



Silent Signals in Early Pregnancy: Rethinking Approaches to Pre-eclampsia Screening

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DESCRIPTION

Pre-eclampsia remains one of the most serious complications associated with pregnancy, affecting both maternal and fetal health across diverse populations. It is characterized by elevated blood pressure and signs of organ involvement, most often appearing after the twentieth week of gestation. Despite advances in maternal care, early identification continues to be a challenge, especially in settings where access to advanced diagnostic tools is limited. Screening practices have therefore gained attention as an essential component of antenatal care, allowing healthcare providers to identify individuals who may benefit from closer monitoring and preventive strategies. The condition develops due to abnormal placental development and impaired blood flow between the uterus and placenta. This leads to systemic changes, including endothelial dysfunction and inflammation, which contribute to hypertension and other complications. Since these biological processes begin early in pregnancy, screening efforts are increasingly focused on the first trimester. Detecting subtle physiological changes before clinical symptoms appear allows for earlier interventions, which may reduce adverse outcomes.

Traditional screening relies heavily on maternal history and clinical measurements. Factors such as a previous history of pre-eclampsia, chronic hypertension, diabetes, obesity and multiple pregnancies are commonly assessed. While these indicators provide useful insights, they are not always sufficient to accurately predict who will develop the condition. As a result, many individuals categorized as low risk may still experience complications, while others may undergo unnecessary monitoring. Recent approaches combine maternal risk factors with biophysical and biochemical

markers to improve predictive accuracy. Blood pressure measurement remains a central element, but it is now often assessed alongside uterine artery Doppler studies, which evaluate blood flow resistance in the uterine vessels. Increased resistance may indicate impaired placental development. Additionally, certain biomarkers found in maternal blood, such as placental growth factor and pregnancy-associated plasma protein A, are being studied for their association with placental function. Lower levels of these markers have been linked to a higher likelihood of developing pre-eclampsia.

Integrating these variables into risk assessment models has shown improved detection rates compared to traditional methods alone. These models generate a probability score, helping clinicians categorize patients into different risk groups. Individuals identified as high risk may benefit from preventive measures such as low-dose aspirin, which has been shown to reduce the incidence of pre-eclampsia when initiated early in pregnancy. Regular follow-up visits, lifestyle guidance and timely referrals also contribute to improved maternal and fetal outcomes. However, the implementation of such comprehensive screening strategies is not without challenges. In many low-resource settings, access to laboratory testing and Doppler ultrasound may be limited. This creates disparities in care, as individuals in these regions may not benefit from early risk identification. Simplified screening methods that rely on easily obtainable clinical data are therefore being explored to ensure broader accessibility. Training healthcare workers and strengthening primary care systems play a significant role in improving screening coverage.

Another important aspect of screening is patient awareness. Many pregnant individuals may not recognize the early signs

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of pre-eclampsia, such as swelling, headaches or visual disturbances, as indicators of a serious condition. Educational initiatives can encourage timely reporting of symptoms and adherence to antenatal visits. Community-based programs have shown potential in increasing awareness and promoting early detection, particularly in underserved populations. Ethical considerations also arise in the context of screening. The identification of high-risk individuals may lead to anxiety and increased medical interventions. It is essential for healthcare providers to communicate risk in a clear and supportive manner, ensuring that patients understand the purpose of screening and the available options for management. Shared decision-making can help balance the benefits and potential concerns associated with early detection.

Technological advancements continue to influence the future of pre-eclampsia screening. Machine learning algorithms and digital health platforms are being developed to analyze large datasets and identify patterns that may not be evident

through conventional analysis. Mobile health applications can assist in remote monitoring of blood pressure and symptom tracking, offering new possibilities for continuous care. These innovations may enhance the ability to detect early changes and respond promptly, even in geographically remote areas. Despite these developments, it is important to recognize that no screening method is perfect. False positives and false negatives remain a concern and ongoing research is needed to refine predictive models. Collaboration between researchers, clinicians and public health experts is essential to develop strategies that are both effective and feasible across different healthcare settings. In conclusion, pre-eclampsia screening represents a critical component of modern obstetric care. By combining clinical assessment with emerging diagnostic tools, healthcare providers can improve early identification and management of this complex condition. Efforts to expand access, enhance patient education and integrate new technologies will contribute to better outcomes for mothers and their babies.