

## The Influence of Hospital Resource Factors on Adverse Health Outcomes

Tolu Abe, PhD Candidate  
Industrial & Systems Engineering  
University of Washington

**Abstract:** The *Influence of Hospital Resource Factors on Adverse Health Outcomes* covers the exploratory, observational study that aims to determine the association between resource accessibility variables and adverse health outcomes in a hospital setting. Past studies have examined the association between resource accessibility and outcomes, and have focused on the patient populations from a single hospital admission source, such as the emergency or surgical departments. These studies have employed various statistical methods--such as logistic regression, weighted least squares regression, and Cox proportional hazard modeling--to determine associations between resource accessibility variables and health outcome variables. To date, a more holistic approach that accounts for multiple resource accessibility (number of beds available, number of staff available, and daily patient volume) as well as outcomes of readmission and mortality have not been studied extensively across different patient populations. As differences can be observed given patient age, admission sources, and existing health conditions, these patient characteristics are important to consider and model. Few studies have also accounted for the hierarchical data structures of the unit-patient relationship, and explored how patient to staffing ratio affects the hierarchical data structures.

This research study aims to identify the influence of controllable hospital resource factors on two (2) adverse health outcomes: 1) 30-day readmission and 2) in-hospital mortality.

The following research aims will be addressed:

Aim 1: Determine the patient risk factors that influence the risk of each adverse health outcome.

Aim 2: Determine the hospital resource factors that influence the risk of each adverse health outcome.

Aim 3: Determine if the risk-adjusted association between hospital resources and adverse health outcomes (as defined in Aim 2) differ by nursing unit. If so, determine if demand:supply ratio measures, including bed occupancy and staffing ratios, contribute to the unit-to-unit variation.

Binomial & LASSO logistic regression methods are used to relate explanatory variables to patient health outcomes. Resource accessibility (explanatory) variables include nurse staffing volume, bed availability, admission volume, discharge volume, day and time of admission, and day and time of discharge. The patient health outcome (response) variables are 30-day readmission and in-hospital mortality rates. The model accounts for patient characteristics that include age, severity of illness, risk of mortality, and admission source. The hospital setting used for this study was the University of Washington Medical Center.

Such research can help hospital decision/policy makers determine resource capacity and healthcare delivery needs in order to mitigate the occurrence of adverse patient outcomes.

**Bio:** *Tolu Abe* is currently pursuing a PhD in Industrial and Systems Engineering from the University of Washington. She also holds a Masters of Public Health from the University of Washington with a focus on General Health Services; a Masters of Science in Industrial & Systems Engineering from the University of Washington; a Bachelors of Science in Industrial & Systems Engineering from the University of San Diego; and a Bachelors of Arts in Liberal Arts from the University of San Diego. Her research focuses on applying statistical modeling to relevant patient health outcome research.

**Tuesday, February 28, 2017**

**1:30 - 2:20 p.m.**

**MEB 235**