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 flyers 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 flyers 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 complications. While 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, the pregnancy-related mortality ratio in the USA rose from 15.7 to 16.9 between 2006 and 2016. 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. Yet current patient education provided to postpartum patients may not sufficiently address the warning signs of severe maternal morbidity which often precedes mortality. 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.\textsuperscript{2-10}

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.\textsuperscript{11} This initiative included training for nurses to use a ‘Discharge Education Checklist’, and postpartum patients is associated with improved knowledge of maternal morbidity and mortality in the state.\textsuperscript{12}

The quality improvement project was enacted through two PDSA cycles.\textsuperscript{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 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
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 healthcare 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 above.

Evaluation of the association of implementation of the AWHONN postpartum discharge educational initiative and patient knowledge of postpartum warning signs was performed using \( \chi^2 \) 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).
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 | POST-BIRTH discharge | 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               |
| (J) 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 reads100.4. | 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 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. 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. 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. 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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