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Beth Karasin  
beth.karasin@shu.edu

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**Improving the Preparedness and Confidence of Healthcare Providers in the Detection and  
Management of Preeclampsia and Acute Stroke in Perinatal Patients: A Quality  
Improvement Initiative**

by

Beth Karasin

DNP Scholarly Project Committee

Dr. Mary Ellen Roberts

Dr. Mary Patricia Wall

Dr. Lauren Eskuchen

Submitted in partial fulfillment of the requirements for the degree of

Doctor of Nursing Practice

Seton Hall University

2024

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College of Nursing  
Graduate Department

APPROVAL FOR SUCCESSFUL DEFENSE

Beth Karasin has successfully defended and made the required modifications to the text of the DNP Final Scholarly Project for the Doctor of Nursing Practice during this Fall, 2024

Final Scholarly Project COMMITTEE

_____	10/16/24__
Dr. Mary Ellen Roberts	Date
_____	10/16/24
Dr. Mary Patricia Wall	Date
_____	10/16/24
Dr. Lauren Eskuchen	Date

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## **Dedication**

*To my husband, Mark and amazing kids, Isabella, Leah, and Harper who have given their  
endless support...*

*&*

*To healthcare providers everywhere who strive to provide the best care possible for the  
community they serve...*

*Thank you*

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## **Abstract**

Pregnancy-related stroke (PRS) is a cerebrovascular injury that occurs during and up to six weeks after pregnancy. This includes hemorrhagic and ischemic strokes, however, regardless of the type, strokes in this special population are on the rise and preeclampsia is a major contributing factor. It is paramount for healthcare providers to not only understand the physiologic changes that occur during pregnancy, but also remain aware of the risk factors, symptoms, and currently accepted management of perinatal preeclampsia and strokes. Aware of the missed opportunities at a single center institution this quality initiative aimed to equip healthcare providers with education in order to increase provider preparedness and confidence in taking care of this special population. This educational offering was delivered to emergency room clinicians and utilized a pre- and post-test, revealing its clinical efficacy. This type of focused education has the potential to serve as a template for other healthcare conditions that require frequent updated information.

*Keywords:* perinatal, preeclampsia, stroke, pregnancy-related stroke

## **Background**

### **Introduction of the Clinically Focused Practice Problem/Issue**

Pregnancy-related stroke (PRS) is a cerebrovascular injury that occurs during and up to six weeks after pregnancy (ElFarra & Martin, 2018). This can be hemorrhagic which includes subarachnoid hemorrhage (SAH), intraventricular hemorrhage (IVH), intracerebral hemorrhage (ICH), or ischemic, resulting from a blockage in the arterial or venous system. Regardless of the type, strokes in this special population are on the rise (Bitar et al., 2023) and preeclampsia is a major contributing factor (Karjalainen et al., 2019). PRS contributes to almost eight percent of maternal deaths in the United States (Browne & Frye, 2021; Elgendy et al., 2021). During pregnancy the body undergoes many physiologic changes; as a healthcare provider, it is paramount to not only understand these changes but also to be aware of the risk factors, symptoms, and currently accepted management of perinatal preeclampsia and strokes.

The Quality Improvement department at a single center institution had identified several opportunities in the detection and logistical management of perinatal preeclampsia and stroke in the emergency department (ED). This Doctor of Nursing Practice (DNP) project was aimed at equipping healthcare providers with education in efforts to increase provider preparedness and confidence in caring for this special patient population.

### **Description of the Project**

This project was conducted by a DNP student practicing as a nurse practitioner with expertise in neurovascular care to provide stroke education for providers caring for this perinatal population and success was evaluated utilizing a pre- and post-test. This quality initiative seeks to answer, “Does providing additional education for healthcare providers on perinatal

preeclampsia and stroke improve preparedness and confidence in the detection and management of these patients?”

### **Project Objectives**

1. To identify and address provider gaps in knowledge in perinatal preeclampsia and stroke populations.
2. To implement provider education utilizing the most current evidence-based practice on perinatal preeclampsia and stroke.
3. To assess knowledge of this education offering on perinatal preeclampsia and stroke through analysis of a pre-and posttest.

### **Significance of the Project for Nursing**

This quality initiative has the potential to affect all levels of nursing. By offering additional education for Advance Practice Nurses (APNs), Physicians Assistants (PAs), and physicians utilizing a stepwise approach, there is the potential to improve preparedness and confidence in the detection and management of preeclampsia and stroke in the perinatal population. Knowledgeable providers who utilize evidence-based practices can, not only translate that education to their patients, but extend it to the nurses caring for those patients at bedside. This knowledge of diagnoses, warning signs, treatment, and management can help nurses educate their patients to understand and advocate for their health in the future.

Collaboration with nursing has the potential to positively impact patient outcomes (Matthys et al., 2017). This coupled with the identification and integration of social determinants of health stands to benefit the community that the hospital serves by improving patient health literacy. Continuing education is vital not only in the pursuit to provide high quality patient care but also to improve skills and competence (Zarei et al., 2022).

## **Literature Review**

### **Explanation of the Theoretical Foundation for the Project**

There were two frameworks, macro and micro, utilized in preparing and executing this quality initiative. The macro framework is the Plan, Do, Check, Act (PDCA) cycle. A four-step approach to continuous process improvement (Johnson, 2016). Starting with problem identification and the proposed plan for change; missed opportunities related to perinatal preeclampsia and stroke occurred most frequently in the ED. This led to planning the additional educational offering tailored to APNs, PAs, and physicians. It was then implemented to the ED on a small scale, in multiple modalities and sessions for convenience. Pre- and post-test was administered for evaluation (Figure 1, PDCA Cycle).

The micro-framework for the development of education is the Outcomes-Activity-Summary Method (Figure 2, O-A-S Method). This method breaks down educational development and considerations into three parts. The first part is outcomes; the educator must consider the learner population, their educational background, the objectives, the goals, and what the student's takeaway should be (van Diggele et al., 2020). Next, is activity; where the educator designs and plans the learning and learning environment. The educator plans a stimulating learning activity to ensure a captive audience (van Diggele et al., 2020). This can mean incorporating, guest speakers, case studies, patient stories, and experiences to drive the learning objectives home. The final part, the summary; finishes with a take-home message, and asks students to identify new points/knowledge/skills learned, making sure the educational session finishes on time (van Diggele et al., 2020). This framework can be applied to both the classroom and clinical setting; it facilitates learning and can be utilized for group teaching (van Diggele et al., 2020).

## **Critique of Empirical Studies Related to the Central Concept of the Project**

To determine what currently exists on the topic, a review of the literature was performed utilizing PubMed and CINAHL, between September 2018-2023. The search terms used were (a) pregnancy; (b) postpartum; (c) perinatal; and (d) stroke. The search was limited to articles published in English from peer-reviewed journals available in the Seton Hall University library collection. The initial search yielded 945 articles, which was further reduced by eliminating duplicate articles and poster abstracts as well as focusing results and research on perinatal preeclampsia and stroke. After careful review and elimination, 75 articles were chosen for critical appraisal. Each study was reviewed for quality; non-research articles, low-level evidence, or articles that did not apply to the target population were eliminated. The studies that met the inclusion criteria and deemed the best evidence on the topic are further discussed.

Browne & Frye (2021) analyzed a patient case of pregnancy-related stroke. They examined the changes that occur during pregnancy and how those changes contribute to stroke. The authors discussed legal considerations when diagnosis and treatment are delayed and the hospital fails to recognize them. Knowledge expectations are reviewed, inclusive of understanding the normal physiological changes of pregnancy, and specific personal health history that may contribute to any pathological condition like stroke and correction of any modifiable risk factors. For risk factors such as elevated blood pressure, it is important to provide education for staff and providers on measuring accurate blood pressure, recognizing severe hypertension/preeclampsia, providing evidence-based treatments in a safe and timely manner, and following established protocols for managing pregnant and postpartum patients with severe hypertension/preeclampsia mandated by The Joint Commission (TJC) to improve the quality and safety of care provided (Browne & Frye, 2021). This case study provides an overview of a single

event and demonstrates the effect education, early identification, and proper management have on perinatal patients.

Bitar et al. (2023) examined the trends of stroke peripartum and assess the relationship between stroke and maternal outcomes and hypertension. This retrospective, cross-sectional design uses the National Inpatient Sample to identify hospitalizations with pregnancy-associated stroke in the United States between 2016 and 2019. The multivariable Poisson regression models were used to examine the association among maternal adverse outcomes, timing of stroke, and hypertensive disorders (Bitar et al., 2023). The results demonstrated an increase in the rate of postpartum stroke. Almost half of hospitalizations with PRS also have hypertensive disorders (Bitar et al., 2023). A major limitation of this study is the utilization of the International Classification of Diseases (ICD) 10 codes as previous studies that evaluate the validity are limited to ICD 9 codes, its strengths include that this is the most recent assessment of the trend of PRS using the National Inpatient Sample (Bitar et al., 2023).

In the case-control study by Keepanasseril et al. (2022), the authors identified the risk factors associated with ICH in preeclampsia between January 2015 and December 2021. Of 124, 473 deliveries, 2,167 women had preeclampsia (1.7%), and of these women, 42 developed ICH. Two-thirds of the preeclamptic women with ICH presented antepartum, the mean gestational age was 34.2 weeks and all presented with seizures, almost half developed a focal neurological deficit (Keepanasseril et al., 2022). The mean interval from the onset of symptoms to ICH diagnosis was 13 hours (Keepanasseril et al., 2022). Keepanasseril et al. (2022) evaluated 19 preeclamptic women with ICH died, most having intraventricular extension or deep ICH. The authors concluded although ICH is rare, it is associated with high maternal mortality rates (Keepanasseril et al., 2022). Awareness and identification of those at risk of preeclampsia, and

complications, early access and decision for neuroimaging for diagnosis, and prompt initiation of treatment must be improved (Keepanasseril et al., 2022). These authors highlight the need for patient and provider education.

The nationwide CONCEPTION study examined 6,297,698 women aged 15-49 years who gave birth in France between 2010 and 2018 with no history of stroke before pregnancy (Martin et al., 2022). Of the 6,297,698 women in the study, 1,261 experienced a first-time stroke during, antepartum peripartum, or the first six weeks postpartum. 42.9% of the 1,261 women who experienced a first-time stroke were ischemic, 41.9% were hemorrhagic, and 17.4% were cerebral venous sinus thrombosis (Martin et al., 2022). Ischemic stroke rates were similar when compared to nonpregnant women (adjusted risk ratio [IRR] 0.9 [0.8-1.1]) (Martin et al., 2022). Pregnant women had a slightly higher occurrence of hemorrhagic strokes (IRR 1.4 [1.2-1.8]) and a considerably increased rate of cerebral venous thrombosis (CVT) (IRR 8.1 [6.5-10.1]) (Martin et al., 2022). This study demonstrated that pregnancy-related stroke overall incidence rose between 2010 from 20.1 to 27.1 per 100,000 person-years (Martin et al., 2022). The strengths of this study include the nationwide setting and that it extended over a period of nine years. A limitation of recruitment was in only including women who gave birth after 22 weeks of amenorrhea, which then missed the potential strokes that occurred before this period that resulted in fetal loss, medical termination of pregnancy, or strokes that led to maternal death (Martin et al., 2022). This prospective study examined the outcomes of the 2010 and 2018 time frame demonstrating strokes are on the rise in this patient population. It also points out that more efforts should be dedicated to prevention.

In a single-center retrospective cohort study, Rajkumar et al. (2023) examined the prevalence of intrapartum hypertension (elevated blood pressure during labor) in previously

normotensive women, without a diagnosis of a hypertensive disorder of pregnancy and flagged the associated clinical characteristics, and determined its impact on maternal and fetal outcomes. Of a total of 229 deliveries, 32 women (14%) had intrapartum hypertension (Rajkumar et al., 2023). Older maternal age, elevated body mass index, and increased diastolic at the first antenatal visit were associated with intrapartum hypertension (Rajkumar et al., 2023). Intrapartum nonsteroidal anti-inflammatory medications (NSAIDs), as well as epidural anesthesia during the second stage of labor, were also linked with intrapartum hypertension (Rajkumar et al., 2023). The 14% of women with intrapartum hypertension not only had longer hospital admissions after delivery but also raised postpartum blood pressure warranting discharge on antihypertensives (Rajkumar et al., 2023). Limitations of this study include the retrospective approach as well as the inability to validate the technique for measuring blood pressure and accuracy. Selection bias from incidence of intrapartum hypertension in women undergoing cesarean sections may also play a role as these patients exclusively receive NSAIDs for pain control and have will have a longer length of stay following surgery (Rajkumar et al., 2023). These authors revealed the characteristics of women with intrapartum hypertension and also point out postpartum blood pressure was raised in these patients further demonstrating the importance of awareness and education.

While each study approaches the topic of perinatal preeclampsia and stroke slightly differently, the overlying motif is consistent: more education is needed. With pregnancy-related stroke on the rise and preeclampsia being a major contributing factor there needs to be more focus on early detection and management. Providers have to identify those at risk of preeclampsia and stroke, and initiate prompt treatment. Fast identification and management helps ensure the best possible outcomes, which further supports the importance of education.



## **Methodology of the Project**

### **Approval Process for the Project**

Prior to implementation, topic approval was granted by the Director of the Doctor of Nursing Practice (DNP) Program, then key stakeholders at the single center institution, such as the Director of the Quality, Risk Management, and Infection Prevention, System Director of Neuroscience, Interim Co-chairs of the Emergency Department, Obstetrics & Gynecology Chairperson, Director of Obstetric Anesthesia, and the Perinatal Patient Safety Manager were identified and buy-in was achieved. A strengths, weaknesses, opportunities, and threats (SWOT) analysis to provide this educational opportunity was performed (Teoli et al., 2023). This project was conducted by an APN with expertise in neurovascular care. This APN is highly engaged with patients, families, and the team, and can collaborate well as part of a multidisciplinary team. The APN also possesses a heightened awareness of the morbidity and mortality associated with preeclampsia and pregnancy-related stroke and the dedication to see this initiative through for the community the hospital serves.

Risks and barriers can be found at the individual, interpersonal, organizational, community, and contextual levels (Heshmati et al., 2020). Potential difficulties that may be encountered for this project were identified. These challenges included coordinating a time to provide education, gathering providers in person, connectivity issues, short adult attention span (Anderson et al., 2001; Biggs & Tang, 2011; Burgess & Mellis, 2015; van Diggele et al., 2020), and the risk of low motivation. These were mitigated by offering education in multiple modalities, including in-person, virtually, and recorded options for convenience. Conference rooms were secured for presentations. The internet connection and sharing mode were prechecked before attendees start signing on to ensure time is not wasted, and prerecorded sessions were tested to

ensure the links connect to the presentation and audio/video supplements. The short adult attention span issue was tackled by utilizing an active learning style that can boost attention span and increase knowledge recall in learners (Anderson et al., 2001; Biggs & Tang, 2011; Burgess & Mellis, 2015; van Diggele et al., 2020). The SWOT analysis was key in identifying potential pitfalls and resources to make this project successful. Buy-in and SWOT analysis was initiated and completed between September and October 2023.

## **Phases of the Project**

### ***Phase I: Needs Assessment Process***

Working with the Director of the Quality Improvement at a large medical center in northern New Jersey, this author identified missed opportunities in the emergency department included but were not limited to lacking Obstetrics and Gynecology consultation, missing lab work when preeclampsia is suspected, decreased utilization of hypertension/preeclampsia protocols, and an unawareness of resources. The next step included determining if there was any additional education that focused on this being done. Once the need was determined and approval was obtained from the Director of the DNP Program, the key stakeholders were identified to achieve buy-in.

### ***Phase II: Obtaining Support from Stakeholders Process***

Once approved by the Director of the Quality, Risk Management, and Infection Prevention, System Director of Neuroscience, Interim Co-chairs of the Emergency Department, Obstetrics & Gynecology Chairperson, Director of Obstetric Anesthesia, and the Perinatal Patient Safety Manager. The stakeholders were approached in strategic order, starting with the Director of Quality, Risk Management, and Infection Prevention, and ending with the Co-chairs of the ED department. The idea was that once the interim ED Co-chairs saw how invested the rest of the

department leaders are it would be an easier sell, which ended up being true. Additional stakeholders include the APNs, PAs, and physicians of the ED department, it is paramount to capture their attention with important details such as, the education is free of cost, was developed based on current practice guidelines, and has the potential to improve health outcomes in the perinatal community. This quality initiative received buy-in from all parties.

### ***Phase III: Initial Implementation Steps***

The planning phase of this project began once it received approval from leadership and included:

- Meeting with the nurse researchers.
- Presenting to the Nurse Research Council.
- Developing of educational content.
- Creating a pre- and posttest.
- Performing Content Validity Index.
- Submitting to health system's IRB.
- Designing educational presentation specific to preeclampsia and stroke.
- Constructing case scenarios.
- Making PowerPoint presentation.
- Practicing, rehearsing, editing, and prerecording sessions to ensure proper functioning.
- Providing multiple formats for learning (in-person, virtual, prerecorded).
- Marketing and advertising.

Once buy-in was achieved, the next steps included meeting with the nurse researchers to discuss the project and presenting to the Nurse Research Council, precursors to submitting to the health system's Institutional Review Board (IRB). The educational offering included the most current evidence-based practices for preeclampsia and stroke in the perinatal population and

include a pre-and post-test. Content development began in October 2023 and was finalized in March 2024. The APN has access to content experts in the fields of neuroscience as well as obstetrics and gynecology that aided in the content development as well as the validation process of the pre-and post-test. Since there was no validated survey for this specific content, one needed to be created to help ensure the quality of the results (de Souza et al., 2017). It was then distributed to five content experts, and a content validity index (CVI) was performed. The experts include physicians, doctorly prepared nurse practitioners, and educators who manage this patient population. The overall CVI was acceptable at 96.3, and the survey questions were used without modification. The pre-and post-test and CVI were created, validated, and submitted with the IRB application. This quality initiative received exemption status from Seton Hall University (Appendix A) in November 2023 and the health system's Institutional Review Board (IRB) (Appendix B) in January 2024. The educational offering was marketed to APNs, PAs, and physicians of the ED department.

As the goal of this project is to improve the preparedness and confidence of ED healthcare providers in the detection and management of preeclampsia and acute stroke, it is paramount to capture the attention of the stakeholders with important details such as, the education is free of cost, will be developed based on current practice guidelines, and has the potential to improve health outcomes in the perinatal community. The educational offerings were advertised via email and during mandatory departmental meetings. The education was set up with the interim Co-chairs of the ED to help ensure attendance and participation. Each educational session was conducted by this APN, additional sessions were offered for each shift, virtually, and prerecorded for convenience.

#### ***Phase IV: Implementation Process***

The ongoing implementation process was the timeframe the education was offered for the emergency department. This included:

- Introduction to educational offering.
- Pretest on preeclampsia and stroke.
- Implementing educational session on preeclampsia and stroke.
- Posttest on preeclampsia and stroke.

The educational offerings were planned with the interim directors of the ED department from mid-March 2024 through mid-June 2024. The timeline below maps out the phases of the project (Table 1).

**Table 1**

*Project Timeline*

<b>Timeline</b>	<b>Project Stage</b>	<b>Action</b>
September 2023 – October 2023	Planning	-Obtain support from stakeholders.
November 2023 – December 2023	Planning	-Meet with Nurse Researchers. -Develop content utilizing the most current evidence and guidelines. -Create Pre- and Posttest. -Perform Content Validity Index. -Present to Nurse Research Council.
January 2024	Planning	-Apply to the IRB. -Receive exempt status.
October 2023 – March 2024	Planning	-Continue developing content. -Create Preeclampsia and Acute Stroke presentation. -Rehearse and edit presentation.

		-Prerecord and edit presentation. -Advertising education.
Mid March 2024 – Mid June 2024	Implementing	-Schedule educational offerings. -Offer education presentation. -Administer Pre- and Posttest.
Mid June 2024 – August 2024	Evaluation	-Review results for Pre- and Posttest.
September 2024 – December 2024	Dissemination	-Dissemination of findings.

### ***Phase V: Project Evaluation Process***

The anonymous pre- and post-test were administered using the Qualtrics®XM online software, this provided evaluation and was accessible utilizing a QR scanning code. Upon completion of the educational offering, the results were evaluated over the summer, June to August 2024. An examination of the demographics and comparison of pre-and post-test scores was done to assess for differences. The results were reviewed, and the findings were shared with the key stakeholders, and will be presented to the Nursing Research Council. In addition to this, an abstract poster is being submitted for Atlantic Health Annual Research Day, and a manuscript to a peer-reviewed journal and abstract to a national conference is being prepared for further dissemination. Anticipated dissemination would begin September 2024 through December 2024.

**Results.** The pre-education test (Table 2) revealed that most participants were males (64.7%), physicians (58.8%), between the ages 36-45 years of age (58.8%), and work alternating [day, night, evening] shifts (41%). Amid the 18 participants who completed the post-education test (Table 2), again most participants 36-45 years of age (61.1%), most work alternate shifts (66.7%), more than half are physicians 61.1% and male (66.7%).

**Table 2***Demographics*

	Pre-education		Post-education	
Age	N	%	N	%
25-35 years of age	2	11.8%	2	11.1%
36-45 years of age	10	58.8%	11	61.1%
46-55 years of age	2	11.8%	2	11.1%
56-65 years of age	2	11.8%	2	11.1%
Missing response	1	5.9%	1	5.6%
<b>Shift</b>				
Day shift	6	35%	1	5.6%
Evening shift	3	18%	2	11.1%
Night shift	1	6%	2	11.1%
Alternating shifts	7	41%	12	66.7%
Missing Response	0	0%	1	5.6%
<b>Title</b>				
Physicians	10	58.8%	11	61.1%
APNs	2	11.8%	2	11.1%
PAs	4	23.5%	4	22.2%
Missing response	1	5.9%	1	5.6%
<b>Gender</b>				
Male	11	64.7%	12	66.7%
Female	5	29.4%	5	27.8%
Missing response	1	5.9%	1	5.6%

The data were analyzed, reflecting on the project objectives and the overall question this quality initiative seeks to answer, “Does providing additional education for healthcare providers on perinatal preeclampsia and stroke improve preparedness and confidence in the detection and management of these patients?”

**Project question 1: Education effects on perceptions of confidence**

There were two questions/statements surrounding confidence; the first in the detection and management of perinatal preeclampsia and the second in detection and management of perinatal stroke.

**Table 3**

*Breakdown of Pre- and Posttest Responses to Statement: "I am confident in my abilities to detect and manage perinatal preeclampsia."*

	Pre-N	%	Post-N	%
Strongly disagree	0	0%	0	0%
Somewhat disagree	1	5.9%	1	5.6%
Neither agree nor disagree	2	11.8%	3	16.7%
Somewhat agree	11	64.7%	8	44.4%
Strongly agree	3	17.6%	6	33.3%

**Table 4**

*Breakdown of Pre- and Posttest Responses to Statement: "I am confident in my abilities to detect and manage perinatal stroke."*

	Pre-N	%	Post-N	%
Strongly disagree	0	0%	0	0%
Somewhat disagree	2	11.8%	0	0%
Neither agree nor disagree	3	17.6%	2	11.1%
Somewhat agree	8	47.1%	10	55.6%
Strongly agree	4	23.5%	5	27.8%
Missing System	0	0%	1	5.6%

While there is an increase seen in participants reporting they strongly agree that they are more confident in their abilities to detect and manage perinatal preeclampsia on the posttest (Table 3), the Mann-Whitney test indicated that this difference was not statistically significant (p-value=0.64). Similarly, with the second question/statement, although there is a decrease in providers disagreeing with the confidence statement on perinatal stroke and an increase in providers agreeing with improved confidence (Table 4), the Mann-Whitney test indicated that this was not statistically significant (p-value=0.36).



## Project question 2: Education effects on perceptions of preparedness

When looking at preparedness, there were two question/statements, first in the detection and management of perinatal preeclampsia and second in detection and management of perinatal stroke.

**Table 5**

*Breakdown of Pre- and Posttest Responses to Statement: "I feel prepared to detect and manage perinatal preeclampsia."*

	Pre-N	%	Post-N	%
Strongly disagree	0	0%	0	0%
Somewhat disagree	1	5.9%	0	0%
Neither agree nor disagree	4	23.5%	3	16.7%
Somewhat agree	7	41.2%	8	44.4%
Strongly agree	5	29.4%	7	38.9%

**Table 6**

*Breakdown of Pre- and Posttest Responses to Statement: "I feel prepared to detect and manage perinatal stroke."*

	Pre-N	%	Post-N	%
Strongly disagree	0	0%	0	0%
Somewhat disagree	2	11.8%	0	0%
Neither agree nor disagree	4	23.5%	2	11.1%
Somewhat agree	6	35.3%	10	55.6%
Strongly agree	4	23.5%	5	27.8%
Missing System	1	5.9%	1	5.6%

Again, the pretest and posttest (Table 5) responses are not statistically significant (Mann-Whitney test p-value=0.41) however, it is integral to point out that an increase is seen in participants reporting they somewhat (41.2% to 44.4%) and strongly agree (29.4 to 38.9%) that they feel more prepared in their abilities to detect and manage perinatal preeclampsia on the posttest.

Correspondingly, the second question/statement examining preparedness, while the distribution of the pretest and posttest (Table 6) responses are not statistically significant (Mann-Whitney test  $p$ -value=0.26), there is a decrease in disagreement with feeling prepared to detect and manage (11.8% to 0%) and a noticeable increase in providers agreement with feeling somewhat (35.3% to 55.6%) and strongly agree (23.5 to 27.8%) that they feel more prepared in their abilities to detect and manage perinatal stroke on the posttest.

### **Project question 3: Education effects on knowledge**

The rest of the questions were to assess knowledge; each participants response to each knowledge question was reviewed pre- and post-education. A score was given to reflect the % correct (Table 7). When comparing the median percentages between the pre- and post-knowledge questions % correct utilizing the Mann-Whitney test, the findings are not statistically significant ( $p$ -value=0.14), however there is improvement in the % correct that is illustrated in Figure 3.

**Table 7**

*Knowledge Questions: % Correct*

<b>Study Period</b>	<b>Sample Size</b>	<b>Mean</b>	<b>Median</b>	<b>Minimum</b>	<b>Maximum</b>	<b>25<sup>th</sup> percentile</b>	<b>75<sup>th</sup> percentile</b>
Pre	17	71.5	73	30	86	66	80
Post	18	79.3	80	60	100	73	86

## **Discussion**

There were three main objectives of this quality initiative. The first objective was to identify and address provider gaps in knowledge in perinatal preeclampsia and stroke populations. Second, to implement provider education utilizing the most current evidence-based practice on perinatal preeclampsia and stroke. Third, to assess the impact of this education offering on perinatal preeclampsia and stroke through analysis of a pre-and post-knowledge test.

Although this educational initiative lacked statistical significance its clinical significance is demonstrated. The results demonstrated successful implementation that improved competence, confidence, and preparedness. This initiative highlights the importance of education, understanding the physiologic changes that occur during pregnancy, and remaining aware of the risk factors, symptoms, and currently accepted management of perinatal preeclampsia and strokes.

Barriers to further success of this initiative include low participation, inconsistent leadership, and the release of the mandatory hospital-wide education. While a large amount of time was spent marketing, reaching out to the department leaders, coordinating, getting on agendas to advertise, and following up, the participation was not as high as expected. The main site had approximately five percent of providers participate, while the satellite site had 100% provider participation. Leadership changes also brought challenges that impacted participation. One of the two sites that were asked to participate, had inconsistent leadership. Throughout the project there were multiple interim director changes. With each change in leadership the quality initiative needed to be reintroduced and buyin re-achieved. This site had lower participation than its counterpart. The satellite site with consistent leadership with a director in the role many years, was able to encourage their entire team of providers to participate in the education initiative. Mandatory hospital-wide education was another barrier encountered. This quality initiative was voluntary and unfortunately during its implementation, the hospital-wide 18-module mandatory education was released and thus, became priority. The release of the mandates ultimately halted participation.

This quality initiative reveals why provider education is so important, and although its focus was perinatal preeclampsia and stroke, this can serve as a template for other health

conditions. When contemplating a similar initiative consideration should be given to the landscape of leadership, timing of project, release of hospital-wide mandatory education and the impact it may have on participation and outcomes when contemplating a similar initiative. Future recommendations include expanding to the neurointensivist team, as well as the ED, neuro intensive care unit, labor and delivery, as well as mother-baby nurses as these are the primary team members caring for this patient population. Additional recommendations include expanding to other ED sites in the health system. Sustainability can be achieved by incorporating the program into the health system's educational platform. This would allow access for all health care professionals and considered as part of training for pertinent departments.

### **Conclusion**

With perinatal strokes on the rise, healthcare providers need to have a solid understanding of the physiologic changes that occur during pregnancy, as well as the risk factors, symptoms, and currently accepted management of preeclampsia and perinatal strokes. Providing additional education utilizing the most current evidence-based practices will ensure healthcare providers are confident and prepared to detect and manage this special population for the community it serves. These findings are consistent with the literature and have the potential to improve the care of perinatal patients. Although this educational initiative focused on perinatal preeclampsia and stroke, it provides a framework that has the potential to be expanded and serve as a template for other healthcare issues and conditions that requires frequent updated information.

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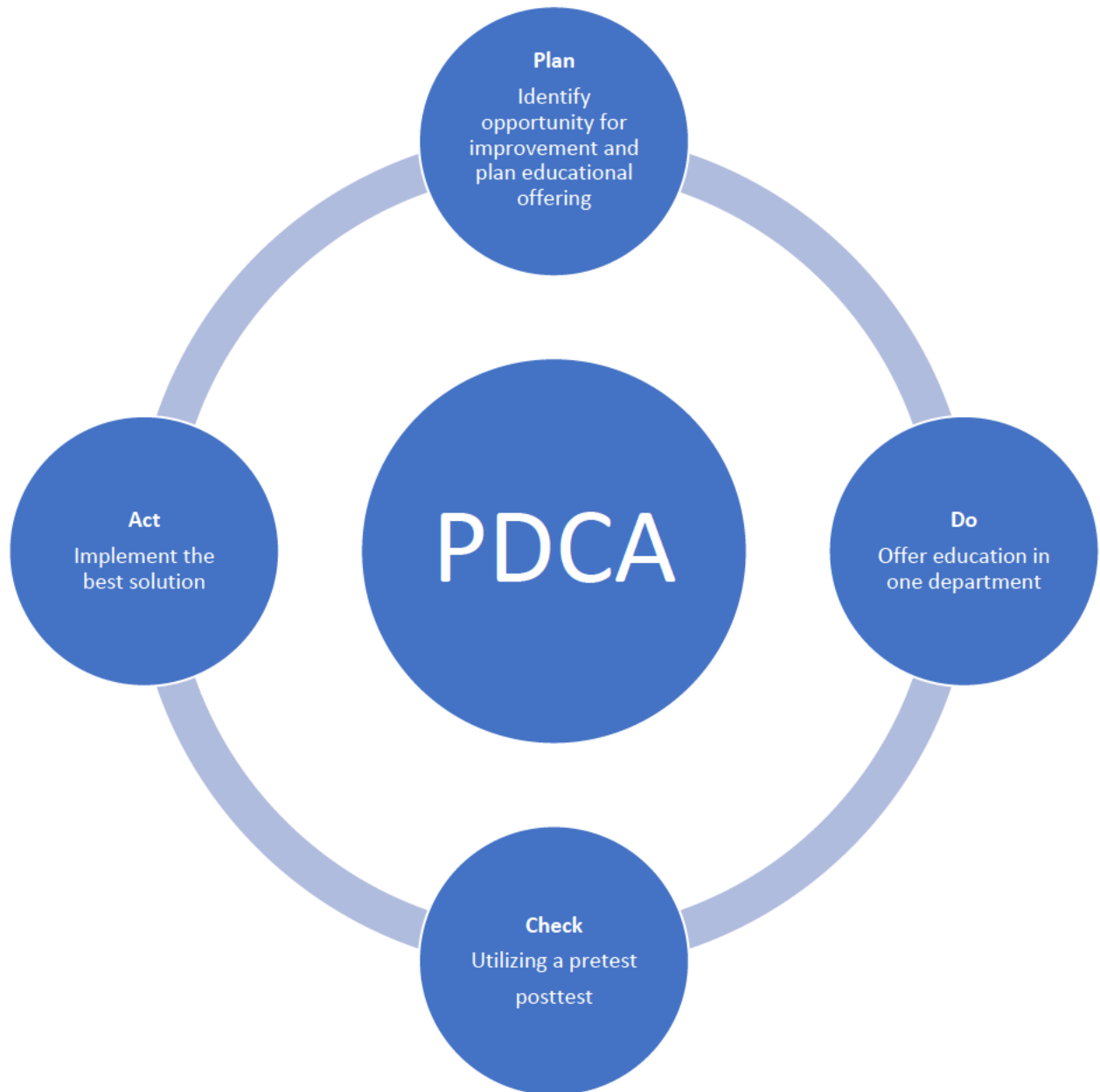
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**Figure 1**

*Plan-Do-Check-Act Cycle*





**Figure 2**

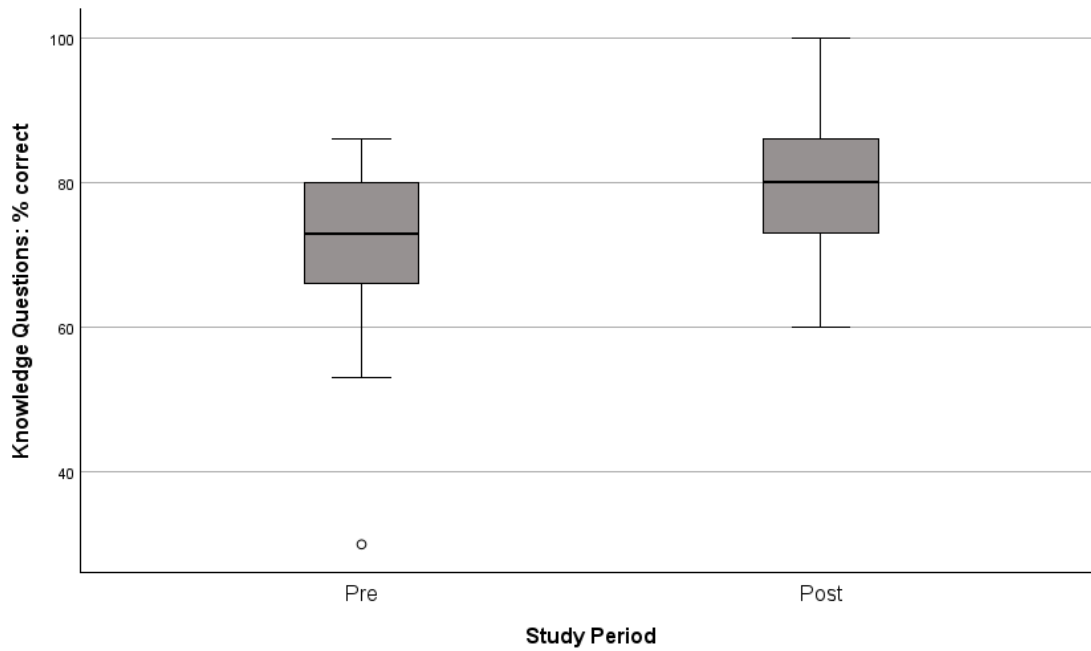
*Outcomes-Activity-Summary Method*

OUTCOMES	ACTIVITY	SUMMARY
<ul style="list-style-type: none"><li>•CONSIDER THE STUDENTS BACKGROUND OF KNOWLEDGE</li><li>•CONSIDER WHAT YOU WANT THE STUDENTS TO LEARN, UNDERSTAND, AND ACCOMPLISH</li><li>•ESTABLISH AND SHARE GOALS AND LEARNING OUTCOMES</li></ul>	<ul style="list-style-type: none"><li>•DESIGN LEARNING THAT ALIGNS WITH OUTCOMES</li><li>•PLAN LEARNING</li><li>•PLAN CLASSROOM ENVIRONMENT AND ARRAGEMENT</li><li>•ENSURE ACTIVE PARTICIPATION</li><li>•ENSURE DELIVERY STIMULATES AND CAPTIVATES AUDIENCE</li><li>•GET INVOLVEMENT</li></ul>	<ul style="list-style-type: none"><li>•ASK STUDENTS TO IDENTIFY NEW POINT/KNOWLEDGE/SKILL LEARED</li><li>•SUMMARIZE CONTENT COVERED</li><li>•FINISH WITH TAKEHOME MESSAGE</li><li>•ENSURE SESSION FINISHES ON TIME</li><li>•EVALUATE YOUR OWN TEACHING</li></ul>

Adapted from "Planning, preparing and structuring a small group teaching session," by C. van Diggele, A. Burgess, and C. Mellis, 2020, *BMC Medical Education*, 20(2), <https://doi.org/10.1186/s12909-020-02281-4>. Copyright 2020 by Christie van Diggele, Annette Burgess, and Craig Mellis. [CC BY 4.0](#).

**Figure 3**

*Boxplot Knowledge Questions % Correct*



*Note.* Mann-Whitney test p-value = 0.14

The median percentages between the pre- and post- periods are not significantly different.

## Appendix A

### Institutional Review Board Letter of Exempt Status



November 13, 2023

Beth Karasin  
Seton Hall University

Dear Beth,

The Proposal entitled "Improving the Preparedness and Confidence of Healthcare Providers in the Detection and Management of Preeclampsia and Acute Stroke in Perinatal Patients: A Quality Improvement Initiative" has been reviewed by the Research Ethics Committee of the Seton Hall University Institutional Review Board and based on the information provided we found the same to be exempt from IRB approval. As per CFR **§46.104 Exempt research**

(1) Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

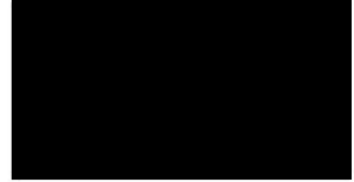
Thank you for your cooperation.

Office of the Institutional Review Board  
Presidents Hall · 400 South Orange Avenue · South Orange, New Jersey 07079 · Tel: 973.275.4654 · Fax 973.275.2978 ·  
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WHAT GREAT MINDS CAN DO

## Appendix B

### Institutional Review Board Letter of Exempt Status



### INSTITUTIONAL REVIEW BOARD (IRB)

January 29, 2024

Beth Karasin



Dear Ms. Karasin:

The project entitled "Improving the Preparedness and Confidence of Healthcare Providers in the Detection and Management of Preeclampsia and Acute Stroke in Perinatal Patients: A Quality Improvement Initiative" has been submitted to the [REDACTED] Institutional Review Board [REDACTED]. The activities do not meet the definition of "Human Subject Research"; therefore, the project does not require IRB oversight.

Any changes to this proposal that may alter this determination should be presented to the [REDACTED] for approval prior to implementation of the changes.

Complete and submit an annual Research Status Report until the conclusion of the project at which time a Research Closure Form should be submitted to the IRB.

Sincerely,

A handwritten signature in black ink that reads "Anita B Richards".

Anita Bond Richards, MAS, CIP  
Administrative Chair