Increasing Surgeon Total Experience and Frequency of Performing Procedure Results in Shorter Length of Stay in Patients Undergoing Laparoscopic Cholecystectomy, an HCUP Analysis

Eric W. Etchill, MD, MPH[1]; Joseph V Sakran, MD, MPH, MPA[1]; James Byrne, MD, PhD[1]; Salma El Marjiya Villareal, MD, MPH, MBA[2]; Pranav Samineni[3]; Trevor Heinrichs, BS[3]; Lillian Tsai, MD[1]; Alistair J Kent, MD, MPH

[1]Department of Surgery, Johns Hopkins School of Medicine; [2]Johns Hopkins University, Bloomberg School of Public Health; [3]Johns Hopkins University
Baltimore, MD, USA 21287

Introduction

Laparoscopic cholecystectomy (lap chole) is one of the most common abdominal surgeries globally.

Substantial costs associated with lap choles are related to complications and resultant hospitalizations rather than the procedure itself. Hospital length of stay (LOS) may be seen as a proxy for health care utilization, effective clinical management, or a health services relevant target for quality improvement.

The impact of varying individual surgeon experience on outcomes in lap choles is not well understood at a sufficiently granular level for policymaking. Relative contributions of total experience (i.e. cumulative number of cases) and recent experience (i.e. case rate) have not been previously well differentiated.

Objectives

We sought to evaluate the effect of surgeon experience on hospital LOS.

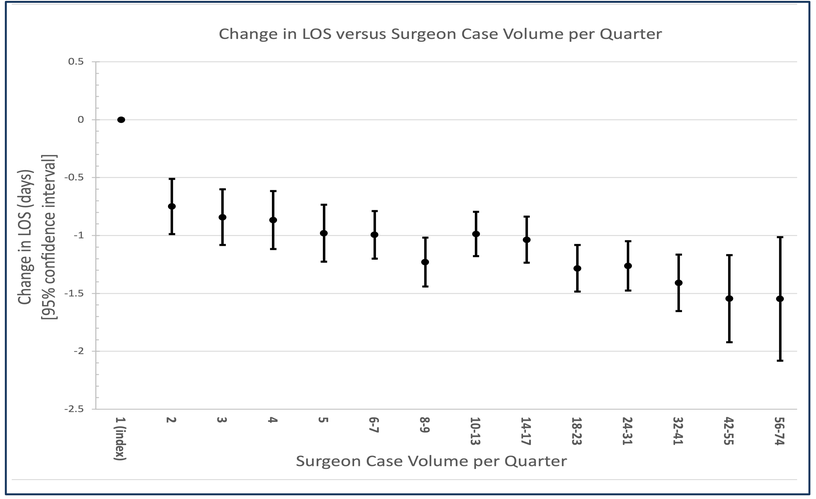
We hypothesized that increasing in surgeon's quarterly volume and increasing cumulative experience will each result in decreased (LOS) following laparoscopic cholecystectomy.

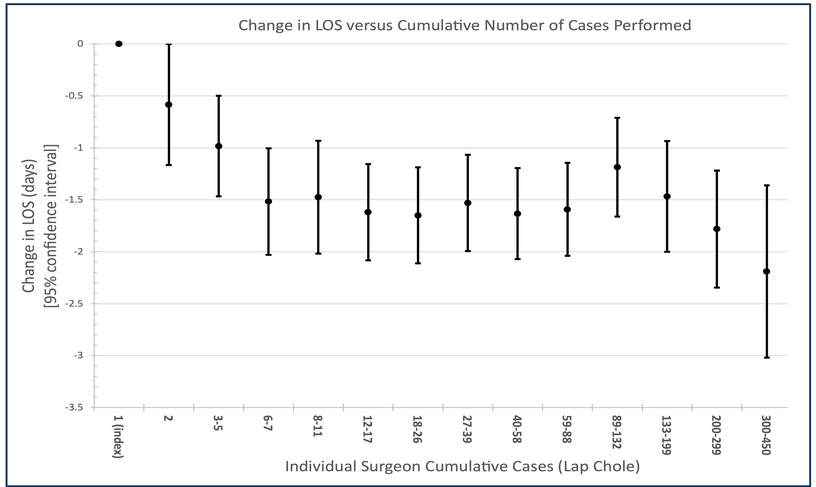
Materials and Methods

The all-payor Maryland Health Services Cost Review Commission (HSCRC) database was queried for adult patients undergoing lap chole between Q3 2012 and Q2 2020. Case counts were tabulated for each individual surgeon and hospital by year and quarter. Volume categories were then assigned 1) for number of cases per study quarter (n=14) and 2) for cumulative cases for surgeons beginning during the study period (n=14) based on a distributional analysis of counts per surgeon and surgeons per category.

LOS was tested in univariate analysis followed by independent multivariable regression models based on cases per quarter and cumulative experience. Hierarchical clustering was utilized in both models for individual hospital factors (institutional lap chole volume, geography, size, academic and trauma center status).

Results





A total of 1,745 surgeons performed 82,947 lap choles in the study period.

Surgeon distribution was log-normal for both cumulative and frequency-based volume categories.

Among all patients, LOS ranged from 0 to 138 days with mean = 1.96 and median = 1.

Age, gender, insurance type, race, urgent presentation, and severity of illness were significantly associated with differences in LOS (all $p<0.02$).

Increasing surgeon frequency of procedure performance and cumulative experience were associated with significant decreases in LOS (max effects -1.55 days, -2.19 days, respectively). (All $p<0.0005$, see figures 1, 2).

Conclusions

After adjusting for age, gender, race, insurance type, severity of illness, and urgent presentation, **increasing quarterly case volume and total cumulative experience independently reduce LOS as experience increases.** These effects appear to be linear for quarterly case volume and demonstrate a plateau for cumulative experience.

This effect was greater than all other factors except patients within the top decile of APR-DRG severity of illness scores.

Maximizing surgeon experience may increase the proportion of patients that can avoid hospitalization and reduce the number of hospital beds needed to care for this population.