

Scheduling Residents to Achieve Adequate Training on Procedures with Random Occurrences

Presented by Ryan Chen

University of Michigan

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Contributors

- Rishindra Reddy, MD
- Andrea Obi, MD
- Jennifer Chung, MD
- Jacob Seagull, PhD
- Mark Daskin, PhD
- Amy Cohn, PhD
- William Pozehl, BSE

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Background

- Many applications of this research – we consider heart and lung (cardiothoracic/CT) transplant surgery as an example
- Projected shortage of CT transplant surgeons over the next 10 years
- CT surgeons constitute the oldest group of surgeons (mean = 55 years old)

Motivation

- Certification for CT transplant surgery is experience-based
- Transplant opportunities cannot be scheduled and occur randomly
- Fellows rotate on a fixed call schedule to acquire experience

Ask the Audience

If a program has 4 fellows (rotating call daily) and receives an average of 40 transplants per year, what is the likelihood that each fellow receives 10 within 1 year?

A) 0% - 20%

B) 21% - 40%

C) 41% - 60%

D) 61% - 80%

E) 81% - 100%

Ask the Audience

If a program has 4 fellows (rotating call daily) and receives an average of 40 transplants per year, what is the likelihood that each fellow receives 10 within 1 year?

A) 0% - 20%

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E) 81% - 100%

Answer: ~5%

Approach

- From previous research, found that the interarrival times of heart and lung transplant opportunities follows an exponential distribution
- Developed software to simulate occurrences of transplants and assignment to fellows
- Developed a Windows Form Application in Visual Basic

Simulator Demo

- At this point, the slide deck won't be showing, but here is a list of the features I want to demo and talk through:
 - Basic inputs
 - One repetition (and timeline)
 - Multiple repetitions
 - How to assign multiple procedures
 - Change rotation paradigms
 - “Sensitivity analysis” tab

Implications

- Changes to the current system?
 - Program sizing – less fellows?
 - Program case volume – get more volume? Is this possible?
 - Push for policy changes?
 - ACGME work hours regulations
 - Alternative certification methods
 - Usage of surgical simulators to count toward certification
 - Proficiency-based certification

Next Steps

- Expand the simulator:
 - ACGME work hour regulations
 - Different “types” of fellows
 - Other statistical distributions
 - More paradigms
- Evaluate other programs, both within UM and nationwide
- Build optimization models!

Questions/Comments

Questions / Comments

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