**MGH Pathology Process Redesign**

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**Transition to Paperless System**

**Motivation**

1. Improved efficiency + Patient safety
2. Environmental Impact
3. Qualitative: IT survey, Interviews

- 40% of interviewed doctors in favor of transitioning to a paperless system.
- 94 staff / trainees of the department participated (Fig. 1)

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**Problem Statement**

Improve the efficiency of process reviewing and signing out cases, while maintaining excellence in resident/ fellow training and ensuring high-quality, error-free pathology reports.

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**Survey and Interview Results**

**IT Survey**

Overall Takeaway: variability in utilization of IT tools within the department

- Highly variable usage of transcriptionists by pathologists (Fig. 3)
- Underutilization of Dragon in direct diagnosis entry

**Key Findings from Workspace Inventory Survey**

- Total number of pathologists in MGH Boston: 69
- Total number of pathologists surveyed: 30
- % of pathologists surveyed: 61.2%
- Average faculty office size (in sqft): 145
- Average number of monitor per office: 1.55
- Average number of pathologists who support direct entry: 13
- % of pathologists who support direct entry: 63.3%

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**Proposed Solutions**

- **Goal 1.** Transition to a direct diagnosis entry system, which will reduce turnaround time and cost.

- **Goal 2.** Redesign the case workflow to a continuous processing system, which will improve resource allocation and reduce turnaround time.

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**Challenges**

- Operational: The change would be disruptive to current workflows and is difficult to implement gradually as it requires coordination between departments.
- Organizational: There is potential for resistance due to role and shift schedule changes.

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**Implementation Plan**

- **Short-Term**
  - Invest in improved hardware.
  - Create streamlined request process.
  - Update CoPath: Accessibility based on common pain points.
  - Offer optimal technology training.
  - Continue adoption of paperless diagnosis entry.

- **Medium-Term**
  - Transition to 64bit Windows system (on progress, done by January 2020).
  - Implement cutoff date for direct diagnosis entry, possibly by hospitality.
  - Begin enhanced QA review by transcription team.

- **Long-Term**
  - Exact continuous case processing by transcription team.
  - Eliminate paper working draft.
  - Continue monitoring key metrics, i.e. turnaround time and amendment rates, to ensure no loss in quality in new system.

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**Simulation Model**

- It is infeasible to pilot the test of hypotheses 1, 2, and 3 directly in the department due to the required coordination between process steps and the need for transcriptionists to have more flexibility in their role.
- We thus construct a discrete-time simulation model to replicate the current pathology department and allow us to evaluate the potential effects of these changes.
- We test new scenarios in the system outlined below:

  - **Phase 1: Enhanced QA Review**
    - Transcriptionists perform more detailed review of cases (and no longer transcribe to direct DX entry).
    - Benefits: Reduced error rate, increased physician trust in the paperless system.

  - **Phase 2: Continuous Processing**
    - Transcription team reviews cases continuously throughout the day as slides are processed and become ready for delivery.
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**Simulation Results**

- We create a discrete-time simulation model that allows us to reconstruct the flow of cases through the pathology department.
- We estimate key parameters, such as case flow volume, resource availability, and time required for each step, based on empirical data from October 2018 as well as interviews with pathologists.
- We run the simulation over the course of seven business days to obtain distributional results on wait times in various steps.

**Phase 1:** Reduces overall turnaround time by 3.2%, and specifically lowers the time from resident review to signout by 14.4%.

**Phase 2:** Results in further turnaround time reduction of 16.6% and saves 30.0% of time between gross complete and shelf delivery.

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**Problem Process**

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