

AWHONN postpartum discharge education: patient knowledge and sustainability

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ABSTRACT

Objective The objective is to evaluate whether the implementation of the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) postpartum discharge educational initiative is associated with improved patient knowledge of warning signs of severe maternal morbidity (SMM) and if the initiative is self-sustaining.

Design A pre–post design was used to evaluate patient knowledge of warning signs of SMM (Plan–Do–Study–Act, PDSA cycle 1) and if the quality improvement initiative was self-sustaining (PDSA cycle 2). Patient understanding of warning signs of SMM prior to initiation of the AWHONN education (Usual Discharge) was compared with understanding of those who were discharged after implementation (POST-BIRTH discharge). The initiative was designed to be self-sustaining. The POST-BIRTH flyer describes nine warning signs of SMM. Eligible participants were English-speaking patients discharged with a live newborn who were able to be contacted within 2 weeks. Participants completed a telephone administered nine-item survey to assess knowledge of SMM. The primary outcome was the percentage of correct answers. To evaluate sustainability, whether the POST-BIRTH fliers and discharge checklist were still being used at 19 months postinitiative was planned.

Results For PDSA cycle 1, in the Usual Discharge group, 347 patients were discharged, 164 (44.7%) were eligible and 151 (92.1%) completed the survey. In the POST-BIRTH discharge group, 268 patients were discharged, 199 (74.3%) were eligible and 183 (92.0%) completed the survey. Compared with the Usual Discharge group, the POST-BIRTH group had significantly more correct responses (30% vs 60%, $p < 0.001$). In PDSA cycle 2, POST-BIRTH fliers were still being used universally on one of the two floors from which postpartum patients are discharged, but not the other.

Conclusion The implementation of an educational initiative for postpartum patients is associated with improved knowledge of warning signs of SMM. The use of the education was self-sustaining on one discharge floor but not the other.

PROBLEM

Approximately 700 pregnant and postpartum individuals in the USA die annually from pregnancy-related complications¹ While

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Current patient education provided to postpartum patients may not sufficiently address the warning signs of severe maternal morbidity, which often precedes mortality.

WHAT THIS STUDY ADDS

⇒ The study improves postpartum education on the warning signs of severe maternal morbidity.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Implementation of Association of Women's Health, Obstetric and Neonatal Nurses postpartum education initiative has the potential to improve knowledge of serious health concerns which increases the likelihood that postpartum patients would seek care when urgently needed and, correspondingly, could result in a reduction in maternal morbidity and mortality in the postpartum period.

the overall pregnancy-related mortality ratio (pregnancy-related deaths per 100 000 live births) has improved worldwide with a 38% decrease between 2007 and 2017,² the pregnancy-related mortality ratio in the USA rose from 15.7 to 16.9 between 2006 and 2016.³ The time of greatest risk for maternal mortality in the USA is the postpartum period, the 12 months following delivery, which accounts for 60% of maternal deaths.^{4,5} Yet current patient education provided to postpartum patients may not sufficiently address the warning signs of severe maternal morbidity which often precedes mortality.⁶ In this time of elevated risk, a postpartum patient's personal ability to recognise warning signs that necessitate medical attention may be of particular importance to protect maternal health. To this end, organisations including the American College of Obstetricians and Gynecologists, Society for Maternal-Fetal Medicine, Council on Patient Safety in Women's Healthcare, the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN), and the

American Academy of Family Physicians have called for strategies that target the postpartum period to improve maternal outcomes and reduce maternal mortality.^{7–10}

In 2016, AWHONN conducted an initiative called ‘AWHONN’s Empowering Women to Obtain Needed Care Project: A Postpartum Discharge Education Program’ with the aim of improving universal discharge education to reduce postpartum maternal mortality.¹¹ This initiative included training for nurses to use a ‘Discharge Education Checklist’ with each patient, as well as the distribution of an educational flyer, entitled, ‘POST-BIRTH’. The checklist consisted of a standardised script which explained each of the nine life-threatening postpartum conditions, their warning signs and whom the patients should contact if they experience these warning signs. The intention of providing patients with the flyer was for patients to place it in an easily visible location. The flyer served as a reference for four warning signs that require a call to emergency services (pain in chest, obstructed breathing or shortness of breath, seizures or thoughts of hurting oneself or someone else) and five that required the patient to contact the provider or seek care at an emergency department immediately (bleeding, soaking through more than 1 pad per hour or passing large blood clots, incision that is not healing, red or swollen leg that is painful or warm to touch, temperature greater than 100.4 or a headache that does not get better, with or without associated vision changes).

AWHONN conducted a pilot study in four hospitals in New Jersey and Georgia to evaluate nursing satisfaction and found that the majority of the nurses found the checklist and flyer to be easy to use and helpful educational tools.¹¹ Though this study provided valuable information about nursing perspectives, it did not address whether the educational initiative is an effective strategy to improve patient knowledge of warning signs of severe maternal morbidity. Importantly, the Illinois Maternal Morbidity and Mortality Report from 2018 called for Obstetric providers to use this educational initiative to improve on maternal morbidity and mortality in the state.¹²

The objectives of this quality improvement initiative are twofold: First, to evaluate whether the implementation of a standardised discharge educational initiative for postpartum patients is associated with improved knowledge of warning signs of severe maternal morbidity (Plan–Do–Study–Act, PDSA, cycle 1)¹³ and second, if the initiative was self-sustaining (PDSA cycle 2). It was hypothesised that incorporating the POST-BIRTH flyer and discharge education checklist as outlined in the AWHONN discharge initiative into the institutional postpartum discharge procedures would improve patient knowledge of warning signs of severe maternal morbidity and that the initiative would be self-sustaining after implementation.

Measurement

The quality improvement project was enacted through two PDSA cycles.¹³ In the first PDSA cycle, the AWHONN postpartum discharge educational initiative was implemented

and its association with patient knowledge of maternal warning signs was evaluated. In the second PDSA cycle, the sustainability of the initiative was evaluated through semistructured interviews with nurses on the postpartum floor and an audit of the use of the flyer and checklist at 19 months postinitiative was performed

Design

PDSA cycle 1: Plan

The quality improvement project adapted the AWHONN postpartum discharge educational initiative and was conducted at the NorthShore University HealthSystem Evanston Hospital in Evanston, Illinois, USA. Implementation of the AWHONN postpartum discharge educational initiative was approved by departmental nursing and physician leadership, which is the process used at the institution of study to approve departmental quality improvement initiatives. The quality team that implemented this initiative was composed of physicians (authors SdlR, BP, DA-K) and postpartum nursing staff.

PDSA cycle 1: Do

Baseline data were collected to assess patient knowledge of postpartum warning signs prior to initiation of the quality improvement initiative during month 1. The initiative was rolled out during month 2 and patient knowledge regarding postpartum warning signs was again assessed during month 3. To assess knowledge, eligible postpartum patients completed a brief telephone-administered nine-item knowledge survey that was created specifically for this assessment (online supplemental figure 1) and were asked if they recalled receiving discharge instructions regarding concerning symptoms. Experts in maternal fetal medicine (BP), obstetrics (SdlR) and survey design (DV) developed and revised the questions pertinent to each scenario and the final format was decided on through consensus. The survey described nine real-world clinical scenarios corresponding to the POST-BIRTH flyer’s warning signs of severe maternal morbidity. For example, for ‘seizures’, participants were presented with the following scenario: ‘Your friend has come over to visit the new baby. Mid conversation your friend notices that you start to have uncontrolled convulsions and you cannot answer his or her questions. When you recover, your friend describes what happened.’ For each scenario, patients were asked if they would call emergency services, contact their provider or seek care at an emergency department immediately, wait until their next clinic appointment to discuss their concerns, or opt to not seek medical care. Patients in the POST-BIRTH group were also asked if they placed the POST-BIRTH flyer somewhere that was easily visible in their homes. In each group, subjects were not alerted to the fact that they would be called to assess their knowledge. Verbal consent to perform the survey was obtained from the patient at the time of phone call prior to initiation of the survey.

During month 2, the AWHONN postpartum discharge educational initiative was deployed. Adaptation of the

programme involved nurse training regarding the ‘Postpartum Discharge Education Checklist’ (online supplemental appendix A) and the POST-BIRTH patient flyer (online supplemental appendix B). Nurse training over 1 month included the following: physician quality team members met with the postpartum nurses at each shift change and introduced the materials until all nurses were trained on each of the floors that discharged postpartum patients. The majority of postpartum patients are discharged from the ‘postpartum floor’ and the minority are discharged from the ‘antepartum floor’ where patients who had complications prior to or during delivery receive care. The nurses on each floor were instructed to provide discharge instructions per the AWHONN postpartum discharge educational initiative in addition to the discharge instructions specified by the patient’s provider. The majority of providers at the institution use standardised postpartum discharge instructions which consist of warning signs of fever, unrelieved pain, excessive bleeding and symptoms of deep venous thromboembolism. The standardised instructions were defined as ‘Usual Discharge’. However, some providers adopted personalised postpartum discharge instructions, which were defined in this project as any variation, by wording or material, from the institution’s standardised postpartum discharge instructions. To assess fidelity to the quality improvement initiative—that the POST-BIRTH flyer was properly reviewed at discharge—nurses were instructed to complete and label each checklist with the patient’s name and medical record number. Members of the quality improvement team (SdLR and DA-K) audited the checklist to verify appropriate patient education regarding warning signs of severe maternal morbidity.

Eligibility criteria for participation in this evaluation of the quality improvement initiative were as follows: English speaking, 18 years or older, discharged with a live newborn and able to be contacted within 2 weeks of discharge. Demographic information on race and ethnicity, marital status, parity, age and insurance status were collected for all patients by review of the electronic medical record. For the Usual Discharge group, the type of discharge instructions the patient received was reviewed and confirmed by way of manual chart review. For the POST-BIRTH discharge group, education using the AWHONN discharge instructions was confirmed through receipt of the discharge checklist with a patient label for each subject.

PDSA cycle 1: Study

The primary outcome for PDSA cycle 1 was the percentage of correct answers on the nine-question survey. A correct answer was defined as calling emergency services immediately for the scenarios that pertained to the ‘POST’ warning signs outlined in the educational flyer, and contacting a provider or seeking care immediately in the emergency department for the scenarios that pertained to ‘BIRTH’ warning signs. The secondary outcome was the percentage of nearly correct answers in which a nearly

correct answer was defined as contacting any health-care entity, whether emergency services or contacting a provider/seeking care at an emergency department immediately. This secondary outcome was chosen to assess patient knowledge that any of the POST-BIRTH warning signs should prompt some form of immediate medical attention, rather than expectant management without medical evaluation. Secondary outcomes also included correct and nearly correct answers for each individual question. Self-sustainability of the initiative was assessed through audit of the discharge folders as described as above.

Evaluation of the association of implementation of the AWHONN postpartum discharge educational initiative and patient knowledge of postpartum warning signs was performed using χ^2 and Wilcoxon rank-sum tests when appropriate to compare the demographic and clinical characteristics, primary and secondary outcomes between the Usual Discharge and POST-BIRTH discharge groups. Statistical significance was defined as a $p < 0.05$. All analyses were performed using Stata V.15.1.

PDSA cycle 2: Plan/Do

Self-sustainability assessment was planned and performed at 19 months postinitiation of the improvement initiative through an audit of the AWHONN checklist in postpartum charts and semistructured interviews with nurses on both the ‘postpartum floor’ and the ‘antepartum floor’ to determine any challenges or issues that arose that prohibited sustainability.

RESULTS

PDSA cycle 1

Baseline data from the month prior to initiation of the AWHONN postpartum discharge educational initiative (Usual Discharge month) are as follows: 347 patients were discharged from the postpartum unit. Of these, 164 (47.3%) met eligibility criteria, 151 of those eligible (92.1%) completed the survey (which corresponds to 43.5% (151/347) of the delivered population). During the month following initiation of the AWHONN postpartum discharge educational initiative (POST-BIRTH discharge month) are as follows: 268 patients were discharged from the postpartum unit. Of these, 199 (74.3%) met eligibility criteria, 183 (92.0%) completed the survey (which corresponds to 68.2% (183/268) of the delivered population) (figure 1).

Patients in the usual and POST-BIRTH discharge groups were similar with regard to race and ethnicity, marital status, and parity. However, patients in the POST-BIRTH group were more likely to be publicly insured as compared with patients in the Usual Discharge group (24.6% vs 13.3%, $p = 0.011$). Patients in the Usual Discharge group were also slightly older (33 ± 6 years) as compared with patients in the POST-BIRTH group (32 ± 8 years, $p < 0.001$) (table 1).

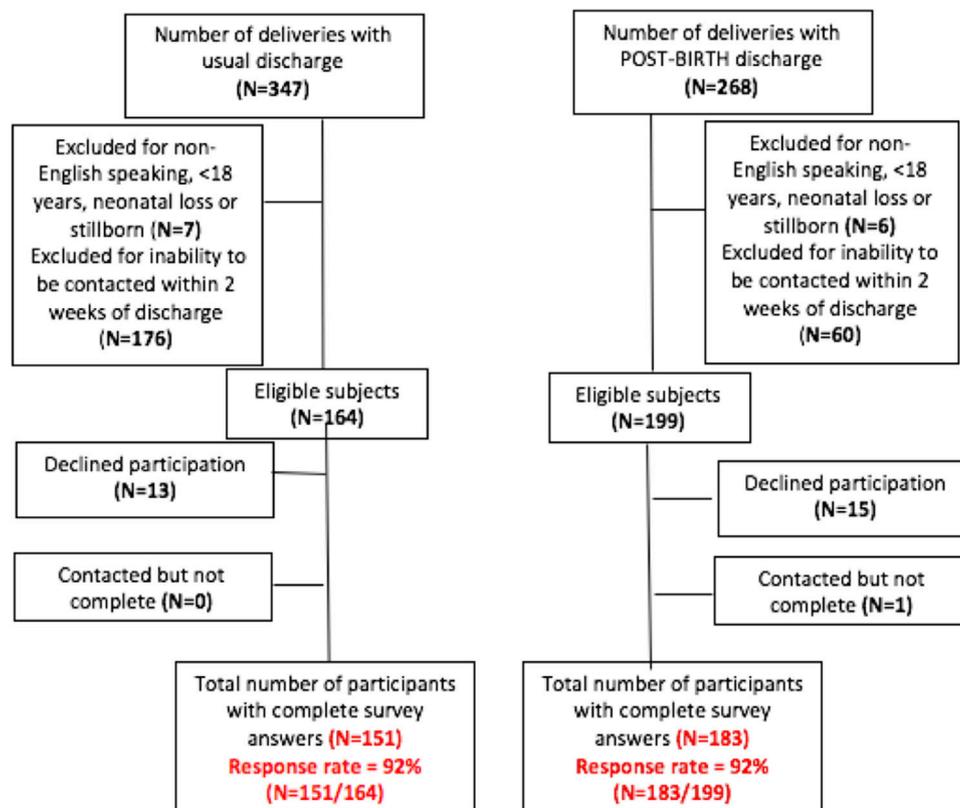


Figure 1 Diagram of excluded and included subjects by discharge type.

Regarding the type of discharge instructions provided to each group, the POST-BIRTH group was more likely to receive standard institutional discharge instructions (95.5%), as compared with the Usual Discharge group (85.9%, $p < 0.001$). The majority of participants in the POST-BIRTH group had nursing documentation of review of the AWHONN discharge instructions (86.5%). When surveyed within 2 weeks of discharge, a comparable proportion of patients in the Usual

Discharge and POST-BIRTH groups recalled receiving discharge instructions that addressed warning signs of severe maternal morbidity (87.4% vs 91.3%, respectively, $p > 0.05$). In the POST-BIRTH group, 56.3% of patients recalled placing the educational flyer somewhere that was easily visible in their homes, such as on the refrigerator.

For the primary outcome of percentage of correct answers, the POST-BIRTH group had significantly more correct responses (60%) as compared with the Usual Discharge group (30%, $p < 0.001$). For the secondary outcome of percentage of nearly correct answers, the POST-BIRTH group had more nearly correct responses (90%) as compared with the Usual Discharge group (80%, $p < 0.001$) (table 2).

With regard to responses to individual scenarios, those in the POST-BIRTH group were significantly more likely to answer correctly for all questions except for the scenario describing a seizure, where there was no significant difference between the groups in recognising the need for immediate medical attention (80.1% vs 84.2%, $p > 0.05$). As compared with the Usual Discharge group, subjects in the POST-BIRTH group were more likely to have a nearly correct response in the scenarios of thoughts of hurting one's self or someone else (85.4% vs 95.1%, $p = 0.002$), red or swollen leg (81.0% vs 96.2%, $p < 0.001$), temperature of 100.4°F or greater (87.4% vs 95.6%, $p = 0.006$) and persistent headache (92.7% vs 97.8%, $p = 0.025$) (table 2).

Table 1 Maternal demographic and clinical characteristics by discharge type

	Usual discharge N=151	POST-BIRTH discharge N=183	P value
Age (years)	33 (27,39)	32 (24,40)	<0.001
Race and ethnicity			
White Non-Hispanic	78 (51.7)	95 (51.9)	0.404
Black Non-Hispanic	9 (6.0)	15 (8.2)	
Asian	12 (8.0)	17 (9.3)	
Hispanic	23 (15.2)	16 (8.7)	
Other	20 (13.3)	32 (17.5)	
Nulliparous	78 (51.7)	99 (54.1)	0.656
Married	126 (83.4)	149 (81.4)	0.627
Public insurance	20 (13.3)	45 (24.6)	0.011

Data are presented as n (%), median (Q1,Q3). Missing data are as follows: Race and ethnicity (n=17), married (n=7), public insurance (n=2).

Table 2 Description of correct and nearly correct answers and overall scores by discharge type*

Scenarios	Usual discharge correct (n=151)	POST-BIRTH discharge correct (n=183)	P value correct	Usual discharge nearly correct (n=151)	POST-BIRTH discharge nearly correct (n=183)	P value nearly correct
Overall score	30%	60%	p<0.001	80%	90%	p<0.001
Scenarios related to the POST† portion of the flyer						
(P) It's 10 o'clock at night and you just put your newborn to bed. You noticed a pain in your chest that does not go away despite laying down and taking TUMS. It seems to be getting worse	55 (36.4)	100 (54.6)	p<0.001	144 (96.7)	180 (98.4)	p=0.110
(O) You're taking a walk outside and you notice that you are becoming increasingly short of breath. You have to stop to catch your breath before continuing.	36 (23.8)	69 (37.7)	p=0.007	119 (78.8)	155 (84.7)	p=0.163
(S) Your friend has come over to visit the new baby. Mid conversation your friend notices that you start to have uncontrolled convulsions and you cannot answer his or her questions. When you recover, you friend describes what happened.	121 (80.1)	154 (84.2)	p=0.338	148 (98.0)	179 (97.8)	p=0.889
(T) You love your newborn but you've become increasingly frustrated over the lack of sleep and things do not seem to be getting better. Sometimes you have thoughts of hurting yourself or your baby	29 (19.2)	69 (37.7)	p<0.001	129 (85.4)	174 (95.1)	p=0.002
Scenarios related to the BIRTH‡ portion of the flyer						
(B) Your bleeding has improved over the last few days but now you notice that you are soaking through more than 1 pad/hour and are passing large clots. You otherwise feel fine.	61 (40.4)	150 (82.0)	p<0.001	146 (96.7)	180 (98.4)	p=0.320
(I) You had a cesarean delivery or vaginal repair and you notice that the pain has not improved or there is foul smelling discharge. It does not seem like things are getting better.	41 (27.2)	161 (88.0)	p<0.001	135 (89.4)	172 (94.0)	p=0.126
(R) You put your feet up at the end of a long day and you realize that your right leg is bigger than the other, is painful or warm compared to the left leg but you know that some swelling after delivery is normal.	48 (31.8)	119 (65.0)	p<0.001	124 (81.0)	176 (96.2)	p<0.001
(T) You're not feeling well and so you take your temperature. It reads>100.4.	53 (35.1)	121 (66.1)	p<0.001	132 (87.4)	175 (95.6)	p=0.006
(H) You've noticed that you have a headache. Despite taking Tylenol and getting in a nap, you still wake up with a headache and sometimes you even have spots in your vision	58 (38.4)	147 (80.3)	p<0.001	140 (92.7)	179 (97.8)	p=0.025
Data are presented as n (%).						
*Correct answers: defined as contacting emergency services for the scenarios related to the POST portion of the flyer and contacting a provider immediately for those pertaining to the BIRTH portion of the flyer; Nearly correct answers: defined as contacting either emergency services or a provider immediately for any of the POST-BIRTH scenarios.						
†POST scenarios: Pain in chest, obstructed breathing, seizures or thoughts of harm.						
‡BIRTH scenarios: Bleeding, incision complications, red or swollen leg, temperature elevation or persistent headache.						

PDSA cycle 2

At 19 months postimplementation, semistructured interviews with nursing staff were performed on both the 'postpartum' floor and the 'antepartum floor'. While nurses on the 'postpartum' floor were using the POST-BIRTH flyer routinely in each discharge folder, nurses on the 'antepartum floor' had stopped using the flyer. Nurses on the 'antepartum floor' were aware that the quality team was studying patient knowledge and thought the study was completed, and thus did not continue using the flyers or checklist. There had been turnover with nurses, nurse leadership and maternity leaves among nursing staff who helped to promote the quality initiative along with redistribution of staff during the COVID-19 pandemic, which may have contributed to the misunderstanding. Nurses on both floors had stopped using the checklist, so the planned audit of patient's charts at discharge was not possible.

The finding of inconsistent use of the POST-BIRTH flyer prompted communication with nurses across both floors and a conversation regarding the acceptability of using the POST-BIRTH flyers. All nurses interviewed (n=10) reported that they liked the POST-BIRTH flyer, found it helpful and recommended continued use however it was discovered that the universal implementation of placing the flyer in the discharge folders had fallen to the wayside likely secondary to staff turnover and less rigorous POST-BIRTH staff involvement on the floor.

Lessons and limitations

The dual objective of this evaluation of the AWHONN POST-BIRTH postpartum educational initiative was to assess first, whether implementation of the initiative was associated with improved patient knowledge of warning signs of severe maternal morbidity and second, whether implementation of the initiative was self-sustaining. With

regard to the first objective, when the primary outcome was evaluated, the proportion of correct answers was significantly higher in the POST-BIRTH group as compared with the Usual Discharge group. Similarly, when the secondary outcome was evaluated, the POST-BIRTH group's overall score was significantly higher than the Usual Discharge group. On an individual warning sign level, the POST-BIRTH group demonstrated improved knowledge across eight of the nine individual scenarios. With regard to the second objective, the results were mixed. The POST-BIRTH flyer was universally utilised on one of the floors at the hospital, the 'postpartum floor', where the majority of postpartum discharges take place. The POST-BIRTH flyer had fallen out of use on the other floor, the 'antepartum floor' where a minority of the hospital's postpartum discharges take. The checklist was no longer used on either floor.

Several limitations to this evaluation should be considered. Regarding the evaluation of knowledge of warning signs, the patients surveyed were English-speaking, predominantly privately insured and non-Hispanic White. Thus, the findings from this evaluation of patient knowledge may not be generalisable to many communities. In addition, only those who were able to be contacted were included in the analysis, thus 54.3% were able to be contacted after discharge. Furthermore, with pregnancy-related morbidity and mortality disproportionately affecting non-Hispanic black and minority patients at a rate four to five times higher than white patients, expanding to more racially diverse hospitals would better measure of the programme's efficacy among those at highest risk.¹⁴ In addition, the health literacy of the patient population was not assessed, however, the POST-BIRTH flyer is written at a fifth-grade reading level thus low health literacy likely did not impact the findings in this assessment.

Despite these limitations, this evaluation of patient knowledge and its association with the implementation of AWHONN postpartum discharge educational initiative presented here has several strengths. The target population for this initiative was all postpartum patients who delivered at the hospital where the initiative was conducted allowed for a large sample size. In addition, there was a high response rate to the survey of >90% in both groups when a patient was able to be contacted. The single-centre approach allowed for consistent implementation of the initiative and 86.5% of nurses who completed postpartum discharge for eligible patients completed the checklist, ensuring that POST-BIRTH warning signs were uniformly reviewed with the majority of patients. The results of this assessment make an important contribution to the literature. This evaluation of patient knowledge before and after implementation of AWHONN postpartum discharge educational initiative suggests that the AWHONN educational initiative of associated with improved patient knowledge of important postpartum warning signs that are associated with severe maternal health consequences.

Regarding the second objective, assessment of sustainability, several limitations should be considered. The planned audit of the use of the postpartum checklist was not performed as the checklist had been abandoned on both of the floors where postpartum discharge takes place. Thus, the assessment of the use of the flyer relied on semistructured interviews and reports of the use of the flyer. The results were consistent in that each person interviewed reported that the flyer was universally used on the 'postpartum' floor and no longer used on the 'antepartum floor'. The reasons for the discrepant findings regarding sustainability may be related to staff turnover and maternity leave among nurses who were champions of this initiative as well as general disruptions that occurred with regard to staffing during the COVID-19 pandemic.

Strategies of quality improvement

For the first objective, these results provide insight into the role of patient education in the effort to decrease maternal morbidity in the postpartum period, and contribute to an understudied, yet important, area in the field of obstetrics.¹¹ It has been suggested by The National Partnership for Maternal Safety, a broad-based multistakeholder collaborative dedicated to development of quality initiatives to improve maternal health, that recognition of postpartum warnings signs by patients could lead to earlier interventions and, as a result, improve postpartum outcomes.¹⁵ The results of this assessment of patient knowledge before and after adaptation of AWHONN postpartum discharge educational initiative suggest that adaptation of the AWHONN educational initiative is associated with improved patient knowledge of the signs of conditions associated with severe maternal morbidity that require immediate medical attention.

For the second objective, these results demonstrate that the AWHONN POST-BIRTH educational initiative can be adapted and self-sustaining, as evidenced by the experience of our 'postpartum floor', however continued use of the checklist was not adopted. The lack of sustainability on our 'antepartum floor' revealed the need for periodic communication and auditing of the processes involved. The finding of inconsistent use of the POST-BIRTH flyer prompted communication with nurses across both floors and a conversation regarding the acceptability of using the POST-BIRTH flyers. All nurses interviewed were in favour of continuing or resuming use of POST-BIRTH flyers. The flyers were shared with the antepartum floor and copies made to be incorporated into the discharge folders. Nurses did not believe that the checklist added to the care but wanted to document use of the POST-BIRTH flyer in a more efficient manner. Nurses proposed universal use of the POST-BIRTH flyer across both floors and the addition of 'Review of POST-BIRTH flyer' to replace the standard discharge checklist and then scanned into the electronic medical record so that use of the flyer could be readily reviewed and audited in the future.

CONCLUSIONS

For the first objective of whether implementation of the initiative was associated with improved patient knowledge of warning signs of severe maternal morbidity, these results may be explained secondary to user-friendly nature of the educational information. The POST-BIRTH flyer is patient friendly, colourful, easy to display and has an easy to remember acronym. Furthermore, the quality check in this quality improvement initiative of asking the nurses to label their educational checklist may have ensured the nurses performed the patient education. For the second objective of whether implementation of the initiative was self-sustaining, the planned sustainability assessment demonstrated the continued utilisation of the discharge educational materials require continued diligence to ensure utilisation of the tool.

Regardless of the mechanism, these results demonstrate that implementation of AWHONN's postpartum education initiative has the potential to improve knowledge of serious health concerns. Improved knowledge may increase the likelihood that postpartum patients would seek care when urgently needed and, correspondingly, could result in a reduction in maternal morbidity and mortality in the postpartum period.

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Patient consent for publication Not applicable.

Ethics approval Implementation of the AWHONN postpartum discharge educational initiative did not require approval by our Institutional Research Board as it was deemed a quality improvement initiative by the institution of study. The evaluation of patient knowledge before and after implementation of the AWHONN postpartum discharge educational initiative presented here also did not require approval from our Institutional Research Board as it was considered to be a component of the AWHONN postpartum discharge educational quality improvement initiative.

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APPENDIX A: Postpartum Discharge Education Checklist

POST-BIRTH WARNING SIGNS: POSTPARTUM DISCHARGE EDUCATION CHECKLIST



This checklist is a teaching guide for nurses to use when educating all women about the essential warning signs that can result in maternal morbidity and/or mortality.

Instructions:

- Instruct ALL women about all of the following potential complications. All teaching should be documented on this form or in your facility's electronic health record.
- Focus on risk factors for a specific complication first; then review all warning signs.
- Emphasize that women do not have to experience ALL of the signs in each category for them to seek care.
- Encourage the woman's significant other or her designated family members to be included in education whenever possible.

The information included on this checklist is organized according to complications that can result in severe maternal morbidity or maternal mortality. Essential teaching points should be included in all postpartum discharge teaching.

The parent handout, "Save Your Life", is designed to reinforce this teaching. This handout is organized according to AWHONN's acronym, POST-BIRTH, to help everyone remember the key warning signs and when to call 911 or a health provider. A portion of this handout is below for reference.

Call 911 if you have:	<input type="checkbox"/> Pain in chest <input type="checkbox"/> Obstructed breathing or shortness of breath <input type="checkbox"/> Seizures <input type="checkbox"/> Thoughts of hurting yourself or your baby
Call your healthcare provider if you have: <small>(If you can't reach your healthcare provider, call 911 or go to an emergency room)</small>	<input type="checkbox"/> Bleeding, soaking through one pad/hour, or blood clots, the size of an egg or bigger <input type="checkbox"/> Incision that is not healing <input type="checkbox"/> Red or swollen leg, that is painful or warm to touch <input type="checkbox"/> Temperature of 100.4°F or higher <input type="checkbox"/> Headache that does not get better, even after taking medicine, or bad headache with vision changes

Below is a suggested conversation-starter:

“Although most women who give birth recover without problems, any woman can have complications after the birth of a baby. Learning to recognize these POST-BIRTH warning signs and knowing what to do can save your life. I would like to go over these POST-BIRTH warning signs with you now, so you will know what to look for and when to call 911 or when to call your healthcare provider.

Please share this with family and friends and post the “Save Your Life” handout in a place where you can get to it easily (like your refrigerator).”



This program is supported by funding from Merck, through Merck for Mothers, the company's 10-year, \$500 million initiative to help create a world where no woman dies giving life. Merck for Mothers is known as MSD for Mothers outside the United States and Canada.
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POST-BIRTH Warning Signs: Postpartum Discharge Education Checklist

Pulmonary Embolism	Essential Teaching for Women
What is Pulmonary Embolism?	Pulmonary embolism is a blood clot that has traveled to your lung.
Signs of Pulmonary Embolism	<ul style="list-style-type: none"> • Shortness of breath at rest (e.g., tachypneic shallow, rapid respirations) • Chest pain that worsens when coughing • Change in level of consciousness
Obtaining Immediate Care	Call 911 or go to nearest emergency room RIGHT AWAY .

RN initials _____ Date _____ Family/support person present? YES / NO

Cardiac (Heart) Disease	Essential Teaching for Women
What is Cardiac Disease?	Cardiac disease is when your heart is not working as well as it should and can include a number of disorders that may have different signs and symptoms.
Signs of Potential Cardiac Emergency	<ul style="list-style-type: none"> • Shortness of breath or difficulty breathing • Heart palpitations (feeling that your heart is racing) • Chest pain or pressure
Obtaining Immediate Care	Call 911 or go to nearest emergency room RIGHT AWAY .

RN initials _____ Date _____ Family/support person present? YES / NO

Hypertensive Disorders of Pregnancy	Essential Teaching for Women
What is Severe Hypertension?	Hypertension is when your blood pressure is much higher than it should be.
Signs of Severe Hypertension	<ul style="list-style-type: none"> • Severe constant headache that does not respond to over-the-counter pain medicine, rest, and/or hydration
What is Preeclampsia/Eclampsia?	Preeclampsia is a complication of pregnancy that includes high blood pressure and signs of damage to other organ systems. Eclampsia is the convulsive phase of preeclampsia, characterized by seizures.
Signs of Preeclampsia	<ul style="list-style-type: none"> • Severe constant headache that does not respond to pain medicine, rest, and/or hydration • Changes in vision, seeing spots, or flashing lights • Pain in the upper right abdominal area • Swelling of face, hands, and/or legs more than what you would expect • Change in level of consciousness
Signs of Eclampsia	<ul style="list-style-type: none"> • Seizures
Obtaining Immediate Care	Call 911 for seizures. Call healthcare provider immediately for any other signs. If symptoms worsen or no response from provider/clinic, call 911 or go to nearest emergency room.

RN initials _____ Date _____ Family/support person present? YES / NO

Obstetric Hemorrhage	Essential Teaching for Women
What is Obstetric Hemorrhage?	Obstetric hemorrhage is when you have an excess amount of bleeding after you have delivered your baby.
Signs of Obstetric Hemorrhage	<ul style="list-style-type: none"> • Bleeding through more than 1 sanitary pad/hour • Passing 1 or more clots the size of an egg or bigger • Character of clots/differentiation of bright red bleeding from dark with clots
Obtaining Immediate Care	Call healthcare provider immediately for signs of hemorrhage. If symptoms worsen or no response from provider/clinic, call 911 or go to nearest emergency room.

RN initials _____ Date _____ Family/support person present? YES / NO





**POST-BIRTH Warning Signs:
Postpartum Discharge
Education Checklist**

Venous Thromboembolism	Essential Teaching for Women
What is Venous Thromboembolism?	Venous thromboembolism is when you develop a blood clot usually in your leg (calf area).
Signs of Venous Thromboembolism	<ul style="list-style-type: none"> • Leg pain, tender to touch, burning, or redness, particularly in the calf area • Swelling of one leg more than the other
Obtaining Immediate Care	Call healthcare provider immediately for above signs of venous thromboembolism. If symptoms worsen or no response from provider/clinic, call 911 or go to nearest emergency room.

RN initials _____ Date _____ Family/support person present? YES / NO

Infection	Essential Teaching for Women
What is Infection?	An infection is an invasion of bacteria or viruses that enter and spread through your body, making you ill.
Signs of Infection	<ul style="list-style-type: none"> • Temp is $\geq 100.4^{\circ}\text{F}$ ($\geq 38^{\circ}\text{C}$) • Bad smelling blood or discharge from the vagina • Increase in redness or discharge from episiotomy or C-Section site or open wound not healing
Obtaining Immediate Care	Call healthcare provider immediately for above signs. If symptoms worsen or no response from provider/clinic, call 911 or go to nearest emergency room.

RN initials _____ Date _____ Family/support person present? YES / NO

Postpartum Depression	Essential Teaching for Women
What is Postpartum Depression (PPD)?	Postpartum depression is a type of depression that occurs after childbirth. PPD can occur as early as one week up to one year after giving birth.
Signs of Postpartum Depression	<ul style="list-style-type: none"> • Thinking of hurting yourself or your baby • Feeling out of control, unable to care for self or baby • Feeling depressed or sad most of the day every day • Having trouble sleeping or sleeping too much • Having trouble bonding with your baby
Obtaining Immediate Care	Call 911 or go to nearest emergency room if you feel you might harm yourself or your baby. Call healthcare provider immediately for other signs of depression (sadness, withdrawn, difficulty coping with parenting).

RN initials _____ Date _____ Family/support person present? YES / NO

Follow-Up Appointment	Essential Teaching for Women
	<ul style="list-style-type: none"> • Discuss importance of follow-up visit with doctor, nurse practitioner or midwife in 4–6 weeks (or sooner if health status warrants it) • Provide correct phone number for appointment • Emphasize importance to notifying all healthcare providers of delivery date up to one year after birth of baby • Confirm date for postpartum appointment prior to discharge

RN initials _____ Date _____ Family/support person present? YES / NO

I have received and understand the POST-BIRTH Warning Signs education and handout.

Patient Signature: _____ Date/Time: _____

The patient received the POST-BIRTH Warning Signs education and a copy of the "Save Your Life" handout.

Nurse Initials and Signature: _____ Date/Time: _____



APPENDIX B: POST-BIRTH patient flyer

SAVE YOUR LIFE:

Get Care for These POST-BIRTH Warning Signs

Most women who give birth recover without problems. But any woman can have complications after giving birth. Learning to recognize these POST-BIRTH warning signs and knowing what to do can save your life.



<p>Call 911 if you have:</p>	<ul style="list-style-type: none"> <input type="checkbox"/> Pain in chest <input type="checkbox"/> Obstructed breathing or shortness of breath <input type="checkbox"/> Seizures <input type="checkbox"/> Thoughts of hurting yourself or someone else
<p>Call your healthcare provider if you have:</p> <p><small>(If you can't reach your healthcare provider, call 911 or go to an emergency room)</small></p>	<ul style="list-style-type: none"> <input type="checkbox"/> Bleeding, soaking through one pad/hour, or blood clots, the size of an egg or bigger <input type="checkbox"/> Incision that is not healing <input type="checkbox"/> Red or swollen leg, that is painful or warm to touch <input type="checkbox"/> Temperature of 100.4°F or higher <input type="checkbox"/> Headache that does not get better, even after taking medicine, or bad headache with vision changes



Tell 911 or your healthcare provider:

"I gave birth on _____ and
(Date)

I am having _____"
(Specific warning signs)

These post-birth warning signs can become life-threatening if you don't receive medical care right away because:

- Pain in chest, obstructed breathing or shortness of breath (trouble catching your breath) may mean you have a blood clot in your lung or a heart problem
- Seizures may mean you have a condition called eclampsia
- Thoughts or feelings of wanting to hurt yourself or someone else may mean you have postpartum depression
- Bleeding (heavy), soaking more than one pad in an hour or passing an egg-sized clot or bigger may mean you have an obstetric hemorrhage
- Incision that is not healing, increased redness or any pus from episiotomy or C-section site may mean you have an infection
- Redness, swelling, warmth, or pain in the calf area of your leg may mean you have a blood clot
- Temperature of 100.4°F or higher, bad smelling vaginal blood or discharge may mean you have an infection
- Headache (very painful), vision changes, or pain in the upper right area of your belly may mean you have high blood pressure or post birth preeclampsia

GET HELP My Healthcare Provider/Clinic: _____ Phone Number: _____
Hospital Closest To Me: _____



This program is supported by funding from Merck, through Merck for Mothers, the company's 10-year, \$500 million initiative to help create a world where no woman dies giving life. Merck for Mothers is known as MSD for Mothers outside the United States and Canada.

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Supplemental Figure 1: 9-item telephone survey

Great! First, I'd like to ask –

1. Did you receive discharge instructions from the nurse about symptoms that are concerning enough to contact a health care provider?
 - a. Yes
 - b. No

I'm going to go through a few scenarios and with each scenario, I ask that you pick the option of what you would do if any of these things happened to you today.

1. It's 10 o'clock at night and you just put your newborn to bed. You noticed a pain in your chest that does not go away despite laying down and taking TUMS. It seems to be getting worse. Would you:
 - a. Call 911
 - b. Call your provider and if you can't reach your provider call 911 or go to an ER
 - c. Wait until your next clinic appointment
 - d. Do nothing
2. Your bleeding has improved over the last few days but now you notice that you are soaking through more than 1 pad/hour and are passing large clots. You otherwise feel fine. Would you:
 - a. Call 911
 - b. Call your provider and if you can't reach your provider call 911 or go to an ER
 - c. Wait until your next clinic appointment
 - d. Do nothing
3. You're taking a walk outside and you notice that you are becoming increasingly short of breath. You have to stop to catch your breath before continuing. Would you:
 - a. Call 911
 - b. Call your provider and if you can't reach your provider call 911 or go to an ER
 - c. Wait until your next clinic appointment
 - d. Do nothing
4. Your friend has come over to visit the new baby. Mid conversation your friend notices that you start to have uncontrolled convulsions and you cannot answer his or her questions. When you recover, your friend describes what happened. Would you:
 - a. Call 911
 - b. Call your provider and if you can't reach your provider call 911 or go to an ER
 - c. Wait until your next clinic appointment
 - d. Do nothing

5. You had a c-section or vaginal repair and you notice that the pain has not improved or there is foul smelling discharge. It does not seem like things are getting better. Would you:
 - a. Call 911
 - b. Call your provider and if you can't reach your provider call 911 or go to an ER
 - c. Wait until your next clinic appointment
 - d. Do nothing

6. You've noticed that you have a headache. Despite taking Tylenol and getting in a nap, you still wake up with a headache and sometimes you even have spots in your vision. Would you:
 - a. Call 911
 - b. Call your provider and if you can't reach your provider call 911 or go to an ER
 - c. Wait until your next clinic appointment
 - d. Do nothing

7. You're not feeling well and so you take your temperature. It reads > 100.4. Would you:
 - a. Call 911
 - b. Call your provider and if you can't reach your provider call 911 or go to an ER
 - c. Wait until your next clinic appointment
 - d. Do nothing

8. You love your newborn but you've become increasingly frustrated over the lack of sleep and things do not seem to be getting better. Sometimes you have thoughts of hurting yourself or your baby. Would you:
 - a. Call 911
 - b. Call your provider and if you can't reach your provider call 911 or go to an ER
 - c. Wait until your next clinic appointment
 - d. Do nothing

9. You put your feet up at the end of a long day and you realize that your right leg is bigger than the other, is painful or warm compared to the left leg but you know that some swelling after delivery is normal. Would you:
 - a. Call 911
 - b. Call your provider and if you can't reach your provider call 911 or go to an ER
 - c. Wait until your next clinic appointment
 - d. Do nothing