**Objective:** Upon completion of this presentation, participants will understand the role that mathematical models can play in defining quantitative relationships between patient covariates, and the labor progress, labor pain, and outcome.

**Summary:** Laboring patients typically provide a substantial amount of information that can inform mathematical models of labor progress, labor pain, and outcome. Parturients are typically admitted with reasonably complete demographic information, including maternal and gestational age, weight, prior pregnancies, and self-identified ethnicity. Additionally, it is likely that in the near future important maternal and neonatal genotypic information will be available to the treating physician.

Similarly, parturients generate considerable data over the course of labor, including the time course of cervical dilation, the time course of pain, and outcome information for both the mother and the neonate.

These data are available in electronic patient data bases, and can inform mathematical models. The talk will present recent work developing population-based mathematical models relating patient characteristics to the time course of labor progress and pain. Such models can inform physicians about when parturient progress has excessively slowed, as well as identify patients at risk for slow progress, unusually painful labor, or poor outcome. Such models also provide sensitive tools to evaluate new therapies to improve outcomes for maternal and neonatal outcomes.

**Key Points:**
1. Mathematical models can be developed from electronic databases.
2. Mathematical models are incredibly sensitive tools for picking up small effects of patient covariates or treatments.
3. Mathematical models can identify patients at risk for slow labor, increased pain, or poor maternal or neonatal outcome.

**Key References:**