Title: Facilitating Patient Flow in a Health Care Delivery Chain

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Start: September 2008

Research Group: MIT Lean Advancement Initiative, VHA New England Health Care Engineering Partnership

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Problem

- Motivation: Fragmentation → Cost driver in U.S. health care system
- Potential Solution: Reduction of cost via fewer operational inefficiencies (e.g., excess waiting times)
- Research Purpose: To improve flow (e.g., rate, variability, waiting times) through health care delivery chain (Fig. 1)
- Research Design: Study of a cross-departmental chain from Emergency Dept. (ED) to Inpatient Unit using prediction of patient flow paths
- Implications: “If one can predict earlier in the course of an evaluation whether the patient will likely be admitted, then one may improve timeliness of inpatient placement or discharge planning” (Whitney 2007)

Key Questions

1. What predictive methods work best to predict downstream demand in this context?
2. Given advance demand predictions, what possible adaptive actions can the hospital system take to improve flow?
3. What specific responses and control actions are optimal or worthwhile improvements given (a) perfect and (b) imperfect downstream demand prediction?
4. How portable or robust are these solutions (questions 1-3) to multiple contexts?

Methodology

- Predictive Methods Explored: Expert opinion, Bayesian networks, other statistical tools
- Interviews conducted with ED nursing staff to understand critical factors for inclusion in statistical tools
- Interviews conducted with Inpatient Unit staff to understand potential responses to predicted information and how uncertain data will be interpreted
- Mathematical and simulation models developed to study optimal response decisions based on information accuracy and timeliness

The Research

The research focuses on developing and implementing predictive models to improve patient flow in healthcare settings. Two main approaches are explored: deterministic and probabilistic predictions.

Remaining Research

Preliminary Conclusions: Potential for the use of expert opinion for making predictions about patient flow

Future Work:
- Statistical prediction tools will be developed and compared to the expert opinion.
- Modeling of how the predictions can be used on the inpatient unit side in order to improve hospital flow.
- Additional research to establish the generalizability of the results

Thank You!

My Committee - Professor Deborah Nightingale, Professor Stephen Graves, Professor James Benneyan.

The VHA West Roxbury Emergency Room Staff – Dr. Stephan Gaehde, Jack Marinello, and all other Nursing and medical staff

Lean Advancement Initiative and ESD Staff and Students.