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 year\(^1\). Fetal deaths are three times more frequent in women with preeclampsia and four times more frequent in women with eclampsia\(^2\). 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.

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**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 1800’s. 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 such as cerebral hemorrhage and cerebral edema. Clinical trial regimens for the acute treatment of high blood pressure generally use medications administered intravenously (e.g. hydralazine, labetalol). While these regimens are effective, they present certain challenges in low-resource settings. IV regimens require venous access, thus a provider trained in IV administration is necessary. In addition, IV regimens may reduce blood pressure too rapidly, potentially destabilizing maternal hemodynamics at the expense of the fetus, and thus careful fetal monitoring is required.

To determine the effectiveness of an alternative oral medication regimen, Gynuity, in collaboration with colleagues at the University of British Columbia, the University of Washington, Government Medical College (GMC) and Daga Memorial Women’s in Nagpur, India, is conducting a study to compare the efficacy of oral labetalol, oral nifedipine and oral methyldopa for management of severe hypertension in pregnant women. Evidence of the relative risks and benefits of different oral regimens will help develop guidance for antihypertensive use in pregnancy.

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 when preeclampsia is present. Induction of labor is therefore a critical intervention in order to prevent morbidity to both mother and baby. Two low-cost interventions—oral misoprostol tablets and transcervical Foley catheterization—are already used in some low-resource settings for labor induction, but their relative risks and benefits are unknown. Gynuity is collaborating with the University of Liverpool and Government Medical College Nagpur on a randomized controlled trial to compare these two methods of labor induction. The results of the trial will provide insight into the benefits and trade-offs in efficacy, safety, acceptability and cost of the two methods. Such information will be useful for the development of clinical guidelines and recommendations both in low-resource settings.
**RELATED RESOURCES**


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