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Effect of Pregnancy Classes Plus Early Warning System on Postpartum Hemorrhage Prevention and Self-Efficacy

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ABSTRACT

Background: Postpartum hemorrhage, defined as blood loss exceeding 500 ml after delivery, is a leading cause of maternal mortality in Indonesia. This condition can lead to serious consequences, including anemia, shock, and even death if not treated promptly and appropriately. Prevention efforts include educating pregnant women about early detection and preventive measures. One intervention is the implementation of pregnancy classes plus an Early Warning System (EWS) as a learning tool to improve mothers' self-efficacy and actions in preventing postpartum hemorrhage. The study aimed to analyze the effect of pregnancy classes plus an early warning system on actions and self-efficacy in preventing postpartum hemorrhage.
Subjects and Method: This study used a true experiment with a pretest-posttest with control group design. The study was conducted at Gayamsari Community Health Center in Semarang city from June to July 2025. A total of 50 pregnant women consisted of two groups: (1) The intervention group, which received the pregnancy class with an Early Warning System (EWS); and (2) The control group, which received a standard pregnancy class. The dependent variables were women's postpartum hemorrhage prevention practices and self-efficacy. The independent variable was the early warning system (EWS) class. The analysis technique used was the Wilcoxon test.
Results: Women in the intervention group reported higher postpartum hemorrhage prevention practices after the EWS class (median = 20; min-max = 13-20) compared to before the intervention (median = 10; min-max = 3-14) and was statistically significant (p <0.001). Women in the intervention group reported higher postpartum hemorrhage prevention practices after the EWS class (median = 52; min-max = 40-60) compared to before the intervention (median = 25; min-max = 20-35) and was statistically significant (p <0.001).
Conclusion: The EWS class and early warning system have been shown to be effective in increasing postpartum hemorrhage prevention practices and efficacy, making them a safe and practical alternative for promotive and preventive interventions.

Keywords: pregnant women's class, early warning system, self-efficacy, postpartum bleeding.

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BACKGROUND

Physiological changes in the postpartum period can trigger contraction disorders due to weak abdominal muscles. This condition causes the abdominal wall to lose sufficient strength, resulting in the uterus failing to contract properly, which can lead to primary postpartum hemorrhage (Evensen et al., 2017; Silvia and Sulistyaningsih, 2022). The most common factors causing postpartum hemorrhage include placenta-related disorders (55.83%), uterine atony without retention of placental tissue (38.91%), trauma (2.82%) and coagulation disorders (1.13%) (Liu et al., 2021).

Postpartum hemorrhage is a common cause of maternal mortality (MMR) due to obstetric hemorrhage (POGI Himpunan Kedokteran Feto Maternal, 2016). Risk factors for postpartum hemorrhage include various aspects, including maternal conditions (such as advanced age, nulliparity, anemia, history of cesarean delivery, and fibroids), pregnancy complications (such as placenta previa, placental abruption, multiple pregnancy, polyhydramnios, amnionitis, and hypertensive disorders of pregnancy), and characteristics of delivery (such as episiotomy, retained placenta, laceration, uterine rupture, and high birth weight) (Sirait, 2019).

According to data from the World Health Organization (WHO), in 2020, 287,000 maternal deaths were recorded, the majority of which occurred in the least developed countries. More specifically, approximately 87% of maternal deaths worldwide occur in sub-Saharan Africa and South Asia. Obstetric hemorrhage contributes to 27% of all global maternal deaths each year, with the majority being caused by postpartum hemorrhage. The WHO estimates that approximately 14 million women experience postpartum hemorrhage each year (World Health Organization, 2023). In Indonesia, this condition is the leading cause of maternal death, contributing around 25–30% of cases (Suparji et al., 2024; Syairaji et al., 2024).

The prevalence of maternal deaths due to obstetric hemorrhage nationally in 2023 was 360 cases (Kemenkes, 2024). Central Java data for 2023 shows that bleeding reached 34.0%. According to Semarang City data, the maternal mortality rate in 2023 was 16 cases out of 20,047 live births, or 68.5 per 100,000 live births. The highest maternal mortality rates were reported at Gayamsari Community Health Center (3 cases), Candilama Community Health Center (2 cases), and Bangetayu Community Health Center (2 cases) (Dinkes Jateng, 2023).

Efforts to reduce maternal mortality due to postpartum hemorrhage are carried out through prevention, early detection, and rapid treatment supported by trained health workers, as well as education for pregnant women. Integration of prenatal classes with the EWS helps improve mothers' knowledge and skills in recognizing danger signs and seeking immediate help. Maternal confidence in facing emergencies is also strengthened by government programs such as the Quick Wins Blood Service, which improves the readiness of health facilities. This synergy between individual and health system readiness is key to reducing the risk of maternal death due to postpartum hemorrhage (Putra et al., 2020).

The government is also strengthening the role of Community Health Centers and their networks as the front line of maternal health services, and optimizing the use of the Maternal and Child Health Book (KIA) as an educational and monitoring tool (Agustina, 2019). Promotive and preventive strategies are also strengthened through community empowerment by involving health cadres and implementing the Childbirth Planning and Complication Prevention Program

(PCPP) (Fatimah et al., 2024). However, despite these programs, maternal mortality in Indonesia remains relatively high. Postpartum hemorrhage remains the leading cause, which generally occurs due to delays in recognizing danger signs, delayed decision-making, and delays in seeking appropriate medical treatment (Wulandari and Laksono, 2020).

This gap indicates the need for innovation in the form of community-based educational interventions. One alternative that could be developed is the Pregnant Women's Class Plus EWS, a modification of the Pregnant Women's Class that includes education on early warning signs of obstetric complications, pregnancy risk monitoring using the EWS, and active involvement of families and health workers in early detection and referral decision-making (Umar et al., 2019). This approach not only increases maternal knowledge but also encourages concrete action in recognizing changes in health and taking prompt action when facing suspicious symptoms. Furthermore, the active involvement of pregnant women in the learning and monitoring process through the EWS can increase confidence in facing pregnancy and childbirth (Ida and Afriani, 2021).

Research Anisykurlillah and Supit (2023) The results showed that the implementation of prenatal classes served as an educational tool to improve the knowledge, attitudes, and practices of pregnant women regarding early detection of pregnancy risks and prevention of childbirth complications. This activity was carried out through counseling, discussions, and effective educational media to help pregnant women understand the importance of maintaining health during pregnancy.

Pregnant women's self-confidence, or self-efficacy, plays a crucial role in the effectiveness of prenatal classes that integrate EWS. When mothers feel confident in their ability to understand and apply the knowledge and actions taught, particularly in monitoring danger signs using EWS parameters, they will be more proactive in managing their health. This increased self-efficacy not only helps mothers more quickly recognize changes in their physical condition early but also encourages them to immediately take appropriate preventive measures, thereby reducing the risk of serious complications during pregnancy and childbirth. Therefore, strengthening self-efficacy is a crucial aspect supporting the success of prenatal classes that focus on preventive measures through the use of EWS (Rezaei et al., 2025).

The implementation of EWS in prenatal classes not only facilitates early detection but also encourages mothers to more actively monitor their physical condition and take early action. Structured education improves mothers' ability to recognize danger signs, while self-efficacy is key to success because it determines how confident mothers are in responding to emergencies. By increasing self-efficacy through action-based learning, mothers' preparedness for potential complications during pregnancy and childbirth also improves (Azlina, 2018).

Research Azlina (2018) This study demonstrates that the use of Maternal Emergency Screening (MES) as an application-based expert system can be an educational tool for pregnant women in early detection of risk factors for pregnancy emergencies. Through MES, pregnant women receive important information regarding their pregnancy condition and risk factors that can lead to complications. This is expected to increase awareness and encourage pregnant women to undergo further examinations to reduce maternal mortality. Research Husna et al. (2022) shows that the implementation

of Pregnant Women's Classes combined with the implementation of EWS effectively increases the ability of pregnant women to take preventive measures and strengthens their self-confidence in facing the risk of postpartum bleeding.

This research approach not only conveys information but also encourages implementation and behavioral change through easy-to-understand and practice prenatal classes. The integration of EWS (Educational Wellness Week) enables pregnant women to more actively recognize risks, communicate with health workers, and enhance their ability and confidence in making quick decisions. This strategy is an educational innovation that strengthens preventive actions and maternal self-efficacy, while simultaneously supporting a reduction in maternal mortality due to postpartum hemorrhage. Based on this background, researchers were motivated to examine the effect of prenatal classes plus EWS on actions and self-efficacy in preventing postpartum hemorrhage.

SUBJECTS AND METHOD

1. Study Design

This study used a true experiment and a pretest-posttest with control group design. The study was conducted at the Gayamsari Community Health Center in Semarang City. Data collection was conducted in June-July 2025.

2. Population and Sample

The target population was pregnant women at the Gayamsari Community Health Center in Semarang City. The total sample size was 50 pregnant women.

3. Study Variable

The dependent variables studied were actions and self-efficacy in preventing postpartum hemorrhage, and the independent variables were classes for pregnant women plus the Early Warning System (EWS)..

4. Operational Definition of Variable

Pregnant women's classes plus the Early Warning System (EWS) are activities that provide information and knowledge to pregnant women that are carried out in a structured manner in class, using modules as the main media to increase pregnant women's understanding of preventing postpartum hemorrhage, once a week for 3 weeks.

Actions in preventing postpartum hemorrhage are a series of efforts undertaken by pregnant women to prevent the risk of bleeding after childbirth. These actions include monitoring maternal health during pregnancy, early detection of risk factors, adequate iron and nutritional consumption, and preparation for childbirth in a health facility.

Self-Efficacy in preventing postpartum hemorrhage is the ability of pregnant women to take preventive measures to reduce the risk of bleeding during pregnancy and after childbirth.

5. Study Instrument

Action and self-efficacy in postpartum hemorrhage prevention were measured using a questionnaire. The Action Questionnaire on Postpartum Hemorrhage Prevention has been tested for Validity and Reliability with Cronbach's Alpha 0.813. The Self-Efficacy Questionnaire on Postpartum Hemorrhage Prevention has been tested for Validity and Reliability with Cronbach's Alpha 0.876.

6. Data Analysis

The data analysis used was Excel and with the help of the SPSS program. The average difference between paired groups was tested using the Wilcoxon test.

7. Research Ethics

Research ethics issues, including informed consent, anonymity, and confidentiality, were carefully addressed throughout the research process. A research ethics approval

letter was obtained from the Research Ethics Committee of the Poltekkes Kemenkes Semarang, Indonesia, No. 900/EA/F.XX-III.38/2025, on June 25, 2025.

RESULTS

Table 1. shows the characteristics of respondents, in the age characteristics of the two groups, most respondents (72%) and (68%) were aged 20-35 years, in the parity characteristics, most of the intervention group were primipara (52%) and in the control group, most respondents were multipara (60%), in the education characteristics of the two groups, most (60%) and (64%) had high school education, and in the characteristics of the history of bleeding, the two groups showed that most respondents did not have a history of bleeding (84%) and (72%).

Table 1. Sample characteristics

Characteristics	Group				p
	Intervention		Control		
	N	%	N	%	
Age (years old)					
<20	1	4	1	4	
20-35	18	72	17	68	0.627
>35	6	24	7	28	
Parity					
Primipara	13	52	5	20	
Multipara	7	28	15	60	0.440
Grande Multipara	5	20	5	20	
Education					
Elementary School	3	12	3	12	
Middle School	5	20	5	20	0.839
High School	15	60	16	64	
Collage	2	8	1	4	
history of bleeding					
Yes	4	16	7	28	0.544
No	21	84	18	72	

Table 2 shows an analysis of the effect of the pregnancy class plus EWS on actions in preventing postpartum hemorrhage. After the intervention, the difference in median increase in action variables in the intervention group (median = 9; min-max = 4-17) was greater than that in the control group (median = 6; min-max = 1-13) and was statistically significant (p<0.001).

Table 3 shows an analysis of the effect of the pregnancy class plus EWS on self-efficacy in preventing postpartum hemorrhage. The difference in median self-efficacy in the intervention group (median = 28; min-max = 15-40) was greater than that in the control group (median = 16; min-max = 9-31) and was statistically significant (p<0.001).

Table 2. Analysis of the influence of pregnant women's classes plus EWS on actions in preventing postpartum hemorrhage

Groups	N	Median	Min-Max	p	Difference	
					Median	Min-max
Intervention						
Pre	25	10	3-14	<0.001	9	4-17
Post	25	20	13-20			

Control						
Pre	25	7	5-12	<0.001	6	1-13
Post	25	15	11-19			

Table 3. Analysis of the influence of pregnant women's classes plus EWS on self-efficacy in preventing postpartum hemorrhage

Groups	N	Median	Min-Max	p	Difference	
					Median	Min-max
Intervention						
Pre	25	10	3-14	<0.001	9	4-17
Post	25	20	13-20			
Control						
Pre	25	7	5-12	<0.001	6	1-13
Post	25	15	11-19			

DISCUSSION

1. Effect of Pregnant Women's Class Plus EWS on Actions in Preventing Postpartum Hemorrhage

The results of the study showed a significant increase in postpartum hemorrhage prevention measures after the intervention of the Pregnant Women's Class plus EWS. This indicates that education through the Pregnant Women's Class plus EWS can increase pregnant women's actions towards postpartum hemorrhage prevention.

The improvement in the intervention group demonstrates that the implementation of the Pregnant Women's Class plus EWS has a positive impact on pregnant women's ability to recognize danger signs and take preventive measures. In the context of this study, the interactive Pregnant Women's Class plus EWS activities act as a supporting and reinforcing factor that can encourage increased maternal action to prevent hemorrhage.

These results align with research (Astuti et al., 2020) which shows that health education through prenatal classes can improve mothers' skills in recognizing pregnancy danger signs and taking steps to prevent complications. Research of (Retnaningtyas et al., 2022) which states that educational interventions with EWS-based media can improve the ability to detect obstetric complications early and strengthen mothers' preparedness for the risk of bleeding.

The pregnancy class plus EWS emphasizes an interactive educational process. Through this approach, pregnant women not only receive information but are also trained to recognize danger signs of pregnancy and take initial preventive measures independently. The median increase from fair to good in the intervention group indicates that after treatment, pregnant women have greater awareness and preparedness for potential bleeding.

These results indicate that EWS-based learning continues to improve maternal preventive measures in preventing postpartum hemorrhage. This education emphasizes cognitive and affective aspects, namely increasing mothers' knowledge and preparedness for changes in their body that could potentially increase the risk of bleeding. The main advantage of this approach is its simple and easy-to-understand presentation, making it accessible to pregnant women of all educational levels. Through the EWS module, pregnant women are taught to recognize theoretical danger signs, such as increased heart rate, decreased blood pressure, pallor, weakness, and unusual

bleeding, and are directed to immediately seek help from a healthcare professional. EWS-based education also strengthens mothers' ability to make quick and appropriate decisions, and improves adherence to antenatal visits and nutrient intake to support the prevention of anemia, a major risk factor for bleeding (Ravintaran et al., 2023).

However, there are several weaknesses that need to be anticipated in implementing an education-based EWS without practical training. The lack of hands-on training can create a gap between knowledge and practical skills in the field. Pregnant women may understand danger signs in theory, but may not be able to apply them quickly and correctly in an emergency situation. Furthermore, the effectiveness of educational interventions will be reduced if they are not followed by reinforcement sessions or follow-up from health workers (Haleema et al., 2019; Yoseph et al., 2024).

To address these weaknesses, strategic steps are needed to strengthen the effectiveness of EWS implementation in the field. One approach is to incorporate simple simulations or demonstrations into classes for pregnant women, so that participants not only understand the theory but also gain a concrete understanding of what to do when danger signs appear during pregnancy or childbirth. Light simulations, such as how to recognize pallor, weakness, or excessive bleeding, can help mothers be better prepared for emergency situations. Furthermore, the involvement of families and health workers needs to be strengthened so that early detection is not only the mother's responsibility but also a collective awareness at the household and community level. Health workers and families can serve as reminders and advocates for pregnant women to be more alert to changes in their physical condition and to seek immediate medical attention if any danger signs are detected (Lee et al., 2025).

This result is in line with the theory Notoadmotjo (2014) which states that changes in health behavior can occur if individuals receive meaningful and repeated learning experiences. A systematic learning process through classroom-based interventions for pregnant women can simultaneously influence knowledge, attitudes, and actions. This finding aligns with research conducted by Ratih Kumala, which demonstrates the importance of the Maternal Early Warning System (MEWS) in identifying obstetric patients at risk of complications, including postpartum hemorrhage. This study emphasizes that physiological adaptations during pregnancy can complicate the early detection of danger signs, so the use of MEWS can help medical personnel identify patients who require rapid intervention (Apsari, 2020).

In line with research conducted by Ika Fitria Elmeida which shows that pregnancy classes are effective in increasing pregnant women's knowledge about early detection of danger signs in pregnancy (Elmeida et al., 2023). The results of this study also align with the findings of several previous studies. Remifta reported that maternal involvement in prenatal classes based on active participation can improve mothers' ability to prepare for childbirth, including preventing complications (Putra et al., 2020).

Thus, the results of this study indicate that the prenatal class plus EWS had a significant impact on improving maternal actions in preventing postpartum hemorrhage, as reflected in the increase in median values and significant statistical test results. This reinforces the importance of implementing health education programs in health care facilities, especially in the working areas of Community Health Centers (Puskesmas), as a strategic effort to reduce

the risk of maternal morbidity and mortality due to postpartum hemorrhage.

2. Effect of Pregnant Women's Class Plus EWS on Self-Efficacy in Preventing Postpartum Hemorrhage

The results showed that the pregnancy class and Early Warning System (EWS) intervention significantly increased the self-efficacy of pregnant women in preventing postpartum hemorrhage. The most significant improvement was seen in the intervention group, where most respondents experienced an increase in self-efficacy from low to high after the intervention, with a p-value <0.001.

This research aligns with research Ardhianingtyas et al. (2024) which shows that health education for pregnant women can increase self-efficacy in preventing postpartum hemorrhage. Research Mardiana et al. (2017) showed that pregnant women's self-efficacy increased significantly after receiving educational intervention through structured activities, namely prenatal classes. This suggests that prenatal classes can be an effective way to build mothers' confidence to better navigate pregnancy and childbirth.

These findings align with self-efficacy theory (Bandura, 1997) which explains that self-efficacy can be enhanced through four main sources: mastery experience, vicarious experience, verbal persuasion, and physiological and emotional states. The pregnancy class plus EWS is designed not merely as a means of conveying information, but rather as an interactive, realistic, and contextual learning method, thus providing a more meaningful learning experience for participants. This participatory learning process enables pregnant women to gain a deeper understanding, internalize knowledge, and hone skills for dealing with real-life situations. Thus, active involvement in the class improves not only cognitive aspects but also affective and psychomotor aspects, ultimately contributing to strengthening their self-efficacy to act appropriately and confidently when facing risky situations, particularly in efforts to prevent postpartum hemorrhage.

The results of this study are also consistent with previous findings. Research by (Mordy et al., 2025) reported that the use of interactive educational media based on pregnancy danger signs had a significant effect on increasing the self-efficacy of pregnant women. Similarly, research by (Dheanda et al., 2024) showed that pregnant women who participated in a health education program using a simulation method had a higher increase in self-efficacy compared to those who only received conventional counseling. Furthermore, research (Jaqin et al., 2019) This study demonstrated that prenatal classes are effective in increasing maternal self-efficacy in preventing childbirth complications.

EWS-based education emphasizes an active learning process where mothers not only receive information but are also trained to assess their condition based on simple, easy-to-remember indicators. The advantages of implementing EWS in prenatal education not only impact knowledge and preventative measures but also contribute to increased maternal self-efficacy in managing the risk of postpartum hemorrhage. Through a systematic educational approach, pregnant women gain a better understanding of danger signs and anticipatory steps they can take independently. This understanding fosters self-confidence in their ability to recognize early symptoms of bleeding, make quick decisions, and communicate with healthcare professionals when needed.

However, the weaknesses of EWS implementation also need to be addressed, particularly when used without direct practice support or ongoing follow-up. Self-

efficacy developed through education alone can be temporary if not reinforced through real-life experiences. Pregnant women may feel confident in understanding danger signs, but may not be able to apply them quickly and correctly in an emergency. Furthermore, if education is not accompanied by supervision and reinforcement from health workers, mothers' interpretation of danger signs can be inaccurate and lead to incorrect decision-making.

To address these weaknesses, a continuous strengthening strategy is needed through mentoring health cadres, family involvement, and routine monitoring by medical personnel during every antenatal care (ANC) visit. Providing simple simulations or practical demonstrations on recognizing danger signs can also strengthen mothers' confidence in taking action. With a combination of theoretical education and practical support, the EWS can function optimally not only as a means of increasing knowledge but also as a tool for building more stable and applicable self-efficacy in preventing postpartum hemorrhage.

Thus, the implementation of the Pregnant Women's Class Plus EWS has proven effective in increasing pregnant women's self-efficacy in preventing postpartum hemorrhage. Through an interactive and structured educational approach, pregnant women gain not only knowledge but also the confidence to recognize danger signs and take appropriate action independently. The implication of these findings is the need to integrate the EWS into prenatal classes at health services as a preventive strategy to reduce the rate of postpartum complications and maternal mortality.

AUTHOR CONTRIBUTION

In compiling this journal, Sulistiawati, Runjati dan Hermien Nugraheni collaborated on the development of the manuscript. Sulistiawati prepared all research administrative documents (research permits) and data collection. Sulistiawati, Runjati dan Hermien Nugraheni analyzed, interpreted, and published the data.

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CONFLICT OF INTEREST

There is no conflict of interest in this study

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