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An IT Innovation for Individualizing Care: Success with Clinicians Leading the Way

Mary L. HOOK[a], Laura J. BURKE[a] and Judy MURPHY[a]

[a]*Aurora Health Care, Milwaukee, Wisconsin, USA*

Abstract. In 2004, the Knowledge-based Nursing Initiative (KBNI) began as a partnership between a university-based college of nursing, an informatics vendor, and a large, integrated health care system. The goal was to develop a process for translating evidence into actionable recommendations, embedding the recommendations into the computerized decision support and documentation systems, and supporting nurses' use of the nursing process to individualize care. This paper will describe the essential administrative, information technology (IT), educational and clinical support activities that were used to deploy this innovation into the electronic health record (EHR) and workflow of nurses on two acute care medical pilot units in July of 2008. The project supported every nurse to document their evidenced-based practice with each patient contact and populate the EHR database with rich, nursing sensitive, retrievable data for quality improvement and research. The results included verifying data reliability and validity, evaluating go-live preparation, and summarizing the qualitative and quantitative findings. Two critical factors that made this implementation a success were that the project had a transformational vision and that it was led by the clinical team and strongly supported by the IT team. The lessons learned in the adoption phase will be diffused to the rest of the health care system and beyond.

Keywords: Decision support systems, Clinical; Evidence-based Nursing; Innovation Diffusion; Nursing Informatics; Patient Care Planning.

1. Introduction

Sackett and colleagues [1] defined evidenced-based medicine (EBM) as the "conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients." Today, evidence-based practice (EBP) refers to the use of best evidence by all disciplines to standardize care practices to achieve the best outcomes for a majority of patients while tailoring care for patients with unique needs. Despite widespread acceptance of EBP, the process for integrating the best evidence into clinician practice and patient care is often challenging.

Strategies to increase the uptake of best evidence into practice have been studied with mixed results. In their systematic review, Grol and Grimshaw [2] reported that change in physician behavior was possible, but required comprehensive approaches implemented at different levels, considering both the characteristics of the evidence and the target group. Strategies that have been used with some success include interactive education, small group meetings for local consensus, performance feedback, reminders, and computerized decision support systems (CDDS). The reviewers noted that education and feedback had short-term effects that stopped when no longer provided. CDDS was viewed as a viable way to sustain the effects of education and feedback over time. Garg and colleagues [3] systematically reviewed 100 studies on the effects of CDSS on practitioner performance and found that CDSS improved practitioner performance, but the effects of CDSS on patient outcomes remained understudied.

In reviewing EBP adoption in nursing, researchers have identified three problematic areas: 1) nursing research is dominated by descriptive studies [4], 2) there is limited evidence and theory to effectively guide EBP implementation in nursing practice [4], and 3) nurses report limited value for training in EBP [5]. Ploeg and colleagues [6] found a small number of quality studies on EBP adoption in nursing and most focused only on the use of practice guidelines. Several implementation barriers were identified including clinical issues when guidelines were not integrated into the structures and processes of nursing care and management issues when negative staff attitudes, high "real" costs, and need for administrative support went unrecognized.

Unlike the physician experience, the use of CDSS for nursing remains in its infancy [7]. Researchers who have worked on developing the infrastructure for integrating evidence into the electronic health record (EHR) have emphasized the importance of redesigning care delivery systems [8] and using evidence, tools, and CDSS embedded into the workflow [9] rather than simply automating existing processes.

2. Objectives

This paper will examine the key leadership, IT, and clinical support activities used by Aurora Health Care, with the help of their academic and informatics vendor partners, the University of Wisconsin-Milwaukee and the Cerner Corporation, to deploy the Knowledge-Based Nursing Initiative (KBNI), an evidence-based electronic nursing care planning system. The KBNI was designed to leverage the strengths of each partner to create an innovative prototype design that was deployed in the EHR and workflow of nurses on two pilot units in a large urban tertiary care medical center. The implementation process was guided by the concepts of Diffusion of Innovation theory [10]. Findings from the qualitative and quantitative evaluation conducted 1 month after go-live were summarized and reported with the plan for ongoing prototype redesign.

3. Materials and Methods

3.1 Creating the Vision for Success

The KBNI vision began with a simple plan: to embed best evidence into the EHR to support the nursing process, building evidence-based resources and CDSS into the workflow to help nurses to assess their patients, make care decisions, document their interventions, and evaluate progress toward outcomes [11], [12], [13], [14]. This vision provided the partners with an opportunity to design and pilot an IT innovation in a practice setting with ample opportunities for research. It soon became obvious, however, that the impact of this innovation would extend beyond the pilot units in ways that would lead to system-wide transformation. The KBNI project leaders decided to reach out to nursing leaders including administrators, managers, clinical specialists, and shared governance staff leaders, to share the transformational vision, and garner additional resources and support for the project. A detailed plan for deploying the prototype design on two "early adopter" pilot units was created with a goal for diffusing to the other hospitals in the 14-hospital system after the initial testing.

This KBNI pilot project was successful because it was led primarily by a clinical team, and secondarily backed by IT support. The Clinical Implementation Team consisted of the organization's Chief Clinical Officer, two research scientists, and six clinical staff who assumed new roles as clinical "Transformers." The IT support staff included the

Vice President of Information Services, project managers, clinical analysts and staff from the appropriate IT Teams.

3.2 Establishing the Work as a Strategic Initiative for the Health Care System

After recognizing the potential impact of the vision, the clinical and IT leaders collaboratively drafted a business case for improving the clinical information system for nurses. This case was compared and contrasted to several other clinical/IT cases during the 2008 strategic planning process and was selected for implementation. The project was funded with no increase in budget by using existing, unfilled positions from system and site budgets and revising some of the team members' work priorities.

3.3 Accessing the Evidence-Based Nursing Prototype Design

The KBNI conceptual framework was used to create referential knowledge and actionable recommendations related to the nursing care for a selected "phenomenon" or topic of concern [11], [15]. The recommendations provided direction and rationale for the evidence-based "care plan" including screening and focused assessments that were used to drive the selection of nursing diagoses, tailored interventions, and patient and nursing-sensitive outcomes. The Clinical Implementation Team was supported by other KBNI team members including research scientists from the university and the health care system, a librarian, vendor and health care system-based IT specialists, coding specialists, advanced practice and staff-based clinicians who worked together to generate the knowledge and embed the recommendations into the vendor-based prototype design with localization by the health care system. This work supported nurses in using the nursing process to plan individualized care while generating nurse-sensitive, retrievable data for quality improvement and research.

Six evidence-based phenomena: Activity Intolerance, Medication NonAdherence, Risk for Venous Thromboembolism, Risk for Falls/Fall Injury, and Post-Fall Management were embedded into the EHR to start the pilot. The prototype care plans, including forms, alerts, and reports, were designed, built, validated, and localized over 5 months.

3.4 Planning the Pilot Deployment

"Transformer" nurses were hired as key members of the Clinical Implementation Team and supported the "early adoption" of KBNI. The "Transformers" were staff nurses who split their full-time position between unit-based staffing and working on the KBNI project. These nurses provided practice-based input into the design to improve workflow and make the project acceptable to practicing nurses. The Transformers were selected based on their practice-based expertise in using the IT system and their ability to communicate and represent the views of key segments of the nursing staff (e.g., expert level nurses, novice nurses, critical care nurses, med/surg nurses). After hire, the "Transformers" were oriented to the vision and EBP content with enough information system support to allow them to participate without feeling overwhelmed.

The Clinical Implementation Team was responsible for working with the IT support staff to develop a plan for localizing the KBNI prototype, studying the workflow, preparing for go-live with pilot-unit segregation, and working to resolve clinical and IT issues from the pilot units that impacted the care/services provided in the rest of the system. In reviewing the KBNI content for the initial build, the Team determined that the innovation would be most effectively tested using an acute care population of

medical patients. They selected pilot units that appeared to be "ready" for innovation, meaning that the units had experienced managers, clinical nurse specialists, and shared governance leaders, experience with IT, and a history of being risk-takers and promoters of change. Two units were identified as ready and their leaders and staff agreed to commit time and resources to working on the project.

The pilot unit staff was oriented to the goals and timeline for the KBNI pilot project during "kick-off" staff meetings. The staff nurses were prepared for go-live by completing self-learning presentations on electronic care planning and plan-specific content and attending two 3½-hour hands-on sessions on paid time. The first hands-on session was designed to validate staff competence on basic IT skills including placing and removing orders, managing their task list, and using several key time-saving functions. The second hands-on session was designed with scenarios to help them to use the new KBNI system and see that it was simple and easy to use with several benefits for patient care. The unit managers made all staff feel involved in the work.

3.5 Implementing the Pilot

The KBNI pilot went live at 05:45 on a Monday morning, a lower volume day that allowed for 1:1 staff support. Newly admitted patients were started on the new system with a plan to transition existing patients later in the week. The researchers and clinical Transformers provided around the clock on-site support for 8 days with IT Transformers providing intensive back up support. Clinical, training, and IT issues were identified and triaged based on urgency and ease of repair. An ongoing "issues list" was used to capture opportunities for future improvement.

The Transformers and the unit-based leaders worked together to create a very positive and upbeat "go-live". Flowers, balloons, and food were delivered to the pilot units to thank them for their participation. Early project successes including the maintenance of performance speed, appropriate alert function, and positive staff responses to their first "admissions" were communicated to enhance perceptions that the go-live was going well. Chief system, hospital, nursing, physician, and IT leaders made visits to the pilot unit to see the work in action. Go-live culminated with an on-site demonstration for the KBNI Leaders including the academic dean and top informatics vendor executives.

3.6 Establishing a Plan to Extract Reliable and Valid Data

The KBNI research scientists worked together to specify the key measures to extract. The IT Team used these specifications to define the population (denominator) and the components of the process that were actually documented against (numerator) by nurses during the delivery of clinical care. Using an iterative process of chart audits and selected data element electronic extractions, the Clinical Implementation and IT Team members verified that the data pulled in the abstraction process were valid and reliable.

4. Results

Pilot unit staff members (n=76) completed the on-line sessions (84%) and the hands-on care planning workshop (90%) and were able to demonstrate competency using the KNBI system prior to go-live. Qualitative feedback after go-live was very positive. Quantitative evidence demonstrated that the system correctly identified patients with KBNI diagnoses, patient care was individualized based on assessments, and desired

outcomes were achieved. The design principles were updated to guide the streamlined implementation of the next group of phenomena.

5. Discussion and Conclusions

Based on the preliminary evidence, the deployment of this innovative process for electronic care planning was a success. The intensive planning and support paid off with positive end-user feedback and evidence that the majority of nurses were able to use the new system and critical thinking skills to individualize evidence-based patient care plans based on the initial and ongoing assessments. Two critical factors that made this implementation a success were that the project had a transformational vision and that it was led by the clinical team and strongly supported by the IT team [16]. Every nurse documents evidenced-based practice during every patient contact, providing a rich, valid, and reliable database to support quality improvement and research activities. The lessons learned in the adoption phase can now be diffused to the rest of the health care system and beyond.

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Email address for correspondence: mary.hook@aurora.org