INTRODUCTION

In the wake of replacing fee-for-service with bundled payments, hospitals face particular demands to provide quality care while curbing costs by eliminating wasted materials, effort, and time. To improve efficiencies in expensive areas like the OR, timely completion of cases is key. This requires improving processes and reliable scheduling of cases.

In this QI project, we sought to improve completion of first case spine fusion in healthy idiopathic scoliosis patients within 30 minutes of scheduled time from a baseline of 66±70 minutes.

First case completion delays have a domino effect on subsequent cases, increasing OR costs, dissatisfaction among staff from resulting staffing inadequacies and late shifts, and dissatisfaction among parents/patients from increased waiting times.

METHODS

- Stakeholders (RNs, APNs, MDs) representing the preoperative units, orthopedics, anesthesiology, OR (circulator/scrub technician), Epic scheduling team and QI consultants met regularly on a biweekly basis from March to June 2015.
- Processes involved in scheduling the case to the patient’s discharge from the PACU were mapped.
- Failure modes and effects analysis was conducted to identify causes for inefficiencies, so unnecessary steps could be eliminated and processes modified.
- Prediction models were generated using linear regression with surgical duration as dependent variable (covariates: gender, age, vertebral levels, weight, height, degree curve, day/month/year of surgery, surgeon).
- Predicted to actual OR time during pre-intervention, post-quality measures implementation and post-prediction model implementation was tracked to assess effects of different interventions.

RESULTS

- Pre-intervention baselines from 64 patients who underwent spine fusion for idiopathic scoliosis from 1/2014 to 7/2015 showed that 22% cases were completed within 30 minutes of scheduled time. Key drivers for improvement were identified at all levels of perioperative patient care and processes standardized (Fig 1A). These changes were implemented starting July 2015 for spine fusions (>90% were by two surgeons only). Time goals were developed for patient transport to OR, anesthesia readiness (including airway and line placement), patient positioning and surgeon availability, sterile draping and wake up.
- Reanalysis after implementation in 24 cases showed only a modest improvement to 33% success in achieving stated goal, likely because 70% of the time in the OR is surgical time which is difficult to modify.
- The final step-wise regression model for predicting surgical time included age, vertebral levels, and year of surgery (p < 0.05, adjusted R-squared = 0.58). This prediction model was used to schedule the next 25 cases. This significantly decreased the average difference between observed and predicted end time (66 minutes vs 25 minutes; p = 0.002), and reduced control limits from a baseline LCL, UCL of (-122, 255) to (-15, 54) minutes. (Fig 1B)

CONCLUSIONS

- Prediction modeling of surgical time improves ability to reliably estimate case time;
- When combined with process standardization, prediction modeling contributes to efficient utilization of OR time.
- The impact of these changes on staff/patient satisfaction and cost-savings needs to be studied in the future.

REFERENCES