Title:
Patient-Centered Teaching Increases Medication Calculation Accuracy of Baccalaureate Nursing Students

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Session Title:
Reducing Medication Errors in Education
Slot:
F 10: Monday, 30 October 2017: 9:30 AM-10:15 AM
Scheduled Time:
9:30 AM

Keywords:
Experiential Learning, Medication Calculation Teaching/Learning and Reducing Medication Errors

References:
Fleming, S., Brady, A., & Maloney, A. (2014). An evaluation of the drug calculation skills of registered nurses. *Nurse Education in Practice*, *14*(1), 55-61.

Grugnetti, A. M., Bagnasco, A., Rosa, F., Sasso, L. (2014). Effectiveness of a clinical skillsworkshop for drug dosage calculation in a nursing program. *Nurse Education Today*, *34*(4), 619-624,

Stolic, S. (2014). Educational strategies aimed at improving student nurses' medication calculation skills: A review of the research literature. *Nurse Education in Practice*, *14*(5), 491-503.

Abstract Summary:
Experiential teaching strategies have been advocated to teach baccalaureate nursing students medication calculations. The experiential teaching methodology had a significant effect on the medication calculation ability of the nursing students, compared to a traditional teaching strategy with significant reductions in conceptual, computational, and conversion errors.

Learning Activity:

LEARNING OBJECTIVES	EXPANDED CONTENT OUTLINE
The learner will be able describe experiential teaching/learning strategies to increase medication calculation ability of nursing students.	Description of the holistic approach of experiential learning that keeps the numbers within the context of patient centered care from medication preparation, assessments, administration, and post-assessment, and documentation.
The learner will be able to identify the effectiveness of using experiential teaching/learning strategies in reducing conceptual, conversion, and computational errors.	Provide outcome data that shows potentially life-threatening error reductions in computational, conversion, and conceptual errors using experiential teaching/learning strategies compared to traditional ones.

Abstract Text:

Purpose / Aim. The objective of the study was to determine if an experiential teaching strategy compared to a traditional one would increase the medication calculation accuracy of baccalaureate nursing students (BNS) enrolled in a nursing skills course at a private liberal arts college in the northeast United States.

Background / Rationale Traditional teaching methods in nursing education have not been effective in reducing calculation errors worldwide. A contributing factor is the students' inability to perform basic mathematical operations needed to solve problems. The literature has focused on math skills and on the number and types of calculation errors being made with conceptual ones being the highest. Experiential strategies have been advocated to facilitate competency by keeping the numbers within a clinical context.

Method. A pretest-posttest design with blind random assignment of 76 volunteer BNS into equal size control and experimental groups. Both groups were taught for 45 minutes each week over the semester. The control group was taught using a traditional method of lecture. The experimental group was taught using active teaching strategies. Calculations were taught within a clinical context that required clinical reasoning and critical thinking to make a determination if the medication was to be given based on simulated patient scenarios. Practitioners' orders, medication administration records, calculations based on drugs available, preparation of dosages, patient assessments, laboratory findings, and documentation were included. The students were exposed to different ways of calculating dosages with the emphasis on simple and mental math and choosing the formula that consistently produced the correct answer. Descriptive and inferential statistics were used to analyze the 10-item pretest and posttest scores and basic math ability using the TEAS-V.

Results / Outcomes. The nursing students committed a total of 548 errors on the pretest and 58 errors on the posttest indicating an 89% reduction after being exposed to a teaching intervention. The experimental group reduced the number of errors by 93% compared to 75% of the control group. The paired t-test $(t = -.312, df = 37, p = .004, CI = 95\%$ (-16.62, -3.32 indicated that this was a significant difference. The control group ($n = 24$) made 28 conceptual, 8 conversion, and 7 computational errors. The experimental group made 5 conceptual, 3 conversion, and 5 computational errors. Groups were compared prior to interventions on basic math and medication calculation ability. There were no significant differences between the experimental and control groups on their TEAS-V math scores and pretest medication calculation scores using a two tailed paired t-test. Basic math ability was found to be correlated with medication calculation.

Conclusion. The experiential teaching methodology had a significant effect on the medication calculation ability of the nursing students, compared to a traditional teaching methodology with a reduction in conceptual, computational, and conversion errors.

Recommendations for Nursing Education. Teaching and learning strategies that actively engage students in real life patient situations should be developed to foster critical reasoning and critical thinking. Within this context, calculations are not separated from the patient. Reducing potentially life threatening errors needs consistent methodologies throughout the program. Pre-med, pre-dental, physician assistance, and nursing students frequently take courses together, interdisciplinary collaboration in developing mathematical and calculation competency could be integrated in these courses. Students would be exposed to the importance of patient safety is an inter-disciplinary responsibility. Basic mathematical competency needs to be assessed upon admission.