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

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Background

- Postoperative complications occur in 15% of nonemergent inpatient surgeries, with up to 6% of patients experiencing multiple complications
- Precise estimates of risk-adjusted increases in postoperative length of stay (PLOS) associated with postoperative complications across a range of complications and operations are not available in the literature

Methods

- Retrospective cohort study using the prospectively collected American College of Surgeons National Surgical Quality Improvement Program participant use file (ACS-NSQIP PUF), 2005-2018.
- Inclusion criteria included inpatients in nine surgical specialties, exclusion criteria included death within 30 days of operation
- The association between PLOS, preoperative characteristics, and postoperative complications were tested using t-test, one factor ANOVA, or Pearson correlation, where appropriate.
- Multiple linear regression analysis was performed with PLOS as the dependent variable and preoperative characteristics and other postoperative complications as independent variables.

Results

Attributable Increase in Post-Operative LOS by Complication

n = 4,413,041, 56.5% female, 67.1% white, 70.0% general or orthopedic procedures

Pulmonary Complications

Ventilator Use > 48 hours	**9.63 (9.58-9.68)**
Unplanned Intubation	3.14 (3.09-3.20)
Pneumonia	3.83 (3.79-3.87)
Pulmonary Embolism	2.09 (2.03-2.16)

Cardiovascular Complications

Deep Vein Thrombosis	**2.99 (2.94-3.04)**
Bleeding/Transfusion	1.94 (1.92-1.96)
Cardiac Arrest Requiring CPR	1.94 (1.82-2.07)
Myocardial Infarction	1.60 (1.53-1.66)

Infectious Complications

Organ Space Infection	**4.25 (4.21-4.28)**
Septic Shock	3.61 (3.56-3.67)
Deep Incisional Infection	3.00 (2.95-3.05)
Sepsis	2.85 (2.81-2.88)
Urinary Tract Infection	2.29 (2.26-2.33)
Superficial Infection	1.91 (1.88-1.94)

Renal Complications

Acute Renal Failure	**6.95 (6.87-7.04)**
Progressive Renal Insufficiency	3.01 (2.94-3.09)

Neurologic Complications

Cardiovascular Accident/Stroke with Neurological Deficit	**3.10 (3.01-3.19)**

Wound Complications

Wound Disruption	**3.29 (3.23-3.35)**

Presented as mean increase of LOS in days with 95% confidence interval

Conclusions

- All 18 postoperative complications collected by the ACS-NSQIP were significantly associated with increased PLOS in unadjusted analysis and remained significant after adjusting for concomitant complications and preoperative risk characteristics
- The increase varied depending on the complication
- Results from the large dataset were precise estimates with narrow confidence intervals

Implications

These data give clinicians additional information for counseling patients on the possible outcomes of surgery including PLOS after complication, can allow administration to better allocate resources where they are needed, and can help guide clinicians on expected clinical course and discharge after a postoperative complication occurs.

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