CE **2.5 ANCC Contact Hours**

Abstract

When caring for women experiencing preterm labor and birth, nurses play a significant role as bedside experts, advocates, patient educators, and key members of the maternity care team. Enhanced expertise on clinical and professional knowledge of preterm labor and birth is crucial in prevention and treatment. As preterm birth rates continue to rise, perinatal nurses as well-informed clinical experts have the opportunity to offer innovative education, holistic assessments, and communication through shared decision-making models. Educating pregnant women about early recognition of preterm labor warning signs and symptoms allows for timely diagnosis, interventions, and treatment. Informed and collaborative nursing practice improves quality of clinical care based on individualized interactions. A clinical review of preterm labor and preterm birth is presented for perinatal nurses.

Key words: Birth disparity; Preterm birth; Preterm labor; Preterm labor screening; Signs and symptoms of preterm labor; Spontaneous preterm birth.

PRETERM LABOR AND BIRTH: A CLINICAL REVIEW

Kellie M. Griggs, DNP, MSN, RNC-OB, Debra A. Hrelic, PhD, RNC, Nina Williams, DNP, MSN-NE, RN, Michelle McEwen-Campbell, DNP, FNP, RNC-OB, CNE, and Rebecca Cypher, MSN, PNNP, RNC

Preterm birth affects over 15 million babies and their mothers and families worldwide (World Health Organization [WHO], 2018). In 2019, in the United States, the preterm birth rate rose for the fifth year in a row to 10.23%, up 2% from 10.02% in 2018, and the highest level reported in more than a decade (Hamilton et al., 2020). This increase comes after a steady reduction in preterm births from 2007 to 2014 (Hamilton et al.; Figure 1). Thus, preterm birth affects more than 1 in 10 babies born in the United States (Centers for Disease Control and Prevention, 2018). Preterm labor (PTL) is regular uterine contractions before 37 weeks of pregnancy that cause cervical change or regular contractions with an initial presentation with cervical dilation of 2 cm or more (American College of Obstetricians and Gynecologists [ACOG], 2016b). Preterm birth (PTB) is birth after 20 weeks' gestation and before 37 completed weeks gestation (ACOG, 2016b). Preterm birth is categorized by timing. These include late preterm births: 34 weeks and 0 days through 36 weeks and 6 days; moderately preterm births (from 32 weeks to 33 weeks and 6 days), very preterm births (from 28 weeks to 31 weeks and 6 days), and extremely preterm births (<28 weeks) (ACOG, 2016b; March of Dimes [MOD], Partnership for Maternal, Newborn & Child Health, Save the Children, & WHO, 2012).

The majority of PTBs are late preterm births, occurring between 34 and 36 weeks of gestation, with the rate of late preterm births increasing from 7.28% in 2018 to 7.46% in 2019 (Hamilton et al., 2020). Early preterm births at less than 34 weeks' gestation also increased from 2.75% in 2018 to 2.77% in 2019 (Hamilton et al.). Preterm babies are at risk for a multitude of complications that account for 36.3% of reported infant deaths (WHO, 2018).

Natality data continue to indicate disparities in PTB rates among non-Hispanic Black women (14.38%), American Indian or Alaska Native women (11.57%), Native Hawaiian or other Pacific Islander women (11.13%), Hispanic women (9.97%), White women (9.26%), and Asian women (8.72%; Hamilton et al., 2020). Preterm birth rates in non-Hispanic Black women are approximately 55% higher than White women (Hamilton et al.). The racial inequity in PTB rates is due to structural racism, social determinants of health such as poverty and lack of health insurance, macroenvironmental factors, and weathering (e.g., increased and prolonged exposure to chronic stressors), among others, rather than race as a biological factor (Beck et al., 2020; Burris et al., 2019; David, 2019). The March of Dimes (2019) estimated the average societal cost of each PTB to be approximately $65,000 dollars, with higher costs at lower gestational ages.

Preterm labor and preterm birth can be either spontaneous or iatrogenic. Spontaneous PTL and PTB include preterm premature rupture of membranes (PPROM), natural onset of uterine contractions, and cervical dilation (Klebanoff et al., 2016). Spontaneous PTL accounts for 75% of all PTBs with no known maternal and fetal risk factors (Martin et al., 2019). Iatrogenic PTB is medically indicated due to complications during pregnancy such as hypertensive

disorders, hemolysis, elevated liver enzymes, low platelet count (HELLP) syndrome, deteriorating fetal status, and placental disorders (Klebanoff et al.). The focus of this review is primarily on spontaneous PTL and PTB.

Factors associated with PTL and PTB illustrate diverse contributing influences, some that are modifiable and others that are nonmodifiable (Table 1). Note that these factors are not causative but rather associated with PTB. The underlying cause of PTB remains unknown and is likely multifactorial (Parfitt, 2021). Nonmodifiable risk factors include cervical insufficiency and shortened cervical length, ethnicity, maternal age, and prior PTB. The three most common risk factors for PTB are history of a prior PTB, current multifetal pregnancy, and uterine or cervical abnormalities (Parfitt). Preterm birth is generally unanticipated and pregnant women are often caught off guard when faced with news of diagnosis, treatment, and potential extended hospital stays. Nurses should be knowledgeable about care, patient education, recognition, and treatment of PTL and PTB (Doyle & Silber, 2015; O'Connor & Gennaro, 2017). A clinical review of spontaneous PTL and PTB is presented with a focus evaluation and assessment; screening and diagnostic testing; treatment; and patient education, communication, and support.

Antenatal Care for Preterm Labor

Because PTL signs and symptoms can be subtle, it is essential all pregnant women are offered counseling, education, and information early in pregnancy about signs and symptoms of PTL and what to do if these occur (ACOG, 2016b; Shmuely et al., 2016). Pregnant women need to know about importance of immediately seeking medical care at the hospital for evaluation of PTL signs and symptoms (ACOG, 2016a, 2016b; Purisch & Gyamfi-Bannerman, 2017; Shmuely et al.). Emphasis should be on timely intervention and treatment that are significant in achieving an optimal outcome to prolong pregnancy (Doyle & Silber, 2015). See Table 2 for common signs and symptoms of PTL for which pregnant women should seek evaluation and care.

History and Risk Assessment

Review of extensive health and obstetric history is warranted starting with the main presenting clinical issue the woman reports, estimated date of birth, number of fetuses, and presence of fetal movement (ACOG, 2016b). Women are asked about pain, vaginal bleeding, amniotic

Despite millions in funding for research and national practice guidelines for decreasing risk of preterm birth, preterm births in the United States have continued to rise over the past 5 years.

Shutterstock/nata-lunata

fluid leakage, abdominal cramping or tightening, lower back pain or pelvic pressure, and specific activities that may have preceded symptoms (ACOG, 2016b). Because infection can cause PTL, women are asked about fever, dysuria, change in vaginal discharge, and uterine tenderness (Killion, 2016). During the triage process, environmental and psychosocial factors that can influence PTL are assessed to include, but are not limited to, intimate partner violence, substance use disorder, mental illness, environmental safety, and access to food and care (Alhusen et al., 2014; Shapiro et al., 2013).

Cervical Length Screening

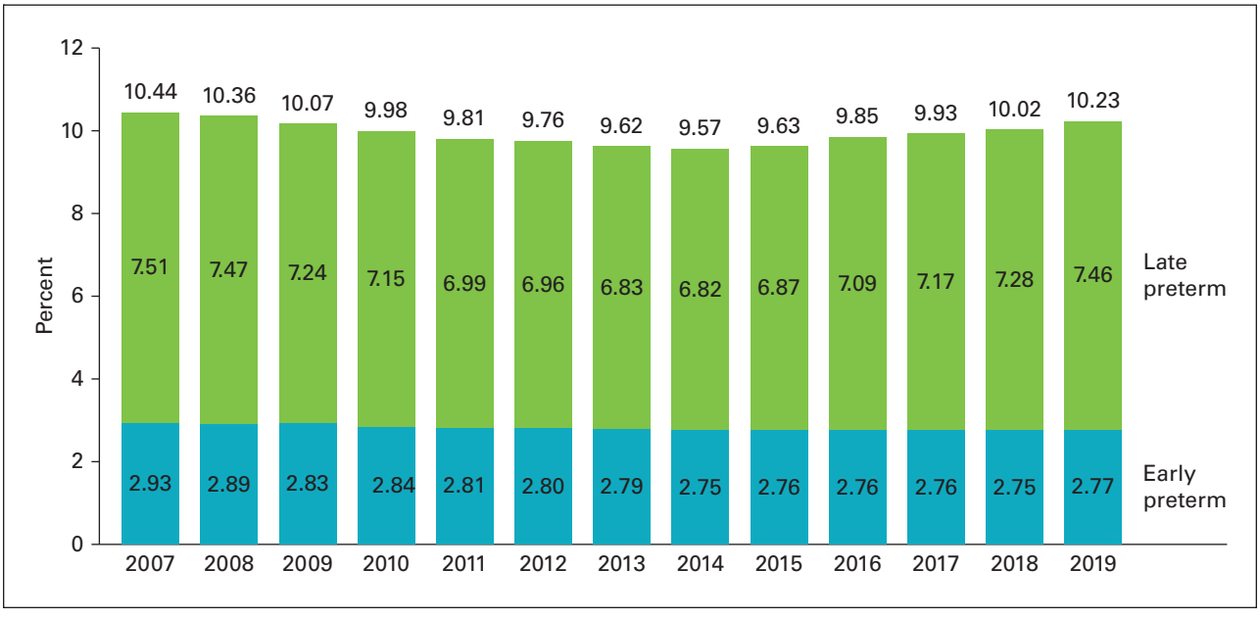
Transvaginal cervical ultrasonography may be performed as part of the woman's care during initial presentations to determine cervical length. Assessing cervical length has been shown to be useful in predicting a woman's risk for PTB (Chiossi et al., 2018; Doyle & Silber, 2015; Dyer et al., 2018). The two most common methods used in assessing and predicting PTL in symptomatic women are measurement of cervical length and fetal fibronectin testing (ACOG, 2016b). In observational studies, these methods seem promising; however, supportive data from randomized controlled trials are lacking. In singleton pregnancies, cervical length measurement has been shown to improve clinical diagnostic accuracy and better patient outcomes for mother and infant (Chiossi et al.; McIntosh et al, 2016). Cervical length may be helpful in predicting birth within a period of 7 days of presentation in symptomatic women pregnant with twins (Dyer et al.; McIntosh et al.). Cervical measurements of 25 mm or less are associated with increased rates of PTB (Suff et al., 2019).

Cerclage Placement to Prevent Preterm Births

Cervical insufficiency is directly related to PTB. Cervical insufficiency is described as an inability of a cervix to maintain pregnancy in the absence of uterine activity, labor, or both in the second trimester (ACOG, 2014b). If criteria have been met such as a shortened cervical length or cervical funneling measured by transvaginal ultrasound, a surgically placed stitch, referred to as a cerclage, may be placed. Cerclages in women with prior PTB and short cervical lengths can significantly reduce composite perinatal mortality and morbidity (Boelig & Berghella, 2017; Shivani et al., 2018). A cerclage can be placed elective or emergently.

Elective cerclage placement is recommended and is typically done between 13 and 16 weeks of gestation. It is placed in the absence of PTL signs and symptoms, and after a transvaginal ultrasound to measure cervix. Typically, placement of an elective cerclage is based on prior maternal obstetric history. An emergent or urgent cerclage placement can occur up to 24 weeks of gestation as a rescue measure. This is indicated for pregnant women with signs and symptoms of cervical changes such as dilation, shortened cervix, or evidence of funneling (Alfirevic et al., 2017). Assessment of these symptoms can be confirmed with a speculum or ultrasound examination. Using suturing material, two types of cerclages, McDonalds or Shirodkar, can be placed transvaginally based on a woman's pregnancy history, current physical examination findings like a short cervix, or as an emergent procedure (Boelig & Berghella, 2017).

FIGURE 1. TOTAL, LATE, AND EARLY PRETERM BIRTH RATES: UNITED STATES, FINAL 2007-2018 AND PROVISIONAL 2019



Notes. Gestational age is based on the obstetric estimate of gestation. Preterm is less than 37 completed weeks, late preterm is 34–36 completed weeks, and early preterm is less than 34 completed weeks of gestation.

Source: NCHS, National Vital Statistics System, Natality

TABLE 1. ENVIRONMENTAL, BIOLOGIC, AND SOCIOECONOMIC FACTORS AFFECTING PRETERM LABOR

Biologic	Socioeconomic	Environmental
Advanced maternal age	Structural racism	Air and water quality
Assisted reproductive technology	Lack of access to prenatal care provider	Alcohol use
Cardiac disease	Late or no prenatal care	Substance use
Cervical insufficiency	Lack of transportation	Opioid use disorder
Depression, anxiety, mood disorders	Lack of accessible health care	Poor diet habits
Diabetes mellitus	Lack of health insurance	Smoking
Fetal anomalies	Unsafe neighborhood	Long work hours
Inherited conditions such as cystic fibrosis, neurofibromatosis, polycystic kidney disease, sickle cell disease, clotting disorders, thrombophilia	Inadequate housing	Long periods of standing
High body mass index	Chronic stress	
Hypertensive disorders	Living in a food "desert"	
Pregnancy with multiples	Inadequate nutrition	
Preterm premature rupture of membranes	Intimate partner violence	
Previous labor and birth prior to 37 weeks' gestation	Level of education	
Short cervix	Low income	
Short interpregnancy interval	Poverty	
Underweight prior to pregnancy	Lack of social support	
Vaginal infection		
Vaginal bleeding		
Young teens and women over age 35		

Note. Adapted from ACOG (2017), O'Connor & Gennaro (2017), Parfitt (2021), Purisch & Gyamfi-Bannerman (2017), Shmuely et al. (2016).

In more serious cases, a cerclage may be placed transabdominally (Boelig & Berghella, 2017). Complications such as amniotic membrane rupture, chorioamnionitis, cervical lacerations, or suture displacement may occur in either approach. There is a higher risk for hemorrhage with a transabdominal cerclage. Cerclages are usually not recommended for women with multiple gestation as there is an increased risk of PTB (ACOG, 2014a, 2014b; Alfirevic et al., 2017; Romero et al., 2014).

Triage Assessment and Management

An obstetric acuity assessment involves a thorough evaluation of maternal and fetal well being and obstetric acuity to assign priority for timely interventions (ACOG, 2016a). If appropriate obstetric and neonatal care is not available at the hospital where the woman has presented for care based on gestational age or there is a potential for prenatal and postnatal complications, she may be transferred to a hospital designated as providing a higher level of care prior to birth (ACOG, 2016b; ACOG & Society for Maternal-Fetal Medicine [SMFM], 2019). A collaborative approach concentrating on unique and individualized maternal–fetal data as well as subjective and objective information is important when formulating strategies to treat PTL. The Maternal Fetal Triage Index identifies maternal–fetal acuity and allows for prompt care of women experiencing symptoms of PTL and is recommended for use during obstetric triage (American Academy of Pediatrics & ACOG, 2017; Association of Women's Health, Obstetric and Neonatal Nurses [AWHONN], 2015; Ruhl et al., 2015).

TABLE 2. SIGNS AND SYMPTOMS OF ACUTE PRETERM LABOR

Contractions
• Cramps that feel like menstrual cramps
• Feeling the baby balling up
• Regular and more frequent contractions (can sometimes be painless)
Discharge
• Increase in amount of discharge
• Ruptured membranes or leaking of fluid (gush or trickle)
• Watery, mucus, or bloody
Discomfort
• Constant low, dull backache
• Pelvic or lower abdominal pressure

Note. Adapted from ACOG (2016b), Doyle & Silber (2015), Purisch & Gyamfi-Bannerman (2017).

Screening and Diagnostic Testing

Speculum

A speculum examination is performed for complaints of leaking fluid to determine if amniotic membranes have ruptured. Positive indicators during this exam will influence management of patient care (ACOG, 2020). Assessment includes observation of pooling amniotic fluid as well as fluid color and odor (ACOG, 2020).

Nitrazine

Nitrazine paper may be used to help confirm rupture of membranes. Because amniotic fluid has a neutral pH of

7.0 or higher, the Nitrazine paper will change from the yellow color to a dark blue if alkaline fluid is present (ACOG, 2020). It is important to note that alkaline pH values of blood, vaginal mucus, and certain secretions form vaginal infections can cause the Nitrazine paper to read as a false-positive result (ACOG, 2020). The use of Nitrazine is most reliable when combined with the fern test (ACOG, 2020). This is done by collecting amniotic fluid on a slide and evaluating for the positive presence of a ferning pattern. The presence of amniotic fluid pooling, ferning pattern, and positive Nitrazine reading are all highly indicative for rupture of membranes (ACOG, 2020). Collectively this information will influence PTL management by providing vital information (ACOG, 2020).

Fetal Fibronectin

Specific screening and diagnostic tests are often performed to determine risk of PTB. Fetal fibronectin (fFN) is an extracellular matrix glycoprotein that is produced by fetal cells and can be detected in maternal vaginal secretions from early gestation to early second trimester, gradually decreasing to undetectable in a pregnancy at low risk for PTB (Ruma et al., 2017). When a sample of fluid is collected between 22- and 34 weeks' gestation, and it is found to be negative for fFN, this is a high reliability indicator that PTB will not occur within 14 days (McCue & Torbenson, 2017). Samples may be obtained as long as there is no evidence of bleeding, no open cervical or vaginal lesions, cervical dilation is less than 3 cm, and amniotic membranes are intact with no evidence of bulging (ACOG, 2016a; McCue & Torbenson).

Group Beta Streptococcus

Group B Streptococcus is part of the normal flora of the genital tract, causing transmission from mother to baby (Nkembe et al., 2018; Park et al., 2018). Infection with Group B Streptococcus remains a leading cause of neonatal sepsis and of newborn morbidity and mortality in the United States (Hae-Ryung et al., 2018). Obtaining a rectovaginal culture upon arrival to triage will aid in identification and in reducing neonatal sepsis (ACOG, 2019).

Cervical Examination

Although vaginal examination results are subjective, valuable information can be gleaned including cervical position, consistency, dilation, and effacement, as well as fetal station and the presenting part (Chiossi et al., 2018; Di Tommaso et al., 2015). Cervical length measurement by transvaginal ultrasound may be performed as an objective component of an examination (ACOG, 2020). Cervical examinations of any kind may not be appropriate until after a sterile speculum exam has ruled out PPROM (ACOG 2020).

Fetal Assessment

Initial fetal assessment methods include a nonstress test or continuous electronic fetal monitoring to evaluate fetal heart rate baseline rate, variability, presence or absence of accelerations and decelerations, as well as uterine activity (ACOG, 2014a).

Uterine Activity Assessment

Assessment of uterine activity occurs with fetal heart monitoring to evaluate the presence or absence of contractions, frequency, duration, and palpated strength to inform the plan of care for PTL. Maternal weight or a smaller uterus related to early gestational age may make it difficult to find optimal placement of the tocodynamometer to detect uterine contractions. In this situation, nurses can assess uterine activity through (a) observing patient demeanor; (b) listening to the patient on frequency and discomfort experienced with contractions; (c) exploring her perceptions of contractions; and (d) uterine palpation to evaluate contractions (Bhogal, 2017).

Antenatal Corticosteroids for Fetal Lung Maturity

Antenatal corticosteroids are recommended for at-risk women. Steroids have significantly reduced incidence of respiratory distress syndrome, intraventricular hemorrhage, necrotizing enterocolitis, and neonatal death through enhancing formation of surfactant in fetal lungs (ACOG, 2017; Shigemi & Yasunaga, 2019; SMFM, 2016). A single course of corticosteroids is generally given between 24 0/7 and 33 0/7 weeks' gestation (SMFM, 2016). Recommended dosage includes betamethasone 12 mg administered as an intramuscular injection for two doses 24 hours apart, or dexamethasone 6 mg given as an intramuscular injection for four doses 12 hours apart may also be used if betamethasone is unavailable (ACOG, 2017; Haas et al., 2014). ACOG (2017) supports offering antenatal corticosteroids to, "pregnant women who are 23 0/7 weeks of gestation who are at risk of preterm delivery within 7 days, based on a family's decision regarding resuscitation, irrespective of membrane rupture status and regardless of fetal number" (p. 1). A single course of betamethasone may also "be considered for pregnant women between 34 0/7 weeks and 36 6/7, and who are at risk of preterm birth within 7 days and who have not previously received corticosteroids" (ACOG, 2017, p. 1).

Tocolytics Used to Treat Spontaneous Preterm Labor

The American College of Obstetricians and Gynecologists advocates for use of a short course of tocolytic medications in cases of PTL less than 32 weeks of gestation (ACOG, 2016b; ACOG, 2017). Goals are to inhibit contractions to have sufficient time for antenatal corticosteroid administration or for in utero transport to a hospital that can support a high-risk patient (Garfield & Chin, 2020; Kiatsuda et al., 2016). Women with acute-onset PTL, who are no more than 4 cm dilated, appear to have a higher success rate in minimizing uterine activity when medication management is initiated (ACOG, 2017; Haas et al., 2014). Those with more advanced cervical dilation are not optimum candidates for therapy as there is an inverse relationship of cervical dilation with time of admission to birth (Kiatsuda et al.). In one study, 85% of women who were 3 cm to 6 cm dilated had premature births within 24 hours, with the remaining percentage giving birth between 24 and 48 hours (Di Tommaso et al., 2015).

TABLE 3. MEDICATIONS FOR PRETERM LABOR

Medication	Recommended Dosage	Potential Side Effects	Contraindications
Corticosteroids	Betamethasone 12 milligram (mg) intramuscular injection for two doses 24 hr apart Dexamethasone 6 mg intramuscular injection for four doses 12 hr apart may be used if betamethasone is unavailable	**Fetal** Decreases risk of: Respiratory depression Intraventricular hemorrhage	
Terbutaline β-Agonists	0.25 mg subcutaneous injection every 20 to 30 min for up to four doses or until tocolysis is achieved, then 0.25 mg every 3 to 4 hr for up to 24 hr	**Maternal** Cardiac arrhythmias Pulmonary edema Myocardial ischemia Hypotension Tachycardia **Fetal** Tachycardia Hyperglycemia Hypotension Intraventricular hemorrhage	Cardiovascular disease Pulmonary disease Hematologic disease Renal disease Unmanaged diabetes Infectious disease
Nifedipine (calcium channel blockers)	10 to 30 mg loading dose orally, then 10 to 20 mg every 4 to 8 hr (maximum dosage: 180 mg per day)	**Maternal** Tachycardia Palpitations Flushing Headache Dizziness Nausea Hypotension **Fetal** No known fetal side effects	Allergy to nifedipine Hypotension Hepatic dysfunction Transdermal nitrates Other antihypertensive medications
Magnesium sulfate for PTL and neuroprotection	PTL: 4 to 6 g loading dose intravenously over 15 to 30 min, then followed by a maintenance dose of 2–3 g/hr intravenously over the course of no more than 24–48 hr. Neuroprotective: 4 to 6 g loading dose intravenously over 15 to 30 min, maintenance dose of 2 to 3 g/hr intravenously until birth, or up to 12 hr, whichever occurs first.	**Maternal** Hypotension Flushing Diaphoresis Nausea Loss of deep tendon reflexes Respiratory depression Pulmonary edema Cardiac arrest **Fetal** Respiratory Depression Lethargy Hypotonia Hypocalcemia	Myasthenia gravis Respiratory depression Pulmonary edema
Indomethacin (prostaglandin inhibitor, nonsteroidal anti-inflammatory drug)	50 to 100 mg loading dose orally or rectally, then 25 to 50 mg orally every 4 to 6 hr; therapy is not recommended for more than 48 hr.	**Maternal** Nausea Esophageal reflux Gastritis **Fetal** Potential change in amniotic fluid levels. Premature closing of fetal ductus arteriosus	Platelet dysfunction Bleeding disorder Hepatic dysfunction Gastrointestinal disease Renal dysfunction Asthma

Note. Adapted from ACOG (2010), ACOG (2016b), ACOG (2017), Hanley et al. (2019).

Timely treatment with tocolysis is associated with fewer admissions to the neonatal intensive care unit and may be associated with lower occurrences of neonatal respiratory distress syndrome, necrotizing enterocolitis, and intraventricular hemorrhage (ACOG, 2016b; Hanley et al., 2019). Not all women are candidates for tocolysis because each medication has significant and serious potential side effects or are contraindicated in some situations (Hanley et al.). Therefore, medication treatment for inhibiting PTL is highly individualized. Thorough nursing assessment for efficacy and side effects of tocolytic therapy focuses on maternal and fetal wellbeing. Promoting patient safety is a priority when using these high-risk medications. Medication, use, dose, considerations, and contraindications for the management of PTL are listed in Table 3.

Beta Agonists

Beta agonists such as terbutaline reduce levels of calcium and decrease smooth muscle contractibility. See Table 3. Terbutaline must be used with caution due to potential risk for serious maternal cardiac complications and side effects.

Calcium Channel Blockers

Calcium channel blockers are a class of medication used for PTL. In many cases, nifedipine is used more frequently and has no known fetal side effects (Haas et al., 2014). As an off-label medication, nifedipine is successful in decreasing uterine smooth muscle activity (ACOG, 2016b; Garfield & Chin, 2020; Haas et al.). See Table 3. Careful monitoring of maternal heart rate and blood pressure, as well as fetal heart rate is important due to risk of maternal hypotension (ACOG, 2016b; Garfield & Chin).

Magnesium Sulfate

Magnesium sulfate has been used as therapy for PTL despite a lack of literature to support effectiveness of reducing PTB (Hanley et al., 2019). Magnesium sulfate for PTL is used to stabilize a pregnant woman to allow for timely administration of corticosteroids (Garfield & Chin, 2020). See Table 3. A serum magnesium level between 5 and 8 mg/dL is considered to be therapeutic (Haas et al., 2014).

Magnesium Sulfate for Neuroprotection

Magnesium sulfate reduces cerebral palsy risk in premature infants and protects the fetal brain from injury through stabilization of neuronal axons, along with preventing intercranial bleeding (ACOG, 2010; Bain et al., 2012; Gano et al., 2016). See Table 3. Loading and maintenance doses are based on individual patient assessment and gestational age, in accordance with facility policies (Usman et al., 2017).

Because magnesium sulfate is a neuromuscular blocker that produces a smooth muscle relaxant effect, women should be closely monitored and assessed for hypotension, respiratory rate, breath sounds, deep tendon reflexes, and blood pressure (Haas et al., 2014; Hanley et al., 2019). Careful monitoring of urine output is warranted as magnesium sulfate is excreted though the kidneys. Assessment guidelines vary between health care agencies (Usman et al., 2017). Loss of patellar reflexes occurs when serum magnesium levels reach 9 to 13 mg/dL and respiratory depression may be evident at 14 mg/dL (Haas et al.). The antidote to magnesium sulfate is calcium gluconate administered as 1 g IV, and should be readily available to the nurse for administration (Hanley et al.). Using magnesium sulfate continuously for greater than 48 hours is not recommended due to evidence linking maternal administration with neonatal hypocalcemia and skeletal abnormalities (ACOG, 2010).

Prostaglandin Inhibitor

Indomethacin is a prostaglandin synthetase inhibitor and works by decreasing the synthesis of prostaglandin to prevent contractions and cervical ripening. See Table 3. There are limited maternal side effects to the gastrointestinal system; however, fetal effects may include constriction of a ductus arteriosus especially if maternal treatment extends greater than 48 to 72 hours and gestation is later than 32 weeks. Fetal renal function may be impaired resulting in a reduction of amniotic fluid volume and in cord compression (ACOG, 2016b; Hanley et al., 2019).

Anticipation of Birth

The nurse caring for a woman anticipating a PTB can coordinate care effectively through support, communication, advocating for appropriate consults with neonatal providers, and communication to prepare equipment and supplies for the birth (ACOG & SMFM, 2019; AWHONN, 2018). Birth may be inevitable despite interventions that have been used to inhibit PTL (Chiossi et al., 2018; Haas et al., 2014). Mode of birth is individualized and based on a number of factors including maternal preferences, prior obstetric history, gestational weight, and fetal presentation (Pedrini et al., 2017). It is essential to have a room designated and set to handle an emergency birth with proper equipment, supplies, and medications for neonatal resuscitation. Immediate notification of the neonatal team upon maternal admission to the birth unit and timely communication to allow the team to attend the birth is recommended (ACOG & SMFM).

Communication and Emotional Support

Women desire honest and complete information, an opportunity to answer questions, explanation of medical terms, procedures, and expectations of care including resuscitative initiatives conferred in language they understand and at the appropriate literacy level (Muniraman et al., 2018; White et al., 2019). Shared decision making allows for transparent planning for all involved parties and promotes confidence and reassurance (Pedrini et al., 2017).

Nurses, midwives, physicians, and other members of the clinical team should avoid using terms with negative connotations such as fetus, nonviable, incompatible with life, spontaneous abortion, and miscarriage as these terms might trivialize or dehumanize the woman's experiences (White et al., 2019). More favorable language such as, life-limiting condition maternal and wellbeing, and refer-

ring to the baby by name, as son or daughter, or what the parents prefer should be used. A woman's perception of viewing oneself as mother and bonding with her unborn child typically evolves as the pregnancy advances (Hutti & Limbo, 2019). Nurses should assess a woman's views of their pregnancy at the time of PTL and PTB (Hutti & Limbo; Hutti et al., 2017). For example, do they perceive their unborn child as a son or a daughter with a name or are they viewing this as an early pregnancy (Hutti & Limbo). Incorporating this type of assessment will help provide individualized empathetic care (Hutti & Limbo).

Discharge Instructions After Acute Preterm Labor Episode

Not all women who experience and seek evaluation for signs and symptoms of PTL are admitted to the hospital. Often, they are discharged home after either successful evaluation to rule out imminent PTL or successful inpatient treatment (Shmuely et al., 2016). On discharge, nurses should focus education on individualized patient needs, home care and provider follow-up instructions, and signs and symptoms that require seeking immediate medical attention such as ruptured membranes, bleeding, increasing frequency and intensity of contractions as well as decreased fetal movement.

If a woman was diagnosed with a urinary tract infection, discharge instructions focus on antibiotics and possibly a repeat urine culture in 2 to 4 weeks after discharge (Wade et al., 2020). If dehydration was the suspected cause, instructions for adequate hydration would be given and ability to maintain hydration would be assessed. The woman's ability to maintain any required limitations in activity and pelvic rest, access to the hospital and provider office, sociocultural environment, and social support at home (transportation, telephone, help with other children, or home management, etc.) need to be fully assessed (White et al., 2019). Stringent activity limitations, bed rest or pelvic rest are not supported by evidence, although, in some scenarios, activity level may need to be adjusted (ACOG, 2016b).

Clinical Implications for Nursing Practice

Nurses are often the main point of contact during the initial evaluation and direct bedside care to women experiencing signs and symptoms of PTL; therefore, knowledge of identification, care, and treatment is essential. Nurses as frontline clinical experts are in an ideal position to address the holistic needs of pregnant women and their support systems (Franck et al., 2017). Listening to women, hearing their concerns, and working on addressing each of the issues they voice are important aspects of nursing care for women in PTL and who give birth preterm. If lack of resources, adequate housing, transportation, access to health care are identified as barriers to safe and effective care, consultation with a social worker or other members of the health care team who can offer support is warranted. For example, if the preterm infant is admitted to the neonatal intensive care unit and transportation to the hospital is a challenge, arrangements can be made for a hospitality room for the mother after she is discharged from the hospital. Fostering an environment of intentional support, empathetic dialogue, and action to meet their needs can build mutual trust. This provides an opportunity for nurses to offer care that is transparent, respectful, and patient-centered. ✣

CLINICAL IMPLICATIONS

- Assessment skills, timely identification of complications, and collaborative communication are essential for nurses caring for women in PTL and who give birth preterm.
- Knowledge of medications used to inhibit PTL enhances the nurse's ability to recognize efficacy of tocolysis therapy and potential harmful side effects.
- Fostering an environment of intentional support and empathetic dialogue can build mutual trust, and assist the nurse in understanding women's perceptions of their experiences of PTL and PTB.
- Referral to a social worker or other members of the health care team who can offer additional support and resources as needed should be considered based on the mother's individual situation.
- Guidelines for nursing assessment, evaluation, and care of women experiencing PTL and PTB may decrease variations and inconsistencies with evaluation and assessment practices.
- Keeping current with the latest evidence and national standards and guidelines promotes safe and effective nursing care for women with pregnancy complications such as PTL and PTB.
- Funding opportunities for nurses to develop unit-based quality improvement and evidence-based practice initiatives may inform new practice guidelines, innovative policies, and enhance outcomes.

Dr. Kellie M. Griggs is an Assistant Professor, Wake Forest School of Medicine, Department of Academic Nursing, Winston-Salem, NC. email: kmgriggs@wakehealth.edu

Dr. Debra Hrelic is an Assistant Professor, School of Nursing, University of North Carolina Wilmington, Wilmington, NC.

Dr. Nina Williams is a Lecturer, School of Nursing, University of North Carolina Wilmington, Wilmington, NC.

Dr. Michelle McEwen-Campbell is a Lecturer, School of Nursing, University of North Carolina Wilmington, Wilmington, NC.

Rebecca L. Cypher, is a perinatal nurse practitioner in Gig Harbor, WA.

The authors declare no conflicts of interest.

DOI:10.1097/NMC.0000000000000656

References

Alfirevic, Z., Stampalija, T., & Medley, N. (2017). Cervical stitch (cerclage) for preventing preterm birth in singleton pregnancy. *The Cochrane Database of Systematic Reviews, 6*(6), CD008991. https://doi.org/10.1002/14651858.cd008991.pub3

Alhusen, J. L., Bullock, L., Sharps, P., Schminkey, D., Comstock, E., & Campbell, J. (2014). Intimate partner violence during pregnancy and adverse neonatal outcomes in low-income women. *Journal of Women's Health, 23*(11), 920–926. https://doi.org/10.1089/jwh.2014.4862

American Academy of Pediatrics & American College of Obstetricians and Gynecologists. (2017). *Guidelines for perinatal care* (8th ed.). Elk Grove Village, IL: Author

American College of Obstetricians and Gynecologists. (2010). Magnesium sulfate before anticipated preterm birth for neuroprotection (Committee Opinion No. 455). *Obstetrics & Gynecology, 115*(3), 669–671. https://doi.org/10.1097/AOG.0b013e3181d4ffa5

American College of Obstetricians and Gynecologists. (2014a). Antepartum fetal surveillance (Practice Bulletin No. 145). *Obstetrics & Gynecology, 124*(1), 182–192. https://doi.org/10.1097/01.AOG.0000451759.90082.7b

American College of Obstetricians and Gynecologists. (2014b). Cerclage for the management of cervical insufficiency (Practice Bulletin No. 142). *Obstetrics & Gynecology, 123*(2 Pt 1), 372–379. https://doi.org/10.1097/01.AOG.0000443276.68274.cc

American College of Obstetricians and Gynecologists. (2016a). Hospital-based triage of obstetric patients (Committee Opinion No. 667). *Obstetrics & Gynecology, 128*(1), e16–e19. https://doi.org/10.1097/AOG.0000000000001524

American College of Obstetricians and Gynecologists. (2016b). Management of preterm labor (Practice Bulletin No. 171). *Obstetrics & Gynecology, 128*(4), e155–e164. https://doi.org/10.1097/AOG.0000000000001711

American College of Obstetricians and Gynecologists. (2017). Antenatal corticosteroid therapy for fetal maturation (Committee Opinion No. 713). *Obstetrics & Gynecology, 130*(2), e102–e109. https://doi.org/10.1097/AOG.0000000000002237

American College of Obstetricians and Gynecologists. (2019). Prevention of group B streptococcal early-onset disease in newborns (Committee Opinion No. 782). *Obstetrics & Gynecology, 134*(1), e19–e40. https://doi.org/10.1097/AOG.0000000000003334

American College of Obstetricians and Gynecologists. (2020). Prelabor rupture of membranes (Practice Bulletin No. 217). *Obstetrics & Gynecology, 135*(3), e80–e97. https://doi.org/10.1097/AOG.0000000000003700

American College of Obstetricians and Gynecologists and Society for Maternal-Fetal Medicine. (2019). Levels of maternal care (Obstetric Care Consensus No. 9). *Obstetrics & Gynecology, 134*(2), 428–434. https://doi.org/10.1097/AOG.0000000000003384

Association of Women's Health, Obstetric and Neonatal Nurses. (2015). *Maternal Fetal Triage Index*. https://www.awhonn.org/general/custom.asp?page=MFTI

Association of Women's Health, Obstetric and Neonatal Nurses. (2018) Continuous labor support for every woman. *Nursing for Women's Health*, *22*(1), 93–94. https://doi.org/10.1016/S1751-4851(18)30035-7

Bain, E., Middleton, P., & Crowther, C. A. (2012). Different magnesium sulphate regimens for neuroprotection of the fetus for women at risk of preterm birth. *The Cochrane Database of Systematic Reviews,* (2), CD009302. https://doi.org/10.1002/14651858.CD009302.pub2

Beck, A. F., Edwards, E. M., Horbar, J. D., Howell, E. A., McCormick, M. C., & Pursley, D. M. (2020). The color of health: How racism, segregation, and inequality affect the health and well-being of preterm infants and their families. *Pediatric Research, 87*(2), 227–234. https://doi.org/10.1038/s41390-019-0513-6

Bhogal, K. (2017). Focus on cardiotocography: Intrapartum monitoring of uterine contractions. *British Journal of Midwifery*, *25*(8), 491–497. https://doi-org.liblink.uncw.edu/10.12968/bjom.2017.25.8.491

Boelig, R. C., & Berghella, V. (2017). Current options for mechanical prevention of preterm birth. *Seminars in Perinatology, 41*(8), 452–460. https://doi.org/10.1053/j.semperi.2017.08.003

Burris, H. H., Lorch, S. A., Kirpalani, H., Pursley, D. M., Elovitz, M. A., & Clougherty, J. E. (2019). Racial disparities in preterm birth in USA: A biosensor of physical and social environmental exposures. *Archives of Disease in Childhood, 104*(10), 931–935. https://doi.org/10.1136/archdischild-2018-316486

Centers for Disease Control and Prevention. (2018). *Reproductive health and preterm birth*. https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pretermbirth.htm

Chiossi, G., Saade, G. R., Sibai, B., & Berghella, V. (2018). Using cervical length measurement for lower spontaneous preterm birth rates among women with threatened preterm labor. *Obstetrics & Gynecology, 132*(1), 102–106. https://doi.org/10.1097/AOG.0000000000002695

David, R. (2019). Inequity at birth and population health. *Archives of Disease in Childhood, 104*(10), 929–930. https://doi.org/10.1136/archdischild-2019-317078

Di Tommaso, M., Seravalli, V., Vellucci, F., Cozzolino, M., Spitaleri, M., & Susini, T. (2015). Relationship between cervical dilation and time to delivery in women with preterm labor. *Journal of Research in Medical Sciences*, *20*(10), 925–929. https://doi.org/10.4103/1735-1995.172761

Doyle, J., & Silber, A. (2015). Preterm labor: Role of the nurse practitioner. *The Nurse Practitioner, 40*(3), 49–54. https://doi.org/10.1097/01.NPR.0000445957.28669.51

Dyer, E., Rowley, A., Mannu, U., & Hoveyda, F. (2018). Introducing a preterm surveillance clinic to manage high-risk women. *British Journal of Midwifery, 26*(5), 301–308. https://doi.org/10.12968/bjom.2018.26.5.301

Franck, L. S., McNulty, A., & Alderdice, F. (2017). The perinatal-neonatal care journey for parents of preterm infants: What is working and what can be improved. *The Journal of Perinatal & Neonatal Nursing, 31*(3), 244–255. https://doi.org/10.1097/JPN.0000000000000273

Gano, D., Ho, M.-L., Partridge, J. C., Glass, H. C., Xu, D., Barkovich, A. J., & Ferriero, D. M. (2016). Antenatal exposure to magnesium sulfate is associated with reduced cerebellar hemorrhage in preterm newborns. *The Journal of Pediatrics*, *178*, 68–74. https://doi.org/10.1016/j.jpeds.2016.06.053

Garfield, L., & Chin, E. (2020). Pharmacology for preterm labor. *The Journal of Perinatal & Neonatal Nursing*, *34*(2), 155–161. https://doi.org/10.1097/JPN.0000000000000474

Haas, D. M., Benjamin, T., Sawyer, R., & Quinney, S. K. (2014). Short-term tocolytics for preterm delivery: Current perspectives. *International Journal of Women's Health, 6*, 343–349. https://doi.org/10.2147/IJWH.S44048

Hamilton, B. E., Martin, J. A., & Osterman, M. J. K. (2020). Births: Provisional data for 2019. *Vital Statistics Rapid Release, 8*, 1–10. National Center for Health Statistics. https://www.cdc.gov/nchs/data/vsrr/vsrr-8-508.pdf

Hanley, M., Sayres, L., Reiff, E. S., Wood, A., Grotegut, C. A., & Kuller, J. A. (2019). Tocolysis: A review of the literature. *Obstetrical & Gynecological Survey*, *74*(1), 50–55. https://doi.org/10.1097/OGX.0000000000000635

Hutti, M. H., & Limbo, R. (2019). Using theory to inform and guide perinatal bereavement care. *MCN. The American Journal of Maternal Child Nursing, 44*(1), 20–26. https://doi.org/10.1097/NMC.0000000000000495

Hutti, M. H., Myers, J., Hall, L. A., Polivka, B. J., White, S., Hill, J., Kloenne, E., Hayden, J., & Grisanti, M. M. (2017). Predicting grief intensity after recent perinatal loss. *Journal of Psychosomatic Research, 101*, 128–134. https://doi.org/10.1016/j.jpsychores.2017.07.016

Kiatsuda, D., Thinkhamrop, J., & Prasertcharoensuk, W. (2016). Success rate in preterm uterine contraction inhibition with tocolytic agents in a tertiary care center. *International Journal of Women's Health*, *8*, 663–667. https://doi.org/10.2147/IJWH.S122781

Killion, M. M. (2016). The maternal fetal triage index: A standardized approach to OB triage. *MCN. The American Journal of Maternal Child Nursing, 41*(6), 372. https://doi.org/10.1097/NMC.0000000000000280

Klebanoff, M. A., Yossef, S. L., Latimer, C., Oza, F. R., Kachoria, R., Reagan, P. B., Oliver, E. A., Buhimschi, C. S., & Buhimschi, I. A. (2016). Development and validation of an algorithm to determine spontaneous versus provider-initiated preterm birth in US vital records. *Paediatric & Perinatal Epidemiology*, *30*(2), 134–140. https://doi/10.1111/ppe.12267

March of Dimes. (2019). *2019 March of Dimes report card*. https://www.marchofdimes.org/materials/MOD2019_REPORT_CARD_and_POLICY_ACTIONS_BOOKLETv72.pdf

March of Dimes, Partnership for Maternal, Newborn & Child Health, Save the Children, & World Health Organization. (2012). *Born too soon: The global action report on preterm birth*. World Health Organization.

Martin, J. A., Hamilton, B. E., Osterman, M. J. K., & Driscoll, A. K. (2019). Births: Final data for 2018. *National Vital Statistics Reports, 68*(13), 1–47.

McCue, B., & Torbenson, V. E. (2017). Fetal fibronectin: The benefits of a high negative predictive value in management of preterm labor. *Contemporary OB/GYN, 62*(9), 1–6. https://doi.org/10.10801/01443610050111922

McIntosh, J., Feltovich, H., Berghella, V., & Manuck, T. (2016). The role of routine cervical length screening in selected high- and low-risk women for preterm birth prevention. *American Journal of Obstetrics & Gynecology*, *215*(3), B2–B7. https://doi.org/10.1016/j.ajog.2016.04.027

Muniraman, H., Cascione, M., Ramanathan, R., & Nguyen, J. (2018). Medicolegal cases involving periviable births from a major United States legal database. *The Journal of Maternal-Fetal & Neonatal Medicine, 31*(15), 2043–2049. https://doi.org/10.1080/14767058.2017.1335704

Nkembe, N. M., Kamga, H. G., Baiye, W. A., Chafa, A. B., & Njotang, P. N. (2018). Streptococcus agalactiae prevalence and antimicrobial susceptibility pattern in vaginal and anorectal swabs of pregnant women at a tertiary hospital in Cameroon. *Biomed Central Research Notes, 11*(1), 480. https://doi.org/10.1186/s13104-018-3589-x

O'Connor, C., & Gennaro, S. (2017). *Preventing prematurity: Preconception, prenatal and postpartum nursing care.* The March of Dimes Foundation.

Parfitt, S. E. (2021). Preterm labor and birth. In K. R. Simpson, P. A. Creehan, N. O'Brien-Abel, C. Roth, & A. Rohan (Eds.), *AWHONN's Perinatal nursing* (5th ed., pp. 142–181). Wolters Kluwer.

Park, H. R., Harris, S. M., Boldenow, E., McEachin, R. C., Sartor, M., Chames, M., & Loch-Caruso, R. (2018). Group B streptococcus activates transcriptomic pathways related to premature birth in human extraplacental membranes in vitro. *Biology of Reproduction, 98*(3), 396–407. https://doi.org/10.1093/biolre/iox147

Pedrini, L., Prefumo, F., Frusca, T., & Ghilardi, A. (2017). Counselling about the risk of preterm delivery: A systematic review. *BioMed Research International, 2017*, 7320583. https://doi.org/10.1155/2017/7320583

Purisch, S. E., & Gyamfi-Bannerman, C. (2017). Epidemiology of preterm birth. *Seminars in Perinatology, 41*(7), 387–391. https://doi.org/10.1053/j.semperi.2017.07.009

Romero, R., Dey, S. K., & Fisher, S. J. (2014). Preterm labor: One syndrome, many causes. *Science, 345*(6198), 760–765. https://doi.org/10.1126/science.1251816

Ruhl, C., Scheich, B., Onokpise, B., & Bingham, D. (2015). Content validity testing of the maternal fetal triage index. *Journal of Obstetric, Gynecologic, and Neonatal Nursing, 44*(6), 701–709. https://doi.org/10.1111/1552-6909.12763

Shapiro, G. D., Fraser, W. D., Frasch, M. G., & Séguin, J. R. (2013). Psychosocial stress in pregnancy and preterm birth: Associations and mechanisms. *Journal of Perinatal Medicine, 41*(6), 631–645. https://doi.org/10.1515/jpm-2012-0295

Shigemi, D., & Yasunaga, H. (2019). Antenatal corticosteroid administration in women undergoing tocolytic treatment who delivered before 34 weeks of gestation: A retrospective cohort study using a national inpatient database. *BMC Pregnancy & Childbirth, 19*(1), 17. https://doi.org/10.1186/s12884-019-2174-1

Shivani, D., Quek, B. H., Tan, P. L., & Shephali, T. (2018). Does rescue cerclage work? *Journal of Perinatal Medicine, 46*(8), 876–880. https://doi.org/10.1515/jpm-2017-0311

Shmuely, A., Aviram, A., Ben-Mayor Bashi, T., Hadar, E., Krissi, H., Wiznitzer, A., & Yogev, Y. (2016). Risk factors for spontaneous preterm delivery after arrested episode of preterm labor. *The Journal of Maternal-Fetal & Neonatal Medicine, 29*(5), 727–732. https://doi.org/10.3109/14767058.2015.1016420

Society for Maternal-Fetal Medicine. (n.d.). *Preterm labor toolkit*. https://www.smfm.org/publications/231-smfm-preterm-birth-toolkitAQ4

Society for Maternal-Fetal Medicine. (2016). Implementation of the use of antenatal corticosteroids in the late preterm birth period in women at risk for preterm delivery. *American Journal of Obstetrics & Gynecology, 215*(2), B13–B15. https://doi.org/10.1016/j.ajog.2016.03.013

Suff, N., Story, L., & Shennan, A. (2019). The prediction of preterm delivery: What is new? *Seminars in Fetal and Neonatal Medicine, 24*(1), 27–32. https://doi.org/10.1016/j.siny.2018.09.006

Usman, S., Foo, L., Tay, J., Bennett, P. R., & Lees, C. (2017). Use of magnesium sulfate in preterm deliveries for neuroprotection of the neonate. *The Obstetrician & Gynaecologist, 19*(1), 21–28. https://doi.org/10.1111/tog.12328

Wade, E. E., Byers, J. G., & Thagard, A. S. (2020). The state of the science of preterm birth: Assessing contemporary screening and preventive strategies. *The Journal of Perinatal & Neonatal Nursing, 34*(2), 113–124. https://doi.org/10.1097/JPN.0000000000000470

White, H., Morton, V. H., Stock, S. J., & Lavender, T. (2019). Preterm labour decision-making and experiences of care for women and clinicians (QUIDS Qualitative): A qualitative exploration. *Sexual & Reproductive Healthcare, 21*, 95–101. https://doi.org/10.1016/j.srhc.2019.06.005

World Health Organization. (2015). *WHO recommendations on interventions to improve preterm birth outcomes*. https://www.who.int/reproductivehealth/publications/maternal_perinatal_health/preterm-birth-guideline/en/

World Health Organization. (2018). *Fact sheet on preterm birth*. https://www.who.int/news-room/fact-sheets/detail/preterm-birth

For additional continuing nursing education activities related to maternal child nursing, go to nursingcenter.com.

Instructions for Taking the CE Test Online
Preterm Labor and Birth: A Clinical Review

- Read the article. The test for this CE activity can be taken online at www.nursingcenter.com. Tests can no longer be mailed or faxed.
- You will need to create a free login to your personal CE Planner account before taking online tests. Your planner will keep track of all your Lippincott Professional Development (LPD) online CE activities for you.
- There is only one correct answer for each question. A passing score for this test is 16 correct answers. If you pass, you can print your certificate of earned contact hours and the answer key. If you fail, you have the option of taking the test again at no additional cost.
- For questions, contact LPD: 1-800-787-8985.

Registration Deadline: January 6, 2023.

Disclosure Statement:

The author and planners have disclosed no potential conflicts of interest, financial or otherwise.

Provider Accreditation:

LPD will award 2.5 contact hours for this continuing nursing education activity.

LPD is accredited as a provider of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation.

This activity is also provider approved by the California Board of Registered Nursing, Provider Number CEP 11749 for 2.5 contact hours. LPD is also an approved provider of continuing nursing education by the District of Columbia, Georgia, and Florida, CE Broker #50-1223.

Payment:

- The registration fee for this test is $24.95.