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Review Article

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1. Abstract

Objective: To increase critical thinking in perinatal nurses caring for patients with preeclampsia, with the support of key nursing, education, and medical leadership, an evidence-based practice.
Design: Quantitative, Descriptive study.
Setting: Metropolitan area of New York.
Participants: A total of six nurses were involved at a time: two from antepartum, two from labor and delivery, and two from postpartum.
Methods: This included 45 minutes for completion of the CCTST, a one-hour lecture supplemented with PowerPoint slides and two studies, two hours engaged in the simulation, 30 minutes for debriefing, and 15 minutes for a post-CCTST.
Results: The test results indicated that there was a significant difference between pre-test and post-test scores. A paired-samples t-test was used to examine the difference between pre-test and the post-test CCTST analysis scores, as reflected in Table 4. The analysis score increased from pre-test to post-test by 0.75 points; the difference between the scores was statistically significant ($t(15) = -3.50$, $p < .01$).Simulation increased critical-thinking skills in perinatal nurses in all domains as measured by the CCTST overall scores and the scores in the areas of analysis, evaluation, inference, inductive reasoning, and deductive reasoning.
Conclusion: The simulation was a successful EBP change project that increased nurses' critical thinking and delivered and evaluated evidenced-based care to improve patient outcomes. Simulation increased critical-thinking skills in perinatal nurses.

Keywords: Critical thinking, Perinatal nurses, Key nursing, Education and medical leardership, An evidenced based practice.

2. Introduction

Providing safe, quality nursing care to pregnant and postpartum women necessitate the efficient use of critical-thinking skills. Comprehensive assessments that are focused on early identification of the symptoms of preeclampsia enable prompt intervention, thus maximizing prevention of serious complications for both the mother and her baby. This paper describes the use of simulation to increase critical thinking of perinatal nurses caring for women at risk for preeclampsia. This word details the background, significance, and question that guided the inquiry into the literature. All acts in nursing are profoundly significant and require of the nurse a mind fully engaged in the practice of nursing. This is the challenge of nursing: critical, reflective practice, based on the sound reasoning of intelligent minds committed to safe, effective client care.

3. Overview of the Problem

Background

Hypertension in Pregnancy (HIP) is divided into clinical subsets of the disease based on end-organ effects. According to Brown (2013), HIP progresses along a continuum that includes gestational hypertension (GH), preeclampsia, eclampsia, and Hemolysis, Elevated Liver Enzymes, and Low Platelets (HELLP) [1]. Preeclampsia is a vasospasm disease characterized by GH and proteinuria [2]. GH, which begins after the 20th week of pregnancy, is a hypertensive disorder of pregnancy whereby the woman has: 1) a blood pressure elevated at 140/90 mm Hg or greater 2) recorded at least twice, 4-6 hours apart within a 1-week period 3) with no proteinuria [3]. During GH, the presence of edema is no longer considered in the increased risk of preeclampsia, and maternal adiposity is an independent risk factor for preeclampsia [4].

Significance

Preeclampsia, a relatively common complication of pregnancy, is a leading cause of maternal and neonatal morbidity and mortality. The only known cure is the delivery of the placenta. Preeclampsia can occur at any time during the second half of pregnancy or in the first few weeks after childbirth. The incidence of mild preeclampsia is 0.5%, and severe preeclampsia is 2%. This occurs four to five times in 10,000 live births, and it occurs typically in non-Caucasian, nulliparous women with lower socioeconomic status [5]. In teenagers, 15-22% demonstrated no proteinuria pre-seizure, and 16% had no hypertension pre-seizure. Prediction models for adverse maternal outcomes have been developed and validated in recent times. There is a paucity of data to guide the clinician on the timing of delivery to ensure the long-term safety of both the mother and baby [6].

Risk factors for preeclampsia are numerous. Preeclampsia is more prevalent among primiparous women (first-time mothers), especially those younger than 20 years or older than 40 years [7]. Other factors identified include morbid obesity, multi-fetal gestation, chronic renal disease, chronic hypertension, family history of preeclampsia, diabetes mellitus, Rh incompatibility, molar pregnancy, and a previous history of GH [8]. Risk factors may be pregnancy-specific, such as multiple fetuses, whereas others are linked to the woman, such as obesity and diabetes. A previous pregnancy complicated by preeclampsia is one of the strongest risk factors. Overweight or obese pregnant women have a substantially increased risk of preeclampsia, and maternal adiposity is an independent risk factor [4]. The perinatal nurse must understand these risk factors and identify them when conducting patient assessments.

4.Purpose of the Project

A clinical problem that was identified was perinatal nurses lacking critical thinking in treating preeclampsia patients. The purpose of the EBP project was to increase their critical-thinking skills. All nurses working in the perinatal unit attended the program. The program was designed to improve critical thinking through the use of simulation and case studies. The project proposal was approved on August 30, 2014, under exempt status due to the educational nature of the project.

5. Literature Review

Critical Appraisal

The evidence for the practice change project was collected through the following online databases: OVID, Cochrane Library, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PUBMED, and Education Resources Information Center (ERIC). The search criteria focused on the last seven years to obtain the most current research. It was limited to the nursing discipline, with a concentration on critical thinking in perinatal and obstetrical nurses, education, obstetrical emergencies, and competence. There was a significant amount of literature, specifically quantitative research, published on the topics of interest. The criteria considered during this literature search were relevant within nursing, and outcomes were related to patient safety. This included evidence related to measures of critical thinking. There is a lot of literature that supports the integration of simulation to promote safe and efficient learning. The empirical studies chosen for this review provided the most current evidence on the effects of simulation on critical thinking. Outcomes of simulation were evaluated through the use of quantitative method designs in all studies selected [9]. An integrated review of the literature is presented below.

Review and Literature

There is substantial information in the literature associated with the need for simulation to increase critical-thinking skills. Carrera (2013) examined the impact of low-budget, low-fidelity simulation on bedside nursing practice [10]. Carrera suggested that simulation is an effective modality of teaching, especially for adult learners in a perinatal unit where the level of nurse experience ranges from 1 to 30 years. The focus should be not only to determine the nurses' skills and readiness to respond to a crisis but also to establish the nurses' ability to be skilled team players able to practice effective communications. Carrera found that staff readiness was improved by using simulation to define the process, educate, and assess competency; teamwork and communications were also enhanced. Simulation, even on a small budget, can help nurses to prepare for high-risk events with the ultimate goal of a healthy mother and infant. This project proposes changes in role-specific functions and responses, initiating a chain of communication, improving teamwork, redesigning unit practice, and regular multidisciplinary simulations. The environment of the simulation is safe, and mistakes are allowed so that during a real event, staff may be prepared and ready.

Need for Education

The use of simulation and online case studies as a teaching approach contributes to optimizing patient safety and outcomes. Providing nurses with opportunities to experience clinical situations that do not pose a risk to patients allows them not to fear errors. Educators have applied different teaching strategies, including integration of simulation and online case studies, to prepare competently functioning nurses in the health care environment [11]. The use of modern technology, such as simulation, helps promote education and enhances a variety of nursing skills. Lack of adequate education can place the patient at risk, particularly when clinical judgment skills are not entirely developed.

Need for Knowledge

According to Burns (2006), the application of scientific knowledge to the processes of diagnosis and treatment is vital for the protection, promotion, and optimization of a patient's health [12]. This is an essential feature of professional nursing.

Nurses caring for childbearing women have a responsibility to protect the health of both women and their babies. As such, they must be familiar with national guidelines related to the detection and management of women with hypertensive disorders in pregnancy. This guiding definition from Burns (2006) supports the need for nurses to obtain additional knowledge, particularly those working with preeclampsia patients in the clinical setting. Recommendations of the Association of Women's Health and Neonatal Nurses (AWHONN) include: (a) perinatal nurses should assess for any signs of fetal distress, such as abnormal fetal heart rate and variability; (b) careful ongoing measurement of the mother's blood pressure is necessary; (c) laboratory values must be assessed so that any changes can immediately be reported to the midwife or physician; (d) documenting initial and subsequent assessments provides important information for other health care team members; (e) nurses are held accountable for their independent practice and for recognizing signs and symptoms of preeclampsia and progressive deterioration in the patient that require medical intervention; and (f) nurses' assessment and intervention skills are critical for ensuring a safe outcome for both mother and infant [13]. These national standards support the need for increased knowledge of preeclampsia in the clinical setting.

6. Evidence-based Practice Model

The Iowa Model of EBP

The EBP model chosen for this change project was the Iowa Model of EBP. With the Iowa model of evidence-based practice, a clinician can use information or a problem-focused approach to reach an answer [14]. The question that guides the inquiry is based on a clinical problem. The clinician determines if the question is relevant to the organization's priorities. If it is found to be relevant, significant documented evidence is then collected. Once enough evidence has been gathered, the practice change is piloted, which may lead to determining a new method to address the initial question. On the other hand, there may be insufficient evidence available, in which case the clinician records recommendations for further research on the matter. Nevertheless, whether a new practice is developed right away or additional research is suggested, the result is a step forward from current practices [14].

The focus of the development project was to educate nurses about preeclampsia to improve patient outcomes. The Iowa Model was most relevant to the development project. This model identified the following steps: (a) assessing whether a change in practice was needed; (b) locating the best evidence through review of the literature and critically analyzing evidence; (c) designing practice change; and (d) evaluating and implementing change in practice and integrating it, with focus on further improvement. These steps applied to the clinical problem identified and helped guide the transformation project, which served to educate nurses on preeclampsia and improve patient outcomes [15].

Implementation Plan

Setting and Participants

The project took place in an 800-bed medical center in the New York metropolitan area. The labor and delivery unit has a four-bed triage area, eight labor rooms, and a three-bed recovery room. Sixty nurses staff the days and nights, with a total of 900 deliveries being performed annually. The postpartum unit located on the other side of the floor consists of forty inpatient beds and a forty-crib newborn nursery. All perinatal nurses were offered the opportunity to participate in this project, as preeclampsia patients are cared for by both labor and delivery nurses and postpartum nurses.

Recruitment

The simulation sessions began September 1st and were completed on September 29th. Recruitment of participants was performed by pasting the flyer on the bulletin board in the nurses' lounge. The first week of implementation consisted of distributing a flyer and project cover letter to all nursing staff. The project coordinator distributed the cover letter to individual nurses, placed copies of it in the nurses' lounge, and posted the flyer by the elevators to recruit participants. The project coordinator attended the monthly nursing staff meetings and reviewed the cover letter with the nursing staff. Posted the flyer by the elevators to recruit participants. Nurses began to inquire about the project and the registration process. Those who wanted to participate were encouraged to contact the Director of Nursing, who scheduled the staff's attendance at the education sessions.

Participant Demographics

The participants in this EBP project included registered nurses in a medical center metropolitan New York area. These nurses had direct clinical responsibilities in maternal and newborn care. Demographic data were collected through use of the California Critical Thinking Skills Test (CCTST) Insight Assessment and were reported via the CapScore Return Form. Thirty eight nurses participated in educational workshops. One participant was male and 37 participants were female. The age of the participants ranged from 22-48 years. Their years of experience in nursing ranged from 5-30 years. Ten of 38 nurses reported prior experience utilizing simulation.

The author investigated the correlation between pre-test score with the age of nurses, the age range were from 22-48 years. The older nurses need this type of simulations than younger nurses.

Instruments

The first step of the process was to analyze critical-thinking skills using the pre/post-activity CCTST [16]. The tests purchased by the program coordinator were developed by the INSIGHT ASSESSMENT COMPANY to measure critical-thinking skills. The CCTST Form 00.210 consists of 34 multiple-choice items that analyze critical thinking in the following areas: (a) analysis,

(b) evaluation, (c) inference, (d) inductive reasoning, and (e) deductive reasoning. Given in paper-and-pencil format, the test can be completed in 45 minutes. Nurses completed the pre- and post-activity CCTST before and after the simulation. This comparison allowed the project coordinator to assess changes in critical thinking. The data collected included demographic data such as age, gender, highest nursing degree held, and previous experience.

The anticipated outcome was an increase in critical-thinking skills after the educational session. The CCTST was most appropriate because of its extensive use in nursing education [17]. The CCTST has been utilized by several authors in the past to measure validity and reliability of the instrument for critical thinking [18].

Implementation Steps

Participants were given reading assignments and a simulation preparation worksheet before arriving at the simulation lab. Simulation sessions were held each week in the conference room of the medical center, on Mondays and Fridays. Eight sessions were completed, and each session lasted four and a half hours. This included 45 minutes for completion of the CCTST, a one-hour lecture supplemented with PowerPoint slides and two studies, two hours engaged in the simulation, 30 minutes for debriefing, and 15 minutes for a post-CCTST. When the participants arrived at the education session, they were given packets of educational information. This was followed by an introduction and overview of the project, completion of the pre-test CCTST, and participation in a lecture on preeclampsia, which was supplemented with PowerPoint materials. The project coordinator presented the education session.

Following the education session, participants engaged in a simulation activity. During the simulation, the project coordinator played the role of the physician, while the nurse educator observed and made notes to guide debriefings after simulation completion. After the educational lecture, participants engaged in a simulation activity. Different case studies on preeclampsia were then reviewed, and time was afforded for discussion and questions. A total of six nurses at a time - two from antepartum, two from labor and delivery and two from postpartum - were called to the simulation room. This was followed by debriefing and completion of the post-CCTST. The CCTST pre-tests and post-tests were administered in paper and pencil format and were completed in 45 minutes.

Project Evaluation

Demographics: The participants in this EBP project included registered nurses in a medical center metropolitan New York. These nurses had direct clinical responsibilities in maternal and newborn care. Demographic data was collected through the use of the California Critical-Thinking Skills Test (CCTST) from Insight Assessment and reported via the CapScore Return Form. Thirty-eight nurses participated in educational workshops. One participant was male, and thirty-seven participants were female. The age of the participants ranged from 22-48 years. They had from 5-30 years of nursing experiences. Ten of the 38 nurses reported prior experience with simulation.

7. Results

CCTST Form 00.210 was used as a pre-test and post-test. The tool included 34 multiple-choice items that measured critical-thinking in the following five areas: analysis, evaluation, inference, inductive reasoning, and deductive reasoning. Only the overall score and the scores for these five areas were used in this EBP change project. The program coordinator administered the CCTST to perinatal nurses in a pencil and paper format over a 45-minute period. Each question answered correctly was worth one point and the total test score ranged from 0-34, with 34 being the maximum score. Data collected from the CCTST were numerical interval data.

Results for the CCTST Analysis Score

A paired-samples t-test was used to examine the difference between pre-test and the post-test CCTST analysis scores, as reflected in Table 4. The analysis score increased from pre-test to post-test by 0.75 points; the difference between the scores was statistically significant ($t(15) = -3.50$, $p < .01$). Simulation increased critical-thinking skills in perinatal nurses in all domains as measured by the CCTST overall scores and the scores in the areas of analysis, evaluation, inference, inductive reasoning, and deductive reasoning. However, the only statistically significant increases from pre-test to post-test were for the CCTST Analysis Scores. The benchmarks for this EBP were established to determine the effectiveness of the educational intervention. The established benchmark for the CCTST analysis scores was a 0.75 increase from pre-test to post-test. The average post-test score was 0.75 points higher than the average pre-test score. Thus, the benchmark was met for the CCTST Analysis scores.

Table 1
Descriptive Statistics for the Pre-Test Scores

Pre-Test Score	Range	Mean	SD	Median
Pre-Test Overall Score	8.00 to 27.00	13.19	4.53	12.50
Pre-Test Analysis Score	1.00 to 6.00	3.00	1.21	3.00
Pre-Test Inference Score	3.00 to 12.00	7.25	2.43	8.00
Pre-Test Evaluation Score	0 to 9.00	2.94	2.29	3.00

Pre-Test Induction Score	5.00 to 15.00	7.69	2.62	7.00
Pre-Test Deduction Score	2.00 to 12.00	5.50	2.53	6.00

The descriptive statistics for the post-test scores, including the mean, standard deviation, range, and median, are presented in Table 2.

Table 2
Descriptive Statistics for the Post-Test Scores

Post-Test Score	Range	Mean	SD	Median
Post-Test Overall Score	7.00 to 27.00	14.19	5.02	13.00
Post-Test Analysis Score	2.00 to 6.00	3.75	1.12	4.00
Post-Test Inference Score	3.00 to 12.0	7.38	2.50	7.50
Post-Test Evaluation Score	0 to 9.00	3.06	2.20	2.00
Post-Test Induction Score	2.00 to 15.00	7.81	3.29	7.00
Post-Test Deduction Score	2.00 to 12.00	6.38	2.41	6.00

Paired-samples t-tests were used to determine how scores changed from pre-test to post-test and whether the group improved, deteriorated, or stayed constant, and by precisely how much. The pre-test and post-test were coded with the participant identification numbers to compare each participant's pre-test with her post-test. The paired-samples t-test analysis addressed within-group differences over time [17] in the six sets of scores. In this EBP, the program coordinator examined differences in one group over time. In the paired-samples t-test analysis, a Bonferroni adjustment was used. Given the number of t-tests used, a Bonferroni adjustment was used to reduce the alpha to 0.01 (0.05/6); $p < 0.01$ was used as the threshold for statistical significance for these analyses.

Results for the CCTST overall score: The first paired-samples t-test was used to examine the difference between the pre- and the post-activity CCTST overall scores, as reflected in Table 3. The average Pre-Test Overall Score was 13.19 (SD = 4.53) and the average Post-Test Overall Score was 14.19 (SD = 5.02) indicating a mean difference of -1.00. While the overall score increased from pre-test to post-test, the difference between the scores was not statistically significant ($t(15) = -1.11$, $p > 0.05$).

Table 3
Paired Samples T-Test Comparing Pre-Test and Post-Test Overall Score (N = 16)

Pair	Mean	*SD*	S.E. Mean	95% Confidence Interval of the Difference		*t*	*df*	*p*
				Lower	Upper			
Pre-Test Overall Score	13.19	4.53	1.13	2.90	.90	1.11	15	.28
Post-Test Overall Score	14.19	5.02	1.25					

Results for the CCTST analysis score: A paired-samples t-test was used to examine the difference between the pre-test and the post-test CCTST Analysis scores, as reflected in Table 4. The analysis score increased from pre-test to post-test by 0.75 points; the difference between the scores was statistically significant ($t(15) = -3.50$, $p < 0.01$).

Table 4
Paired Samples T-Test Comparing Pre-Test and Post-Test CCTST Analysis Score (N = 16)

Pair	Mean	*SD*	S.E. Mean	95% Confidence Interval of the Difference		*t*	*df*	*p*
				Lower	Upper			

Pre-Test Analysis Score	3.00	1.21	.30	2.90	.90	3.50	15	.003
Post-Test Analysis Score	3.75	1.12	.28					

8. Discussion

Limitations

A small sample of perinatal nurses was used. While 30 nurses participated in the project, only 16 completed the pre-test and post-test questions. The participants that did not complete the tests stated that the stem questions were too long. Perhaps in a future project, providing extra time to read the stem questions will address this issue. A significant limitation of this study was the inability of the simulation equipment to communicate verbally. Incorporation of verbal expression: Noelle simulation would have allowed participants to talk and ask questions, thereby offering more realistic experiences.

Lastly, not all perinatal nursing staff participated in the project. Participation was voluntary; the lack of full participation may have been due to scheduling conflicts. Staff was expected to take part in the education sessions during their regularly scheduled shifts.

Future Implications for Nursing Clinical Practice

This project has several implications for nursing practice, including clinical prevention, health care policy development, methods for interprofessional collaboration, and methods to disseminate findings to help close the evidence-based intervention gap that was discovered in the literature. All of these implications are related to "The Essentials of Doctoral Education for Advanced Nursing Practice." A limitation of this project was a lack of voluntary participation by nurses. Plans could offer continuing education credits for participants, which might be an incentive for participation.

9. Conclusion

The project examined the use of simulation to increase the critical-thinking skills of perinatal nurses caring for preeclampsia patients. It was a collaborative process that required assertiveness, meaningful conversations with stakeholders in the medical center, and an interdisciplinary team approach to the problem. The project coordinator identified underperformances in the perinatal nursing staff in both nursing assessments and interventions concerning preeclampsia patients. The failure to perform prompt assessments and intervene appropriately can result in mother and newborn death. The simulation was a successful EBP change project that increased nurses' critical thinking and delivered and evaluated evidenced-based care to improve patient outcomes.

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