Promoting Safe Nursing Care by Bringing Visibility to the Disciplinary Aspects of Interdisciplinary Care

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The provision of safe and effective interdisciplinary care requires making the unique and interdependent aspects of disciplinary care visible and understandable. Ideally, the electronic health record (EHR) should capture both disciplinary and interdisciplinary care. This paper reports on a "real time" pilot of a technology supported method of documenting, communicating, and tracking the nursing component of the patient's plan of care for eventual integration into an EHR. An intensive care unit tested the intervention that included the adoption and use of the NANDA, NOC, and NIC terminologies. Multiple methods were used to evaluate the impact of the care planning method for a 12 month period. We found that the increased visibility of nursing care promoted greater awareness and understanding (collective mind) of care and in turn enhanced continuity. The results of the pilot were used to further refine our theoretical framework and method for the multi-site study currently underway.

Introduction

As the coordinators of care, nurses need tools to promote a shared understanding of their care and decisions among members of the multi-disciplinary team. The shared understanding of the disciplinary aspects of care in turn provides the foundation to engage in interdisciplinary efforts that lead efficiently to the achievement of desired patient outcomes. One mechanism, which has thus far been underutilized, is the care planning process. This is an important aspect of both continuity of care and patient safety. Though required by the Joint Commission on Accreditation of Healthcare Organizations[1, 2] current care plans do little to enhance information flow or the mindfulness needed to support effective decision making. In reality care plans are often documents filed in the medical record at the beginning of a patient's hospital stay and soon forgotten. This paper reports on a "real time" pilot utilizing a health information technology (HIT) enabled care planning process that truly engenders the JCAHO intent. Our technologically-enabled care planning model is targeted at nurses as coordinators of care and is designed to be a central piece to support efficient and effective care planning and communication of vital nursing care information.

HANDS

The Hands-on Automated Nursing Data System[3] [HANDS] tool supports the care planning process and its documentation using the NANDA, NOC, and NIC (N3) terminologies to represent nursing diagnosis, outcomes, and interventions. The N3 classifications have been under systematic development, validation, and refinement for several decades; NANDA since 1974[4], NIC since the mid 1980s[5], and NOC since the late 1980s[6]. With the existence of automation and domain specific nursing terminologies, tools can be developed to standardize the format and content of nursing information to enhance the communication and collaboration across distributed groups throughout the care planning process. The HANDS tool is the first computerized recordkeeping repository and database system to utilize the NANDA, NOC, and NIC terminologies[3].

Literature Review

In health care organizations, the electronic health record (EHR), oral reports, handoffs, conferences, and health information technologies (HIT) all facilitate information flow and are parts of a matrix to ensure safety. Wide variation in the ways nurses coordinate care through documentation practices[7] makes it difficult to identify uniform and best practices for representing and communicating nursing information. JCAHO has identified the care planning process as the structuring framework for this work. The Essentials of Baccalaureate Education for Professional Nursing Practice[8] drafted by the accrediting body American Association of Colleges of Nursing (AACN) lists several core competencies that directly relate to the care planning process including the ability to "diagnose, plan, deliver, and evaluate quality care" (p. 11), "use appropriate technologies in the process of assessing and monitoring patients" (p. 14), "apply health care technologies to maximize optimal outcomes for

patients" (p. 16) and "develop a comprehensive plan of care (p. 16)."

The care plan could be a critical component in providing safe, appropriate, and accountable health care. Yet, JCAHO currently leaves the format of this plan open and is silent on its content and form. Most importantly, there is no guidance as to the most appropriate care planning process or routines to support the process. Research has demonstrated the role of documentation in conveying shared meaning [9] and ensuring accountability [10]. Specifically, studies have demonstrated how an underlying culture of shared meanings can either be reinforced by a recordkeeping system or work against it, thus rendering the system less effective [11]. Our research addresses the need for more standardization in the care planning process. While current documentation systems capture care, the recorded information is of little value if meaning is not shared by users. We view the HANDS method as a key mechanism for creating shared meaning about nursing care practices.

In research where interventions have focused on changing the care planning process, findings have shown that patient outcomes can be improved[12]. Other studies have found that nurses consider care plans to be of little value when they are not kept current or when inappropriate details are included[13-15]. Research on the effects of the N3 terminologies in the care planning process is limited. Scherb[16] evaluated the utility of N3 in the care planning process. She found that nurses had difficulty understanding which interventions assisted in the achievement of positive outcomes when interventions and outcomes are not linked in the patient record.

The literature review indicates several important things. First, care planning can support better patient outcomes if kept current with appropriate information. Second, altering the care planning process has thus far been done in an ad hoc manner producing wide variation in the practice. While supporting the continuity of care on an individual unit is good, the larger issue of increasing continuity of care across units and health care settings needs to be addressed if patients are to receive truly holistic care. Finally, current approaches to care planning have focused primarily on the care plan document itself. The focus of this study is the care planning process; a change in the plan results from this, but is only a reflection of deeper changes in nurses' planning activities, thought patterns, and information flows.

Methodology

From late 2002 to early 2004, a "real-time" pilot study of an HANDS supported care planning process was conducted on an intensive care unit located in an academic medical center. The study had three phases: 1) Baseline evaluation of the unit (December 2002 – February 2003) and 2) Training Sessions: HANDS and NANDA, NIC, NOC (December 2002 and January 2003), conducted simultaneously, and 3) Go-live and continuous evaluation of the HANDS supported care planning process (February 2003 – early 2004). Each phase was characterized by qualitative and quantitative data collection.

Results

Phase 1. Baseline Data Collection

Surveys administered at baseline assessed the nurses' technological competence, their familiarity with the N3 languages, and unit care planning attitudes. These indicated that the nurses in the test unit were comfortable with computers, dissatisfied with the current care planning mode, motivated to improve the care planning, and minimally familiar with the N3 terminologies. Initial observational studies on the test unit examined the nurses' work practices, particularly their documentation practices, the communications during shift change, and the patterns of interaction with both other nurses and health providers. The observations uncovered that to facilitate practice, nurses maintained information about a patient's condition and nursing activities that was never recorded in the medical record. The observations also verified the nurses' survey responses that the care planning process received minimal attention on the test unit. Nurses would select a paper-based care plan from a previously developed set available on the unit and place this in a patient's chart at admission. The care plan was rarely, if ever, referred to again throughout a patient's stay on the unit.

Phase 2. Training Sessions

The training sessions focused on learning the N3 languages and becoming familiar with the HANDS software. These consisted of two 4-hour sessions of in-class instruction and 8 hours of self-learning. Training ended with a competency evaluation: 1) a short answer written test, 2) a competency demonstration on software use, and 3) pair-wise comparisons of nurses independently creating care profiles on a target patient. The written test and software demonstration were both useful evaluation mechanisms. The pair exercises were useful in evaluating inter-rater reliabilities (IRR) of NOC outcome ratings but were less effective in evaluating consistency of N3 term meanings [17]. The IRR ratings on NOC outcomes were similar to those obtained in the NOC evaluation study[18, 19]. A 43% of pair ratings were in absolute agreement and 89% were within one number. In this exercise, 19 pairs of nurses [one observer and one provider] agreed on approximately 46% of the diagnoses, 30%

of the NOC outcomes, and only 20% of the NIC interventions describing the actual care provided[17].

Phase 3. Evaluation of the Real Time Use of HANDS Supported Care Planning Process

Multiple methods were used to evaluate the "real-time" use of the HANDS software and care planning process. These included think-aloud protocols to test the usability of the software, surveys, focus groups, and analysis of transaction logs to examine both the software and the process. Since this was a pilot, our evaluation primarily focused on identifying problems with the HANDS interface and on discovering patterns of usage of the software, terminology, and care planning process across time. In examining usage, we thus were looking for evidence that would support actual utility in practice and ways to improve the care planning process to enhance patient care.

Think Aloud Protocols

During the four months following implementation, 12 "think-alouds" were conducted with nurses to assess navigability of the software and common patterns of data entry. The think-alouds involved recording of the key strokes and verbalizations of nurses entering data into HANDS. Six were conducted with nurses while entering admission care plans and six updating care plans The sample was also constructed to ensure representation of nurses with varying levels of experience (e.g., at least two novices and two experts for each type). These data were valuable in identifying problems with the software that nurses had not otherwise reported. The think-alouds also provided preliminary evidence of different thinking patterns of experts and novices. For example, on admission care plans novices typically entered all NANDA diagnoses first, then all NOC outcomes, and finally all NIC interventions. Experts entered the main nursing diagnoses with its associated outcomes and interventions first and then returned to add secondary diagnoses, outcomes, and interventions. These findings suggest that by studying the HANDS supported care planning process across time we may discover more efficient ways to transfer expert knowledge to novices.

Survey, Interviews, Meetings, Focus Groups

Numerous measures of satisfaction for the HANDS tool and the care planning process were taken over the course of pilot. A focus group was held at month 10 post "go-live." Additionally, unit meetings and individual interviews were conducted throughout the deployment. There are three findings of note from these data. First, one of the major causes of dissatisfaction was the location of the software. The HANDS software was available on two computers in the nurse "break" room, a difficult and noisy location for the day shift nurses to conveniently access the software and enter data. Second, the application resided on two computers that were not networked so no access to patient laboratory and test results was readily available, making data entry more time consuming. Third, the focus group data revealed that the HANDS data were not well enough integrated into other nursing routines, such as report. In spite of these issues, nurses continued to enter the admission or updated care plans at the end of each shift and agreed that the new care planning process was more valuable than the old method.

Analysis of Transaction Logs

We also examined the transactions logs in three ways to identify patterns of term usage and changes to the care plan. First, we contrasted the N3 labels used with the first 35 and last 35 patients through month nine following "go-live" for whom there were admission and discharge visits in HANDS. Second we compared the number of changes made to the updated care plans by shift, by patient, and by nurse. Finally, we examined the number of times the top ten NOC outcomes on patients reached the expected rating at discharge for the first and last 35 patients.

Trends in Label Type Usage

The number of unique N3 terms varied considerably between the first 35 and last 35 patients who had recorded admission and discharge visits in the HANDS database. There were dramatic shifts in the numbers and types of labels (Total N3 types: first 35 patients = 289, last 35 patients = 196) selected in the two time periods suggesting the group had moved toward a deeper shared understanding of the meaning and appropriate application of the terminologies.

Trends in Adjustments to Care Plans Across Time

We also examined the number of voluntary additions and status changes made to the care plans for the first and last 35 patients. We viewed this measure as a means of evaluating the utility of the HANDS care planning process for day-to-day practice. We hypothesized that voluntary changes would in some way indicate the value of the method. The percentage of updated care plans with changes was consistently lower for the last set of patients across all the N3 labels. The number of patients with care plan changes in the designated categories was also lower for the last 35 patients. In line with this trend, lower percentages of nurses made changes to the NANDA, NOC, and NIC categories on the last 35 patients' care plans. When we contrasted nurses average number of N3 changes to update care plans based upon shift worked, 66% of nurses had a lower percentage of changes per care plan on the last 35 patients and 33% recorded a higher percentage. What is unclear about this trend is whether it signifies meaningful stabilization of a mindful process or a return to mindless care planning

Actual vs. Expected Outcome Ratings at Discharge

We also carefully monitored the baseline, expected, final NOC outcome ratings, particularly differences between the expected and final outcomes using the first 35 and last 35 patients to identify change across time. In the HANDS training, nurses were asked to indicate the NOC rating expected of the patient at discharge. Once saved, this expected rating was never displayed to minimize response bias. Thus, we were able to measure how frequently patients actually met the nurse's expected outcome rating. Table 1 provides descriptive data on four of the most frequently selected outcome measures for our test unit with the first and last 35 patients.

Discussion

Three aspects of the pilot were most instructive in the development of the HANDS care planning process and in leading us to our care planning model on collective mind, heedful interrelating to achieve desired outcomes, and mindfulness of problems, outcomes and interventions. These were: 1) the technology must be conveniently located to support ease of access and reliable use, 2) shared meaning about language develops over time through purposeful use and dialogue, and 3) implementing the HANDS method involves a major practice change and consistent attention to ensure that desired behaviors remain in place.

Usage Patterns

We learned a substantial amount from studying term usage patterns such as differences between novice and expert usage and patterns of documentation across time. Most importantly these patterns and focus group data indicated both an increasing level of understanding of the terminologies across time and a tendency toward lower mindfulness in the care planning process. Given a major goal was to ensure ongoing mindful care planning, we have devised new ways to monitor mindfulness in our subsequent studies. Because our users did not regularly discuss the care plans with other nurses and care providers at the hand-off, the degree to which shared meaning of N3 terms developed is unknown. In our current study, heedful interrelating about the plan of care at the hand-off is a requirement. We expect this to reinforce N3 learning and promote shared meaning. More refinement is needed for the measures of inter-indexer consistency and inter-term reliability. This is discussed elsewhere[17]. Most importantly, we learned that much of nursing care is not observable and not captured in time and motion studies.

NOC Ratings

The interrater reliabilities for NOC outcomes were consistently strong; however, there were major discrepancies between the expected and actual discharge ratings (with actual being lower). If valid, this would suggest that patients were being released too early. In focus group discussions, nurses indicated that they did not believe patients were being regularly released early from the ICU. Thus, it is possible that nurses may have misunderstood how to rate the expected outcome and may have assumed it was to be the rating expected at discharge from the hospital rather than from the unit. Clarifying the meaning of documentation parameters is essential to evaluate the meaning of study outcomes.

Increasing Support in Communication Among Nurses

Finally, the pilot confirmed our theory that a dynamic care planning process must be embedded in a rich communication infrastructure. In the pilot, we did not mandate times to discuss the care plan or to share it with other nurses. Through our interviews, observations, and focus groups we determined that not requiring discussion about the care plan seriously limited the impact of the HANDS method. Nurses have very busy schedules; it was naïve to think that they would recognize the value of discussing the plan of care without prompting. Consequently, heedful interrelating about the plan of care was minimal. In our current multi-site study, nurses are required to engage in dialog about the care plan during report.

Conclusion

The results of this study have allowed us to refine our model of a HIT-supported care planning process leading to a safety culture through the development of greater "collective mind," "mindfulness," and "heedful interrelating." In this model, the HIT tool is an external instantiated embodiment of collective mind, sharing nurses' information across space (units) and time (shifts). The HIT tool facilitates memory, documents nursing activities and patient care across shifts to visualize patterns and trends across time, and provides cues for comment and activity. In this manner the HIT tool supports heedful interrelating about and mindfulness of patient conditions among nurses. Heedful interrelating refers to the interactions and dialogue among two or more nurses regarding the care plan or outputs of collective mind. This activity takes place most explicitly during report or handoffs at shift change. Mindfulness is an individual level construct concerning how a nurse thinks about care planning and providing care. Our work also now integrates change theory and safety culture norms[18] recognizing that context is essential for implementing the HANDS method successfully. With a ripe context, mindful care planning, and heedful interrelating about the care plan will take place and support collective mind (HANDS). This external collective mind in turn facilitates effective communication about care that leads to continuity and safe care.

Table 1 Expected Versus Actual Ratings of Top Four NOC Labels for First and Last 35 Patients

NOC terms	Number of patients Assigned NOC term	Mean (Standard Deviation) 1st rating	Mean (Standard Deviation) last rating	Mean (Standard Deviation) expected rating	Number (Percentage) to meet expected
First Patients n=35					
Cardiac Pump Effectiveness	21	2.2 (.8)	3.5 (1.1)	3.7 (1.0)	11 (53%)
Fluid Balance	15	2.2 (.9)	3.6 (1.2)	3.7 (.8)	9 (60%)
Knowledge: Disease Process	13	2.5 (.8)	2.9 (1.1)	4.3 (.5)	2 (15%)
Coagulation Status	12	2.8 (1.2)	3.6 (1.2)	4.4 (1.0)	5 (42%)
Last Patients n=35					
Cardiac Pump Effectiveness	30	2.5 (.8)	2.9 (.7)	4.1 (1.0)	5 (17%)
Fluid Balance	25	2.6 (.9)	2.9 (.8)	4.4 (.6)	3 (12%)
Knowledge: Disease Process	13	2.1 (.5)	2.5 (.7)	4.1 (.6)	0 (00%)
Coagulation Status	16	2.9 (1.0)	3.6 (.9)	4.3 (.5)	8 (50%)

REFERENCES

1. Joint Commission on Accreditation of Healthcare Organizations. 2003 Standards for Home Health, Personal Care, and Supportive Services. Oakbrook Terrace, IL: Joint Commission Resources; 2003.
2. Joint Commission on Accreditation of Healthcare Organizations. 2003 Hospital Accreditation Standards. Oakbrook Terrace, IL: Joint Commission Resources; 2003.
3. Keenan G, Stocker J, Geo-Thomas A, Soporkar N, Barkauskas V, Lee J. The HANDS project: Studying and refining the automated collection of a cross-setting clinical data set. Computers, Informatics, Nursing 2002;20(3):89-100.
4. NANDA International. NANDA nursing diagnoses: Definitions & classification 2003-2004. Philadelphia: NANDA International; 2003.
5. Dochterman-McCloskey J, Bulechek GM, editors. Nursing interventions classification [NIC]. St. Louis, MO: Mosby Inc; 2004.
6. Moorhead S, Johnson M, Maas M, editors. Nursing outcomes classification. St. Louis, MO: Mosby Inc.; 2004.
7. Ngin PM. Organizational analyses of computer user acceptance among nurses. [Dissertation]. Ann Arbor: University of Michigan; 1993.
8. American Association of Colleges of Nursing. The Essentials of Baccalaureate Education for Professional Nursing Practice. Washington, DC: American Association of Colleges of Nursing; 1998.
9. Brown JS, Duguid P. The social life of documents. First Monday 1996;1(1).
10. Roberts J. From Discipline to dialogue: Individualizing and socializing forms of accountability. In: Munro R, Mouritsen J. eds. Accountability: Power, ethos & the technologies of managing. London: International Thomson Business Press; 1996.
11. Heath C, Luff P. Documents and professional practice: 'Bad' organizational reasons for 'good' clinical records. In: ACM Conference on Computer Supported Cooperative Work 1996; Boston, MA: ACM; 1996; 354-363.
12. From G, Pederson M, Hansen J, et al. Evaluating two different methods of documenting care plans in medical records. Clinical Governance: An international journal 2003;8(2):138-150.
13. Coldwell G, Page S. Just for the record. Nursing Management 1996;2(9):12-13.
14. Kerr CM, Lewis DM. Factors influencing the documentation of care. Professional Nurse 2000;15(8):516-519.
15. Webster J. The effect of care planning on quality of patient care. Professional Nurse 1998;14(2):85-87.
16. Scherb C. Outcomes research: Making a difference. Outcomes Management 2002;6(1):22-26.
17. Keenan G, Falan S, Heath C, Treder M. Establishing competency in the use of North American Nursing Diagnosis Association, Nursing Outcomes Classification, and Nursing Interventions Classification terminology. Journal of Nursing Measurement 2003;11(2):183-198.
18. Weick E, Sutcliffe K. Managing the unexpected. San Francisco: Jossey-Bass; 2001.