

PREECLAMPSIA

OVERVIEW

Preeclampsia and eclampsia are serious conditions unique to pregnancy and the postpartum period, most often characterized by a rapid rise in blood pressure. If not diagnosed and treated promptly, they can lead to seizure, stroke, organ failure, and death of the mother and/or fetus. Affecting 5-8% of pregnancies, preeclampsia is a leading cause of maternal and fetal death, resulting in approximately 60,000 maternal deaths worldwide each year¹. Fetal deaths are three times more frequent in women with preeclampsia and four times more frequent in women with eclampsia². Gynuity's goal is to increase access to evidence-based screening, prevention, and treatment for preeclampsia and eclampsia, especially in low-resource settings, and in so doing, reduce maternal and infant mortality and improve the quality of care available to all women.

LOCATIONS

The map below highlights the countries where we conduct preeclampsia research.



RESEARCH

Screening for Preeclampsia

The diagnosis of preeclampsia has traditionally relied on the presence of hypertension and proteinuria. Unfortunately, these signs are often non-specific and could be confounded with essential hypertension and chronic kidney disease. Researchers have identified that women with severe forms of preeclampsia excrete high amounts of unfolded or misfolded proteins in their urine. This phenomenon classifies preeclampsia as a protein conformational disorder. (Creutzfeldt–Jakob disease, Alzheimer's disease, and Parkinson's disease are also characterized by such proteins.) Misfolded proteins in preeclampsia urine exhibit congophilia or affinity for Congo Red dye, originally developed for the textile industry in the 1800s. Based on the information that Congo Red was found to stain selectively misfolded protein in brains of Alzheimer's patients, colleagues at Nationwide Children's Hospital in Ohio developed a simple urine diagnostic test [Congo Red Dot (CRD) Test]. With the CRD developers and hospitals in Mexico and Bangladesh, Gynuity is testing the clinical utility and usability of the CRD for the diagnosis and prediction of preeclampsia during pregnancy and in the postpartum period.

Increasing Access to Magnesium Sulfate

Magnesium sulfate, an inexpensive drug, is an effective treatment for preeclampsia and eclampsia, but it is used sub-optimally in many settings. In general, a loading dose of magnesium sulfate is administered intravenously and intramuscularly followed by an intramuscular (IM) injection every four hours or by a continuous intravenous (IV) infusion. Although the IV regimen has been shown to be effective, it requires the use of an infusion pump for safe delivery and, when administered manually, has a greater potential for inadvertent overdose and missed or delayed administration. The IM dosing regimen, while potentially safer, requires painful injections and is often initiated only when delivery is imminent. These limitations in administration may result in delayed or inadequate treatment of preeclamptic women.

The Springfusor® pump offers an alternative to intramuscular administration of magnesium sulfate where electronic pumps for IV administration are not available. Introduction of the Springfusor® has the potential to improve the quality of preeclampsia care by making drug administration easier and more acceptable to women and providers. The Springfusor® may help avoid the barriers associated with IM administration and the dangers of “free running” IV magnesium sulfate. Gynuity is studying the use of the Springfusor®, hypothesizing that it could offer a treatment approach that is superior to the current standard of care in terms of accurate delivery of treatment, ease of use, cost-effectiveness, demands on staff time, reduction of pain and side effects in women receiving the treatment, and increased acceptability to patients.

Improving Management of Hypertension in Pregnancy

Treatment of elevated blood pressure—one of the primary signs of preeclampsia—reduces the risk for maternal complications. Historically, clinical trial regimens for the acute treatment of high blood pressure used medications administered intravenously, which require venous access and monitoring of the fetus. Oral anti-hypertensives are characterized by ease of use, greater availability, low cost, and ability to be used in a wider range of settings. Gynuity, in collaboration with the University of British Columbia, the University of Washington, Government Medical College (GMC), and Daga Memorial Women’s Hospital in Nagpur, India, conducted a randomized trial to compare the efficacy of oral labetalol, nifedipine, and methyldopa for management of severe hypertension in pregnant women. The study found that oral anti-hypertensives are effective in controlling severe hypertension in pregnancy without serious maternal or fetal complications. Use of oral anti-hypertensive drugs for treatment of severe hypertension in pregnancy thus represents an innovative treatment approach with the potential to increase access to life-saving care at the lowest levels of the health system.

Improving Care at Delivery for Women with Preeclampsia

While magnesium sulfate and various anti-hypertensive therapies can reduce the morbidity associated with preeclampsia, the only cure comes with delivery. Prompt delivery, preferably by vaginal route, is vital in order to achieve good maternal and neonatal outcomes. Inducing labor promptly and safely is a critical component of care for women with preeclampsia. Together with colleagues from the University of Liverpool and GMC Nagpur, Gynuity is studying the relative risks and benefits of low-cost methods for labor induction (Foley catheter and misoprostol) and augmentation (misoprostol and oxytocin) in women with preeclampsia.

¹ Say L, Chou D, Gemmill A, Tunçalp Ö, Moller AB, Daniels J, Gülmezoglu AM, Temmerman M, Alkema L. Global causes of maternal death: a WHO systematic analysis. *Lancet Glob Health*. 2014 Jun;2(6):e323-33.

² Abalos E, Cuesta C, Carroli G, Qureshi Z, Widmer M, Vogel JP, Souza JP; WHO Multicountry Survey on Maternal and Newborn Health Research Network. Pre-eclampsia, eclampsia and adverse maternal and perinatal outcomes: a secondary analysis of the World Health Organization Multicountry Survey on Maternal and Newborn Health. *BJOG*. 2014 Mar;121 Suppl 1:14-24.

RELATED RESOURCES

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