



# Karen Hicklin

## North Carolina State University

### A Markov Decision Process to Identify Optimal Policies for Stopping a Trial of Labor

[kthickli@ncsu.edu](mailto:kthickli@ncsu.edu)

Cesarean delivery is the most common major abdominal surgery in many parts of the world. As of October 2012, the cesarean section rate in the United States was reported to be 32.8% in 2011, rising from 4.5% in 1970. In addition to the risks of short-term surgical complications, cesarean section is associated with increased risk of neonatal respiratory morbidity and an increased risk of major complications in subsequent pregnancies, such as uterine rupture, placenta previa, and placenta accreta. In this study we evaluate current delivery practices and determine when it is most appropriate to perform a cesarean delivery. The goal of this project was to create a dynamic programming decision model that can provide threshold values for when a cesarean section is needed in order to maximize the expected utility of healthy outcomes for the mother and child. In order to do this, we formed a Markov decision process (MDP) that evaluates the best course of delivery. Through examining the long- and short-term benefits and harms associated with mode of delivery, we develop a decision model for determining when to continue or stop a trial of labor.