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
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!
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- 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
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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