Enhancing Nursing Informatics Competencies and Critical Thinking Skills Using Wireless Clinical Simulation Laboratories

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Abstract. Nursing students at New York City College of Technology are assigned client care experiences that focus on common alterations in health status. However, due to the unpredictability of client census within any healthcare facility, it is not possible for all students to have the same opportunity to care for clients with specific medical conditions. But with the use of patient simulators in a dedicated Clinical Simulation Laboratory setting, students can be universally, consistently, and repeatedly exposed to programmed scenarios that connect theory with the clinical environment. Outcomes from using patient simulators include improved nursing knowledge base, enhanced critical thinking, reflective learning, and increased understanding of information technology for using a Personal Digital Assistant and documenting care by means of an electronic Patient Record System. An innovative nursing education model using a wireless, inter-connective data network was developed by this college in response to the need for increasing nursing informatics competencies and critical thinking students in preparation for client care.

Keywords: nursing education; nursing care planning; nursing process; educational technology; nursing informatics

1. Introduction

The healthcare industry is undergoing dynamic changes from system reorganization to using information technology across the spectrum of healthcare delivery [1]. The healthcare workforce must be educated in new ways to meet clinical and regulatory challenges for providing safe, quality patient care. US healthcare organizations now expect graduating nurses to be familiar with using computers and information technology to improve patient care outcomes. According to current research, reduction in client mortality rates and better client care occur when better educated nurses provide direct client care. NYCCT is responding to meet these care concerns by incorporating technology that employs action-research models across the nursing curriculum [1]. The technologies that the student nurses encounter in these programs will be similar to the technologies they will encounter in their practice environments.

2. Objectives

Many nursing programs throughout the US are adapting patient simulators to improve nursing education. Adapting this technology presents great difficulties for teaching institutions as well as for their faculty. For the institution, there are high costs for initial purchase, setup, space, development, and ongoing technical support, in addition to, encouraging faculty to integrate simulators into their curricula [1, 2]. For these reasons, the use of patient simulators is generally slow and fragmented. However, the NYCCT Department of Nursing responded to these educational challenges by proposing a project that offered a comprehensive approach to teaching nursing competencies and the development of critical thinking skills through problem-based learning [3] "This is a form of active learning whereby students are required to learn the material and apply it to a problem". [3] A Clinical Simulation Laboratory (CSL) was planned to integrate information technologies and nursing education activities, focused on problem-based learning, through a wireless data network high-tech patient simulators, wireless Personal Digital Assistants (PDAs), and an online Patient Record System (PRS). CSL activities were combined with course tutorials patterned on the content and focus of the National Council Licensure Examination (NCLEX) Preparation Program that prepares students for taking the Registered Nurse examination, a state licensing requirement for practicing nurses. The critical thinking skills that students gain from guided care scenarios in the CSL also address dynamic changes occurring within the healthcare industry focused on evidence-based patient care management using advanced information technology.

3. Materials and Methods

The CSL project builds upon successful outcomes of the 2007 to 2008 pilot project funded by means of federal and college sources. During that project, the Department of Nursing at NYCCT developed an integrated approach for the CSL using wireless connectivity technology for patient simulators, an online patient record system (developed by the Department of Nursing), PDAs, and laptops.

PRS data were collected by students in their clinical sections and entered at the college by means of networked computers connected to a database server. Patient simulator scenario parameters, such as vital signs and other medical data, match the data fields in the PRS. The PRS includes physician order documents, laboratory test results, and Xray images corresponding to disease entities used for scenarios, for example, pneumonia. Students and/or faculty are able to update patient simulator records by documenting nursing care that they provide within each care scenario with either a PDA or notebook computer at the bedside in the CSL.

Individual patient simulator scenarios were developed for clinical courses and were based upon the skills and knowledge included in current NCLEX examination content. In the future, there will be a centrally located, modular nursing station, configured into a radial cluster of client/patient simulators reflecting a modular configuration for client care. Students will be exposed to a group of simulators, each with its own scenario, clustered around this nursing station. Each client simulator will present a different scenario, but the simulator group will provide student care experience concerned with the management and prioritization of client care that might include:

- Delegation of care, based on multiple scenarios. Students must delegate care to match caregiver, i.e., experienced RN, graduate RN, and other healthcare staff, to client care needs.
- Sequencing of care in multiple scenarios such as administration of medication for the group based on a time-dependent schedule.
- Sequencing of care in single simulations where decisions must be made as to sequence of care.
- Assessing and gathering care materials and supplies that apply to patient care, that is, given a scenario with various treatment interventions, students must select all material and supplies that are applicable to each intervention.

At regular intervals throughout this project, faculty received instructional and technology training sessions to present patient simulator usage and to report project updates. Strategies for integrating the various technologies into the curriculum continued to be discussed and developed.

4. Results

By the completion of the Spring 2008 semester, a total of 13 second and third semester nursing students completed the pneumonia scenario using the patient simulator. Each student was given a pre-scenario and post-scenario test using NCLEX format questions to measure their knowledge about pneumonia before versus after they completed the scenario. The average pre-scenario test score for this group was 71% while the average post-scenario test score was 85% - an increase of 14%. Data analysis using a paired t-test showed that there was a significant (p = 0.0398) increase in post-scenario test scores after completing the clinical simulation. The students in this pilot study also reported that the simulation was a positive experience that increased their knowledge about caring for a client with pneumonia.

5. Conclusion

Results obtained from the pre-scenario and post-scenario tests were encouraging and showed that, at least in this model, clinical simulations are a creative and effective means of promoting critical thinking as well as enhancing clinical skills in nursing education through problem-based learning. Future plans are to expand the number of scenarios and to integrate them throughout the nursing curricula, in other college nursing laboratories, classrooms, and ultimately, online for home study assignments within all nursing programs. It is anticipated that NCLEX pass rates will similarly be affected and improved.

References

- [1] Ref Billings DM, Halstead JA. Teaching in nursing: a guide for faculty. St. Louis: Elsevier Saunders; 2005.
- [2] Jeffries PR. Simulation in nursing education: from conceptualization to evaluation. New York: National League of Nursing; 2007.
- [3] Richardson K. Trudeau, KJ. A case for problem-based, collaborative learning in the nursing classroom. Nurse Educator. 2003 March/April; 28(2): 83-8.

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