

# Training Residents: Reconciling Scheduled Work Hours with Random Opportunities to Perform Rare Procedures

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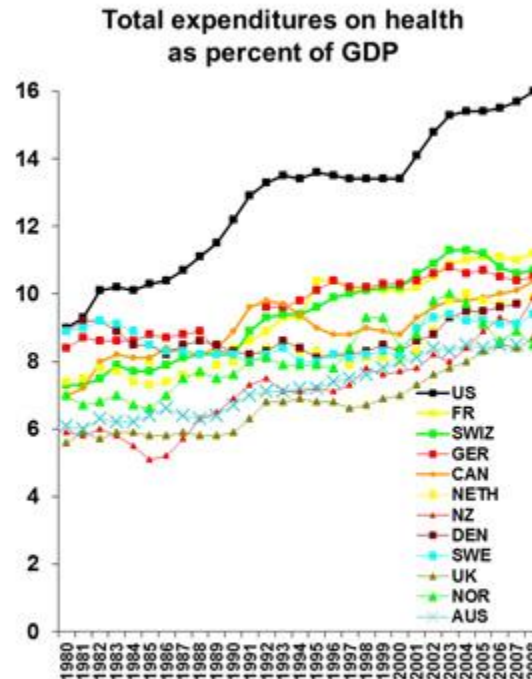
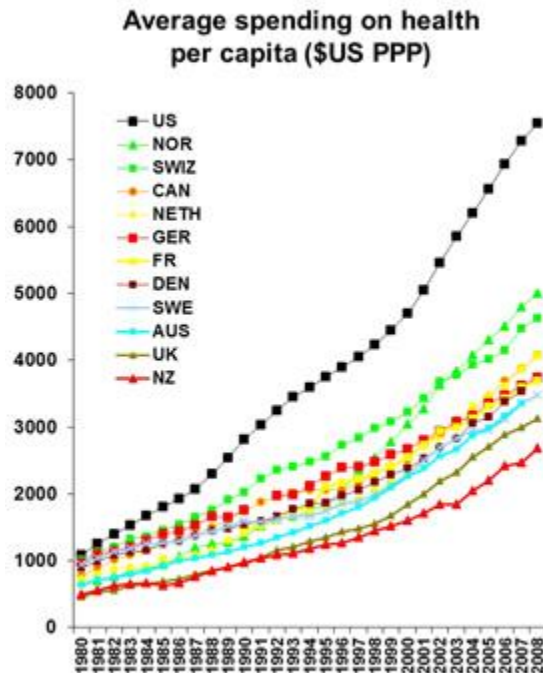
# A Little Something Different

- Motivation for healthcare and OR
- Lots of opportunities for deep, rich mathematical work
- Second challenge – equally difficult: Solving the right problem and having the solution implemented
- Barriers of culture, language, trust, understanding
- Difference between healthcare and transportation, manufacturing, telecom, energy...



# Motivation

## International Comparison of Spending on Health, 1980–2008



Source: OECD Health Data 2010 (Oct. 2010).



# OR/MS Opportunities for Impact

- Why is partnership between healthcare and OR/MIS important?
  - Systems perspective
  - OR/MS ability to translate complex real-world problems into mathematical models that can be analyzed and optimized
  - Use of data to drive decisions
- Decision making may be as critical to care as devices or drugs, but data does not automatically translate to good decisions
- How do we improve the quality of decision making in healthcare?



# The OR is the easy part

- The hardest challenges in healthcare are not mathematical
  - Communication
  - Culture
  - Competing objective criteria
  - Competing decision makers/constituents
  - Autonomous decision makers
  - Understanding the briar patch of healthcare finance



# Transplant Surgery Training: Merging Scheduled Shifts with Random Surgical Opportunities



# Motivation for Computer Simulation

- We are failing to adequately train transplant surgeons in a timely manner – may lead to shortage of surgeons very soon – conflict between ACGME and UNOS
- Cardio thoracic surgeons don't always think about probability the way we do
- Policy makers limiting work hours don't always think about probability the way we do
- Policy makers setting training certification levels don't always think about probability the way we do



$$4 \times 10 \neq 40???$$

- Motivating question:
  - If you have, on average, 40 transplants per year...
  - If you have four residents...
  - If each resident is on call every fourth night...
  - What is the probability that each resident gets 10 transplants over the course of the year?





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  - Hint: It's not 1!
  - Very different answers asking this question at an OR meeting and a surgical meeting



# Description of Computer Simulation

- A way to demonstrate these probabilistic issues to people not used to thinking about probability
- A way to analyze policy questions
- A way to evaluate alternative scheduling paradigms



# Demo

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# Key Take-Aways

- Language is important ... for both sides! (“stochastic”, “mediastenoscopy”)
- Educating our partners is important
- Potential for policy impact as well as operations
- A little technical skill can go a long way
- Ground work for bigger, more “interesting” problems



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# Questions and Discussion

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