

THE COMPUTERWORLD HONORS PROGRAM

CASE STUDY

LOCATION:
*New York City, New York,
United States*

YEAR:
2006

STATUS:
Laureate

CATEGORY:
Education and Academia

NOMINATING COMPANY:
Sybase

ORGANIZATION:

Columbia University School of Nursing

PROJECT NAME:

Nurse Practitioner PDAs

Summary

Nurse Practitioners (NPs) are at the forefront of providing primary care to communities traditionally considered underserved from the perspective of socioeconomic status, location, race/ethnicity, or clinical condition. It is vital that NPs are taught to practice in an evidence-based manner and to use available technologies to provide quality care to those at most risk for health disparities. In 2001, Columbia University School of Nursing, initiated a project to develop a personal digital assistant (PDA)-based system to replace the existing paper-based student clinical logs. Because existing software programs such as Patientkeeper did not possess the functionality to capture both the medical and the nursing aspects of NP care, we decided to design custom software to meet this need. In Phase I, with funding from the Health Services Resources Administration, we designed the NP student clinical log and implemented it in the curriculum across NP specialties. We have overcome significant organizational and technical difficulties to achieve benefits to the NP students, NP faculty, and the patients to whom the students provide care through supporting documentation of clinical encounters, aggregation of data, and provision of benchmarking reports based upon those data. As detailed in the sections that follow, these data are essential for ensuring that the NP students are providing high quality care.

In Phase II, which is currently in process, we have added decision support functionality to the NP student clinical log system to improve screening and initial management of three prevalent and significant health care conditions: obesity, depression, and tobacco use. Through funding from the National Institute of Nursing Research, we are conducting a randomized, controlled trial to assess the impact of this system of rates of screening and adherence to guideline-based care. During the course of our trial, it is anticipated that more than 100,000 persons will be screened. Consequently, there is the potential to positively impact the quality of care of the underserved populations to whom our students provide care.

Introductory Overview

Nurse Practitioners (NPs) are at the forefront of providing primary care to communities traditionally considered underserved from the perspective of socioeconomic status, location, race/ethnicity, or clinical condition. It is vital that NPs are taught to practice in an evidence-based



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Benefits

The NP Student Clinical Log System during Phase I provided advantages to NP students, NP faculty, and the patients to whom they provide care through supporting documentation of clinical encounters, aggregation of data, and provision of benchmarking reports based upon those data. In the current phase, Phase II, an additional advantage is provided through provision of clinical decision support screening and management for three highly prevalent and significant conditions: obesity, depression, and tobacco use.

In order to potentially benefit others beyond our organization and the patients to whom we provide care, we have disseminated our approaches through presentations and journal publications so that others can replicate them. For example:

Bakken S, Cook, SC, Curtis L, Desjardins K, Hyun S, Jenkins M, John R, Klein WT, Paguntalan J, Roberts WD, Soupios M. Promoting Patient Safety Through Informatics-based Nursing Education. *International Journal of Medical Informatics* 2004;73(7-8):581-589.

Desjardins K, Cook SC, Jenkins ML, Bakken S. Effect of an Informatics for Evidence-based Practice Curriculum on Nursing Informatics Competencies. *International Journal of Medical Informatics*; 2005;74(11-12):1012-20.

Bakken S, Jenkins M, Choi J, Hyun S, John R, Joyce M, Lee N-J, Roberts WmD, Soupios M. Usefulness of a Personal Digital Assistant-based advanced practice nursing student clinical log: Faculty stakeholder exemplars. 9th International Congress on Nursing Informatics, Seoul, Korea (in press).

Lee N-J, Bakken S. Preliminary analysis for the development of a PDA-based decision support system for the screening and management of obesity. 9th International Congress on Nursing Informatics, Seoul, Korea (in press).

Choi J, Bakken S. Creation of a gold standard for validation of a computer-interpretable depression screening guideline. 9th International Congress on Nursing Informatics, Seoul, Korea (in press).



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The Importance of Technology

Personal digital assistants and synchronization software (OneBridge) were essential to our project. The previous paper-based approach to NP student clinical logs did not support aggregation of data across student or over time. Moreover, the paper-based approach precludes the provision of decision support at the point of care. Because our NP students practice in underserved areas with variable access to technology, it was vital that we provide a stand alone solution that could be later synchronized with our central data repository.

Originality

The exceptional aspects of our project include its focus on NP care in underserved communities and the decision support provided for screening and management of three highly prevalent and significant health conditions: obesity, depression, and tobacco use.

Our project is original in three ways. First, to the best of our knowledge, it was the first PDA-based system designed to support documentation of both medical and nursing aspects of NP care. Second, it is the first randomized, controlled trial of a decision support system for NPs. Third, our application is based upon evolving health care data standards for standardized terminologies and clinical document architecture.

Success

Our PDA-based NP Student Clinical Log benefits three groups of stakeholders: NP students, NP faculty, and the patients for whom care is provided. In the following paragraphs, the impact of Phase I of our project which focused on documentation of clinical encounters is described. This is followed by a brief description of Phase II in which we have added decision support for three significant conditions: obesity, depression, and tobacco use.

Of prime importance is the impact on patients. Encounter-level data collected during the last few years via our PDA-based NP student clinical log indicate that the NP students primarily care for racial and ethnic minorities typically considered to be underserved. NP students documented 71,664 encounters during an 18-month period of time. Race/ethnicity distribution in the encounters was: Hispanic – 46.2%, Non-Hispanic White – 25.8%, African American – 20.9%, Asian/Pacific Islander – 3.7%, Other – 2.8%, Native American - <1%. Almost half (49.5%) of the encounters had an expected payment source of Medicaid (35.3%) or Medicare (14.2%) with only 20.6% indicating private insurance. Age distribution was: under 18 – 48.4%, 18-49 – 30.1%, 50 and older – 21.5%. The number and types of medical diagnoses (n=130,106) and nursing diagnoses (n=38,525) documented in these encounters provide evidence of the morbidity in the population to whom APN students deliver care. Medical diagnoses included: asthma (n=3,304), hypertension (n=2,638), diabetes (n=2,115), cardiovascular disease (n=1,961) and premature infant (n=1,683). Other diagnoses related to acute, minor illnesses such as upper respiratory infections (n=2,907) and urinary tract infections (n=826), health maintenance such as well child care (n=13,559) and gynecological examination (n=3,841), and life processes such as pregnancy (n=2,120). Frequently documented nursing diagnoses were: Knowledge Deficit: Safety Precautions (n=5,724); Knowledge Deficit: Disease Process (n=4,554); Knowledge Deficit: Therapeutic Regimen (n=3,450); Knowledge Deficit: Medication Regimen (n=2,866), and Noncompliance: Medication Regimen (n=2,482). Treat-



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ments included 66,348 medications and 344,132 teaching and counseling interventions. These data support not only the medical and social vulnerability of the community, but Columbia University School of Nursing's commitment to the community.

NP students benefit from the student clinical log by having a tool that supports data entry in a manner consistent with faculty expectations and from which they receive individual reports about their performance. This allows them to critically examine the care that they provide over time and across patients. Moreover, the summative portfolio from the clinical log database has been helpful in some instances in securing employment.

The three following exemplars illustrate the manner in which data allow faculty and program directors to examine NP student performance.

Pediatric Asthma Care

We examined the quality of pediatric asthma care provided by Pediatric NP students in 60 encounters with asthma as a diagnosis. Seventy-four prescriptions were associated with the 60 encounters: 50% bronchodilators and 26% anti-inflammatory agents. The most frequently occurring intervention was teaching (n=78), with 39 teaching interventions specifically focused on medication actions and adherence. Influenza vaccination was judged to be appropriate in the encounters. There was no use of spirometry documented in the encounters. In this instance, the Program Director used these data to remediate selected student deficiencies and to reinforce the significant aspects of a pediatric asthma plan of care.

Acute Care NP Procedures

We compared Acute Care NP students (n=8) in the number of procedures completed and the level of independence in the procedures. The range of the number of independent procedures was: continuous positive airway pressure (CPAP) - 0-23, central venous pressure catheter insertion (CVP) - 0-5, lumbar puncture - 0-4, thoracentesis - 0-1, and ventilator management - 0-56. In addition to revealing the variation in student experience, the data show that as a group the students are getting plenty of opportunity to do respiratory procedures (CPAP and ventilator management), but not other essential procedures. These data served multiple purposes. First, the Acute Care NP Program Director used these data to communicate with students and their preceptors regarding student learning needs during the final clinical rotation. Second, the cumulative procedure data were provided to Acute Care NP students along with other data for sharing with prospective employers.

Women's Health NP Diagnostic and Screening Procedures

We summarized the diagnostic and screening procedures provided by Women's Health NP students in 1517 encounters for 1449 patients. Most patients were age 18-49 and White (42%) or Hispanic (36%). Most diagnostic and screening procedures were related to obstetrical/gynecologic concerns: pap smears (n=403), Chlamydia cultures (n=238), and pregnancy tests (n=102). Only a few general diagnostic and screening procedures were documented: mammogram (n=39), total lipid profile (n=7), stools for occult blood (n=3) and colonoscopy (n=1) in those >50. The top five reasons for visit were: gynecological exam (n=419) pregnancy-normal state (n=280), contraceptive management (n=147), vaginitis (n=79), and urinary tract infection (n=46). Although these data are not longitudinal, they suggest that Women's Health NP students are either under-ordering general diagnostic screening procedures or are not documenting them in the clinical log. This is of concern given that Women's Health NPs serve as primary care



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providers for some women. These data were of use to faculty in discussing with students the relevance of obstetrical/gynecologic and general diagnostic and screening procedures in Women's Health NP practice.

In Phase II, funded by the National Institute for Nursing Research, our project is focused on providing decision support related to three clinical practice guidelines (CPGs): smoking cessation, obesity management, and depression screening. Informatics tools that integrate CPGs into point of care documentation have demonstrated improved adherence to recommendations, but for the most part these tools have been integrated into desktop rather than mobile systems. The overall goal of this project is to determine if mobile decision support improves adherence to selected CPG recommendations by comparing the effect of the NP student clinical log with decision support vs. without decision support on screening for obesity, depression, and tobacco use and adherence to CPG-based management of those conditions. Such tools have the potential to increase CPG adherence, enhance evidence-based practice, promote patient safety, and in the long term improve patient outcomes.

The level of acceptance of the innovation has varied across NP specialties. In specialties in which the program director was part of the design team (i.e., Pediatric NP and Acute Care NP), the NP student clinical log has been more easily integrated into the specialty curriculum. In other specialties, the use by NP students and faculty has been less enthusiastically accepted. However, all specialties are participating in Phase II of our project. We continue to use an implementation model that includes initial rollout in specialties that had faculty as part of the design team and then subsequent implementation in other specialties.

Difficulty

Since we secured external federal funding for our project, we had access to adequate resources and expertise. Our primary obstacles were organizational and technical. In terms of organizational issues, despite support from the Columbia University School of Nursing administration, there was differential integration of the NP student clinical log into the NP specialty curriculum. We continue to work on three levels to increase use of our system: 1) top-down with the administration, particularly with those with oversight for curriculum; 2) educating program directors and faculty about the project and engaging them to improve the reports that they receive; and 3) providing training and user support for NP students. In terms of technical issues, our primary problem has related to data synchronization between the PDA and the data repository. As our project has evolved, our application development environment, database, and synchronization software have also undergone changes – sometimes resulting in compatibility issues and necessitating workarounds to keep our NP student clinical log system operational. To deal with this issue, we have increased the level of expertise on our project team and worked with our synchronization software vendor (iAnywhere) through their consultation services to optimize performance with our current set-up and to prepare for upgrades in the various components that support our system.

Approval was based on securing funding from external agencies. The first four years of funding was provided by the Health Services Resources Administration (HRSA). The current funding that supports a randomized controlled trial of our PDA-based decision support system is from the National Institutes of Health, specifically the National Institute of Nursing Research.