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Obstetrical Morbidity and Mortality in Women of Color

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Obstetrical Morbidity and Mortality in Women of Color

by

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Acknowledgements

Abstract

Non-Hispanic black women are three to four times more likely to die from pregnancy-related complications when compared to their Caucasian equivalents, however more than half of these deaths are considered potentially preventable. The purpose of this research and systematic literature review is to analyze why obstrictrical morbidity and mortality is significantly higher amongst women of color, and determine if racial disparities play a role. Healthcare measures used to reduce or prevent maternal morbidity and mortality are also accomplished in this article. A comprehensive literature review was performed using electronic databases, including CINAHL, PubMed, Clinical Key, Cochrane Library, and Dynamed Plus. Results were limited to studies completed within the past 10 years. The addition of a pregnancy question on the U.S. death certificate in 2003 increased the mortality rate, which suggests improved detection and reporting, but there have been some inconsistencies with reporting. The magnitude of chronic conditions and racial disparities in pregnancy-related deaths in women of color and strategies for quality healthcare measures. These factors are significant; however, they do not fully explain the prominent rates of severe maternal morbidity and mortality among ethnic minority women. Factors that must be taken into consideration are those of significant ethnic disparities, structural racism, and implicit bias that contribute to maternal health outcomes.

Keywords: included maternal mortality, pregnancy-complication, racial disparities, black mortality, racial disparities, prenatal care, obstetrics, severe maternal morbidity, and women of color.

Obstetrical Morbidity and Mortality in Women of Color

The World Health Organization (WHO) defines maternal mortality as death of a woman while pregnant or 42 days postpartum from causes related to or provoked by pregnancy or its management. This definition is not inclusive of accidents, incidental causes, duration, or location of the pregnancy. Maternal mortality ratio (MMR) is the number of maternal deaths per 100,000 live births. The WHO uses the MMR to compare maternal health worldwide. The United States has reduced its MMR over the last century due to advances in surgical techniques, anesthesia, and antiseptics. Over the last several decades, data has shown that MMR numbers in the U.S. have been increasing while rates in other developed countries are declining. Maternal mortality rates vary among ethnicities but are significantly higher amongst women of color. The nature of this literature review is to research disparities in healthcare, associated risk factors, prevention strategies, and barriers related to maternal morbidity and mortality. By understanding the barriers to healthcare and associated risk factors, it could lead to improved treatment and prevention outcomes.

Statement of the Problem

Non-Hispanic black women are three to four times more likely to die from pregnancy-related complications when compared to their Caucasian equivalents. Pregnancy-related mortality is also higher in Native Americans, Native Alaskans, Asians, Pacific Islanders, and Puerto Ricans in the United States. Non-Hispanic black women also have the highest proportion of severe maternal morbidity during delivery. However, more than half of these deaths are considered potentially preventable.

Research Question

Obstetrical morbidity and mortality in the United States are still relatively high when compared to other developed countries. Women of color have experienced morbidity and mortality more frequently compared to non-Hispanic white women. This led to the research question asking how do racial disparities influence obstetrical morbidity and mortality in women of color when compared to non-Hispanic Caucasians? In women of color, what healthcare measures can be used to reduce or prevent maternal morbidity and mortality when compared to non- Hispanic Caucasians?

Methods

A comprehensive literature review was performed using electronic databases, including CINAHL, PubMed, Clinical Key, Cochrane Library, and Dynamed Plus. Keywords included maternal mortality, pregnancy-complication, racial disparities, black mortality, racial disparities, prenatal care, obstetrics, severe maternal morbidity, and women of color. The literature was further searched for black mortality in pregnancy. The search revealed a total of 262 studies. Articles were limited to the past ten years to incorporate the most recent literature. Journal articles were further eliminated due to location, publication year, and specific health conditions. After removing research articles that met the exclusion criteria, 14 studies met all inclusion criteria.

Overview: Reporting Obstetrical morbidity and mortality

In the United States, the National Center of Health Statistics (NCHS) calculates the maternal death count from state death certificates. The cause of death stated on the death certificates must match the WHO International Classification of Disease (ICD) codes for death during pregnancy, childbirth, and puerperium (Callaghan, 2012). The WHO ICD-9 and ICD-10 defines maternal death as the death of a woman while pregnant or within 42 days of termination

of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by pregnancy or its management but not from incidental or accidental causes (Callaghan, 2012). The ICD-10 includes late maternal deaths from direct or indirect obstetric causes that occur more than 42 days but less than 1 year after delivery. Obstetric hemorrhage, complications from anesthesia, and cesarean section are a few examples of direct maternal death. Indirect maternal deaths result from previous existing health conditions or health conditions developed during pregnancy.

Preventable deaths

In 2003 the U.S. standard death certificate was revised to include a checkbox format to indicate whether the deceased was pregnant at the time of death or was 42 days to 1 year postpartum. Although the pregnancy checkbox improved the detection of some maternal deaths, it also incorrectly identified some deaths as maternal deaths or late maternal deaths (Joseph, 2021). Physicians, medical examiners, or coroners are the only people capable of completing the medical portion on the death certificate.

MacDorman et al. (2021) analyzed the cause of death literal data from the NCHS from 2016 and 2017. Cause of death literals are the words written in the cause of death section of the death certificate. IDC-10 maternal death codes A34, O00-O95, and O98-O99 and late maternal death codes are established from the cause of death literals. Women ages 10-54 with these IDC codes were included in this study along with confirmed maternal deaths identified from the pregnancy checkbox. The leading cause of maternal mortality as well as maternal mortality ratios for non-Hispanic white, non-Hispanic black, and Hispanic women were identified. Other racial ethnicities were included in the study; however, they were not analyzed individually as reporting is less accurate for Asians, Pacific Islanders, and Native Americans.

MacDorman et al. (2021) found that maternal mortality rate ratios (MRRs) for non-Hispanic black women were 3.55 times higher than non-Hispanic white women. The late maternal mortality ratio for non-Hispanic Black women was 3.52 times higher than non-Hispanic white women. These ratios were higher than the NCHS maternal mortality ratios. The MRR for Hispanic women, when compared to non-Hispanic white women, was 1.08. for maternal mortality and 1.29 late maternal mortality. The NCHS reported Hispanic maternal mortality rates significantly lower at 0.76.

Obstetric embolism, eclampsia, and preeclampsia were the primary causes of maternal deaths among all populations (MacDorman, 2021). Obstetric embolism is inclusive of any embolism during pregnancy or postpartum. Postpartum cardiomyopathy was the third leading cause of death followed by obstetric hemorrhage (MacDorman, 2021). In non-Hispanic Black women eclampsia and preeclampsia were the primary cause of deaths, followed by postpartum cardiomyopathy, obstetric embolism, and obstetric hemorrhage, and ectopic pregnancy respectfully (MacDorman, 2021). Non-Hispanic black women have 5.06 times higher MRR for preeclampsia and eclampsia and 4.86 times higher MRR for postpartum cardiomyopathy when compared to non-Hispanic white women. The primary cause of death in late maternal mortality was postpartum cardiomyopathy in the total population. Non-Hispanic black women have six times (MRR=6.16) the risk for postpartum cardiomyopathy than that for non-Hispanic white women.

Maternal deaths associated with preeclampsia, postpartum cardiomyopathy, obstetric embolism, and hemorrhage are preventable. About 60% of maternal deaths associated with preeclampsia and 70% associated with hemorrhage are thought to be preventable (MacDorman, 2021). Early intervention with hypertension safety bundles could drastically reduce mortality in

non-Hispanic black women. Non-Hispanic black also women tend to present with more

significant symptoms and more advanced disease with postpartum cardiomyopathy

(MacDorman, 2021). Increased awareness among health care providers as well as earlier

detection is critical as deaths from postpartum cardiomyopathy are preventable.

Comorbidities and Severe Maternal Morbidity

Brown et al. (2020) conducted a retrospective study that analyzed the number of chronic

comorbidities within various maternal ethnicity groups to evaluate the risk of severe maternal

morbidity. Patient age, insurance, delivery type, median household income, and location of

residence were also included in the analysis. Hospital discharge data from 2016 and 2017 was

evaluated from the Healthcare Cost and Utilization Project (HCUP) National Inpatient Sample

(NIS) using the ICD-10 Clinical Modification and Procedure Coding System (PCS) (Brown et

al., 2020).

A total sample size of 1,480,925 deliveries was included in the study. Maternal morbidity

was identified by using the Center for Disease Control and Prevention (CDC) severe maternal

morbidity indicator list. Deliveries with at least one of the 21 indicators from this list in addition

to one of the following; a hospital death, cesarean delivery with hospitalization greater than five

days, or vaginal delivery with hospitalization greater than three days were indicative for severe

maternal morbidity (SMM) (Brown et al., 2020). They assessed SMM with and without blood

transfusions as an indicator.

SMM rates were 139.7 per 10,000 deliveries with blood transfusions compared to 43.9

per 10,000 deliveries when omitting deliveries with only blood transfusions (Brown et al., 2020).

When paralleled to non-Hispanic whites, all ethnic minorities had increased odds of SMM. Non-

Hispanic black 225.7 per 10,000 (OR 2.2; 95% CI 2.1–2.3), Hispanic's 163.3 per 10,000 (OR

1.6; 95% CI 1.5–1.7), and Asian's 153 per 10,000 (OR 1.5; 95% CI 1.4–1.6) (Brown et al.,

2020). Non-Hispanic white women had an SMM rate of 104.7 per 10,000. Non-Hispanic white

women also had lower rates of SMM with omitting blood transfusions relative to all other racial

minorities.

Morbidity rates of women without comorbidities, with one, two, and three comorbidities,

were 48.5, 238.6, 379.9, and 560, respectfully (Brown et al., 2020). Morbidity risk significantly

increased within racial groups as comorbidities increased. Non-Hispanic black women without

comorbidities had a higher risk odd when compared to non-Hispanic white women without

comorbidities (OR 2.0; 95% CI 1.8–2.1; 72 vs 37/10,000). Risk odds were less when comparing

non-Hispanic black women and non-Hispanic white women with the same number of

comorbidities. Ethnic minority women, especially black women, develop chronic conditions at

earlier ages and are less likely to have their conditions adequately managed (Howell, 2018). The

study concluded that there was there were higher rates of severe maternal morbidity among

women with comorbid or chorionic conditions.

Postpartum Hemorrhage

Gyamfi-Bannerman et al. (2018) assessed individual risks for severe morbidity consistent

with hemorrhage, postpartum hemorrhage, and morbidity with hemorrhage by race. They utilized

data from 2012 to 2014 from the National Inpatient Sample (NIS) from the Agency for

Healthcare Research and Quality using ICD-9-CM codes. A total of 360,370 women with a

diagnosis of postpartum hemorrhage aged 15-54 years old of varying ethnicities were included in

this analysis.

Gyamfi-Bannerman et al. (2018) found that severe morbidity risk, including transfusions,

was highest for non-Hispanic black women at 26.6 % when paralleled to non-Hispanic white,

Hispanic, Asian, or pacific islander women 20.7%, 22.5%, and 21.4% respectfully (P < .01).

Even after adjusting for transfusions, morbidity remained highest for non-Hispanic black women

(P <.01) (Gyamfi-Bannerman et al., 2018). The risk for disseminated intravascular coagulation (

DIC) was also higher among non-Hispanic black women when compared to non-Hispanic white

women, Hispanics, Asians, and Pacific Islanders, 8.4%, 7.1%, 6.8%, and 6.8%, respectfully (P <

.01) (Gyamfi-Bannerman et al., 2018). Non-Hispanic black women were also more likely to

undergo hysterectomy (2.4% vs. 1.9%, P < .01), although Asian or Pacific Islander women were

at the highest risk with 2.9% (Gyamfi-Bannerman et al., 2018).

In another study, it was found that among women with a diagnosis of hemorrhage, non-

Hispanic black and Hispanic women were 4.7 (95% CI: 1.3–16.8) and 3.7 (95% CI:0.8–16.70)

times more likely to die than non-Hispanic white women. (Howell, 2018).

Colaillo et al. (2021) conducted a retrospective cohort study that analyzed the ability of

the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) risk assessment

tool to predict obstetrical morbidity related to hemorrhage. Increased risks for hemorrhage were

associated with higher BMI, increased age, rate of cesarean, number of prior cesareans, and

preeclampsia (p <0.0001) (Colaillo, 2021). Obstetrical hemorrhage rates occurred at rates of

2.1%, 7.6%, and 11.4% in low, medium, and high-risk groups, respectively. Morbidity risk

increased in medium (diagnostic OR 3.80; 95% Cl 3.37-4.27) and high-risk groups (diagnostic

OR 5.93; 5.26-6.68) when paralleled to the low-risk group separately. The AWHONN risk

assessment tool has been successful in identifying high-risk hemorrhage as well at transfusions.

The risk tool is backed by the American College of Obstetricians and Gynecologists (ACOG)

Safe Motherhood Initiative.

Maternal Age

Linsonkova et al. (2017) conducted a population-based retrospective cohort study to compare maternal age with severe maternal mortality and morbidity risk factors. The study included 828,269 live and still single birth pregnancies from January 1, 2003, to December 31, 2013, in women ages 15 to 60 years old. The Birth Events Record Database (BERD) analyzed information from birth certificates, fetal death certificates, and patient demographics. The Comprehensive Hospital Abstract Reporting System (CHARS), ICD-9CM codes, and the Canadian Perinatal Surveillance System and Center of Diseases and Prevention morbidity identifiers list were used to assess eleven maternal mortality and morbidity categories. Maternal age was organized into the following categories: 15–19, 20–24, 25–29, 30–34, 35–39, 40–44, and ≥45, ≥50.

This study found that maternal morbidity was higher among teens when compared to the reference group 25-29 age. (OR 1.5, 95%, CI 1.5-1.6). Teens 15-19 had increased risks of developing sepsis. Teen mothers were noted in the study to more commonly be of Hispanic or non-Hispanic black ethnicity. Rates of morbidity considerably increased in women over the age of 39. Ages 35-39 (OR 1.2, 95%, CI1.2-1.3) were intensified to (OR 5.4, 95%, CI 2.4) in women greater than 50. Mothers with increased maternal age were more commonly non-Hispanic white or in the other category. Women over the age of 35 had increased severe morbidity for amniotic fluid embolism (OR 8.0, 95% Cl 2.7-23.7), shock (OR 2.9, 95%, Cl 1.3-6.6) when paralleled to women over the age of 40. The adjusted risk difference in severe maternal morbidity compared to mothers 25–29 was 0.9% (95% CI 0.7%–1.2%) for mothers 40–44, 1.6% (95% CI 0.7%–2.8%) for mothers 45–49, and 6.4% for mothers ≥50 (95% CI 1.7%–18.2%)

Cesarean Deliveries

Leonard et al. (2019) evaluated maternal age, pre-pregnancy obesity, pre-pregnancy comorbidities, and cesarean delivery and its association with severe maternal morbidity. This study found that cesarean delivery was associated with 2.7 times the risk of severe maternal morbidity (95% CI: 2.6, 2.7) when paralleled to vaginal deliveries (Leonard, 2019). Cesarean deliveries are attributed to 37% (95% CI: 36, 38) of severe maternal morbidity cases in the population (Leonard, 2019).

Minehart, R. D. et al (2020) published a literature review of the unique role anesthesiologist can have in reducing this morbidity and mortality in women of color. ACOG's Levels of Maternal Care Guidelines recently mandated that a board-certified anesthesiologist with special training in obstetrics be available at specialty obstetric facilities, subspeciality facilities, and regional prenatal facilities at all times (Minehart,2020).

Non-Hispanic black women and Hispanic women receive epidurals at lower rates and are more likely to receive unnecessary general anesthesia (Minehart et al., 2020). Anesthesiologists with obstetrics experience induce general anesthesia less frequently for a cesarean delivery when compared to a non-fellowship-trained anesthesiologist. Anesthesiologist with special training in obstetrics can make a difference in the overall health of minorities. Anesthesiologists with knowledge in obstetrics' should be optimized to reduce maternal morbidity and mortality.

Factors After Delivery

Chen et al. (2021) published a retrospective cohort study that analyzed morbidity onset after hospital discharge and paralleled it to severe maternal morbidity seen in hospitalized patients. The study included 2,667,325 women between the ages of 15 and 44 with live births or stillbirths between January 1, 2010, and September 30, 2014. Severe maternal morbidity was identified by diagnosis and procedure codes from the International Classification of Diseases,

Ninth Revision, Clinical Modification (ICD-9-CM) used in combination with the CDC severe maternal morbidity identification list.

The women were further categorized into one following groups: those without any SMM factors during delivery or postpartum, those with at least one SMM factor during hospitalization, and those with any de nuevo SMM factor present six weeks to 42 days after postpartum discharge (Chen et al. 2021). The term de novo is Latin for from the beginning or anew, and de novo SMM factors could not be present during the delivery phase. This study found that in the two combined groups, 17,584 women in Medicaid (2.2%; 95% CI, 2.1%-2.2%) and 32,079 women in the commercial insurance (1.7% ; 95% CI, 1.7%-1.8%) experienced at least one factor identified with severe maternal morbidity (Chen, 2021). A total of 3,265 women (0.4%; 95% CI, 0.4%-0.4%) in Medicaid and 5275 women in (.0.3%; 95% CI, 0.3%-0.3%) in commercial insurance had de novo SMM after discharge. De novo SMM represented 15.7% (95% CI, 15.1%-16.2%) of Medicaid group and 14.1% (95% CI, 13.8%-14.5%) in commercial insurance groups (Chen, 2021).

Women in the Medicaid group and women in the commercial insurance group experienced de novo symptoms two weeks after discharge. The factors seen in SMM during hospital delivery were different than those seen after hospital discharge. Non-Hispanic black women (adjusted OR,1.53; 95% CI, 1.48-1.58), Hispanic women (adjusted OR, 1.46; 95% CI, 1.37-1.57), other ethnicities (adjusted OR, 1.40; 95% CI, 1.33-1.47) all had increased risk during delivery hospitalization when compared to non-Hispanic white women. Disparities in the Medicaid group between non-Hispanic black women and non-Hispanic white women could continue to be seen in the postpartum period (adjusted OR, 1.69; 95% CI, 1.57-1.81). This is especially significant for the Medicare group as it covers up to 60 days postpartum.

Disparities

Healthy disparity is defined as the differences that results in a particular type of health difference that is closely linked with economic, social or environmental disadvantage. Social demographics, neighborhoods, provider factors, and system factors contribute to overall maternal health. Preconception, antenatal, delivery, postpartum are closely related, and the care received during any of these phases can momentously affect severe maternal morbidity or mortality.

Hospital quality is associated with a higher risk of severe maternal mortality and morbidity among ethnic minority women. National data found that 75% of non-Hispanic black deliveries in the United States occurred in a quarter of hospitals, 18% of non-Hispanic whites delivered in those same hospitals (Howell, 2018). Studies conducted in New York found that black women were more likely to deliver in hospitals with a higher risk for severe maternal outcomes ($p < .001$). Non-Hispanic black and American Indian/Alaska Native women report the highest number of stressful life events in the year before birth (Howell, 2018). Non-Hispanic black women and Hispanic women experience a higher rate of discrimination due to race, language, or culture. A Listening to Mothers III survey found that 40% of minority participants experienced communication issues, and nearly one-quarter perceived discrimination during birth hospitalization (Howell, 2018).

A study conducted in North Carolina revealed that non-Hispanic black women had higher death ratios for cardiomyopathy, hemorrhage, and respiratory complications 4.6 (95% CI 2.2–9.9), 4.9 (95% CI 1.2–19.4), and 6.1 (95% CI 1.2–31.3) respectively (Howell, 2018). Non-Hispanic black women and Hispanic women were 9.9 (95% CI: 4.4–22.2) and 7.9 (95% CI: 3.2–19.6) times more likely to die from pregnancy-induced hypertension (Howell, 2018). Non-Hispanic black and Hispanic women were 4.7 (95% CI: 1.3–16.8) and 3.7 (95% CI:0.8–16.70)

times more likely to die from complications from hemorrhage. (Howell, 2018). Asian women were found to have an increased odds for postpartum hemorrhage, lacerations, and infections. Hispanic women were found to have increased odds of postpartum hemorrhage, diabetes, and postpartum infections.

Early access to prenatal care is recommended in facilitating healthy pregnancies through screening and comorbidity management. High-risk pregnancies associated with chronic conditions are five times more likely to die from pregnancy complications if they did not receive prenatal care (Villavicencio, 2020) First-trimester prenatal care initiation in 2012 was highest for non-Hispanic white women, Asian women, multiple races, and Hispanic women with 79 % and 78% ,71% and 69% respectively. It was the lowest for non-Hispanic black women, American Indian/Alaska Native, and Native Hawaiian/other Pacific Island women with 64%, 59%, and 55%, respectively (Howell, 2018). Preconception risk factors have also been studied and associated with adverse birth outcomes. American Indian and Alaska Native women having the highest risk factors rates for drinking, smoking, diabetes, and mental distress. Black women had the highest rates of obesity, and Hispanics had the second highest rates of diabetes.

Non-Hispanic Black women and Hispanic women have significantly higher rates of unintended pregnancy as compared with non-Hispanic white women. Further research is needed in studying the association of access to contraception and abortion and severe maternal mortality and morbidity.

Postpartum care is important for monitoring the health of women with chronic illness and, the number of low-income women who attend a postpartum visit is low. Barriers such as cost, transportation, childcare, psychological distress, communication with provider, and knowledge are limitations.

Discussion

A review of the literature shows that mortality and morbidity rates in women of color have been heavily investigated. The current literature discusses the magnitude of chronic conditions and racial disparities in pregnancy-related deaths in women of color and strategies for quality healthcare measures.

The addition of a pregnancy question on the U.S. death certificate in 2003 increased the mortality rate, which suggests improved detection and reporting, but there have been some inconsistencies with reporting. Comorbidities and chronic conditions have continued to be a significant factor in maternal mortality and morbidity outcomes. Maternal age, income, hypertension, gestational age at delivery, and receipt of prenatal care were adjusted in one study and this only reduced odds ratios for pregnancy-related mortality from 3.07 (95% CI 2.0–4.54) to 2.65 (95% CI 1.73–4.07). These factors are significant; however, they do not fully explain the prominent rates of severe maternal morbidity and mortality among ethnic minority women. Factors that must be taken into consideration are those of significant ethnic disparities, structural racism, and implicit bias that contribute to maternal health outcomes. There are quality improvements that are required to reduce ethnic disparities in severe maternal morbidity rates.

Policies

Structural racism, as well as implicit provider bias, have been identified at significant contributors to this overall health crisis. The results of a Society for Maternal Fetal Medicine survey revealed that 84% of medical providers agreed that disparities impact their practice, but only 29% believed personal biases affected how they care for patients (Howell, 2018). The National Birth Equity Collaborative offers education sessions on implicit bias for medical

professionals and institutions (Villavicencio et al., 2020). Diversity and equality initiatives have increased across medical schools allowing for more diverse medical providers.

Maternal mortality review committees (MMRCs) are multidisciplinary groups that gather to examine pregnancy-related deaths. Due to implicit bias and its negative impact on maternal mortality rates, the MMRC ensures members are diverse and reflective. MMRCs utilizes various recourse to understand, analyze, and recommend preventative resolutions. Analysis from the MMRCs determined that greater than 60 percent of deaths are preventable (Villavicencio, 2020). Cardiovascular disease is the leading preventable cause of maternal mortality followed by infection, hemorrhage, preexisting illness, and cardiomyopathy, respectively.

The Alliance for Innovation in Maternal Health (AIM) is a partnership between 28 organizations, including ACOG, the American College of Nurse-Midwives, and the American Hospital Association. It is a national data-driven safety and quality improvement initiative. AIM emphasizes the need to be prepared and ready prior to the occurrence of a dangerous event in order to reduce or eliminate maternal deaths. AIM develops evidence-based protocol bundles to prevent maternal mortality. Currently, bundles are used for hypertension, venous thromboembolism, obstetrics hemorrhage with continuing effort to find developments for early cesarean deliveries and maternal morbidity warning signs.

Access to healthcare has been greatly discussed in the topic of maternal mortality. It is estimated that 27 million people in the United States do not have health insurance. Medicaid is an insurance program that offers low-income families health coverage. Medicaid eligibility is income-based in reference to the federal poverty level (FPL). Medicaid programs differ in each state, but one requirement is coverage for all pregnant individuals who are 133% FPL. The ACA expanded Medicaid eligibility covering up to 138% of FPL in 36 states. Pregnancy related-risk

extends into postpartum with 31% of deaths occurring during this period. Villavicencio et al.

encourages the addition of a Medicare extension program to cover the full duration of pregnancy

and up to 60 days postpartum.

Levels of Maternal Care

Kilpatrick et al. (2019) found that women with high-risk conditions benefited from giving

birth in hospitals that offer subspecialty services. Maternal morbidity when giving birth in

hospitals of low awareness (OR, 9.55; 95% CI, 6.83-13.35) when paralleled to hospitals of high

awareness (OR 6.50; 95% CI, 5.94-7.09). Levels of Maternal Care are classified into basic care

(level one), specialty care (level two), subspecialty (level three), and regional perinatal health

centers (level four). In emergency situations, the nearest hospitals should be utilized if traveling

to a higher-level facility increases the risk. Current data suggest that delivery volume, patient

volume, and hospital level or overall rating can contribute to maternal outcomes. Women with

placenta previa or placenta accrete have better outcomes if managed in hospitals with higher

delivery volumes (Kilpatrick, 2019).

Healthcare Strategies

According to the Center of Disease Control and Prevention (CDC) 53% of pregnancy-

related deaths occur in the postpartum period. Bingham et al. (2018) analyzed potential

healthcare strategies for reducing mortality and morbidity in the postpartum period.

Nurses on postpartum units did not provide consistent information to new mothers about

postpartum complications or signs and symptoms of warning signs (Bingham et al., 2018). It was

also noted that nurses in these positions were not aware of the increasing mortality rates in the

United States and were unaware of the leading cause of maternal deaths. This led to the

Association of Women's Health, Obstetric and Neonatal Nurse implemented the acronym POST-

BIRTH to help nurses and women remember the leading causes of maternal morbidity and mortality. Postpartum women are instructed to seek medical attention immediately if they experience any of the following: pain in the chest, obstructed breathing, seizures, thoughts of self-harm or harming infant, bleeding greater than one hour, incision that is not healing, red or swollen leg, temperature greater than 100.4, or a headache that does not improve with medication or causes vision changes (Bingham et al., 2018).

The American College of Obstetricians and Gynecologists Committee on Obstetric Practice's Opinion reported that postpartum follow-up should be a continuous process. Postpartum visits are recommended in the first three weeks after birth, but women with severe risk complications should be seen as early as three days postpartum. Medicaid postpartum services end 42 days after delivery, ultimately putting them at a higher risk (Bingham et al., 2018).

Maternal Early Warning Trigger

Shields et al. (2016) conducted a study in six maternity centers to analyze the use of maternal morbidity intervention tools. They developed a Maternal Early Warning Trigger (MEWT) algorithm to address early assessment and treatment of sepsis, cardiopulmonary dysfunction, preeclampsia-hypertension, and hemorrhage in clinically symptomatic patients.

Shields et al. (2016) found The MEWT algorithm reduced severe maternal morbidity (-18.4%, P= .01) and composite mobility (-13.6%, P=.01) when paralleled to baseline data. This study demonstrates that severe maternal morbidity and composite morbidity can be reduced with intervention with early warning tools. The use of warning tools is also supported by the joint commission and national partnership of women's health.

Telehealth Appointments

Jenganthan et al. (2020) analyzed patient and provider satisfaction rates towards telehealth implementation in high-risk obstetrical patients who received a telehealth visit between March 1, 2020- May 30, 2020, at four sites in New York City. The covid-19 pandemic relentlessly affected New York City and the surrounding areas during this time frame. A total of 5698 appointments were scheduled between March 1, 2019, and May 30, 2019, and 5116 telehealth visits during this same time frame. Telehealth visits were defined as visits that were completed via 2-way audio or 2-way audio-video connections. Blood pressure cuffs were provided for telehealth visits, but Doppler fetal heart tones were unable to be provided. In-person examinations were required for ultrasound or physicals and were required to be scheduled six weeks out. Depending on the patient's risk factors and comorbidities, telehealth visits were conducted every 1-3 weeks.

After the implementation of telehealth, there were lower rates of attended visits and total canceled appointments. There was a significantly lower rate of no-show appointments (8.49% vs 4.61%, P <.001), patient-cancelled appointments (7.06% vs 4.96%, *P*<.001), and patient same-day cancellations (2.30% vs 1.35%, P<.001) . There was also a significantly lower rate of patient-canceled appointments (3.82% vs. 5.44%, *P*=.021) and patient same-day cancellations (0.60% vs. 1.65%, *P*=.002) with those receiving telehealth visits than in-person visits in 2020. Overall, 86.9% of patients were satisfied with the care they received, and 78.3% would recommend telehealth visits to others. 87.8% of providers like using telehealth, and 90.9% believed it improved patient access to healthcare. 78.8% of patients desired a mixture of in-person and telehealth visits for future obstetrical telehealth care, and providers preferred in-person than telehealth visits.

Applicability to Clinical Practice

The information collected and presented in this literature review can help inform clinicians and patients of the factors most associated with severe maternal morbidity. Provide insight about health care barriers such as prenatal care and continued postpartum care contribute to the increased risk among racial minorities. Continued efforts to treat chronic conditions across ethnicities, improved access to healthcare, limit provider bias, and address structural racism are essential to optimize minority maternal health outcomes.

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