Review regarding the Effect of Educational Programs on Maternity Nurses' Knowledge Concerning High-Risk Pregnancy and Maternal Near-Miss Cases

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Abstract

A woman who is pregnant encounters various dangers throughout her pregnancy, labor, and delivery. Any unforeseen or unpredicted medical or obstetric issue associated with pregnancy that presents an actual or possible risk to the health or welfare of the mother or baby is considered a high-risk pregnancy. Approximately 20 million women worldwide experience high-risk pregnancies, with over 800 deaths occurring each day due to perinatal issues. In developing nations, maternal morbidity and mortality rates are still remarkably high, as many women suffer from both severe and ongoing obstetric complications. Women who survive serious acute maternal health issues, or near misses, share several similarities with circumstances that lead to maternal fatalities, especially concerning risk factors. Inadequate care can greatly contribute to rising rates of maternal morbidity and mortality. Moreover, the frequency of these incidents within a community often mirrors the quality of maternity care available to expectant mothers. The maternity nurse plays an essential role in improving maternal outcomes by identifying, anticipating, and reporting early warning signs of a mother's potential decline. In developing countries, roughly 75% of women with obstetric complications reach tertiary care in critical condition. Consequently, enhancing nurses' knowledge and practices is vital for providing effective care for high-risk pregnancies and maternal near-miss situations. ***This review article examines the dedication and commitment of nurses to deepen their understanding and practices related to high-risk pregnancies and maternal near-miss cases, with the ultimate goal of raising the standard of care for pregnant women.***

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Keyword: maternity nurses, high-risk pregnancies, maternal near-miss cases, maternal morbidity, maternal mortality

Introduction

A high-risk pregnancy (HRP) means a pregnancy with a high probability of adverse pregnancy outcomes for the pregnant woman and fetus and is applicable when there are risk factors for high-risk pregnancy that can affect the outcome- maternal or perinatal or both. Factors that contribute to high-risk pregnancies include the older age of the expectant mother, pre-existing medical or surgical conditions, internal or surgical issues that arise during pregnancy, obstetric complications, and health problems that develop during pregnancy **(Ahn & Na, 2023)**. Identifying high-risk pregnancies at an early stage is essential for implementing appropriate interventions and achieving a favorable outcome. **(Sharma et al., 2023)**.

Severe maternal morbidity (SMM) refers to "potentially life-threatening conditions during pregnancy, childbirth or after pregnancy, from which maternal near miss (MNM) cases would emerge **(Nik Hazlina et al., 2022)**. The most fatal outcome for a pregnant woman is maternal death. It is frequently described as just the "tip of the iceberg" while maternal morbidity is the "base," and for every woman who dies, many more will survive but often suffer from lifelong disabilities **(Tolesa et al., 2021)**. Maternal near miss (MNM) is defined according to WHO as "a woman who nearly died but survived due to complication that occurred during pregnancy, childbirth or within 42 days postpartum or post termination of pregnancy" **(Bagambe et al., 2023).** Maternal near miss (MNM) serves as an effective method to assess the quality of care given to pregnant women and to identify the number of women in need of obstetric services throughout pregnancy, delivery, and the postpartum period **(Beyene et al., 2022)**.

Based on information from the World Health Organization (WHO), around 830 women around the world lose their lives daily due to issues related to pregnancy or childbirth. Furthermore, it is estimated that between 20% to 30% of pregnancies are identified as high-risk, contributing to 70% to 80% of perinatal mortality and morbidity **(Tiwari, 2021).**

Maternal near misses are prevalent in Egypt, as indicated by a study conducted among 28,877 deliveries over two years, which recorded 171 MNMs and 14 fatalities. Thus, the incidence ratio of MNM stands at 5.9 per 1,000 live births. **(El-Agwany, 2019)**.

Maternity nurses serve a crucial function as primary healthcare providers. To reduce the mortality and morbidity rates among mothers and newborns, they need to be prepared for obstetrical emergencies. Ongoing training sessions for staff nurses can help enhance the quality of care they are expected to provide **(Verma et al., 2022)** .

Maternity nurses who focus on the care of high-risk pregnancies and maternal near-miss cases need to gain knowledge and experience regarding these situations to develop effective practices and improve patient outcomes. The most effective method for decreasing high-risk pregnancies and maternal mortality in Egypt is to enhance nurses' knowledge and practices toward early diagnosis and appropriate management of these cases **(Farahat et al., 2020; Taksande, 2021)**

Maternal death has significant impacts on healthcare systems, communities, and families. To successfully reduce maternal mortality rates, it is crucial to determine the root causes of maternal deaths and improve clinical care. If high-risk pregnancies are not managed properly, they can result in maternal near misses (MNM), which may occur before maternal death. this review aims to extensively discuss the vital role of maternity nurses and the importance of increasing awareness concerning HRP and MNM cases, which are key strategies for reducing maternal mortality rates. In this review, we will first explain the essential information regarding HRP and MNM cases. Next, we will highlight the role of maternity nurses. Finally, we will discuss how educational programs can enhance nurses' knowledge. Our goal is to provide valuable guidance for both researchers and maternity nurses.

(I) High-Risk Pregnancy

A- Background

A high-risk pregnancy means a high probability of adverse pregnancy outcomes for the pregnant woman and fetus **(Ahn & Na, 2023)**. High-risk pregnancies can occur for numerous reasons, including pre-existing conditions like diabetes or hypertension, complications from earlier pregnancies, or problems that emerge during pregnancy or childbirth.

According to the guidelines set by the Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA), antenatal women are deemed high-risk if they exhibit any of the following conditions: a. Severe anemia b. Pregnancy-related hypertensive disorders (characterized by blood pressure above 140/90 mmHg) c. A previous history of lower segment cesarean deliveries d. Adverse obstetric background (including obstructed labor) e. Low-lying placenta or placenta previa **(Pallangyo & Seif, 2023)**

The global occurrence of high-risk pregnancies suggests that 2-8% of pregnancies are impacted by pre-eclampsia or eclampsia, while 5-25.5% are affected by gestational diabetes mellitus. Moreover, more than 40% of pregnant individuals experience anemia, and around 4.5% of pregnancies in certain low-income countries, as well as between 0.5% to 1% (approximately one in 100 to 200) in wealthier nations, are influenced by antepartum hemorrhage (APH).**(Burn et al., 2023; Choudhury & Rajeswari, 2021; Onebunne & Aimakhu, 2019; Pallangyo & Seif, 2023)**

In Egypt, eclampsia occurs in 0.3% of pregnancies, while preeclampsia is seen in 27.7% of expectant mothers. Additionally, an alarming 91.25% of pregnant women in Egypt suffer from anemia. The country also has a notably higher rate of diabetes than many other countries, positioning it among the top 10 globally for the number of individuals with diabetes, according to the International Diabetes Federation (IDF). Furthermore, the rate of gestational diabetes mellitus (GDM) among pregnant women in Egypt stands at 14.2% **(Obeagu et al., 2023; Saad et al., 2023)**.

B- Pre-eclampsia& Eclampsia

Preeclampsia is characterized by the onset of hypertension during pregnancy, specifically defined as a systolic blood pressure of 140 mmHg or higher and/or a diastolic blood pressure of 90 mmHg or higher, occurring after 20 weeks of gestation **(Dimitriadis et al., 2023)**. Eclampsia refers to the occurrence of generalized tonic-clonic seizures or coma (eclampsia sine eclampsia) in a pregnant woman with preeclampsia, which is a serious complication of the disease **(Xavier et al., 2023)**. the tonic-clonic seizure-not related to diseases such as epilepsy, cerebral artery ischemia and infarction, and intracranial hemorrhage **(Dartey et al., 2022)**

High-risk factors for preeclampsia/eclampsia (PE/E) include women with chronic hypertension, a history of hypertensive disorders or PE in previous pregnancies, diabetes (both type 1 and type 2), chronic kidney disease, or autoimmune disorders such as antiphospholipid antibody syndrome or systemic lupus erythematosus. Additionally, moderate risk factors for PE/E encompass women with a family history of PE/E, polycystic ovarian syndrome, multiple pregnancies, advanced maternal age (under 20 or over 40), a body mass index (BMI) of 35 kg/m² or higher, primiparity, or pregnancy intervals exceeding 10 years.**(Giannakou, 2021)**

Pre-eclampsia and eclampsia are believed to contribute to approximately one-third of all instances of severe maternal morbidity and mortality, with about 5% of affected women needing intensive care admission. A study carried out in Egypt found that preeclampsia and eclampsia together represent 14.9% of the causes of maternal mortality. This underscores the considerable effect of these hypertensive disorders on maternal health in the area. **(Beketie et al., 2022)**

The most prevalent maternal complications related to preeclampsia and eclampsia include venous thromboembolism and repeated pregnancy loss. Furthermore, significant problems can occur, such as hemolysis, disseminated intravascular coagulation (DIC), placental abruption, cardiovascular issues, cerebrovascular conditions, and complications involving the liver and kidneys. Additionally, there is a risk of HELLP syndrome developing in mothers. Neonatal and fetal complications associated with eclampsia may include oligohydramnios, premature delivery, low birth weight, severe asphyxia, and stillbirth **(Musa et al., 2021)**.

C- Gestational diabetes mellitus (GDM)

Gestational diabetes mellitus (GDM) defined by the World Health Organization (WHO) as carbohydrate intolerance resulting in hyperglycemia of variable severity with onset or first recognition during pregnancy, is the most common metabolic disorder of pregnancy **(Eltoony et al., 2021)**. In 2013, the WHO approved a consensus proposal for global screening and consistent international diagnostic standards for gestational diabetes mellitus (GDM). Using a 75 g oral glucose tolerance test (OGTT), the guideline includes thresholds of fasting plasma glucose (FPG)≥5.1, 1 h≥10.0, and/or 2 h≥8.5 mmol/L**(Scheuer et al., 2023).**

Risk factors for gestational diabetes (GD) include increasing maternal age and polycystic ovary syndrome (PCOS). Additional predisposing factors for the development of GD encompass maternal overweight and obesity, belonging to ethnic groups with a high incidence of diabetes (such as Caribbean black, Asian, or Middle Eastern communities), having a history of prediabetes, a family history of diabetes, and previous occurrences of GD **(Barbach et al., 2023).**

Worldwide, the occurrence of gestational diabetes mellitus (GDM) is increasing. The rate of GDM ranges from 4% to 15% across various populations.**(Tehrani et al., 2022).** Gestational diabetes mellitus (GDM) is associated with a significantly increased risk of both fetal and maternal morbidity and mortality. The incidence of pre-eclampsia (12.7%), cesarean sections (44.3%), and maternal mortality (0.6%) among women with diabetes is notably higher than that of the general population. Additionally, women with GDM face an elevated risk of developing Type 2 Diabetes Mellitus (T2DM) later in life.**(Gul et al., 2023; Sabry et al.)**.

Maternal complications from gestational diabetes mellitus (GDM) might include spontaneous abortion, stillbirth, premature labor, polyhydramnios, preeclampsia, and cesarean delivery. Acute consequences of GDM include hypoglycemia and hyperglycemia. Neonatal and fetal complications associated with GDM include congenital abnormalities, neonatal hyperbilirubinemia, neonatal morbidity, shoulder dystocia, macrosomia infant, hypoglycemia, and respiratory issues **(Akalpler & Bagriacik, 2023)**.

D- Anemia during pregnancy

Anemia during pregnancy is defined by (WHO) as hemoglobin less than 11 gm/dl in 1st and 3rd trimesters and less than 10.5 gm/dl in 2nd trimester **(R. & Madenor, 2023).** Anemia during pregnancy, often associated with micronutrient deficiencies, can arise due to insufficient levels of iron, folic acid, and vitamin B12 during pregnancy **(John et al., 2023)**

The risk of anemia during pregnancy is significantly influenced by various factors, including place of residence, educational background, interpregnancy interval (IPI), lack of antenatal care (ANC), absence of iron and folic acid supplementation, and the prevalence of malaria **(Elmugabil & Adam, 2023)**. Furthermore, several elements contribute to the high rates of anemia in pregnant women in underdeveloped countries. A key issue is the absence of essential micronutrients in the diet, such as iron, folate, and vitamins A and B12. Additionally, the prevalence of chronic illnesses such as HIV and tuberculosis, along with parasitic diseases like hookworm **(Vikhe et al., 2023).**

Anemia during pregnancy continues to be a major cause of morbidity and mortality, even though most cases observed during pregnancy are generally preventable and manageable if detected early**(Albadri et al.)**.Research indicates that anemia in pregnancy is associated with 23% of maternal mortality in developing countries **(Li et al., 2022).**

Anemia during the antenatal period can lead to inadequate weight gain, pregnancy-induced hypertension (PIH), placenta previa, eclampsia, placental abruption, and premature rupture of membranes. During the intranatal period, complications such as preterm labor, intranatal bleeding, shock, and anesthesia-related heart failure can arise, posing significant risks to the mother.**(Archana, 2021)**

E- Ante Partum Hemorrhage (APH)

Ante Partum Hemorrhage (APH) refers to bleeding from or into the genital tract that occurs after 28 weeks of gestation or following the period of viability but before the delivery of the baby. APH can be categorized into three main causes: (1) Placenta Previa: This occurs when the placenta is partially or completely implanted in the lower segment of the uterus. (2)Placental Disruption: This type of bleeding results from the placenta detaching early from its normal position.(3) Other causes include vasa previa, genital malignancy, cervicitis, trauma, marginal sinus rupture, and localized lesions of the cervix and vagina.**(Singh et al., 2021)**.

Risk factors for antepartum hemorrhage (APH) include: Previous uterine scars (e.g., myomectomy, manual placenta removal), History of placenta previa or abruptio placentae, Preterm premature rupture of membranes, Past miscarriages (induced and spontaneous) , Presence of uterine fibroids, Multiparity, Endometritis, Age (under 20 or over 35), Enlarged placenta (e.g., multiple gestations), Diabetes mellitus, Severe anemia, Smoking, Intrauterine infections, Abdominal trauma, and Polyhydramnios **(Ghosh et al., 2023; Wekere et al., 2022) (Nkwabong et al., 2023; Sulaiman & Azeez, 2023)**

Abruptio placenta and placenta previa are significant causes of maternal and neonatal morbidity and mortality. They are difficult to predict and occur in approximately one in every 80 deliveries, contributing to perinatal mortality and morbidity..**(Nethaji et al., 2023)**. APH represents 19% of admissions to the Intensive Care Unit (ICU) and also is the primary cause of maternal mortality worldwide, accounting for around 27% of fatalities. APH causes 16.3% of maternal mortality in high-income nations, while it still accounts for 24.5% of maternal mortality in Sub-Saharan Africa **(Patil & Patil, 2019).**

Antepartum hemorrhage is associated with various complications for both the mother and the fetus. For mothers experiencing antepartum hemorrhage, potential complications include the necessity for blood transfusions, disseminated intravascular coagulation (DIC), acute kidney injury, pulmonary edema, the requirement for obstetric hysterectomy, Sheehan's syndrome, retained placenta, placental accreta, sepsis, shock, abnormal fetal positioning, as well as preterm labor and postpartum hemorrhage. Potential fetal risks include premature delivery, low birth weight, intrauterine demise, birth asphyxia, and congenital defects. **(Nethaji et al., 2023; Sano et al., 2022; Shobharani, 2020)**

(II) Maternal Near-Miss

A- Background

Maternal near-miss (MNM) is defined as according to WHO "a woman who nearly died but survived due to complication that occurred during pregnancy, childbirth or within 42 days postpartum or post termination of pregnancy" **(Bagambe et al., 2023)**

Analyzing near-miss events associated with maternal morbidity and mortality presents numerous advantages. In contrast to maternal deaths, which are relatively infrequent, near-miss incidents occur with greater regularity. This frequency facilitates prompt assessment and reporting of clinical characteristics, which can lead to immediate enhancements in clinical practice. Investigating these near-miss occurrences permits a comprehensive examination of rare conditions during pregnancy.**(D. Lucas & K. Murray, 2020).** Furthermore, this provides valuable insights into the reasons why clinical therapy may not have been successful and offers strategies to prevent or address challenges in managing severe pregnancy complications **(Beyene et al., 2022).**

The risk factors associated with near misses include increased mother age, obesity, and smoking during pregnancy. Maternal near miss events and mortality are also linked to pre-existing medical disorders in the mother, such as diabetes mellitus, asthma, hypertension, cancer, heart disease, renal illness, anemia, diabetes, and hypertension, and in facilitating risk modification **(D. Lucas & K. Murray, 2020)**

The disease-specific criterion to identify MNM which was developed by WHO based on five core diagnostic groups was used in this study: (1) hemorrhage leading to an emergency hysterectomy, shock, coagulation, or need two or more units of blood transfusion; (2) pregnancy-induced hypertension including pre-eclampsia and eclampsia with clinical or laboratory indication necessitating termination of pregnancy to save the life of women; (3) uterine rupture due to prolonged obstructed labor or previous cesarean section; (4) pulmonary embolism (5) anemia with a hemoglobin level of less than 6 g/dL or clear clinical sign of anemia(Mekonnen et al., 2021). The criteria of the World Health Organization (WHO) for the identification of maternal near-miss cases are based on dysfunction or failure of any vital organ and its resulting complications. A block of laboratory, clinical, and management-related markers was developed for the identification of severe cases **(Farahat et al., 2020; D. N. Lucas & K. J. Murray, 2020; Negash et al., 2023).**

B- Rupture Uterus

Uterine rupture (UR)is defined as the complete disruption of all uterine layers during pregnancy, delivery, or immediately after delivery. It is a catastrophic situation in obstetrics, and, although

rare, often results in both maternal and fetal adverse consequences **(Figueiró-Filho et al., 2022).**

Uterine rupture is classified into two main categories: rupture in a scarred uterus (typically due to previous surgeries like cesarean sections) and rupture in an intact uterus, which can occur spontaneously or due to trauma. Trauma-related causes include abdominal injury, certain delivery techniques, and improper use of oxytocics. Spontaneous ruptures may arise from factors like uterine scarring, a malformed uterus, large babies, malposition, malpresentation, and cephalopelvic disproportion **(Abdulmane et al., 2023) (Raval et al., 2020).** Uterine rupture can be incomplete (serosa intact) or complete (full thickness disruption), potentially leading to fetal or placental expulsion into the peritoneal cavity**.(Cinnella et al., 2023; Dimitrova et al., 2022; Figueiró-Filho et al., 2022).**

Risk factors for uterine rupture include (a) Sociodemographic factors: insufficient health education, early marriage, limited healthcare access, and poor prenatal care. (b) Medical factors: congenital uterine anomalies, multiparity, advanced maternal age, teenage pregnancy, improper use of uterotonics, placental abnormalities, and a history of uterine scars. (C) Other contributors: fetal macrosomia, prolonged labor, abnormal fetal presentation, grand multiparity, chronic steroid use, and substance use. (D)Healthcare access: being referred from another facility and the distance to a hospital...**(Gupta et al., 2020) (Odusolu et al.; Sharma, 2020).**

Uterine rupture is a serious public health issue that accounts for 13% of maternal deaths and 74-92% of perinatal deaths in sub-Saharan Africa **(Alemu et al., 2023)**. A study by the World Health Organization (WHO) indicates that uterine rupture occurs significantly more frequently in developing countries compared to developed ones. In sub-Saharan Africa (SSA), uterine rupture remains a leading cause of both maternal and fetal morbidity and mortality **(Desta et al., 2020)**

The impact of uterine rupture on mothers can differ based on the duration between diagnosis and surgical intervention, once uterine ruptures occur, the mother can suffer from severe blood loss and anemia, hypovolemic shock, injury to the bladder, the need for an obstetric hysterectomy, and even maternal death. The fetus could face hypoxic-ischemic encephalopathy, impaired motor development, and death. Although uterine rupture is rare, it seems to present a considerable risk of morbidity and mortality for both the mother and the fetus **(Baradaran, 2021).**

C- Pulmonary Embolism

Thromboembolic disease encompasses a wide range of conditions, including deep vein thrombosis (DVT) and pulmonary embolism (PE). Pulmonary thromboembolism (PTE) refers to the obstruction of one or more pulmonary arteries by a liquid, solid, or gaseous material, primarily caused by a blood thrombus that originates in the deep venous system of the legs or pelvis before migrating to the lungs. Pulmonary thromboembolism remains one of the leading causes of mortality during pregnancy. The annual incidence of PE ranges from 60 to 120 cases per 100,000 individuals, threatening the lives of approximately 60,000 to 100,000 people each year. Additionally, pulmonary embolism accounts for 1.1 fatalities for every 100,000 births, highlighting its significant impact during pregnancy.**(Mehdipoor et al., 2022).**

Physiological factors raise the chances that PE will develop during pregnancy such as (1) Thrombocyte activation, decreased fibrinolytic and protein S activities, (2) Progesterone production during pregnancy has a relaxing impact on venous smooth muscles, (3) Estrogen increasing procoagulant factor levels, (4) Estrogen lowering anticoagulant factors, such as protein S and antithrombin levels, (5) The inferior vena cava and iliac vein are compressed by the uterus during pregnancy, (6) Vascular intimal damage brought on by surgical techniques as vacuuming, forceps, and cesarean sections, (7) Stasis brought on by immobility during pregnancy and the postpartum phase; (8) Genetic factors, such as antithrombin, protein S, and protein C deficits that cause thrombophilia; (9) A mother's age of 35 years or older, and (10) a venous thromboembolism. history before becoming pregnant, (11) BMI $\geq$ 30 kg/m2, obesity, sickle cell disease, systemic lupus erythematosus, heart disease, and (12) Multiparas and delivery by caesarean section **(Dikis & Ulasli, 2022; Konstantinides et al., 2020; Takakura et al., 2021; Zhang et al., 2020) .**

D- Hypovolemic/hemorrhagic shock during pregnancy

Hypovolemia/ hemorrhagic shock involve a fall in circulatory volume resulting from a loss of blood, plasma and/or plasma fluid, which is caused by internal or external hemorrhage. In turn, hypovolemic shock occurs as a result of insufficient oxygen supply and is associated with significant mortality **(Summers, 2020)**.

In obstetrics, the primary causes of hemorrhage include traumatic injuries, surgical complications, abruptio placentae, placenta previa, ruptured uterus, ectopic pregnancy, and postpartum hemorrhage. The presence of placenta previa, particularly in conjunction with a previous Caesarean section, can

significantly heighten the risk of severe bleeding during surgery. Massive obstetric hemorrhage remains one of the leading causes of maternal morbidity and mortality in both industrialized and developing nations.**(Atallah & Goffman, 2020).**

Hemorrhage accounts for at least 27% of maternal deaths worldwide. Patients experiencing hemorrhagic shock are among the most critically ill individuals treated in medical settings; diligent critical care and the transfusion of blood products are essential to prevent death caused by acidosis, coagulopathy, hypothermia, hypocalcemia, and multisystem organ failure. Furthermore, while access to transfusion-safe blood is crucial for managing severe bleeding, such safe blood is often not readily available, especially in low- and middle-income countries (LMICs).**(Faria et al., 2022)**

(III) Nursing role in the management of high-risk pregnancy & Maternal Near-Miss cases

A- Nursing role in the management of HRP

Maternity nursing care for eclampsia and pre-eclampsia involves vigilant monitoring and prompt resolution of any issues. Key actions include: (a) Keeping a close watch on vital signs and fetal heart rate (FHR). (b) Reducing external stimuli to promote relaxation. (c)Measuring and documenting urine output, protein levels, and specific gravity. (d) Assessing for edema in the feet, ankles, legs, arms, hands, and face, as well as checking for signs of pulmonary edema.(e)Weighing the patient daily. (f)Evaluating deep tendon reflexes every four hours. (g)Monitoring for altered consciousness, headaches, vision disturbances, epigastric discomfort, and signs of placental separation. **(Hendiya et al., 2020).**

Maternity nurses play a crucial role in managing gestational diabetes (GDM) by providing education and counseling. They inform pregnant women about the risks of GDM and promote self-care practices, including nutrition, exercise, and blood glucose monitoring. This health education enhances women's understanding and adherence to treatment plans, ultimately reducing complications and improving outcomes for both mother and child. Implementing health education interventions is essential for effective GDM management..**(El-Nagar et al., 2019)**

Maternity nurses are essential in managing antepartum hemorrhage (APH) when a woman is admitted to the hospital. Their responsibilities include: Assessing the bleeding and gathering critical information about the patient's medical history, such as gravidity, parity, estimated due date, general health, and pain , Evaluating fetal status through fetal heart sounds and monitoring maternal vital signs , Conducting an abdominal examination to check fundal height, and Performing necessary laboratory tests, including blood type, Rh factor, coagulation profile, and cross-matching for blood transfusions if needed..**(Emam, 2018).**

Maternity nurses manage anemia in pregnant women when hemoglobin levels fall below 10 mg, indicating a need for prompt care. Key actions include assessing risk factors, alleviating fatigue, ensuring proper nutrition, maintaining tissue perfusion, adhering to treatment plans, and preventing complications..**(A/gadir et al., 2021)**

B- Nursing role in the management of MNM cases

The management of a woman with uterine rupture by a maternity nurse starts with assessing a pregnant patient who presents with abdominal pain. Key steps include: (1) Initiating triage and risk assessment (2) Rapid evaluation of vital signs and symptoms (3) Close monitoring of vital signs and fetal heart rate (4) Opening the green channel for timely interventions based on assessments (5) Tracking the patient's medical history and continuous reassessment of care.These actions aim to reduce adverse outcomes associated with uterine rupture, promoting the health of both mother and fetus.**(Xiao et al., 2021)**

Maternity nursing practices for managing pulmonary embolism (PE) include preventive interventions such as: Initiating active and passive range-of-motion exercises for immobilized patients post-surgery, Encouraging early ambulation, Utilizing pneumatic compression devices and anti-embolism stockings, Avoiding constricting clothing, Conducting thorough assessments of peripheral circulation, Performing leg exercises, Administering prescribed low-dose anticoagulant and anti-platelet medications and Promoting smoking cessation. It's important to assess the patient's response to these interventions and make adjustments as needed, particularly since PE can be a medical emergency that requires focused evaluation. **(Khedr et al., 2019).**

Maternity nurses play a crucial role in managing hemorrhagic shock by stopping bleeding, restoring fluid balance, preventing damage, and ensuring tissue perfusion. It is important to enhance their emergency obstetric care skills due to the rapid onset of hemorrhages, necessitating that all staff members be well-prepared.**(Sharkawy et al., 2020)**. Vital signs, particularly blood pressure, should be assessed by the nurse at baseline. The doctor may order blood pressure checks every five to fifteen minutes. The nurse is also responsible for monitoring the fetus's heart sounds and tracking the mother's labor progress through uterine contractions.**(Gad-Elrab et al., 2020)**.

(IV) Discussion Impact of educational programs on maternity nurses' Knowledge

One of the key interventions to reduce maternal mortality in Egypt is enhancing the knowledge of maternity nurses as primary health care providers concerning high-risk pregnancies (HRP) and maternal near-miss cases (MNM). This review aims to highlight the impact of educational programs on maternity nurses' understanding of HRP and MNM cases.

According to a previous study, conducted by **(El-Khawaga et al., 2022)** in Egypt to evaluate the impact of educational programs on nurses' performance concerning bleeding in late pregnancy. The findings revealed a significant increase in the overall knowledge levels of the participating nurses regarding placenta previa and placental abruption, both immediately following the program and after its implementation, compared to their knowledge before the program.

Another study conducted by **(Said et al., 2021)** in Egypt evaluated the impact of simulation on maternity nurses' knowledge, practice, and self-efficacy in managing eclamptic fits. The findings indicated a significant improvement in total knowledge immediately following the intervention, as well as at the follow-up assessment. Additionally, **(Nagwa & Afefy, 2017)**carried out a study in Egypt to assess the effects of structured educational sessions on nurses' knowledge regarding gestational diabetes. Their results demonstrated a substantial increase in the total knowledge score following the educational intervention.

Also, In a study conducted by **(Devi et al., 2020)** in India, the impact of an educational program on gestational diabetes (GD) among nurses was assessed by evaluating their knowledge before and after the program. The findings indicated that the mean knowledge scores of the nurses improved following the educational intervention, demonstrating a significant enhancement in their understanding of GD compared to their knowledge before the program.

In addition, (**Farahat et al., 2021)** conducted a study in Egypt to evaluate the impact of educational programs on nurses' knowledge regarding maternal near-miss cases. They reported a highly statistically significant difference between the total knowledge scores in the pretest and post-test. Furthermore, **(Kulkarni et al., 2019)** examined the effects of training on the awareness and knowledge of service providers about maternal near-miss events in Maharashtra, India, and found a significant improvement in participants' knowledge of MNM cases.

Additionally, **(Haza'a et al., 2020)** conducted a study in Egypt to assess the effectiveness of an educational program on critical care nurses' performance in managing pulmonary embolism emergencies. They reported statistically significant differences in the mean knowledge scores of nurses before and after the training, as well as three months post-implementation regarding the care of the study group for pulmonary embolism. Moreover **(Hussein & Hassan, 2016)** who perform a study in Egypt to to assess the effectiveness of an educational program on nurse's knowledge concerning the management of shock. Reported that good improvement with highly significant differences in study group between pre and posttests in overall main domains. for the nurses' knowledge.

Also, according to a study conducted by **(Abdelhakm & Said, 2017)**, which aimed to develop a nursing management protocol for maternity nurses in Egypt concerning obstetric emergencies, including uterine rupture, there was a highly statistically significant improvement in the nurses' knowledge about uterine rupture before and after the implementation of the protocol.

On the other hand, some studies suggest that educational programs may not be effective in enhancing nurses' knowledge. For instance, research conducted by **(Babelgaith et al., 2021)** in Yemen aimed to evaluate the impact of continuing education on diabetes among healthcare professionals. The study found no significant change in diabetes knowledge scores from the pre-test to the post-test, indicating that the educational program was ineffective. This may be attributed to variations in the qualifications of the nurses included in the study, such as their educational backgrounds, prior training, years of experience, and sociodemographic characteristics.

Additionally, studies assessing maternity nurses' knowledge levels before the implementation of any educational program have found that many nurses possess adequate knowledge. For example, **(Adeleke et al., 2013)** assessed the knowledge, attitudes, and practices of antenatal caregivers in Oyo State and discovered that two-thirds of the nurses demonstrated good knowledge of gestational diabetes.

Similarly, a study by **(Angelina et al., 2020)**, which focused on "Knowledge on Prevention and Management of Preeclampsia and Eclampsia among Nurses in Primary Health Settings," reported that more than half of the nurses had sufficient knowledge about preeclampsia. Furthermore, **(Ahmed Abdelmoty et al., 2021)**, in a study conducted in Egypt evaluating nurses' performance regarding the care of patients with hypovolemic shock, reported that over half of the nurses in their study exhibited a satisfactory level of knowledge.

The differences observed may be due to the specific characteristics of the study populations. Maternity nurses, for instance, typically have higher

educational levels, receive on-the-job training, and possess over five years of experience.

Conclusion

High-risk pregnancies (HRP) and maternal near-miss cases (MNM) demand specialized healthcare teams to ensure optimal outcomes. Inadequate care can result in increased maternal morbidity and mortality. This paper discusses the effectiveness of educational programs in enhancing maternity nurses' knowledge. A thorough review of information regarding high-risk pregnancies and maternal near-miss cases is included, addressing all aspects of knowledge related to these situations. It is important to emphasize the necessity of developing additional educational programs to improve maternity nurses' understanding of optimal management strategies for high-risk pregnancies and maternal near-miss cases. Furthermore, providing booklets, books, and guidelines in the workplace can help nurses stay updated on the latest knowledge regarding high-risk pregnancies and maternal near-miss cases.

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