

A Study on High-Risk Pregnancy and Its Management: Role of Obstetric Nurses in Improving Maternal and Fetal Outcomes

Vazahid Khan^{1,*}, Ananda Nimmy², Sarika Samson³

Abstract

High-risk pregnancy is a major challenge in maternal and neonatal healthcare and is associated with increased morbidity and mortality among mothers and newborn, particularly in developing regions where access to quality healthcare services remains uneven, this article examines the concept, classification, risk factors, pathophysiology, and management of high-risk pregnancy with a strong focus on the role of obstetric nurses in improving maternal and fetal outcomes, obstetric nurses play a central role in early identification of complications, continuous monitoring, implementation of evidence-based interventions, and patient education across antenatal, intrapartum, and postnatal periods, nurse-led care has been shown to reduce complications such as preeclampsia, gestational diabetes, preterm birth, and postpartum hemorrhage while improving patient satisfaction and adherence to treatment, despite advancements in maternal healthcare, challenges such as inadequate training, high workload, and limited resources continue to affect nursing effectiveness, therefore strengthening nursing education, promoting skill-based training, and ensuring institutional support are essential for optimizing outcomes, this article highlights the importance of empowering obstetric nurses and integrating their role into maternal healthcare systems to achieve better clinical outcomes and reduce maternal and neonatal mortality.

Keywords: High-risk pregnancy. obstetric nursing. maternal outcomes. fetal outcomes. antenatal care. nursing management. pregnancy complications. maternal health

INTRODUCTION

High-risk pregnancy refers to a condition in which the mother, fetus, or both are at increased risk of complications during pregnancy, childbirth, or the postpartum period. It represents a critical concern in global maternal health due to its strong association with adverse outcomes, including maternal mortality, neonatal morbidity, and long-term health consequences for both mother and child. This classification is widely used in clinical practice to identify pregnancies that require specialized monitoring and intervention because of underlying medical, obstetric, or social risk factors that may compromise normal physiological processes and increase vulnerability during the reproductive period. The burden of high-risk pregnancy has increased significantly over the past decade as a result of epidemiological transitions, including rising maternal age, increased prevalence of chronic diseases such as diabetes and hypertension, and lifestyle-related factors such as obesity and sedentary behavior, which collectively contribute to complications during pregnancy. Globally, high-risk pregnancies account for a substantial

*Author for Correspondence

Vazahid Khan

E-mail: healtheducation236@gmail.com

¹Associate Professor, Department of Nursing, SN Pareek College of Nursing, Kota, Rajasthan, India

²Principal, Department of Nursing, Metas Adventist School of Nursing, Surat, Gujarat, India

³Assistant Professor, Department of Nursing, Geetanjali College and School of Nursing, Udaipur, Rajasthan, India

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proportion of maternal and perinatal deaths, with studies indicating that nearly 20 to 30 percent of all pregnancies fall into the high-risk category and are responsible for a disproportionately high share of adverse outcomes. The identification of high-risk pregnancy is based on a wide range of determinants, including demographic factors such as age, medical conditions such as cardiovascular or endocrine disorders, obstetric history including previous complications, and environmental or behavioral influences such as poor nutrition and substance use. Early recognition of these risk factors during antenatal care is essential because timely intervention can significantly reduce complications and improve outcomes through targeted management strategies and continuous monitoring [1–6]. In this context, obstetric nurses play a pivotal role as they are often the first point of contact within healthcare systems and are responsible for comprehensive assessment, identification of warning signs, and implementation of preventive and therapeutic interventions tailored to individual patient needs. Their role extends beyond clinical care to include patient education, counseling, and emotional support, which are particularly important given that a high-risk pregnancy is often associated with psychological stress, anxiety, and uncertainty for the expectant mother. Continuous monitoring by obstetric nurses involves regular assessment of maternal vital signs, fetal growth and well-being, and laboratory parameters, which helps in early detection of complications such as preeclampsia, gestational diabetes, and preterm labor, thereby enabling timely clinical decision-making. Furthermore, obstetric nurses are integral to multidisciplinary care teams and collaborate with obstetricians, midwives, and other healthcare professionals to ensure coordinated and evidence-based management of high-risk pregnancies. Their involvement in antenatal education programs also empowers women with knowledge regarding nutrition, medication adherence, lifestyle modification, and recognition of danger signs, which contributes to improved self-care and health outcomes. Advances in maternal-fetal medicine and healthcare technology have enhanced the ability to manage high-risk pregnancies effectively. However, the success of these interventions largely depends on the competence, vigilance, and clinical judgment of nursing professionals who apply these tools in real-world settings. Despite these advancements, challenges such as limited resources, inadequate training, and high patient load continue to affect the quality of care delivered in many healthcare settings, particularly in low-resource environments. Therefore, strengthening the capacity of obstetric nurses through continuous education, skill development, and institutional support is essential for improving maternal and neonatal outcomes and reducing preventable complications associated with high-risk pregnancy. Figure 1 illustrates the conceptual framework of high-risk pregnancy, highlighting the interaction between risk factors, nursing interventions, and outcomes and emphasizing how effective nursing care can act as a critical link in improving both maternal and fetal health outcomes through early detection, timely intervention, and comprehensive care delivery [7–16].

CONCEPT AND CLASSIFICATION OF HIGH-RISK PREGNANCY

High-risk pregnancy is categorized based on maternal, fetal, and placental factors that may negatively influence pregnancy outcomes, and this classification plays a crucial role in identifying vulnerable cases and guiding timely clinical interventions. Maternal factors include advanced maternal age, chronic conditions such as hypertension, diabetes, cardiac disorders, anemia, and thyroid dysfunction, as well as previous obstetric complications such as recurrent miscarriage, cesarean section, or history of preeclampsia, which significantly increase the likelihood of adverse maternal and fetal outcomes. Fetal factors encompass conditions such as intrauterine growth restriction, congenital anomalies, multiple gestation, and abnormal fetal presentation, which may compromise fetal development and survival, requiring specialized monitoring and care. Placental factors include placenta previa, placental abruption, and placental insufficiency, which are associated with serious complications such as hemorrhage, fetal distress, and preterm birth, thereby necessitating immediate clinical attention and careful management. Classification of high-risk pregnancy into these categories is essential for guiding clinical decision-making, prioritizing healthcare resources, and ensuring appropriate referral to higher levels of care when necessary. It also facilitates early detection of complications through systematic screening and risk assessment during antenatal visits, which significantly improves maternal and neonatal outcomes. Obstetric nurses play a vital role in applying this classification in clinical practice by conducting comprehensive assessments, identifying risk factors, and implementing individualized care plans tailored to each patient's condition. Their involvement ensures continuity-of-care and

effective monitoring throughout pregnancy, labor, and the postpartum period. Furthermore, classification systems help in standardizing care protocols and enhancing communication among healthcare professionals, which is critical in the multidisciplinary management of high-risk pregnancy cases. Table 1 shows the classification of high-risk pregnancy, which is presented within this paragraph to provide a structured overview of maternal, fetal, and placental risk categories along with their clinical implications and significance in guiding nursing interventions and improving overall pregnancy outcomes [17–24].

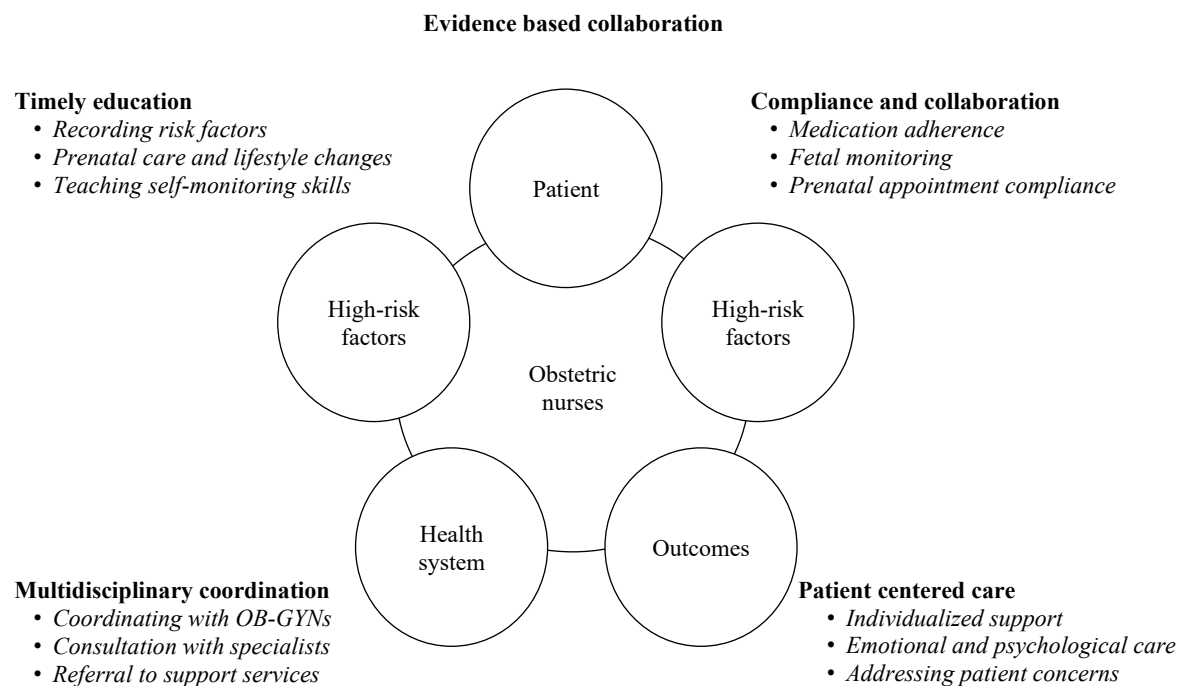


Figure 1. Conceptual framework of high-risk pregnancy and role of obstetric nurses in improving outcomes.

Table 1. Classification of high-risk pregnancy.

Category	Conditions included	Risk to mother and fetus
Maternal age-related	Teenage pregnancy, advanced maternal age (>35 years)	Increased risk of preeclampsia, chromosomal abnormalities, and preterm birth
Obstetric history related	Previous cesarean section, recurrent miscarriage, stillbirth, preterm labor	Higher risk of pregnancy loss, uterine rupture, and placental complications
Medical disorders	Hypertension, diabetes mellitus, renal disease, thyroid disorders, cardiac disease	Increased maternal morbidity and fetal growth restriction, congenital anomalies
Pregnancy-related complications	Preeclampsia, gestational diabetes, placenta previa, placental abruption, multiple pregnancy	Hemorrhage, preterm delivery, fetal distress, and perinatal mortality
Fetal factors	Intrauterine growth restriction, congenital anomalies, fetal distress, abnormal presentation	Increased risk of stillbirth, neonatal complications, and neonatal intensive care unit (NICU) admission
Lifestyle and environmental factors	Smoking, alcohol use, substance abuse, poor nutrition, stress, and low socioeconomic status	Low birth weight, preterm birth, and developmental complications
Infection-related factors	TORCH infections, HIV, hepatitis B, and urinary tract infections	Vertical transmission, congenital infections, fetal malformations

EPIDEMIOLOGY AND RISK FACTORS

The prevalence of high-risk pregnancy is increasing globally due to rapid demographic and epidemiological transitions, including delayed childbearing, urbanization, and the rising incidence of non-communicable diseases, which significantly influence maternal and fetal health outcomes. Advanced maternal age has emerged as one of the most important contributors to pregnancy complications in women above 35 years, which are associated with higher risks of hypertension, gestational diabetes, and chromosomal abnormalities affecting fetal development. In addition, the growing prevalence of high-risk fertility behavior, such as short birth intervals and high parity, has been identified as a major determinant of adverse maternal and neonatal outcomes, particularly in developing countries. Studies conducted in India indicate that nearly half of all pregnancies may involve one or more high-risk factors, highlighting the magnitude of the problem in low- and middle-income settings. The coexistence of multiple risk factors further amplifies complications, as women with combined medical and obstetric risks are more likely to experience severe maternal morbidity and poor neonatal outcomes. Epidemiological data also suggest that high-risk pregnancies contribute significantly to maternal mortality and adverse perinatal outcomes, emphasizing the need for early detection and intervention. Biological risk factors such as anemia, malnutrition, infections, and pre-existing chronic diseases interact with pregnancy-related physiological changes, thereby increasing vulnerability to complications. Socioeconomic determinants, including poverty, low educational status, and limited access to healthcare services, further exacerbate risks by delaying timely diagnosis and treatment. Environmental and lifestyle factors such as smoking, alcohol use, poor dietary habits, and sedentary lifestyles have also been strongly associated with adverse pregnancy outcomes and contribute to the rising prevalence of high-risk pregnancies. Inadequate antenatal care remains a critical issue, particularly in resource-limited settings where women often lack access to regular check-ups, screening services, and skilled healthcare providers, leading to late identification of complications. Early screening and risk assessment during antenatal visits are essential strategies for identifying high-risk pregnancies and initiating timely interventions that can significantly reduce maternal and neonatal morbidity and mortality. Obstetric nurses play a pivotal role in this process as they are responsible for conducting comprehensive assessments, identifying risk factors, and ensuring continuous monitoring throughout pregnancy. Their involvement in health education and counseling helps in improving awareness regarding nutrition, hygiene, and danger signs, thereby empowering women to seek timely care and adhere to treatment plans. Continuous monitoring of maternal and fetal parameters such as blood pressure, blood glucose levels, and fetal growth enables early detection of complications such as preeclampsia, gestational diabetes, and intrauterine growth restriction. Obstetric nurses also facilitate multidisciplinary collaboration by coordinating with obstetricians, neonatologists, and other healthcare professionals to provide comprehensive and integrated care for high-risk pregnancies. Despite advancements in maternal healthcare systems, challenges such as high patient load, shortage of trained healthcare professionals, and inadequate infrastructure continue to limit the effectiveness of interventions in many regions. Therefore, strengthening healthcare systems through improved access to antenatal services, enhanced training of healthcare providers, and implementation of evidence-based guidelines is essential for addressing the growing burden of high-risk pregnancy. Figure 2 demonstrates major risk factors associated with high-risk pregnancy and their interrelationships, highlighting how biological, socioeconomic, and healthcare-related determinants interact and identifying key areas where targeted nursing interventions can significantly reduce complications and improve maternal and fetal outcomes [25–29].

PATHOPHYSIOLOGY OF HIGH-RISK PREGNANCY

High-risk pregnancy conditions involve complex physiological changes that affect maternal and fetal health, often resulting from interactions between genetic, environmental, and metabolic factors that disrupt normal pregnancy processes. One of the most significant conditions is preeclampsia, which is characterized by abnormal placental implantation, reduced uteroplacental perfusion, and widespread endothelial dysfunction, leading to hypertension and multiorgan involvement. This disorder originates early in pregnancy due to impaired trophoblastic invasion of spiral arteries, resulting in placental hypoxia and the release of antiangiogenic factors into the maternal circulation. These circulating factors contribute to systemic inflammation, oxidative stress, and vascular dysfunction, which further

exacerbate maternal complications and compromise fetal growth. Gestational diabetes mellitus is another major high-risk condition that develops due to progressive insulin resistance during pregnancy, combined with inadequate pancreatic beta-cell compensation, resulting in maternal hyperglycemia. This hyperglycemic state increases the risk of fetal macrosomia, neonatal hypoglycemia, and long-term metabolic disorders in the offspring. The underlying mechanism involves hormonal changes, including increased levels of placental hormones, such as human placental lactogen and progesterone, which interfere with insulin signaling pathways. Preterm labor is another important complication and is often associated with inflammatory and infectious processes that trigger uterine contractions and cervical changes before term. Activation of inflammatory pathways leads to increased production of cytokines and prostaglandins, which promote uterine activity and membrane rupture. Intrauterine growth restriction is linked to placental insufficiency, where inadequate blood flow and nutrient transfer result in impaired fetal development and an increased risk of perinatal morbidity and mortality. This condition is often associated with maternal factors such as hypertension and malnutrition, which further compromise placental function. Placental abruption is another serious complication characterized by premature separation of the placenta from the uterine wall, leading to hemorrhage and fetal distress, and is often associated with hypertension and trauma. Pathophysiology involves vascular injury and bleeding within the decidua, which disrupts placental attachment and compromises the oxygen supply to the fetus. Anemia during pregnancy also contributes to high-risk conditions by reducing the oxygen-carrying capacity of blood, which can lead to fetal hypoxia and an increased risk of preterm birth. Additionally, infections such as urinary tract infections and intrauterine infections can trigger inflammatory responses that increase the risk of preterm labor and neonatal complications. Obesity further complicates pregnancy by increasing the risk of metabolic disorders, hypertension, and cesarean delivery due to altered inflammatory and hormonal pathways. Cardiovascular adaptations during pregnancy, including increased blood volume and cardiac output, may become maladaptive in women with pre-existing heart disease, leading to an increased maternal risk. Understanding these complex mechanisms is essential for obstetric nurses, as it enables them to identify early warning signs, such as elevated blood pressure, abnormal glucose levels, reduced fetal movements, and signs of infection, which require immediate attention. Early recognition allows timely interventions, including medication administration, lifestyle modification, and referral to specialized care, which can significantly improve outcomes. Continuous monitoring and patient education are also critical components of nursing care that help prevent complications and ensure adherence to treatment protocols. Furthermore, the integration of evidence-based practice and multidisciplinary collaboration enhances the effectiveness of management strategies for high-risk pregnancies.

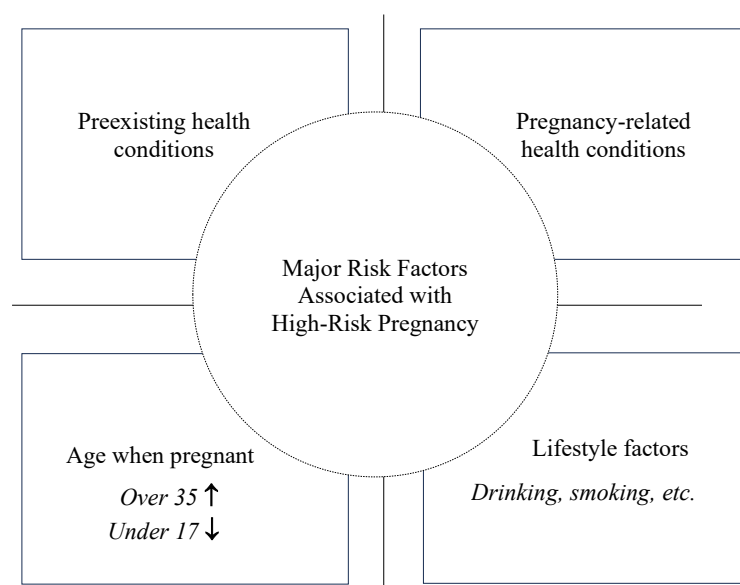


Figure 2. Major risk factors associated with high-risk pregnancy.

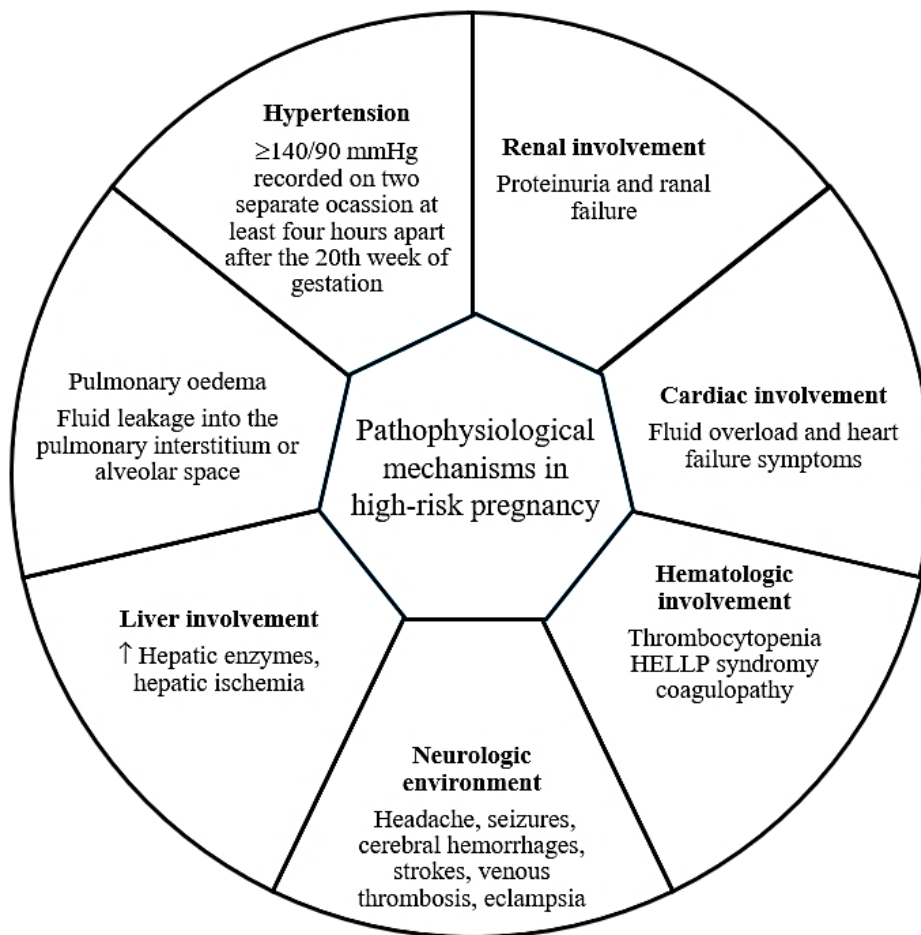


Figure 3. Pathophysiological mechanisms in high-risk pregnancy.

Figure 3 illustrates the pathophysiological mechanisms underlying common high-risk pregnancy conditions highlighting the complex interplay between maternal, placental, and fetal factors and emphasizing the importance of early detection and comprehensive nursing care in improving maternal and fetal outcomes. [30–31]

ROLE OF OBSTETRIC NURSES IN ANTENATAL CARE

Obstetric nurses are central to antenatal care as they conduct comprehensive assessments, monitor maternal and fetal health, provide health education, and ensure adherence to treatment plans, which collectively contribute to improved pregnancy outcomes and reduced complications. Their role begins with a detailed antenatal assessment that includes the collection of medical, obstetric, and social history, along with physical examination to identify potential risk factors early in pregnancy.

They are responsible for regular monitoring of maternal vital signs such as blood pressure, weight, and temperature, which helps in early detection of conditions such as hypertension and infection. Fetal monitoring is another essential responsibility where nurses assess fetal growth, heart rate, and movements to ensure proper development and identify any deviations from normal patterns. Early identification of complications such as preeclampsia, gestational diabetes, and anemia is facilitated through routine screening and laboratory investigations conducted and interpreted by obstetric nurses. In addition to clinical monitoring, obstetric nurses play a vital role in providing health education to pregnant women regarding nutrition, hygiene, exercise, and medication adherence, which significantly influences maternal and fetal health outcomes. Nutritional counseling provided by nurses ensures adequate intake of essential nutrients such as iron, calcium, and folic acid, which are critical for

preventing anemia and supporting fetal development. They also educate women about danger signs during pregnancy, such as vaginal bleeding, severe headache, and reduced fetal movement, which require immediate medical attention. Counseling on lifestyle modifications, including cessation of smoking and alcohol consumption, further reduces the risk of adverse outcomes. Obstetric nurses also support psychological well-being by addressing anxiety, stress, and emotional concerns associated with pregnancy, particularly in high-risk cases. Continuity-of-care provided by nurses ensures that patients receive consistent monitoring and follow-up, which enhances adherence to treatment plans and improves overall satisfaction with care. They play a key role in coordinating care with other healthcare professionals, including obstetricians, midwives, and nutritionists, to provide comprehensive and multidisciplinary management. Use of evidence-based guidelines and protocols by obstetric nurses ensures standardized and high-quality care across different healthcare settings. Technological advancements such as electronic health records and telehealth services have further enhanced the ability of nurses to monitor patients remotely and provide timely interventions. Despite their critical role, challenges such as high workload, limited resources, and lack of training may hinder the effectiveness of obstetric nursing care, particularly in low-resource settings.

Therefore, strengthening nursing education, providing continuous professional development, and improving healthcare infrastructure are essential for optimizing antenatal care services. Figure 4 highlights the role of obstetric nurses in antenatal care and their contribution to early detection and management of high-risk conditions by illustrating key responsibilities such as assessment, monitoring, education, and coordination of care, which ultimately lead to improved maternal and fetal outcomes [32–34].

MONITORING AND EARLY DETECTION OF COMPLICATIONS

Continuous monitoring is essential in managing high-risk pregnancies and involves systematic and regular assessment of maternal and fetal parameters to ensure early detection of complications and timely clinical intervention, which significantly improves maternal and neonatal outcomes. Obstetric nurses play a central role in this process by conducting ongoing surveillance of maternal vital signs including blood pressure, pulse, temperature, and respiratory rate, which helps in identifying early signs of conditions such as preeclampsia, infection, and cardiovascular complications.

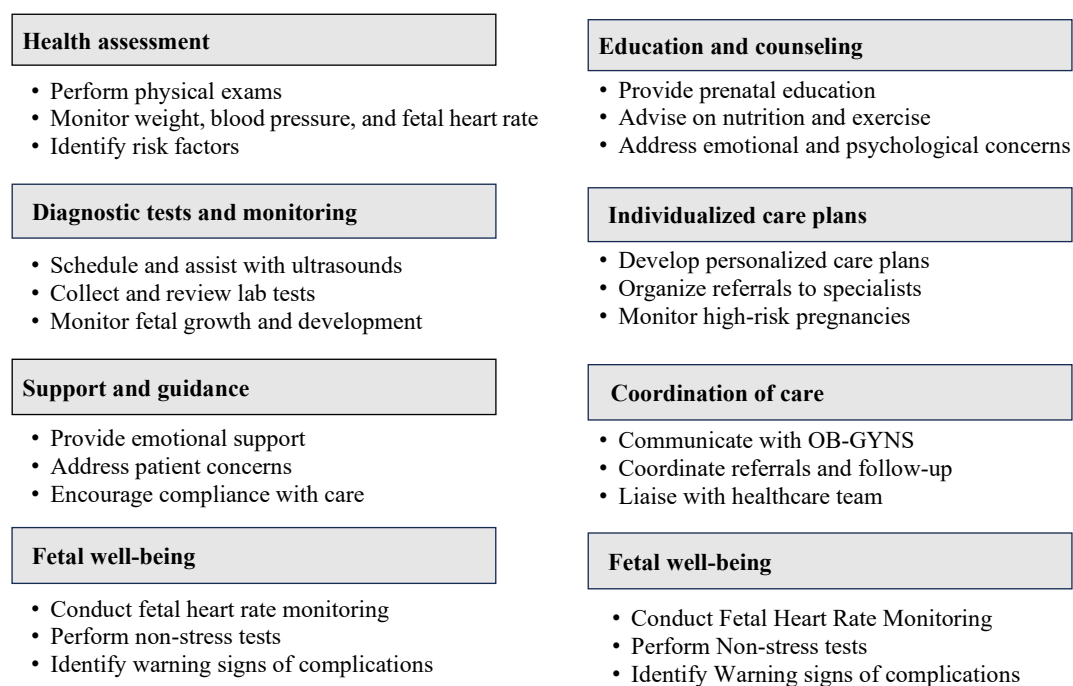


Figure 4. Role of obstetric nurses in antenatal care.

Monitoring blood pressure is particularly important as hypertensive disorders are among the leading causes of maternal morbidity and mortality and require prompt management to prevent progression to severe complications. Assessment of blood glucose levels is another critical component, especially in cases of gestational diabetes, where strict glycemic control is necessary to prevent fetal macrosomia and neonatal complications. Obstetric nurses also monitor hematological parameters such as hemoglobin levels to detect anemia, which is associated with increased risk of preterm birth and low birth weight. Fetal monitoring includes regular assessment of fetal heart rate using Doppler or electronic fetal monitoring devices, which helps in detecting fetal distress and ensuring adequate oxygenation. Evaluation of fetal growth through fundal height measurement and ultrasound assessment is essential for identifying intrauterine growth restriction or macrosomia, which require specialized care. Monitoring fetal movements reported by the mother is a simple yet effective method for assessing fetal well-being and detecting early signs of compromise. The use of partographs during labor allows obstetric nurses to track the progress of labor and identify abnormalities such as prolonged or obstructed labor, which may require intervention. Continuous electronic fetal monitoring provides real-time information on fetal status and helps in making timely decisions regarding delivery to prevent adverse outcomes. In addition to clinical monitoring, obstetric nurses assess signs of complications such as vaginal bleeding, edema, and proteinuria, which may indicate serious conditions requiring immediate attention. Monitoring of amniotic fluid levels and placental function through ultrasound further enhances the ability to detect complications such as oligohydramnios or placental insufficiency.

Patient education is an integral part of monitoring, as nurses teach women to recognize warning signs and seek care promptly, which improves early detection and intervention. Documentation and accurate record keeping by obstetric nurses ensure continuity-of-care and facilitate communication among healthcare providers, which is essential for effective management of high-risk pregnancies. Technological advancements such as telemonitoring and mobile health applications have improved access to monitoring services, especially in remote areas, and enable continuous follow-up of high-risk patients. Despite these advances, challenges such as limited resources, inadequate staffing, and a lack of training may affect the quality of monitoring in some healthcare settings, particularly in low-resource environments. Therefore, strengthening healthcare systems and providing adequate training to obstetric nurses are essential for improving monitoring practices and ensuring better outcomes. Table 2 shows the monitoring parameters in high-risk pregnancy is included in this paragraph to summarize key indicators such as blood pressure, fetal heart rate, blood glucose levels, and hemoglobin, along with corresponding nursing actions that collectively contribute to effective monitoring and management of high-risk pregnancy and improved maternal and fetal outcomes [35].

MANAGEMENT OF HIGH-RISK PREGNANCY

Management of high-risk pregnancy involves a comprehensive multidisciplinary approach that integrates medical treatment, lifestyle modification, and continuous monitoring to ensure optimal maternal and fetal outcomes. Obstetric nurses play a vital role in implementing individualized care plans by coordinating with obstetricians, endocrinologists, and other healthcare professionals to provide holistic and patient-centered care. Medical management includes the use of antihypertensive drugs for controlling blood pressure in preeclampsia and insulin therapy or oral hypoglycemic agents for managing gestational diabetes to prevent complications. Nurses are responsible for administering medications accurately, monitoring therapeutic responses, and identifying adverse drug reactions to ensure patient safety. Lifestyle modification is another essential component of management and includes dietary changes, physical activity, and behavioral counseling aimed at reducing risk factors and improving overall health. Nutritional counseling provided by obstetric nurses helps in maintaining optimal weight gain during pregnancy and preventing complications such as obesity and anemia. Regular physical activity, as recommended by healthcare providers, improves cardiovascular health and reduces the risk of gestational diabetes and hypertension. Continuous monitoring of maternal and fetal parameters allows early detection of complications and timely intervention, which significantly improves pregnancy outcomes. Management of pre-eclampsia involves close monitoring of blood pressure, administration of magnesium sulfate to prevent seizures, and timely delivery when necessary.

In cases of gestational diabetes, strict glycemic control through diet, exercise, and medication reduces the risk of fetal macrosomia and neonatal complications. Preterm labor management includes the use of tocolytic agents to delay labor and corticosteroids to enhance fetal lung maturity, which improves neonatal survival. Obstetric nurses also provide psychological support to women experiencing high-risk pregnancy, as emotional stress and anxiety can negatively affect maternal and fetal health. Patient education is a key responsibility of nurses and includes teaching women about medication adherence, dietary modifications, warning signs, and the importance of regular follow-up visits. Effective communication between healthcare providers and patients ensures a better understanding of treatment plans and improves adherence to interventions. Technological advancements such as telemedicine and remote monitoring systems have enhanced the ability to manage high-risk pregnancies by providing continuous care and reducing the need for frequent hospital visits. Despite these advances, challenges such as limited resources, inadequate staffing, and lack of access to specialized care continue to affect the quality of management in many regions. Therefore, strengthening healthcare infrastructure, improving the training of healthcare professionals, and implementing evidence-based guidelines are essential for effective management of high-risk pregnancy. Obstetric nurses play a central role in ensuring the successful implementation of these strategies by providing continuous care, monitoring patient progress, and coordinating multidisciplinary interventions. Figure 5 presents management strategies in high-risk pregnancy emphasizing the integration of nursing care with medical treatment and highlighting how coordinated efforts among healthcare professionals contribute to improved maternal and fetal outcomes [36].

INTRAPARTUM CARE AND NURSING RESPONSIBILITIES

During labor, obstetric nurses play a critical role in monitoring maternal and fetal status, managing pain, and identifying complications, such as fetal distress and prolonged labor, which are essential for ensuring safe delivery and improving maternal and neonatal outcomes. Continuous assessment of maternal vital signs, including blood pressure, pulse, temperature, and uterine contractions, allows for the early detection of complications such as hypertension, infection, and abnormal labor progression. Fetal monitoring through intermittent auscultation or continuous electronic fetal monitoring helps identify signs of fetal distress, such as abnormal heart rate patterns, which require immediate intervention. The use of a partograph is an important tool that enables obstetric nurses to track the progress of labor and identify deviations, such as prolonged or obstructed labor, which can lead to serious complications if not managed promptly.

Table 2. Monitoring parameters in high-risk pregnancy.

Parameter category	Specific monitoring items	Clinical importance
Maternal vital signs	Blood pressure, pulse rate, respiratory rate, temperature	Early detection of hypertensive disorders, infection, and maternal instability
Blood investigations	Hemoglobin, blood glucose, liver function tests, renal function tests	Identification of anemia, gestational diabetes, and organ dysfunction
Urine analysis	Proteinuria, glucose, ketones, and urinary tract infection screening	Detection of preeclampsia, diabetes, and infections
Fetal heart monitoring	Fetal heart rate, variability, and decelerations	Assessment of fetal well-being and distress
Ultrasound assessment	Fetal growth, amniotic fluid index, placental position	Detection of growth restriction, oligohydramnios, and placenta previa
Weight monitoring	Maternal weight gain pattern	Evaluation of nutritional status and pregnancy progression
Fundal height measurement	Symphysis-fundal height	Estimation of fetal growth and gestational age consistency
Movement tracking	Fetal kick counts	Early indicator of fetal well-being or distress
Blood pressure trends	Serial BP recordings	Monitoring the progression of preeclampsia or gestational hypertension
Doppler studies	Umbilical artery and uterine artery flow	Assessment of placental circulation and fetal oxygenation

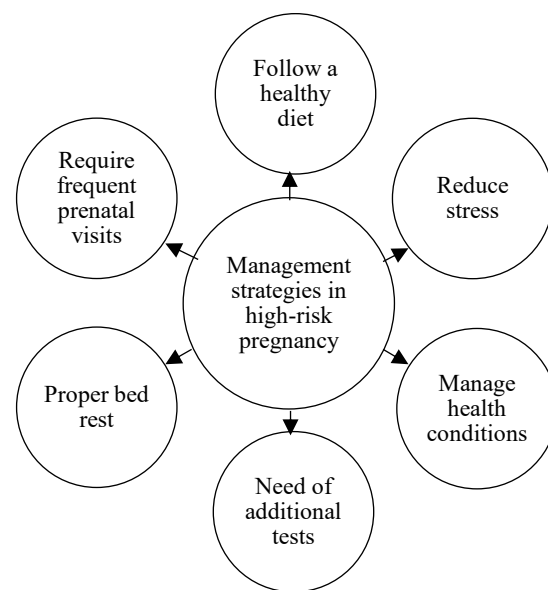


Figure 5. Management strategies in high-risk pregnancy.

Pain management is another essential responsibility of obstetric nurses and includes both pharmacological methods, such as epidural analgesia, and non-pharmacological approaches, such as breathing techniques, positioning, and emotional support. Providing continuous emotional support during labor has been shown to reduce anxiety, shorten labor duration, and improve overall birth experience for women.

Obstetric nurses are also responsible for maintaining a safe and hygienic environment during labor to prevent infections and ensure the well-being of both mother and newborn. Early identification and management of complications such as postpartum hemorrhage, umbilical cord prolapse, and uterine rupture are critical aspects of intrapartum care that require prompt nursing interventions. In cases of fetal distress, nurses coordinate with obstetricians to initiate interventions such as oxygen administration, maternal repositioning, or emergency delivery to prevent adverse outcomes. Monitoring the second stage of labor is essential to ensure effective pushing and prevent complications such as perineal trauma and fetal hypoxia. Obstetric nurses also assist in safe delivery by preparing necessary equipment, supporting the mother during childbirth, and ensuring immediate care of the newborn, including assessment of the APGAR (Appearance, pulse, grimace, activity, and respiration) score and initiation of breastfeeding. Effective communication and teamwork among healthcare professionals are essential during labor as coordinated efforts improve decision-making and patient outcomes. Documentation of labor progress and interventions by obstetric nurses ensures continuity-of-care and provides valuable information for clinical decision-making. Technological advancements such as electronic health records and fetal monitoring systems have enhanced the ability of nurses to provide accurate and timely care during labor. Despite these advancements, challenges such as high workload, limited resources, and lack of skilled personnel may affect the quality of intrapartum care, particularly in low-resource settings. Therefore, strengthening training programs, improving staffing levels, and ensuring the availability of essential equipment are necessary to enhance the effectiveness of obstetric nursing care during labor. Figure 6 illustrates nursing responsibilities during intrapartum care and their impact on maternal and neonatal outcomes, highlighting the importance of continuous monitoring, timely interventions, and coordinated care in ensuring safe delivery and reducing complications.

POSTNATAL CARE AND FOLLOW-UP

Postnatal care is essential for preventing complications and ensuring the recovery of the mother and newborn, as this period is highly vulnerable and requires continuous monitoring and support to detect and manage any emerging health issues.

Monitoring in high-risk pregnancy	Nursing interventions
Fetal heart rate (FHR) monitoring • External or internal • Assess for distress	Positioning and comfort • Reposition for comfort • Pain management
Uterine activity monitoring • Contraction patterns • Frequency and intensity	IV Therapy and medications • IV Fluids, medications • Labor induction as needed
Maternal vital signs • Blood pressure, pulse • Temperature, respiration	Oxygen administration • Administer O₂ as indicated
Amniotic fluid assessment • Color and odor • Amount and clarity	Emotional support • Provide reassurance • Support the patient
	Prepare for delivery • Assist with c-section • Prepare for neonatal care

Figure 6. Nursing responsibilities during intrapartum care.

Obstetric nurses play a central role in providing comprehensive postnatal care by assessing maternal vital signs, including blood pressure, pulse, temperature, and uterine involution, to identify complications such as postpartum hemorrhage, infection, and hypertension. Monitoring vaginal bleeding and uterine contraction is crucial to ensure proper recovery and prevent life-threatening complications. Newborn assessment is equally important and includes evaluation of breathing, temperature, feeding patterns, and early detection of neonatal complications such as jaundice and infections.

Supporting breastfeeding is a key responsibility of obstetric nurses as early initiation and exclusive breastfeeding significantly improve neonatal immunity and maternal health outcomes. Nurses provide guidance on proper breastfeeding techniques, positioning, and management of common problems such as nipple pain and inadequate milk supply. Education of mothers on self-care practices, including hygiene, nutrition, rest, and recognition of danger signs, is essential for promoting recovery and preventing complications. Counseling, family planning, and birth spacing are also an important aspect of postnatal care that helps in reducing the risk of future high-risk pregnancies. Psychological support provided by obstetric nurses helps in addressing postpartum depression, anxiety, and emotional stress, which are common during this period and can affect maternity and child well-being. Continuous follow-up and home visits by nurses ensure adherence to care plans and early identification of complications, especially in high-risk cases. Monitoring newborn growth and development, including weight gain and feeding patterns, helps ensure optimal health and early intervention when required. Infection prevention practices such as maintaining hygiene, proper cord care, and immunization are essential components of postnatal care that are reinforced by obstetric nurses. Nurses also play a vital role in educating families and caregivers about newborn care and the importance of regular health check-ups. Use of technology such as telehealth services has enhanced postnatal care by enabling remote monitoring and consultation, particularly in resource-limited settings. Despite the importance of postnatal care, challenges such as a lack of awareness, limited access to healthcare services, and cultural barriers may affect its utilization. Therefore, strengthening healthcare systems, increasing awareness, and improving access to quality postnatal services are essential for reducing maternal and neonatal morbidity and mortality. Obstetric nurses remain key contributors in ensuring effective postnatal care through continuous monitoring, education, and support, which ultimately improves long-term health outcomes for both mother and child. Figure 7 shows postnatal care interventions led by nurses and their contribution to long-term outcomes, highlighting the importance of comprehensive care, early detection of complications, and continuous support in promoting maternal and neonatal health [37].

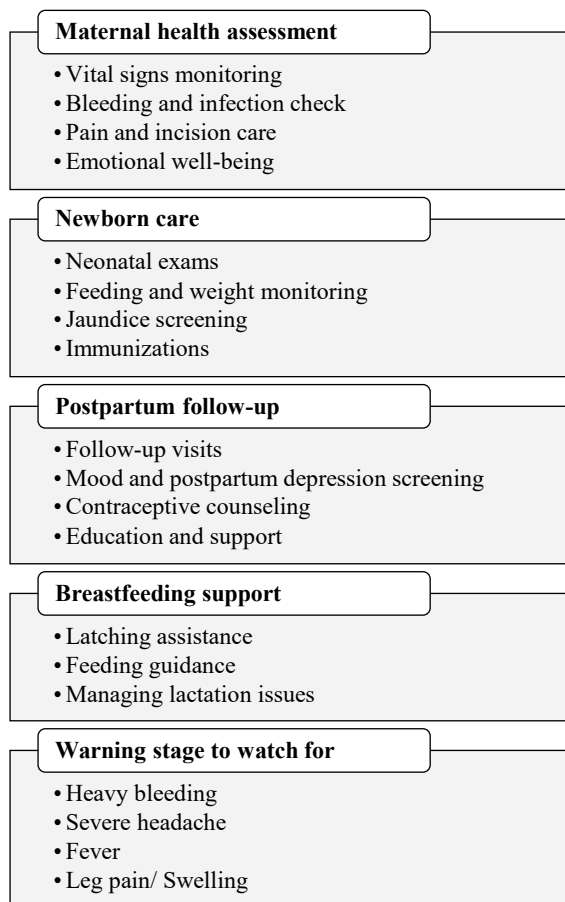


Figure 7. Postnatal care and nursing interventions.

FACTORS INFLUENCING NURSING PRACTICE

The effectiveness of obstetric nurses is influenced by multiple interrelated factors, including education, clinical experience, workload, availability of resources, and institutional support, which collectively determine the quality of care provided to mothers and newborns in high-risk pregnancy settings. Education and training play a fundamental role in enhancing nursing competence, as nurses with advanced knowledge and evidence-based training are better equipped to identify complications early and implement appropriate interventions. Continuous professional development programs, including workshops, simulation training, and clinical updates, help in improving clinical skills and decision-making abilities among obstetric nurses. Clinical experience is another critical factor, as experienced nurses demonstrate greater confidence, better judgment, and improved ability to manage complex high-risk cases effectively. Workload significantly impacts nursing performance as excessive patient load and long working hours can lead to fatigue, burnout, and reduced quality of care, which may increase the risk of medical errors. Adequate staffing levels are therefore essential to ensure that nurses can provide attentive and individualized care for each patient. Availability of resources, including medical equipment, medications, and infrastructure, is also crucial as a lack of essential supplies can hinder effective monitoring and management of high-risk pregnancies. Institutional support in the form of supportive leadership, clear protocols, and a positive work environment enhances job satisfaction and motivates nurses to perform. Effective communication and teamwork among healthcare professionals are important determinants of nursing effectiveness, as collaborative practice improves coordination of care and patient outcomes. Access to evidence-based guidelines and clinical protocols ensures standardized care and reduces variability in practice, which is essential for managing high-risk pregnancies. Technological advancements such as electronic health records and telehealth services support nurses in monitoring patients efficiently and maintaining accurate documentation.

However, challenges such as inadequate training, limited career advancement opportunities, and poor working conditions may negatively affect nurse motivation and performance, particularly in low-resource settings. Emotional and psychological stress associated with managing high-risk pregnancies can also impact nursing effectiveness and highlight the need for mental health support for healthcare workers. Cultural competence and communication skills are essential for providing patient-centered care and ensuring that patients understand and adhere to treatment plans. Supportive supervision and mentorship programs can enhance skill development and confidence among newly trained nurses. Policy-level interventions, including investment in healthcare infrastructure, workforce development, and training programs, are necessary to strengthen nursing capacity and improve healthcare delivery. Therefore, a comprehensive approach that addresses education, workload, resources, and institutional support is essential for optimizing the effectiveness of obstetric nurses and improving maternal and neonatal outcomes. Table 3 shows the factors influencing nursing practice, which is presented in this paragraph to summarize key determinants such as education, experience, workload, and resources, along with their impact on nursing performance and quality of care in high-risk pregnancy management [38].

IMPACT OF NURSE-LED INTERVENTIONS ON OUTCOMES

Nurse-led interventions significantly improve maternal and fetal outcomes by reducing complications, enhancing patient satisfaction, and improving adherence to treatment. Evidence shows that continuous supportive care during pregnancy strengthens maternal engagement with antenatal services and improves early identification of risk factors, leading to safer pregnancy trajectories and improved neonatal health outcomes. Structured antenatal nursing care, which includes health education, routine monitoring, and individualized counseling, has been associated with improved maternal knowledge, better self-care practices, and reduced incidence of preventable complications, such as anemia and hypertensive disorders, during pregnancy, thereby contributing to healthier fetal growth and development. Nurse-led health education programs focusing on nutrition, danger sign awareness, and birth preparedness have demonstrated measurable improvements in maternal health behaviors, resulting in higher rates of institutional delivery and improved perinatal outcomes, including reduced low birth weight and improved APGAR scores.

Evidence from community-based maternal health nursing models indicates that regular home visits and continuity-of-care provided by nurses enhance the early detection of pregnancy-related complications and improve timely referrals, thereby reducing maternal morbidity and fetal risk exposure. In addition, nurse-led interventions that integrate psychosocial support have been shown to reduce maternal anxiety and stress during pregnancy, which are strongly associated with improved fetal neurodevelopment and reduced risk of preterm birth. Continuous nursing support during labor has also been widely studied, with findings indicating that women receiving one-to-one nurse support experience lower rates of cesarean sections, reduced labor duration, and improved satisfaction with the birth experience compared to standard care models. Further research has highlighted that intrapartum nurse-led care improves maternal coping mechanisms through non-pharmacological pain management techniques, resulting in a reduced need for medical interventions and improved physiological birth outcomes. Nurse-led antenatal surveillance programs using structured risk assessment tools have been shown to significantly improve the early detection of gestational diabetes and preeclampsia, enabling timely management that reduces adverse fetal outcomes, such as macrosomia and intrauterine growth restriction. Postnatal nurse-led follow-up care also plays a critical role in improving maternal recovery and neonatal health by promoting breastfeeding, monitoring postpartum complications, and providing emotional support, which collectively enhance long-term maternal and infant well-being. Additionally, digital health and tele-nursing interventions introduced in maternal care have demonstrated improved access to skilled guidance, particularly in rural populations, resulting in higher adherence to antenatal visits and improved maternal and fetal outcomes through continuous remote monitoring. Recent systematic reviews have further confirmed that nurse-led continuity-of-care models across the antenatal, intrapartum, and postnatal phases significantly reduce maternal mortality risk, decrease preterm birth

rates, and improve overall perinatal survival by ensuring coordinated and patient-centered care delivery. Figure 8 illustrates the impact of nurse-led interventions on maternal and fetal outcomes, showing a consistent pattern in which integrated nursing care across all stages of pregnancy contributes to reduced obstetric complications, improved psychological well-being, higher maternal satisfaction, and enhanced neonatal survival rates, thereby reinforcing the central role of nursing in modern maternal healthcare systems.

Table 3. Factors influencing obstetric nursing practice.

Factor category	Specific factors	Impact on nursing practice
Educational factors	Level of nursing education, evidence-based training, and simulation exposure	Improves clinical competence, decision-making, and patient safety
Clinical experience	Years of experience, exposure to high-risk cases	Enhances confidence, accuracy in assessment, and emergency response
Institutional support	Staffing levels, availability of resources, and leadership support	Influences the quality-of-care delivery and workload management
Work environment	Workload, shift patterns, workplace safety, team collaboration	Affects job satisfaction, performance, and risk of burnout
Continuing professional development	Workshops, in-service training, certifications	Ensures updated knowledge and improved clinical skills
Communication skills	Patient interaction, teamwork, and interdisciplinary coordination	Improves patient education, care coordination, and outcomes
Policy and guidelines	Adherence to clinical protocols, hospital policies	Ensures standardized and evidence-based care delivery
Technological support	Electronic health records, monitoring equipment, and telehealth systems	Enhance efficiency, accuracy, and continuity-of-care
Psychological factors	Stress levels, motivation, resilience	Influences performance, attention to detail, and patient interaction
Socio-cultural factors	Patient beliefs, cultural sensitivity, and language barriers	Affects communication, compliance, and care acceptance

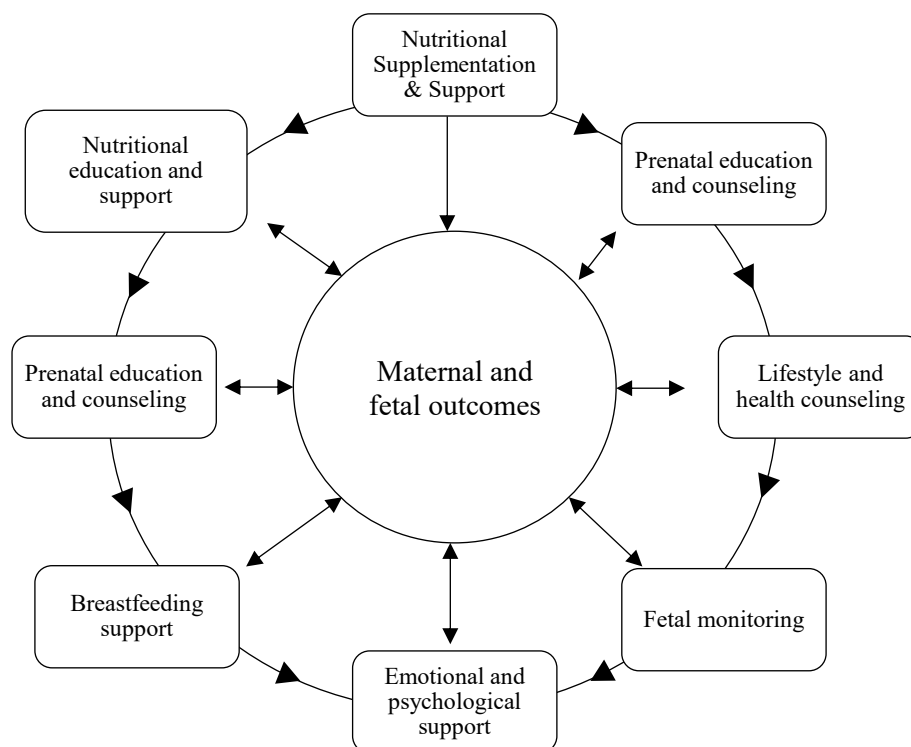


Figure 8. Impact of nurse-led interventions on maternal and fetal outcomes.

IMPLICATIONS FOR NURSING EDUCATION AND PRACTICE

Strengthening nursing education through evidence-based curricula and simulation-based training is essential for improving care quality, as it develops clinical competence, critical thinking, and decision-making skills among nursing students, ensuring a smoother transition from theoretical learning to real clinical practice. Simulation-based education has been shown to significantly enhance psychomotor skills and clinical judgment, enabling nursing students to practice procedures safely and repeatedly in controlled environments, which ultimately improves patient safety and care quality. Evidence-based nursing curricula that integrate current research findings into teaching content help students develop a strong foundation in best practices, leading to improved clinical outcomes and reduced variability in care delivery. Continuous professional development opportunities provided by healthcare institutions ensure that nurses remain updated with evolving clinical guidelines and emerging healthcare technologies, which improve their adaptability and performance in complex care settings. Supportive learning environments within hospitals and academic institutions play a crucial role in reducing stress and burnout among nurses, thereby enhancing job satisfaction and retention, which directly contributes to higher-quality patient care. Simulation-based training also improves teamwork and interprofessional communication skills, which are essential for safe and coordinated patient care in high-pressure clinical settings. Advanced training programs that incorporate scenario-based learning strengthen nurses' ability to respond effectively to emergencies and critical situations, thereby improving patient survival and recovery rates. The integration of technology-enhanced learning methods, such as virtual simulations and digital case studies, further supports individualized learning and improves clinical preparedness among nursing students. Healthcare institutions that prioritize structured mentorship programs and continuous skill development contribute to improved clinical confidence and reduced medical errors among nursing staff. Furthermore, competency-based education models ensure that nurses achieve measurable skill proficiency before entering clinical practice, enhancing patient safety and care effectiveness [39, 40].

CONCLUSION

High-risk pregnancy requires comprehensive and coordinated care to prevent adverse maternal and fetal outcomes. These pregnancies are associated with increased chances of complications such as preeclampsia, gestational diabetes, preterm labor, intrauterine growth restriction, and postpartum hemorrhage, which require timely identification and effective management. Obstetric nurses play a central role in ensuring safe pregnancy outcomes through early screening, continuous monitoring, and prompt recognition of warning signs. Their responsibilities include regular assessment of maternal vital signs, fetal heart rate monitoring, nutritional counseling, medication adherence support, and emotional reassurance to reduce anxiety during pregnancy. In addition, obstetric nurses contribute significantly to patient education by informing expectant mothers about danger signs, birth preparedness, and the importance of regular antenatal check-ups, which enhances self-care practices and improves health-seeking behavior. Continuous nursing care also ensures effective communication between patients and multidisciplinary healthcare teams, allowing for timely interventions when complications arise. Strengthening nursing education is essential to improving the quality of care provided in high-risk pregnancies. Evidence-based training, simulation-based learning, and skill development programs enhance clinical decision-making and preparedness among nurses. Furthermore, institutional support in the form of adequate staffing, access to updated clinical guidelines, and ongoing professional development opportunities help improve nursing performance and reduce clinical errors. Supportive healthcare environments also contribute to increased job satisfaction and retention of skilled nurses, which ultimately strengthens continuity-of-care. When nursing education and institutional systems work together effectively, they significantly improve maternal and fetal outcomes, reduce complication rates, and contribute to lowering maternal and neonatal mortality.

REFERENCES

1. American Academy of Pediatrics. Neonatal Care: A Compendium of AAP Clinical Practice Guidelines and Policies. 2nd ed. Itasca (IL): American Academy of Pediatrics; 2023.
2. American College of Obstetricians and Gynecologists. Gestational hypertension and preeclampsia:

-
- ACOG Practice Bulletin No. 222. *Obstet Gynecol.* 2020;135:e237–e260. doi:10.1097/AOG.0000000000003891. PMID: 32443079.
3. American Diabetes Association. Classification and diagnosis of diabetes: Standards of Medical Care in Diabetes—2021. *Diabetes Care.* 2021;44(Suppl 1):S15–S33. doi:10.2337/dc21-S002. Erratum in: *Diabetes Care.* 2021;44(9):2182. doi:10.2337/dc21-ad09. PMID: 34135016.
 4. Tikkanen M. Placental abruption: Epidemiology, risk factors and consequences. *Acta Obstet Gynecol Scand.* 2011;90(2):140–149. doi:10.1111/j.1600-0412.2010.01030.x. PMID: 21241259.
 5. Ayres-de-Campos D. Electronic fetal monitoring or cardiotocography, 50 years later: What's in a name? *Am J Obstet Gynecol.* 2018;218(6):545–546. doi:10.1016/j.ajog.2018.03.011. PMID: 29793572.
 6. Baschat AA. Fetal responses to placental insufficiency: An update. *BJOG.* 2004;111(10):1031–1041. doi:10.1111/j.1471-0528.2004.00273.x. PMID: 15383103.
 7. Bohren MA, Vogel JP, Hunter EC, Lutsiv O, Makh SK, Souza JP, Aguiar C, Saraiva Coneglian F, Diniz ALA, Tunçalp Ö, et al. The mistreatment of women during childbirth in health facilities globally: A mixed-methods systematic review. *PLoS Med.* 2015;12(6):e1001847. doi:10.1371/journal.pmed.1001847. PMID: 26126110. PMCID: PMC4488322.
 8. Brown MA, Magee LA, Kenny LC, Karumanchi SA, McCarthy FP, Saito S, Hall DR, Warren CE, Adoyi G, Ishaku S, et al. Hypertensive disorders of pregnancy: ISSHP classification, diagnosis, and management recommendations for international practice. *Hypertension.* 2018;72(1):24–43. doi:10.1161/HYPERTENSIONAHA.117.10803. PMID: 29899139.
 9. Cao C, Saxena R, Gray KJ. Placental origins of preeclampsia: Insights from multi-omic studies. *Int J Mol Sci.* 2024;25(17):9343. doi:10.3390/ijms25179343. PMID: 39273292. PMCID: PMC11395466.
 10. Campbell OMR, Graham WJ; Lancet Maternal Survival Series Steering Group. Strategies for reducing maternal mortality: Getting on with what works. *Lancet.* 2006;368(9543):1284–1299. doi:10.1016/S0140-6736(06)69381-1. PMID: 17027735.
 11. Catalano PM. Obesity, insulin resistance, and pregnancy outcome. *Reproduction.* 2010;140(3):365–371. doi:10.1530/REP-10-0088. PMID: 20457594. PMCID: PMC4179873.
 12. Salimbayeva D, Urazbayeva G, Kurmanova A, Smailov M, Nurmakova A. RNA biomarkers in hypertensive disorders of pregnancy: Systematic review. *J Perinat Med.* 2025;54(3):467–480. doi:10.1515/jpm-2025-0143. PMID: 41100582.
 13. Cleland J, Bernstein S, Ezeh A, Faundes A, Glasier A, Innis J. Family planning: The unfinished agenda. *Lancet.* 2006;368(9549):1810–1827. doi:10.1016/S0140-6736(06)69480-4. PMID: 17113431.
 14. Davenport MH, Marchand AA, Mottola MF, Poitras VJ, Gray CE, Jaramillo Garcia A, Barrowman N, Sobierajski F, James M, Meah VL, et al. Exercise for the prevention and treatment of low back, pelvic girdle and lumbopelvic pain during pregnancy: A systematic review and meta-analysis. *Br J Sports Med.* 2019;53:90–98. doi:10.1136/bjsports-2018-099400. PMID: 30337344.
 15. Brown HL, DeNicola N. Telehealth in maternity care. *Obstet Gynecol Clin North Am.* 2020;47(3):497–502. doi:10.1016/j.ogc.2020.05.003. PMID: 32762934.
 16. Escañuela Sánchez T, Linehan L, O'Donoghue K, Byrne M, Meaney S. Facilitators and barriers to seeking and engaging with antenatal care in high-income countries: A meta-synthesis of qualitative research. *Health Soc Care Community.* 2022;30(6):e3810–e3828. doi:10.1111/hsc.14072. PMID: 36240064. PMCID: PMC10092326.
 17. Screening for pregnancy complications. *BMJ.* 2002;325(7356):0. PMCID: PMC1123649.
 18. Vallely LH, Shalit A, Nguyen R, Althabe F, Pingray V, Bonet M, Armari E, Bohren M, Homer C, Vogel JP. Intrapartum care measures and indicators for monitoring the implementation of WHO recommendations for a positive childbirth experience: A scoping review. *BMJ Open.* 2023;13(11):e069081. doi:10.1136/bmjopen-2022-069081. PMID: 37993161. PMCID: PMC10668293.
 19. Kamphof HD, Posthuma S, Gordijn SJ, Ganzevoort W. Fetal growth restriction: Mechanisms, epidemiology, and management. *Maternal-Fetal Med.* 2022;4(3):186–196. doi:10.1097/FM9.
-

0000000000000161. PMID: 40406022. PMCID: PMC12094350.
20. Dassie GA, Lemi H, Getachew T, Ayana S. Maternal diet quality during pregnancy and birth outcomes in low- and middle-income countries: A scoping review. *BMC Nutr.* 2026;12(1):25. doi:10.1186/s40795-025-01229-5. PMID: 41514381. PMCID: PMC12882475.
21. National Guideline Alliance (UK). Fetal movement monitoring: Antenatal care: Evidence review P. London: National Institute for Health and Care Excellence (NICE); 2021 Aug. (NICE Guideline, No. 201.) Available from: <https://www.ncbi.nlm.nih.gov/books/NBK573940/>
22. Bohren MA, Hofmeyr GJ, Sakala C, Fukuzawa RK, Cuthbert A. Continuous support for women during childbirth. *Cochrane Database Syst Rev.* 2017;7:CD003766. doi:10.1002/14651858.CD003766.pub6. PMID: 28681500. PMCID: PMC6483123.
23. Keighley CL, Skrzypek HJ, Wilson A, Bonning MA, Gilbert GL. Infections in pregnancy. *Med J Aust.* 2019;211(3):134–141. doi:10.5694/mja2.50261. PMID: 31271467.
24. Kruk ME, Gage AD, Arsenault C, Jordan K, Leslie HH, Roder-DeWan S, Adeyi O, Barker P, Daelmans B, Doubova SV, et al. High-quality health systems in the Sustainable Development Goals era: Time for a revolution. *Lancet Glob Health.* 2018;6:e1196–e1252. doi:10.1016/S2214-109X(18)30386-3. PMID: 30196093. PMCID: PMC7734391.
25. Xu J, Lin X, Fang Y, Cui J, Li Z, Yu F, Tian L, Guo H, Lu X, Ding J, et al. Lifestyle interventions to prevent adverse pregnancy outcomes in women at high risk for gestational diabetes mellitus: A randomized controlled trial. *Front Immunol.* 2023;14:1191184. doi:10.3389/fimmu.2023.1191184. PMID: 37675099. PMCID: PMC10477780.
26. Lavender T, Hart A, Smyth RMD. Effect of partogram use on outcomes for women in spontaneous labour at term. *Cochrane Database Syst Rev.* 2013;(7):CD005461. doi:10.1002/14651858.CD005461.pub4. Update in: Lavender T, Cuthbert A, Smyth RM. *Cochrane Database Syst Rev.* 2018;(8):CD005461. doi:10.1002/14651858.CD005461.pub5. PMID: 30080256.
27. Chew LC, Osuchukwu OO, Reed DJ, et al. Fetal growth restriction. In: *StatPearls*. Treasure Island (FL): StatPearls Publishing; updated 2024. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK562268/>
28. Magee LA, Pels A, Helewa M, Rey E, von Dadelszen P; Canadian Hypertensive Disorders of Pregnancy (HDP) Working Group. The hypertensive disorders of pregnancy. *Best Pract Res Clin Obstet Gynaecol.* 2015;29(5):643–657. doi:10.1016/j.bpobgyn.2015.04.001. PMID: 26141795.
29. Yu CK, Teoh TG, Robinson S. Obesity in pregnancy. *BJOG.* 2006;113(10):1117–1125. doi:10.1111/j.1471-0528.2006.00991.x. PMID: 16903839.
30. Murray SR, Reynolds RM. Short- and long-term outcomes of gestational diabetes and its treatment on fetal development. *Prenat Diagn.* 2020;40(9):1085–1091. doi:10.1002/pd.5768. PMID: 32946125.
31. Menon R, Behnia F, Polettini J, Richardson LS. Novel pathways of inflammation in human fetal membranes associated with preterm birth and preterm pre-labor rupture of the membranes. *Semin Immunopathol.* 2020;42(4):431–450. doi:10.1007/s00281-020-00808-x. PMID: 32785751. PMCID: PMC9296260.
32. James AH. Iron deficiency anemia in pregnancy. *Obstet Gynecol.* 2021;138(4):663–674. doi:10.1097/AOG.0000000000004559. PMID: 34623079.
33. Moller AB, Patten JH, Hanson C, Morgan A, Say L, Diaz T, Moran AC. Monitoring maternal and newborn health outcomes globally: A brief history of key events and initiatives. *Trop Med Int Health.* 2019;24(12):1342–1368. doi:10.1111/tmi.13313. PMID: 31622524. PMCID: PMC6916345.
34. da Silva Lopes K, Ota E, Shakya P, Dagvadorj A, Balogun OO, Peña-Rosas JP, De-Regil LM, Mori R. Effects of nutrition interventions during pregnancy on low birth weight: An overview of systematic reviews. *BMJ Glob Health.* 2017;2(3):e000389. doi:10.1136/bmjgh-2017-000389. PMID: 29018583. PMCID: PMC5623264.
35. Johns EC, Denison FC, Norman JE, Reynolds RM. Gestational diabetes mellitus: Mechanisms, treatment, and complications. *Trends Endocrinol Metab.* 2018;29(11):743–754. doi:10.1016/j.tem.

-
- 2018.09.004. PMID: 30297319.
36. Burton GJ, Redman CW, Roberts JM, Moffett A. Pre-eclampsia: Pathophysiology and clinical implications. *BMJ*. 2019;366:l2381. doi:10.1136/bmj.l2381. PMID: 31307997.
 37. Regitz-Zagrosek V, Roos-Hesselink JW, Bauersachs J, Blomstrom-Lundqvist C, Cifkova R, De Bonis M, Iung B, Johnson MR, Kintscher U, Kranke P, et al. 2018 ESC Guidelines for the management of cardiovascular diseases during pregnancy. *Kardiol Pol*. 2019;77(3):245–326. doi:10.5603/KP.2019.0049. PMID: 30912108.
 38. Renfrew MJ, McFadden A, Bastos MH, Campbell J, Channon AA, Cheung NF, Silva DRA, Downe S, Kennedy HP, Malata A, et al. Midwifery and quality care: Findings from a new evidence-informed framework for maternal and newborn care. *Lancet*. 2014;384:1129–1145. doi:10.1016/S0140-6736(14)60789-3. Erratum in: *Lancet*. 2014;384(9948):1129–1145. doi:10.1016/S0140-6736(14)60789-3. PMID: 24965816.
 39. Rollins NC, Bhandari N, Hajeerhoy N, Horton S, Lutter CK, Martines JC, Piwoz EG, Richter LM, Victora CG; Lancet Breastfeeding Series Group. Why invest, and what it will take to improve breastfeeding practices? *Lancet*. 2016;387(10017):491–504. doi:10.1016/S0140-6736(15)01044-2. PMID: 26869576.
 40. Hudić I, Stray-Pedersen B, Tomić V. Preterm birth: Pathophysiology, prevention, diagnosis, and treatment. *Biomed Res Int*. 2015;2015:417965. doi:10.1155/2015/417965. PMID: 26413520. PMCID: PMC4568055.