

Association of Postoperative Complications with Attributable Increase in Postoperative Length of Stay in a Broad Surgical Population

Background: Precise estimates on the impact of individual complications on postoperative length of stay (PLOS) may be helpful to patients and providers in informing decision-making and resource allocation.

Methods: This was a retrospective cohort study using the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) participant use file, 2005-2018. The associations between PLOS, preoperative characteristics, and postoperative complications were tested using a t-test, one-factor ANOVA, or Pearson correlation, where appropriate. Multiple linear regression analysis was performed with PLOS as the dependent variable and the preoperative variables and postoperative complications as independent variables. Models estimating the association between postoperative complications alone and risk-adjusted with preoperative variables and PLOS were examined.

Results: Of 4,413,041 patients, the majority were female (56.5%), white (67.1%), ASA class II-III (87.2%), and underwent general or orthopedic surgery inpatient procedures (70.0%). A total of 733,500 patients (16.6%) had at least one postoperative complication, with a subsequent average increase in their length of stay of 6.1 days, increasing their stay from an average of 3.3 to 9.4 days. Occurrence of each of the 18 postoperative complications was associated with significant increases in unadjusted PLOS (2.1-12.8 days, all $p < 0.05$). After risk-adjustment for preoperative characteristics, the increases in PLOS were somewhat attenuated but remained statistically significant (1.6-9.6 days, $p < 0.0001$). The largest risk-adjusted increases in PLOS were associated with prolonged ventilator use (9.63, 95% confidence interval 9.58-9.68 days), acute renal failure (6.95, 6.87-7.04 days), and organ-space surgical site infection (4.25, 4.21-4.28 days).

Conclusion: After risk adjustment, occurrence of any postoperative complication was associated with extended PLOS, with increasing PLOS varying by complication type. These data provide more precise estimates for counseling patients about the impact of postoperative complications and empower surgeons to target perioperative risk mitigation and administration to better allocate resources after postoperative complications.