Utilizing Lean Methodology to Optimize Operating Room Efficiency: A Multi-Disciplinary Process Mapping Exercise

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STUDY OBJECTIVE

The aim of our study was to utilize Lean and Quality Improvement (QI) methodology to design an "ideal-state" intraoperative pathway for robotic hysterectomy in order to improve surgical efficiency and minimize case cancellation

INTRODUCTION

Optimizing surgical capacity while maintaining high quality patient care is an ongoing challenge in the operating room, particularly for complex procedures requiring significant resources, such as robotic hysterectomy.

Lean methodology is a systematic method for the identification and elimination of waste in a process without sacrificing productivity. This approach was initially used in the manufacturing industry but more recently has expanded to other areas including healthcare. "Waste" is considered any step in a process which doesn't increase value for the customer or patient and ideally, as waste is eliminated quality improves while costs are reduced.

The Lean toolkit includes various strategies for minimizing waste and ensuring continuous quality improvement (CQI). Process Mapping is a QI strategy which can identify common barriers to surgical process efficiency and quality of care by dividing a process into its individual components and analyzing each step separately.

METHODOLOGY

A "current-state" process map for robotic hysterectomy was developed with input from the intraoperative care team which consisted of gynecologists, anesthesiologists and nursing staff. This pathway represented the current flow of process steps during robotic hysterectomy for all three of the care teams. Surgical care team members were then invited to a meeting where the process steps were discussed, evaluated and suggestions for improvements were identified. Various QI/Lean methodologies were utilized for this evaluation including affinity diagrams with multi-voting, parallel processing strategies and checklist development (Figures 1-3).

Following the initial exercise, the group's suggestions were consolidated and the final output was the design of a "future-state/ideal-state" process map (Figure 4). This updated process map incorporated proposed strategies for improved efficiency for each of the multidisciplinary teams and plans for subsequent implementation.

RESULTS

Data regarding mean robotic hysterectomy case time and second-case cancellation rate was collected prospectively after the introduction of the "ideal-state" process map. This data was compared to a retrospective control group from the 12 months prior to the process mapping exercise.

In the eight months following introduction of the "ideal-state" process map, mean case time for decreased by 28 mins [11%] from 241 to 213 mins (Figure 5) and second-case cancellation rate decreased by 70%.

Mean case time, case cancellation rates and acceptability of the proposed interventions will be analyzed in a recurring fashion as part of a Plan-Do-Study-Act (PDSA) cycle.

Figure 1.
Utilizing multi-voting to determine common areas of delay and/or inefficiency

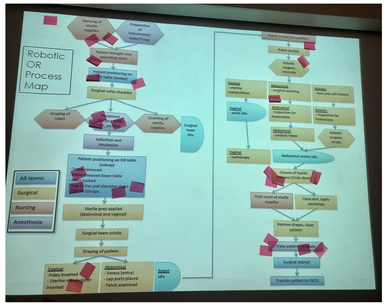


Figure 2.
Final output from mapping exercise included identification of most inefficient steps

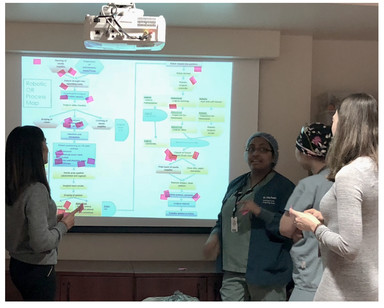


Figure 3.
Discussing possible interventions to improve efficiency for steps with highest number of votes

Figure 4. Future-state/ideal-state process map for robotic hysterectomy

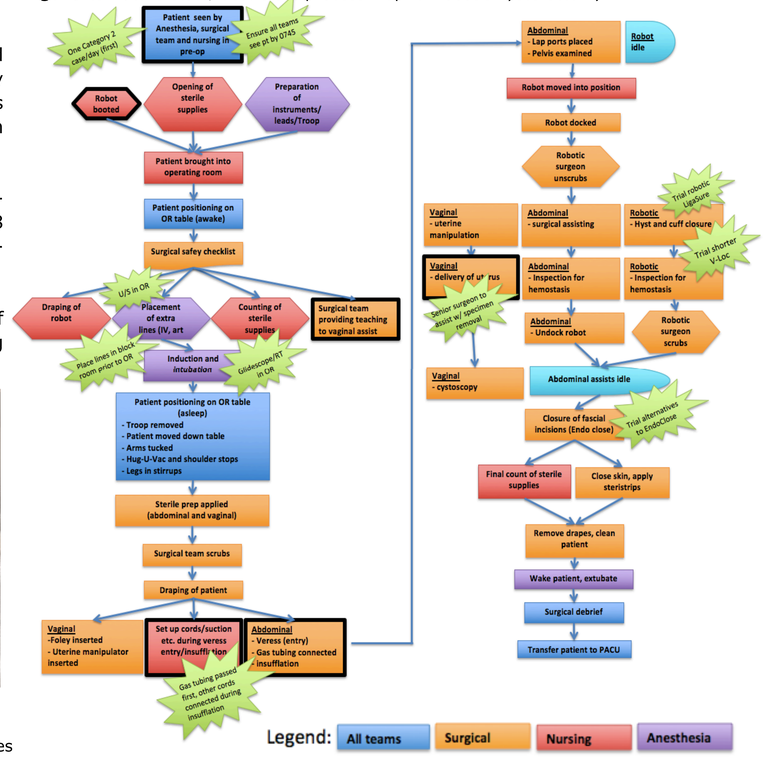
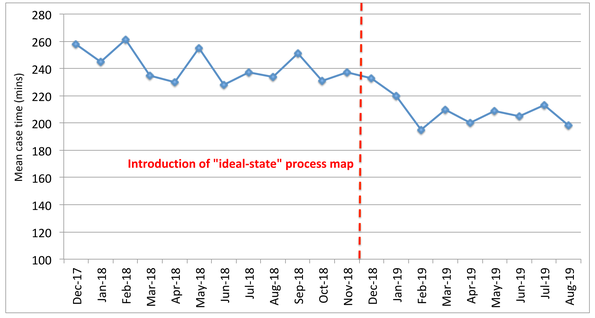


Figure 5. Mean case time for robotic hysterectomy (Dec 2017-current)



CONCLUSION

A multi-disciplinary approach to improving operating room efficiency allowed for sharing of responsibility and improved communication between team members.

The creation and implementation of an "ideal-state" process map was successful in decreasing the mean case time for robotic hysterectomy and minimizing second-case cancellations. The process map will be re-analyzed periodically as part of the PDSA cycle and we will continue to collect prospective data in order to determine long-term outcomes from this exercise.

Engagement of all stakeholders is fundamental to ensuring accurate analysis of current process flow and successful deployment of QI strategies. This process mapping exercise can be easily applied to other surgical procedures and expanded for use in surgical teaching and education.

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