The Effectiveness of Simulation in Increasing Nursing Student's Knowledge Regarding Their Role in Adverse Drug Events in an Undergraduate Medical-Surgical Theory Course

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Background

- High alert medications have the potential to cause harm to patients with increased frequency and a greater degree of adverse effects. An estimated 1.5 million preventable adverse events occur yearly in the U. S. at an estimated cost of $3.5 billion in additional costs to hospitals.
- Reversing the trend of inefficient medication management should not only include reducing errors, but identifying the root cause and implementing changes.
- Pharmacology and medication administration are two crucial areas of nursing education contributing to the knowledge and patterns of behavior nurses develop as primary caregivers with significant responsibilities for medication administration.
- Nurses practice at the point of care and represent the greatest opportunity to intervene and mitigate the risk and potential harm to patients .
- Nursing students do not have the experience to fully comprehend the impact of systematic measures to ensure patient safety.
- Nurse educators must revise the teaching learning strategies for students to understand their role and responsibility in patient safety.
- High fidelity patient simulation has become an integral part of nursing education. The simulated environment parallels the clinical environment, but allows students to practice without the possibility of harm.
- The debriefing component of simulation offers an opportunity for reflection and recognition by students of their knowledge and understanding of the situation.

Purpose

- Measure the effectiveness of simulation on the student's ability to recognize risk factors related to adverse drug events
- Measure the effectiveness of simulation on the student's ability to identify errors and harm related to adverse drug events
- Measure the effectiveness of simulation on the student's ability to mitigate harm related to adverse drug events

Results

Data were analyzed using SPSS version 23 software, using descriptive statistics and a mixed design ANOVA with one between factor and one repeated factor. For this study, effectiveness of simulation was operationalized as the level of student performance on a pre-test post-test after teaching was completed. The overall mean of the pre-test post-test for the simulation and the non-simulation group are presented in the table below:

Table 1. Student Pre-Test Post Test Results

	Group	n	Mean	Standard Deviation
Pre	Simulation	30	59.67	13.767
	Non-Simulation	34	56.47	16.121
Post	Simulation	30	73.33	14.46
	Non-Simulation	34	69.41	9.51

- This indicates that both groups scores increased between the pre-test and the post-test. The mixed design ANOVA indicated that there was a significant increase in the pre-test post-test scores for the simulation group (M difference =-13.66, SD 13.77 and also a significant increase in the pre-test post-test scores for the non-simulation group (M difference=-12.94, SD 13.14) $F(1, 62)=62.44$, $p=0.000$.
- The between subjects test was conducted to compare the effect of simulation on the simulation group's post test scores. There was not a significant difference $F(1, 62)=1.428$, $p=.237$. The interaction between subjects was not statistically significant, $F(1, 62)=0.466$, $p=.830$. These findings suggest that there was no difference between the simulation and the non simulation group.

Discussion

- Both the simulation and non-simulation groups scored higher on the post-test, with the simulation group scoring slightly higher, although we did not find the results statistically significant. However, the students anecdotal comments (*this made it real, It made me really think about how important medication administration is, I didn't realize how many decisions I would have to make*) led the researchers to believe that the students in the simulation group were more aware of their role in administering high risk medications.
- The disconnect leads the researchers to question if the post-test was able to adequately capture the higher ordered thinking which the students exhibited during simulation and debriefing. Prior to this study the majority of research studies measured the satisfaction with simulation, but only a few reported measuring the effectiveness of simulation. Are examinations really the best way to measure simulation effectiveness? Did the time difference in time between the post-test administrations of the two groups affect the outcome?

Recommendations

- Further research with increased sample size needs to be conducted to investigate the use of simulation in increasing student's knowledge of their role in preventing adverse drug events.
- Explore methods other than examinations to capture the effectiveness of simulation in a non-traditional setting.

Methodology

- A quasi–experimental design was used with one repeated factor (pre-test, post-test) and one between groups (lecture, lecture + simulation).
- The sample consisted of sixty-four, second semester nursing students enrolled in the first medical surgical course within an undergraduate curriculum.
- University IRB approval and informed consent was obtained.
- Participants were randomly assigned into either the simulation group or the non-simulation group.
- The pre- and post-test were instructor created, consisting of 10 multiple choice questions designed to recognize risk factors, early signs and symptoms, and appropriate nursing action to intervene in adverse drug events.
- The pre-test was administered to both groups prior to the lecture.
- At the conclusion of the lecture the non-simulation group was administered the post-test.
- The simulation group proceeded with the simulation learning.
- Simulation scenarios lasted approximately 15-20 minutes. Students not actively participating in the scenario observed the simulation scenarios via live streaming video.
- A total of 3 simulation scenarios were conducted.
- The situational simulation scenarios were developed based on the learning objectives which focused on three of the high risk medication classifications (anticoagulant, insulin and opioids).
- At the conclusion of the scenarios, a debriefing was held after each simulation, and a post-test was administered to the simulation group.

References

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