Evaluation of Three-Dimensional Computerized Simulation: Innovative Pedagogy to Prepare Graduate Nursing Students for Clinical Practice

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Introduction

- Transitioning graduate nursing students from general practice to advanced practice in a complex healthcare environment can be challenging.
- Decreased availability of clinical preceptors, mentors, and clinical sites.
- Increased patient acuity, provider workload, and number of graduate students.
- Students are entering into clinical practice unprepared in patient assessment, diagnostic reasoning, clinical decision making, and team participation.
Purpose and Design

- Evaluate the use of a computerized simulation program as one pedagogy to prepare graduate nursing students for clinical practice.
- Literature search: Nursing education, computerized simulation/technology, and interactive learning.
- Students were surveyed before and after using a three-dimensional computerized simulation program specifically designed for health assessment each semester; study conducted for three consecutive semesters.
- Surveys were eliminated if all questions were not answered or if both pre and post surveys were not completed.
- Formative evaluation conducted at the end of the semester.
Three Dimensional Computerized Simulation (TDCS)

- On-line cost-effective interactive program that simulates real-life nursing experiences using virtual patients (Avatars)
- Allows unlimited practice at any time in a risk-free environment without compromising patient care
- Requires students to interact with on-line virtual patients through therapeutic conversation
- Students conduct a health history and physical assessment with an interactive virtual patient avatar and document findings
- Virtual patients are culturally diverse and of various ages
Survey Instrument and Data Collection Process

- Ten question survey using a five-point Likert scale ranging from strongly disagree to strongly agree
- First class day of the semester, before students were introduced to TDCS, students were provided the opportunity to complete the survey
- End of the semester, after using TDCS for fourteen weeks, the same survey was administered
- Students were offered to engage in a formative evaluation at end of semester (advantages and disadvantages of TDCS)
Study Participants

- Graduate nursing students taking Advanced Health Assessment class at a Midwestern University; study duration three semesters (2014-2016)
- Seventy graduate nursing students voluntarily participated
- Eleven surveys were eliminated; fifty nine ($N=59$) participants completed surveys in entirety
- Study approved by University’s Institutional Review Board
Data Analysis

- Null hypothesis: There is not a difference in student learning using TDCS
- Bowkers Test for Symmetry of Disagreement (BTSD) was used to evaluate survey responses
- BTSD verified whether or not the positive changes match negative changes from pre to post survey
- BTSD test represents number of students that showed some level of positive change on the Likert scale; $p$-value = significance of BTSD
- Formative evaluation addressed advantages and disadvantages
Results: Survey Questions (SQ) 1, 2, 3, 4

- SQ 1-4 asked participants to rate their confidence in ability to complete a health history (SQ1); perform a physical exam (SQ2); perform physical exam tests (SQ3); and identify normal and abnormal findings (SQ4).
- BTSD reported 47, 46, 49, and 37 respectively; SQ 1-4 each had p-values of <.0001.
- For example, SQ1, 47 of the 59 participants rated a positive change from pre-survey to post-survey in their confidence in ability to complete a health history (p < .0001).
Results: SQ 5, 6, 7, 8, 9, 10

- SQ5, ease of use of TDCS, BTSD = 47 ($p < .0001$)
- SQ6, virtual patient simulation realistically simulated a real patient, BTSD = 12, ($p < .2367$)
- SQ 7-10, virtual patients allowed me to learn to obtain a health history (SQ7), BTSD = 21 ($p < .0018$);
- Learn advanced physical assessment skills (SQ8), BTSD = 18 ($p < .0062$);
- Synthesize data and develop differential diagnoses (SQ9), BTSD = 26 ($p < .0018$)
- Reflect on my performance, skills, and assumptions (SQ10), BTSD = 27 ($p < .0001$)
Results: Formative Evaluation

Advantages

- Therapeutic conversation strengthened; learned questions to ask to formulate differential diagnosis
- Prepared for class
- Received immediate feedback
- Could use program at any time
- Health history, cardiac, and pulmonary modules most popular for usefulness

Disadvantages

- Modules took too much time
- Needed to ask the patient multiple questions to discover patient problem
- Questions needed to be phrased in a specific way for patient to answer
- Too much documentation required for each module
Results
Reject Null Hypothesis

- Statistical analysis of the surveys and review of formative evaluations resulted in rejection of the null hypothesis: TDCS did not affect clinical preparedness of graduate nursing students.
- Overall results were significantly significant for use of TDCS.
Discussion

- Traditional methods of practicing skills during clinical rotations or during new job orientation without jeopardizing patient care is becoming increasingly difficult
- Imperative graduate nursing students are entering into practice well prepared
- There is a lack of empirical evidence in the literature related to preparation of graduate nursing students
- Findings contribute to a body of evidence that is lacking
Implications for Nursing

- TDCS offers opportunities for taking patient health history, physical assessment, and documentation in a risk-free safe environment
- Common and uncommon situations that may be encountered can be practiced before entering the clinical environment
- TDCS could also be of benefit in other healthcare teaching environments including orientation
Recommendations

- TDCS is one pedagogy for preparing graduate nursing students for clinical practice
- Enhance patient avatar to simulate real patients
- Further evaluative studies are needed on the use of TDCS
- Further study is required in innovative pedagogical methods to prepare nursing students for practice
Conclusion

Integrative literature review supports the need for testing innovative pedagogy to prepare students for clinical practice.

Studies have demonstrated that computerized simulation may be beneficial in student’s perceived self-efficacy in a variety of skills.

Using $p$ values from BTSD, survey findings demonstrated that nine of ten questions were statistically significant (values ranging from $p<.0001$ and $p<.0062$) for use of TDCS to prepare graduate nursing students for clinical practice.

One question was not statistically significant ($p<.2367$): Virtual patient simulation realistically simulated a real patient.
References


