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Healthcare Strategies for Reducing Pregnancy-Related Morbidity and Mortality in the Postpartum Period

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ABSTRACT

The majority of pregnancy-related deaths in the United States occur in the postpartum period, after a woman gives birth. Many of these deaths are preventable. Researchers and health care providers have been focusing on designing and implementing strategies to eliminate preventable deaths and ethnic and racial disparities. Six healthcare strategies for reducing postpartum maternal morbidity and mortality will be described. These strategies, if provided in an equitable manner by all providers to all women, will assist in closing the disparity in outcomes between black women and women of all other races and ethnicities who give birth throughout the United States.

Key Words: education, morbidity, mortality, postpartum, quality improvement

According to the Centers for Disease Control and Prevention, 53% of pregnancy-related deaths in the United States occur in the postpartum period not including the 16.8% that occur on the day of delivery.[1] Of that 53%, 18% of these deaths occur 1 to 6 days postpartum, 21% occur between 7 and 41 days, and 13% from 42 days to 1 year.[1]

Although healthcare providers cannot predict maternal death, more than half of the conditions that contribute to pregnancy-related morbidity and mortality can be managed and are preventable.[2] The current leading causes of maternal death reported in the United States in 2013 are related to cardiac disease and noncardiovascular diseases (see Figure 1).[3] Preexisting conditions such as endocrine, kidney, and immune disorders contribute to noncardiovascular deaths. In addition, obesity and consistently high rates of cesarean births in the United States are contributing factors for several of these conditions. Demographically, black women are 3 to 4 times more likely to die than non-Hispanic white women, and women older than 40 years are also at higher risk.[1] The reasons for the higher rates of deaths among black women are multifactorial, but we do know from maternal mortality reviews that many of these deaths are preventable and thus, much of this disparity could be reduced if there were more efforts to ensure that black women receive more timely and adequate treatments.[2]

Reducing maternal mortality requires a multipronged approach. Three major types of strategies for reducing pregnancy-related morbidity and mortality can be divided into those that (*a*) focus on improving the health of the woman, (*b*) improve public policies, and (*c*) improve healthcare. Comprehensive assessments by providers prior to discharge and during postpartum visits that lead to appropriate and timely interventions, and education provided to women prior to and after delivery are 2 healthcare–related strategies currently employed to reduce postpartum maternal morbidity and mortality.

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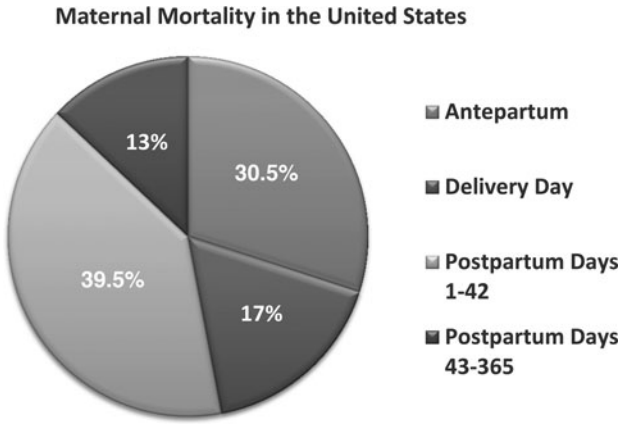

Figure 1. Timing of maternal deaths in the United States.[1]

The purposes of this article are to briefly outline the leading causes of postpartum morbidity and mortality and provide strategies for standardizing postpartum discharge education and postpartum healthcare as essential components of increasing perinatal healthcare quality and safety. It is beyond the scope of this article to discuss all of the possible strategies and tactics for reducing maternal morbidity and mortality. The focus on postpartum healthcare strategies is not meant to imply that other strategies such as improving the health of women or expanding women's access to healthcare are less important. All women should be taught that these symptoms are warning signs.

SIX HEALTHCARE PRIORITY STRATEGIES

Several leading nursing, medical, and healthcare-related organizations have taken the lead in developing recommendations to reduce postpartum maternal morbidity and mortality. For example, 1 of the 9 Alliance for Innovation of Maternal Health patient safety bundles focuses on improving postpartum care.[4] This bundle specifically includes recommendations for improving postpartum discharge education. These recommendations focus on ensuring that all women receive standardized information about postbirth warning signs; tailoring the timing and quality of the postpartum visit to meet the needs of each woman; enhancing social and mental health support; decreasing complications by reducing overuse of cesarean births; and expanding public health policies, advocacy, and education outside the obstetrical realm.[4]

Improve and standardize postpartum discharge education

It is recommended that all women receive consistent and standardized education on potential warning signs.[5] Every woman who gives birth has the potential to experience a postpartum complication, albeit some women have a higher risk than others. It is impossible to predict which women will actually experience a complication especially if they have no preexisting, prenatal, or intrapartum risk factors. Women who are educated on the specific signs and symptoms of the leading causes of maternal morbidity and mortality may act more quickly to seek care and may receive more timely and appropriate interventions.

There is limited research about how and what women are taught about postpartum warning signs. In a study by Suplee et al,[5] nurses employed on postpartum units from 6 pilot project hospitals located in 2 states did not provide consistent information to new mothers on potential warning signs related to complications of pregnancy, how to assess for these signs, or how to report findings or concerns. The findings in a follow-up national study by Suplee et al[6] were consistent with the pilot study. Nurses who provided care to women postbirth reported that they were not always providing comprehensive teaching on potential warning signs to all women. In addition, 46% of the nurses who responded to the survey did not know that the pregnancy-related mortality rates had increased in the United States, and the majority of nurses named hemorrhage and hypertension as the leading causes of maternal deaths instead of cardiac and noncardiovascular diseases.

Educating new mothers during the short hospital stay is no easy task. New mothers may be focused on learning how to care for their newborns rather than on their own care and health needs. In fact, in one study, the majority of nurse respondents reported spending less than 10 minutes teaching about postpartum warning signs and that the information provided (both verbal and written education) was not standardized.[6] Teaching new mothers prior to discharge how to recognize warning signs needs to be a standard of practice especially since more than half of all maternal deaths occur in the postpartum period.[1]

The Association of Women's Health, Obstetric and Neonatal Nurses implemented a quality improvement project that included education for nurses about the leading causes of maternal morbidity and mortality, utilization of a discharge education checklist that encouraged standardization of the discharge education that nurses provided, a patient education handout titled Save Your Life, and an audit tool.[7] A description of the project along with educational tools with guidelines for how to use them is available for use by nurses.[7] The acronym POST-BIRTH was developed as a unique feature of this program to help both the nurses and the women remember the leading causes of maternal morbidity and mortality. The acronym POST-BIRTH is

not an "all-inclusive list," rather it is a summary of the warning signs for the leading causes of postpartum morbidity and mortality. In addition, trying to teach women about every potential complication that could occur would be an overwhelming amount of information to teach and remember. The symptoms that spell out "POST" are all symptoms of leading causes of death that the expert panel identified to be critical. Women with any of these 4 symptoms were told to seek medical assistance immediately. The symptoms that spell out "BIRTH" indicate an urgent situation. Women were instructed to call their healthcare provider or go to the emergency department (ED) if they are unable to reach their healthcare provider in a timely fashion. The symptoms included in the acronym POST-BIRTH are outlined below with additional recommendations related to increasing postpartum safety and quality.

Pain in chest

Since cardiovascular disease is the number 1 cause of maternal deaths in the United States, educating women about cardinal signs and symptoms is vital. During the postpartum period, these signs and symptoms are often illusive and may present as nonspecific to the woman especially if she has no cardiac history. These signs and symptoms may include chest discomfort/pain, palpitations, shortness of breath, and pedal edema, and are not all-inclusive.[8] Therefore, if a woman experiences any of these symptoms, she needs to seek immediate medical attention.

Obstructed breathing or shortness of breath

There are nonspecific symptoms that women can experience before receiving a diagnosis of pulmonary embolism.[9] Although the most common symptom is shortness of breath, Bělohlávek et al[10] report a triad of symptoms including chest pain, hemoptysis, and dyspnea that can occur in combination or separately when a pulmonary embolism develops. Similarly, women can experience pulmonary edema as a result of low plasma oncotic pressure and increased intravascular volume status.[11] Any of these symptoms require immediate medical attention.

Seizures

Women can develop eclampsia, a progressive disease process, before or after giving birth. In fact, seizing has been reported up to 8 weeks postdelivery.[12] Seizures may also be related to other diagnoses such as epilepsy and require immediate medical attention.

Thoughts of hurting yourself or your infant

Postpartum depression has a wide array of symptoms that include emotional withdrawal from others, severe sadness, inability to sleep, overeating, inability to eat, crying frequently, worrying, and fears about harming the infant or self.[13] Women are encouraged to seek immediate assistance if they feel that they are going to hurt themselves or their infants.

Bleeding

Obstetric hemorrhage remains one of the leading causes of pregnancy-related mortality worldwide that is highly preventable if recognized early and treated promptly.[1,14] The Association of Women's Health, Obstetric and Neonatal Nurses' expert panel recommended that a woman call her provider if she is soaking through a pad for more than an hour or passes a clot the size of an egg or larger.[7] This is consistent with the recommendations from the American College of Nurse-Midwives[15] that recommends notifying a provider if a golf-ball sized clot or larger is passed or if a pad is soaked with blood in or less than an hour.

Incision that is not healing

Women can have incisions because of vaginal or cesarean births. Infection leading to sepsis is the third leading cause of maternal mortality.[3] More women are at increased risk of abdominal surgical wound complications because of the rise in obesity, diabetes, and surgical births.[16–19] Between 3% and 30% of women with cesarean births have incisions that do not heal properly.[16,19–21] Women need to call their provider for any incision that is reddened, edematous, tender to touch, dehiscence, or is producing discharge.

Red or swollen leg that is painful or warm to touch

Pregnancy is a "hypercoagulable" state whereas every woman is at risk for developing a clot especially those who are obese or who have undergone a cesarean section. Meetoo[22] reports that pain redness or discoloration, swelling, and warmth in the leg are the most common symptoms of a deep vein thrombosis. Women do not have to experience all of the symptoms combined, and some women do not experience any symptoms at all. Women need to notify their providers if they experience any of these symptoms postbirth.

Temperature of 100.4° F or higher

Postpartum infections and sepsis remain a leading cause of maternal morbidity although the rates have been decreasing over time. The American College of Nurse-Midwives encourages women to report a fever over 100.4°F, foul smelling vaginal discharge, and any swelling or redness around stitches or incisions.[15] Infections can arise from the genital tract, breasts, urinary tract, or even respiratory tract making early intervention crucial. Symptoms of sepsis include fever, pelvic pain,

and foul-smelling discharge while wound infections are most commonly identified by edema and pain.[23]

Headache that does not get better, even after taking medicine, or a bad headache with vision changes

Since women can develop preeclampsia, eclampsia, or hypertension even after they give birth, it is important that signs and symptoms be discussed prior to discharge. The most common symptom a woman presents with is a headache. In one study of 152 women who had postpartum preeclampsia and eclampsia, 63% did not have hypertension during pregnancy and all of the women who were diagnosed with eclampsia presented with a headache, as did two-thirds of women with postpartum preeclampsia.[24] In addition to a headache, women need to report other symptoms including right upper quadrant pain, changes in vision, or nausea and dizziness.[24] In addition, some women may notice swelling of their hands or feet that although not diagnostic, can be related to the preeclampsia disease process. Timely recognition and treatment are the best responses to postpartum preeclampsia.[25] A history of preeclampsia has been associated with an increased risk of cardiovascular disease later in life.[26] It is important to point out that not all women who have hypertension will experience symptoms and not all women with preeclampsia will have elevated blood pressures.

Enhance the timing of postpartum care services

Traditionally, women who had a vaginal birth received an appointment to be seen at 6 weeks and those who gave birth via cesarean birth were seen earlier around 4 weeks.

More recently, The American College of Obstetricians and Gynecologists' Committee on Obstetric Practice's Opinion[27] reported that postpartum follow-up should be "an on-going process" with the timing of visits scheduled to meet the woman's individual needs. Ideally contact with all women who have given birth should take place within the first three weeks. For those women who have had cesarean births or are at increased risk for postpartum complications based on their medical or psychological history, the recommendation is to see these women earlier in the postpartum period (ie, severe hypertension follow-up within 3-5 day). Earlier contact in the postpartum period may help circumvent or prevent identified issues more easily than if these issues are discovered and addressed later in the postpartum recovery. In addition to a focus on mitigating any physical complications, an early postpartum visit can provide an ideal opportunity to address existing lactation issues, screen for increased risks for postpartum depression or mood disorders, offer anticipatory guidance, and provide connections to available community resources, medical homes, and services.[27] Any healthcare follow-up in the early postpartum period for women at increased risk should not preclude a later postpartum comprehensive follow-up examination to include complete physical, social, and psychological well-being assessments.[27]

Access to care and insurance issues play a role in continued care options for women. Half of all births to women who give birth in the United States rely on Medicaid to cover obstetrical care services.[28] These services technically end after 42 days postbirth per federal guidelines; however, additional services may vary state to state. Therefore, women may not seek out care for chronic conditions or preventive services after their insurance runs out placing them at higher risk for future pregnancies. Women who are undocumented or considered unauthorized immigrants do not qualify for standard Medicaid but can receive some benefits to cover prenatal care and labor and delivery under emergency Medicaid or state safety net providers although reimbursement for these services has almost been exhausted.[29] Unfortunately, women who have decreased access to perinatal care are usually at a higher risk for potential birth complications.

Improve the quality of the postpartum care visit

There are limited data regarding the ideal timing and the quality of what occurs during the postpartum visits. The American College of Obstetricians and Gynecologists' Committee Opinion[27] reports that women would benefit from receiving education or guidance on various topics including birth control, physical activity, sexuality, nutrition, depression, infant feeding, weight retention, and any complications that may affect future pregnancies. The standard postpartum visit also needs to include a comprehensive assessment of physical, social, and psychological well-being as well as a reassessment of nonpregnancy or pre–pregnancy-related health conditions. Describing potential postpartum warning signs related to complications of pregnancy during these visits and education about these warning signs need to become the standard of practice since more than 50% of maternal mortality occurs after birth.[1] It is also during this visit that a handoff needs to occur between the obstetrical provider and a primary care provider. For many women, this is the last interaction with a provider prior to their next pregnancy.

Enhance social and mental health support

Social support is the help offered and accepted from others.[30] Emotional support (feeling loved, supported,

and encouraged) and instrumental support (supplying of material needs or tasks) are vital during the postpartum period.[30,31] Improvements in postpartum social support can be enhanced when obstacles to using or receiving this support are identified and solutions are implemented to remove the barriers. An essential time to assess whether acceptable social support resources are available, if not completed prior to the birth, is prior to women being discharged from the hospital after giving birth. Registered nurses and other healthcare providers can help women consider anticipated postdischarge social support needs and determine areas where support may be lacking.[32] By ascertaining what established maternal support resources and programs are available within the hospital and surrounding communities as well as accessible virtual options, healthcare providers can connect postpartum women to resources that they may never realize exist otherwise.[32]

Instrumental support has been identified by mothers as key to their recovery both physically and emotionally.[31] When mothers are able to attend to their personal care needs (eg, bathing, eating, and sleeping) and their household's needs (eg, cooking and cleaning) during the postpartum period, they better handle the physical as well as the emotional stressors even when potential hindrances to recovery exist (eg, pain from cesarean birth or breastfeeding discomforts).[31] Identified maternal barriers to receiving support include beliefs that asking for help would be perceived negatively, create burdens for others, and signal a lack of ability to manage the demands associated with childbirth recovery and parenting a newborn.[31]

Studies have explored different approaches of offering women postpartum support including home visits with healthcare professionals or community workers, telephone support, or text messaging.[33–36] Interventions have targeted providing education, offering practical support, addressing maternal questions, and encouraging breastfeeding with measured outcomes including maternal satisfaction, maternal perceived stress, maternal perceived health, symptoms of postpartum depression, infant healthcare utilization, and breastfeeding duration and exclusivity. Evidence for these methods of support has not been consistent in the literature.[33–36]

In a systematic review of telephone support, breastfeeding exclusivity increased at several different time intervals and symptoms of postpartum depression decreased.[37] Telephone-based support has been linked to a decrease in postpartum depression symptoms,[38–40] and associated with a decrease in depressive symptoms, an increase in perception of social support was noted in postpartum women.[39] Lower maternal perceived stress and a higher maternal perception of health post–hospital discharge were noted in first-time mothers receiving postpartum telephone follow-up from experienced pediatric nurse practitioners.[33] In addition, 79% significant healthcare cost savings ($56 501) for healthcare services rendered at ED and urgent care visits and for rehospitalizations were reported for infants whose first-time mothers received postpartum telephone follow-up.[33] A free-for-users, midwife-staffed, 24-hour telephone hotline available to mothers for 4 months following birth showed that utilization was highest by mothers during the first 4 weeks of the postpartum period.[35]

Text messaging has been utilized and studied among various populations, including the maternal and infant population. However, the mobile messaging employed in most of these studies has utilized automated messages developed specifically to target a change in health behavior, manage disease, or promote preventative health behaviors.[41–43] Personalized support provided by professional nurses to first-time mothers in the early postpartum period via text messaging may be a convenient and relatively low-cost option to offer individualized support. This approach is being evaluated in a randomized controlled trial in the southeastern United States (M. H. Morris, oral communication, December 18, 2017).

The Motherhood Center of New York is a first of its kind of facility to offer classes, education, counseling, consultations, and a day clinic to support and treat perinatal mood and anxiety disorders.[44,45] Its intensive day program has shown early success in providing support and decreasing symptoms of postpartum depression.[46]

Reducing postoperative complications by decreasing rates of cesarean births

Cesarean births are associated with increased morbidity compared with vaginal births.[47] Possible intrapartum and postpartum complications, some resulting in hospital readmission within 30 days following birth, can include hemorrhage, wound infection, surgical injury, anesthesia issues, and failure to establish breastfeeding.[47–49] Emergency department use by postpartum women was found to be higher in women who had cesarean births than in women who had vaginal births, and surgical wound complications accounted for the most common specific diagnosis following cesarean birth.[50] Recovery from cesarean birth can take weeks longer than recovery from a vaginal birth, with women reporting more fatigue, breastfeeding issues, urinary tract difficulties, depression, anemia, abdominal pain, and constipation.[51] Women may find it difficult and perhaps impossible to provide care for newborns without additional assistance. This need creates challenges for all women but especially for those who have minimal resources or a limited support network.

Decreased early contact with the infant following birth can contribute to decreased birth satisfaction as well as delayed breastfeeding initiation and can also result in long-term morbidity related to postpartum depression and posttraumatic stress disorder.[47] Separation of mothers and newborns, following a cesarean birth is common in many hospitals and delays early skin-to-skin contact for newly born infants if it is implemented at all. This interrupts the simultaneous, natural release of oxytocin that takes place in the mother and the newborn during the hour or so following physiologic birth when the newborn is placed skin-to-skin on the mother's chest.[52] This hormone release causes both mother and her newborn to experience feelings of euphoria and love that influences the biologic bonding between them.[53] Additional benefits of this skin-to-skin interaction that facilitates a peak oxytocin release may include stronger uterine contractions helping to decrease the risk of postpartum hemorrhage, enhanced newborn thermoregulation, initiation of breastfeeding, and reduction of maternal and newborn stress.[52]

Data concerning the long-term consequences related to cesarean births are not abundant, but related long-term costs of cesarean births can include chronic pain, surgical adhesions, subsequent fertility issues, and complications in subsequent pregnancies.[47–49] For some women, a cesarean birth signals the loss of a desired vaginal birth experience that may have been anticipated for months.[54] This may precipitate unexpected emotions that can affect postpartum recovery.

Promoting and supporting physiologic vaginal birth by nurses at the laboring woman's bedside is one strategy to attempt to reduce unnecessary surgical cesarean births. The consequences of unnecessary surgery for birth can extend well beyond the initial postpartum period as maternal health and functional status can also directly or indirectly influence newborn/infant well-being.[55] Prior surgical birth also increases the risk of placental abnormalities such as previa, accreta, and percreta and emergency peripartum hysterectomy in subsequent pregnancies.[47,48]

Expand public health policies, advocacy, and education outside the obstetrical realm

At the legislative level, the Maternal Health Accountability Act of 2017 is currently under review at the Senate level. The focus of this bill is to

> support States in their work to save and sustain the health of mothers during pregnancy, childbirth, and in the postpartum period, to eliminate disparities in maternal health outcomes for pregnancy-related and pregnancy-associated deaths, to identify solutions to improve health care quality and health outcomes for mothers, and for other purposes.[56]

At the state level, more providers are investigating ways to enhance reporting and evaluation of maternal mortality cases and near misses. In 2016, New Jersey passed a legislative bill to support the Stop, Look, Listen Campaign and established a Maternal Health Awareness Day to take place each year.[57] Bringing more awareness to the public about maternal health awareness is another useful strategy to reduce mortality.

In addition to the traditional exchange of information between nurse and patient upon discharge, there are several other providers who can reinforce postpartum warning signs information including pediatric, ED, and home healthcare providers. The American Academy of Pediatrics[58] recommends specific time frames for well childcare visits and provides comprehensive guidelines for practitioners to use at each visit. The first visit is within 2 to 5 days postbirth, followed by 1, 2, 4, 6, 9, and 12 months. Currently, an assessment for postpartum depression is standard in the pediatric guidelines but a review of potential signs and symptoms of pregnancy related mortality is not. Educating pediatric providers on postpartum warning signs who can then query the mother for potential signs and symptoms is another related strategy for lowing the maternal mortality rate.

Asking all women of childbearing age who present to the ED "Have you been pregnant within the last year?"[7] may trigger the provider to focus on pregnancy-related complications that require an extensive workup they might not have normally performed had they not known the woman had recently given birth. Specific care protocols have been created to guide care for several of the potential complications.[59]

Perinatal community outreach programs' home healthcare workers who visit women in their homes during the postpartum period may play a key role in educating new mothers on potential warning signs. It is likely that they also require further education on assessment and education on these warning signs.

CONCLUSION

Focused strategies designed to reduce maternal morbidity and mortality in the postpartum period are needed. The 6 strategies recommended previously are not all inclusive. However, they need to be considered priorities for action since they are tailored to reduce what are currently the leading causes of postpartum morbidity and mortality. These strategies include recommendations for improving patient education, timing and quality of the postpartum visit, enhanced social and mental health support, reducing overuse of cesarean births, and finally a need to expand public health

policies, advocacy, and education outside the obstetrical realm. These strategies need to be implemented in an equitable manner to decrease disparities that already exist and to improve outcomes for all women.

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