foundation is a multispecialty academic medical center, a national referral center and an international health resource dedicated to providing patients with excellence in all aspects of their care.

The Nursing Unit of the Future location at CCF was selected on the basis that it would leverage the existing wireless infrastructure. Stable staffing, strong leadership and predictable patient load were also selection criteria. A post-open-heart surgery and telemetry unit was chosen in December 2003. This project was not viewed as a cardiology project, but one in which the research would benefit all nursing units.

Successful Nursing Leadership

Developing clinical systems that satisfy caregivers of every discipline is a challenge all healthcare facilities face. To meet the challenge, the philosophy of leadership should be aligned between the chief executive officer, chief information officer and chief nursing officer. Through a united front, aligned leadership provides sponsorship of the initiative and direction during difficult times of change. Sponsors possess formal authority, allocate resources, serve as ultimate champions, remove barriers and are directly responsible for the success of the initiative. Accountability and buy-in are benefits of strong sponsorship.

In particular, nursing leadership must embrace the opportunity at all levels—chief, directors, managers and staff nurses. Staff nurses, key stakeholders in the initiative, are the ultimate source of success. Taking steps to involve unit leadership councils, in which staff nurses have influence in the management of the units, is a proven method to gain involvement and achieve success.

Unit leadership councils provide “decentralized decision-making with the goal of building a structure that supports the point-of-care provider. Participation sustains ownership
and accountability for changes to patient care at the bedside," states Michele Thoman, BSN, RN, MBA, nurse manager of medicine and telemetry at CCF. In essence, staff nurses lead themselves, which results in lasting organizational change.

Staff nurse involvement practically ensures a positive outcome of any initiative. Being at the bedside day-to-day offers the unique perspective of watching a concept tried in a real-world setting; it provides the opportunity to apply technology to practice. Because the staff nurse knows how the hardware and software will affect the direct caregiver, seeking to include the staff nurse in the development and implementation of clinical systems ensures not only success but also the promise of future technological development.

**How the Initiative Was Started**

With the CEO, CIO and CNO aligned in their support, the decision was made to move forward with a Nursing Unit of the Future project, starting with mobile documentation. The first project was the use of mobile devices to gather nursing admission assessment data and to document interdisciplinary nursing consults.

A project charter was developed and outlined. It included a project description; project objectives; project activities; project structure, roles and responsibilities; project deliverables, milestones and timing; evaluation criteria; device support process and change request and testing procedure. Guiding principles were then developed to guide all decisions throughout the project. An 80/20 rule of designing documentation drop-down lists was used, with the aim of documenting 80 percent of care using drop-down lists and 20 percent using free-text. The admission assessment form was redesigned before automation to reduce redundancy. No electronic database would be maintained because of the proximity of the EMR implementation to avoid data conversion issues. No major facility reconstruction would occur, and the admission assessment form would be completed in a single event using the mobile device at the point of care; the form would be printed and placed in the permanent paper record.

An initial design and training session was held with the nurses involved to ensure the best software design would be completed and workflow issues would be addressed. The software was a homegrown application written on mainframe REXX (Web-enabled).

The devices were procured: one tablet PC with a removable keyboard with "soft" keyboard functionality, a mini-computer and mobile carts on which to place either device. A subset of RNs was involved in this initial pilot to gain knowledge without significant investment and risk.

This pilot was conducted for five weeks, during which time there were minor iterations of software design. Table 1 contains objectives of the pilot and the outcomes.

**Next Steps for the Project**

An accelerated design session was held in March 2004 with members of the Division of Nursing and representatives from nursing specialties. The vision of the Nursing Unit of the Future was that it

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<td>Expose nurses and educate both Nursing and ITD on the usability and maintenance of mobile devices.</td>
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<td>Determine appropriate use of mobile device workstations.</td>
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<td>Educate nurses on electronic documentation using drop down lists in preparation for the inpatient EMR.</td>
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Note: Device physical security and charging were not addressed on this pilot because of its small scope.
should be a generator and repository of best practices with supporting technology in nursing both internally and externally to CCF. The mission for the unit is to provide a medium for CCF to gain experience with new information technologies and processes and to focus on optimal practices to be rolled out to the entire Division of Nursing.

During the accelerated design session, nursing participants identified patient safety, staffing and productivity and communication as the top three opportunities in nursing. These top issues can be applied to any healthcare organization today.

To address these opportunities, the following strategic plan was developed for the Nursing Unit of the Future for 2004.

**Patient Safety**

*Labeling of Specimens.* A feasibility study will be conducted to generate specimen labels integrated with the laboratory information system at the bedside, using patient and staff identifiers. Issues to be considered include integration with CCF’s IT strategic plan; the process of lab collects versus unit clinician collects; leveraging currently used patient identifiers; required interfaces, hardware and software; impact on lab automation and overall cost versus benefit. This study was to be completed by the end of June 2004.

*Mobile Access to Clinical Reference Tools.* Various reference databases, such as a nursing drug guide, patient care guidelines, and level of care and severity criteria will be implemented on a stand-alone, hand-held wireless device. Access to clinical reference tools at the point of care will be implemented with process changes that support efficient patient throughput. Nursing staff will have real-time access to supporting standards and data when communicating with the rest of the healthcare team. This implementation was to be completed by the end of June 2004.

**Staffing and Productivity**

*Staffing Automation.* An operating model for the use of current nurse staffing software and patient acuity software will be developed to optimize functionality and decrease workload. Managers currently spend as much as twelve hours weekly on the staffing process alone; the goal is to cut that to four to six hours per week. An assessment of the actual staffing process will be conducted to ensure that the new model does not support automating an inefficient process. This model was to be completed by the end of June 2004. Access from remote locations and “bidding” on open shifts will be assessed in a later study.

**Mobile Device Strategy.** Mobile devices will be implemented to record the admission assessment form and interdisciplinary nursing consults to all nurses and patients on the Nursing Unit of the Future. The ultimate goal of this initiative is to involve nursing in identifying features and functional requirements of mobile devices for complete on-line documentation with the EMR. An assessment of device security, mobility and reliability is included in this project. This strategy is expected to be completed by the end of August 2004.

**Mobile Comprehensive Nursing Documentation.** Comprehensive, streamlined nursing documentation will be designed and implemented for use on mobile devices on the Nursing Unit of the Future before rollout to the entire division of nursing. Nursing documentation components include admission assessment, nursing interdisciplinary consults, vital signs, intake and output, medication administration record, plan of care, problem list, point-of-care testing, shift reports and patient education. The Nursing Unit of the Future will design documentation applicable across all nursing specialties. This initiative provides an opportunity to truly enable documentation practices that provide value, eliminate redundancies and enhance interdisciplinary communication and care.

**Communication**

*Wireless Devices.* Wireless, hands-free communication devices will be piloted for nurses, various patient care assistants and secretaries on the Nursing Unit of the Future. Participants in the accelerated design session indicated that phones tethered to the nursing station were inhibiting communication between caregivers and resulted in missed pages, phone calls and connections on transporting patients for tests. A few units have successfully tried and implemented wireless phones, but no decision for the entire Division of Nursing has been made.

This pilot will involve installing infrastructure to support new devices that are hands free and voice-activated. Researchers plan to gain basic understanding of the number of devices per unit; handoffs of devices at shift change; maintenance; device security; charging; and nurse, physician and patient satisfaction levels. This system will be implemented by the end of September 2004 and piloted for three months, and an evaluation will then be conducted with recommendations for rollout to the Division of Nursing.
An assessment for redundancy of information technology functionality between the current nurse locator system and wireless, hands-free communication devices will be conducted. Are both systems needed when the purpose of the locator system is to easily find and communicate with caregivers? This evaluation will be completed by the end of 2004.

Measuring Success

Success of the clinical system must be measured in terms of clinical outcome metrics. Is care delivered in a more efficient, safer manner? Does it enable the staff nurse and other caregivers to spend more teaching time with the patient, improving the clinical outcome of the hospital stay and decreasing rehospitalization? Does it still enable the human side of healthcare to be dominant and, in fact, improve? These questions should be answered in a concrete manner with the assistance of measurable variables.

At the onset of each initiative, a charter will be developed that outlines success metrics. Various metrics will be included and measured at defined points in the initiative.

Although investment in nursing information technologies by vendors and healthcare has been slow, the tide is turning. Healthcare organizations are turning to information technology as a significant contributor in enhancing efficiency in care, thereby reducing costs. Societal and payer pressures for demonstrated quality outcomes are increasing. And vendors are better able to meet the functional requirements of nurses and other clinicians.

Where does an organization start to support their nursing staff with information technology? It is important to ensure that any project related to nursing information systems fits within the overriding information technology strategic plan for the organization. CCF will be fully implementing an inpatient EMR (integrated with our outpatient EMR) during the next few years. In the interim, leadership wants to enhance nurses’ experience with innovative information technologies before the implementation of the inpatient EMR and develop optimal practices that will be rolled out to the entire nursing division. Thus, the Nursing Unit of the Future, a medium in which to safely trial new technology and processes, was implemented.

Using an accelerated design approach, nurses identified the top three issues facing nurses today, applicable to any healthcare organization: patient safety, staffing and productivity and communication. Involving bedside nurses in project leadership is a vital component of success; this provides a unique opportunity to achieve lasting changes in care. Nursing can only be transformed by those who own it; transformation will be enabled through the best application of information technology and devices.

Acknowledgment

The authors would like to give a special thanks to Kelly Hancock, RN; Kate Sibila, RN; and Sue Maistros, RN, for their leadership in making the Nursing Unit of the Future a success.

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