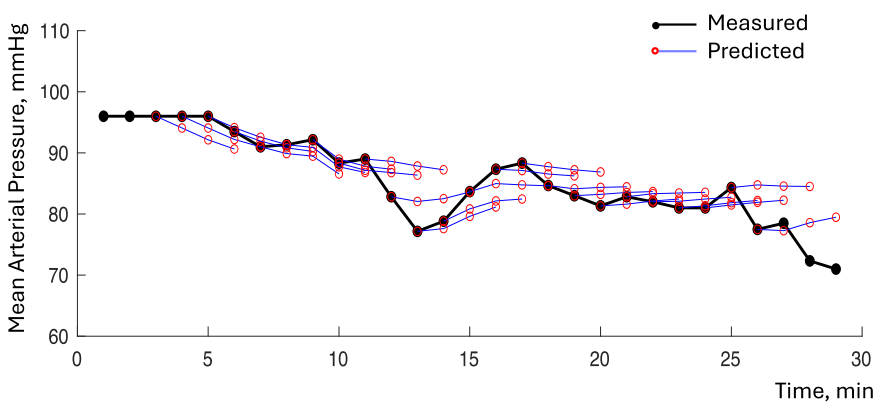
Automating Drug Administration: AI-powered Blood Pressure Management during Cesarean Delivery



Vesela Kovacheva, MD PhD
Director Translational and Clinical Research in Obstetric Anesthesiology, Mass General Brigham
Assistant Professor, Harvard Medical School
vkovacheva@bwh.harvard.edu

MGB Innovation Contact
Robert Ng, PhD
cng11@mgb.org

Clinical Need

Optimizing drug infusion can significantly improve patient safety and outcomes. However, this process is error-prone as the response to the administered medication varies, and individual physicians use different approaches. In cesarean delivery, the most common surgery in the world, maternal and fetal safety relies on maintaining optimal blood pressure.

Our Innovative Approach

Our AI-powered platform (Fig. 1) uses a scalable microservices architecture to process real-time data in the OR in a fast, resource-efficient way. We used high-dimensional time-series mean arterial pressure data with precise times and doses of vasopressor administration in 172 patients to create an Autoregressive with Exogenous Input (ARX) model.

Results

The ARX model predicts blood pressure changes up to 3 minutes in advance, an interval sufficient to allow intervention. The model performed 49% better than a mean constant model for one-minute-ahead predictions with a root mean square error (RMSE) of 3.6±1.3 mmHg. We anticipate that implementing machine learning can further enhance performance.

Commercial Potential

We are seeking partners to commercialize our IP-protected automated system. Integrating these models with a smart infusion pump can aid optimal blood pressure management and improve patient experience and outcomes.