DOI: https://doi.org/10.53350/pjmhs2023173340

**ORIGINAL ARTICLE**

# Factors Leading to Prolonged Hospital Stay in Patients Undegoing Laproscopic Cholecystectomy at Tertiary Care Hospital, Karachi

UNAIZA ERUM[1], MURK LAKHANI[2], ERUM KAZIM[3], BUSHRA KIRAN NAEEM[4], MIRZA ARSALAN BAIG[5], HASSAN SHAHAB[6]
[1]*Resident, Surgical Unit 4, Dr Ruth KM PFAU CHK, DUHS, Karachi*
[2]*Resident, Surgical Unit 4, Civil Hospital, DUHS, Karachi*
[3]*Assistant Professor, Surgical Unit 4, Civil Hospital, DUHS, Karachi*
[4]*Fellow General Surgeon, Surgical Unit 4, Dr Ruth KM PFAU CHK, DUHS, Karachi*
[5]*Resident, Surgical Unit 6, Civil Hospital, DUHS, Karachi*
[6]*Resident, Surgical Unit 6, Dr Ruth KM PFAU CHK, DUHS, Karachi*
*Corresponding author: Murk Lakhani, Email: m_lakhani4@hotmail.com*

## ABSTRACT

**Objective:** To determine the frequency of prolonged hospital stay and its associated factors in patients undergoing laparoscopic cholecystectomy for symptomatic cholelithiasis at Tertiary Care Hospital, Karachi.

**Methods:** After the ethical approval from College of Physicians and Surgeons Pakistan, this descriptive study, was conducted at Department of Surgery, Civil Hospital, Karachi, from 08-06-2021 till 08-01-22. Data was prospectively collected from patients after taking a verbal consent. 88 patients who met the diagnostic criteria were included. Quantitative data was presented as simple descriptive statistics giving mean and standard deviation and qualitative variables was presented as frequency and percentages. Effect modifiers were controlled through stratification to see the effect of these on the outcome variable. Post stratification chi square test was applied taking p-value of ≤0.05 as significant

**Results:** A total of 88 patients who met the inclusion and exclusion criteria were included in this study. Mean age, duration of surgery, BMI, height and weight in our study was 50.14±10.49 years, 75.25±20.87 minutes, 29.66±2.56 kg/m$^2$, and 152.3±10.28 cm and 76.9±8.87 kg. Out of 88 patients, 26 (29.5%) and 62 (70.5%) had and did not have prolonged hospital stay.

**Conclusion:** It is possible to shorten the length of time spent in the hospital after surgery if the patient is carefully evaluated beforehand, the operation is performed with precision, and the patient is well cared for afterward.

**Keywords:** Prolonged hospital stay, laparoscopic cholecystectomy, symptomatic cholelithiasis and factors.

## INTRODUCTION

Surgeons of the general variety commonly deal with cases of gallstone disease (also known as cholelithiasis). Between 10 and 15 percent of people in the Western world will develop this disease at some point in their lifetimes (1, 2). In the United States, roughly 6.3 million males and 14.2 million women suffer from it (1, 2). Being female, being elderly, having an ethnic/family background of the condition, being overweight, having metabolic syndrome, rapidly losing weight, having certain illnesses, and having gallbladder obstruction are the main risk factors (2). People with cholelithiasis can be silent or experience symptoms, such as sickness and vomiting, after consuming oily meals due to sporadic cystic duct blockage. Laboratory testing to check for excessive bilirubin and an abdomen ultrasound or CT scan are commonplace in emergency departments. There is a broad spectrum of clinical manifestations for gallstone disease. Symptomatic cholelithiasis (also called gallbladder colic) can occur when the cystic duct is intermittently blocked, causing the typical symptoms already described. When the bile duct is completely blocked, germs can invade the liver. It is possible for the pancreas duct to become refluxed if the common bile duct becomes blocked, causing chronic jaundice. Infection of the bile tract due to choledocholithiasis has also been linked to serious sepsis and high mortality (2). Likewise, gallstones can increase the likelihood of developing gallbladder cancer, though this is an extremely unusual occurrence (1). The yearly incident rate for individuals with benign cholelithiasis is 1-4% (1). Lower-risk individuals with acute cholelithiasis are typically advised to undergo cholecystectomy due to the morbidity and fatality linked with more serious consequences of gallstone disease. These days, the laparoscopic method is typically used to remove a cholecyst, with postoperative change rates to open surgery ranging from 1% to 15% (3). Percutaneous evacuation of the gallbladder is an option to surgery that is often designated for individuals with a greater surgical risk (1). In addition, choledocholithiasis patients often need ERCP before undergoing cholecystectomy to remove stones and potentially stench the bile system. Cholelithiasis cannot be remedied with any contemporary pharmaceuticals because none have been shown to be effective. Ursodeoxycholic acid can be prescribed to people at high risk of developing kidney stones without causing any noticeable side effects (1). There are an estimated 700,000 cholecystectomies done each year in the United States, according to an earlier report (4). With an expected yearly expense of $6.2 billion, the prevalence of gallbladder illness has skyrocketed by 20% in the United States over the past 30 years (5). As healthcare costs continue to rise, better management of cholecystectomy patients' lengthy hospital stays has become critical (5). Reducing the waiting time before emergency surgery is performed is a significant cost-cutting measure. Hospital expenses can be reduced without compromising patient outcomes if medical action is delayed less (6-12). Earlier surgical intervention has also been shown to be preferable to postponed intervention, particularly in the group suffering from severe cholecystitis (6, 10–12). However, consensus regarding what constitutes "early" medical surgery remains elusive. 12 Surgeries performed within 72 hours of patient appearance are most frequently mentioned in the literature. 12 Early surgical action has also been linked by experts to decreased LOS, death, and problems (6, 12). An investigation into what causes prolonged hospital stays for people with severe cholecystitis was conducted in 2014 (13, 14). Although postoperative LOC did not change, the overall surgery expenses for the cholecystectomy patients in this research who had a prolonged LOS rose by as much as 64 percent by the fifth hospital day. 7 Therefore, it appears that promoting "early" operation and avoiding extended LOC are crucial for attaining optimal patient care efficiency. There have been studies looking at LOS in biliary illness, but they have typically only looked at one particular cause rather than the full spectrum. Because of this, data on the variables that affect LOS for all cholecystectomy patients is still scarce. To better serve postoperative patients and reduce overall hospital expenses, we set out to investigate what variables affected cholecystectomy patients' lengths of stay (LOS). The objective of the study was to determine the frequency of prolonged hospital stay and its associated factors in patients undergoing laparoscopic cholecystectomy for symptomatic cholelithiasis at Tertiary Care Hospital, Karachi.

## METHODOLOGY

After the ethical approval from College of Physicians and Surgeons Pakistan, this descriptive study, was conducted at Department of Surgery, Civil Hospital, Karachi, from 08-06-2021 till 08-01-22. Through Non-probability consecutive sampling, patients

undergoing laparoscopic cholecystectomy for symptomatic cholelithiasis for ≥ 24 hours , with ASA ≤ 2, between age 20-60 years and of either gender were included in the study. Patients with history of hospitalization within the last month, with history of Hepatitis C, B or HIV infection, malignancy, recent infection like pneumonia, UTI or cellulitis, hypothyroidism or hyperthyroidism were excluded from the study. All patients gave their informed permission before being randomly assigned to a group or having their data used for study purposes. A brief medical history, including family history of type II diabetes mellitus, hypertension, and smoking habits, as well as basic personal information (age, gender, and current location) was obtained. At the time of admittance, before operation, we assessed each patient's height in metres using a wall-mounted scale, and their weight to the closest kilogramme using a measuring system. Everyone had a cholecystectomy done laparoscopic ally by a physician with at least ten years of expertise. The study tracked individuals who met the practical criteria of having a lengthy hospital stay. After defining what constitutes an extended medical stay, the scholar looked for contributing variables. Longer hospital stays and factors leading to longer hospital stays (old age, diabetes mellitus type II, dyslipidaemia, hypertension, obesity, duration of surgery 60 minutes, postoperative nausea and vomiting (PONV)) were determined by analysing data from quantitative variables (age, height, weight, BMI and duration of surgery) and qualitative variables (gender, family monthly income residence status, occupational status, educational status, type of surgery (elective/emergency), anaemia status). The SPSS version 20 programme was used for data entry and analysis. The average and standard variation were determined for constant factors such as age, height, weight, body mass index, and surgical time. Quantitative factors that did not follow a normal distribution were given as median (IQR) rather than mean SD. Type of surgery (elective/emergency), smoking status, anaemia status, length of hospital stay (yes/no), and factors causing a lengthened hospital stay (diabetes mellitus type II, hypertension, dyslipidaemia, obesity, advanced age, duration of surgery 60 minutes, postoperative nausea and vomiting (PONV) score 2 and postoperative emesis) were analysed using frequencies and percentages. To examine the impact of potential effect moderators on the outcome variable, we stratified patients based on gender, marital status, monthly household income, schooling, employment, operation type (elective vs. emergency), smoking, and anaemia (prolonged hospital stay and factors leading to prolonged hospital stay). The chi-square or Fischer test will be used after the sorting is complete, and a p-value of less than 0.05 will be deemed statistically important.

## RESULTS

In the present study total 88 patients who fulfilled the inclusion criteria was included, their clinical and demographic parameters were shown in table 1. Mean age in our study was 50.14 ±10.49 years. Whereas, mean duration of surgery, BMI, height and weight in our study was 75.25±20.87 minutes, 29.66±2.56 kg/m2, and 152.3±10.28 cm and 76.9±8.87 kg respectively. Out of 88 patients, 43 (48.9%) and 45 (51.1%) were male and female. 38.6%of the patients experienced post-operative nausea and vomiting, while 45.45% experienced postoperative pain. Out of 88 patients, 26 (29.5%) and 62 (70.5%) had and did not have prolonged hospital stay. 69.3% of the recruited patients had diabetes mellitus type II, 83% of the recruited patients had hypertension, and 43.2% of the recruited patients had obesity. 80.7% of the patients were from rural areas, while 19.3% are from rural areas. 58% of the patients underwent elective surgery while 42% had emergency surgery. 36.4% of the patients were smokers in the present study, while 50% were suffering from anaemia. 9.1% of the patients had monthly income ≤ 25000, 35.2% had 25001-50000, and 55.7% > 50000 monthly income. 5.7% of the patients were illiterate, 10.2% had primary education, 36.4% had secondary education, and 47.7% had higher education. Table 2 shows the prolonged hospital stay in age, gender, Residence, income, education wise stratification. Stratification for age with respect to prolonged hospital stay showed that 08 (30.8%), 09 (34.6%) and 09 (34.6%) patients who were in age group 20-40 years, 41-60 years and > 60 years had prolonged hospital stay respectively (P value 0.20). Stratification for gender with respect to prolonged hospital stay showed that 10 (38.5%) and 33 (53.2%) who were in male group had and did not have prolonged hospital stay respectively. Whereas 16 (61.5%) and 29 (46.8%) who were in female group had and did not have prolonged hospital stay respectively (P-value was 0.15). Stratification for residence status with respect to prolonged hospital stay showed that 21 (80.8%) and 50 (80.6%) who had urban residence had and did not have prolonged hospital stay respectively. Whereas 05 (19.2%) and 12 (19.4%) who had rural residence had and did not have prolonged hospital stay respectively (P-value was 0.62). Stratification for duration of surgery with respect to prolonged hospital stay showed that patients who had the surgery for < 60 minutes, 10 (38.5%) and 21 (33.9%) had and did not have prolonged hospital stay respectively. Whereas patients who had the surgery for ≥ 60 minutes, 16 (61.5%) and 41 (66.1%) had and did not have prolonged hospital stay respectively (P-value was 0.43). Stratification for type of surgery with respect to prolonged hospital stay showed that patients who had elective surgery, 17 (65.4%) and 34 (54.8%) had and did not have prolonged hospital stay respectively. Whereas patients who had the emergency surgery, 09 (34.6%) and 28 (45.2%) had and did not have prolonged hospital stay respectively (P-value was 0.25). Stratification for diabetes mellitus type II with respect to prolonged hospital stay showed that patients who had diabetes mellitus, 20 (76.9%) and 41 (66.1%) had and did not have prolonged hospital stay respectively. Whereas patients who did not have diabetes mellitus, 06 (23.1%) and 21 (3.9%) had and did not have prolonged hospital stay respectively (P-value was 0.22). Stratification for hypertension with respect to prolonged hospital stay showed that patients who had hypertension, 22 (84.6%) and 51 (82.3%) had and did not have prolonged hospital stay respectively. Whereas patients who did not have hypertension, 04 (15.4%) and 11 (17.7%) had and did not have prolonged hospital stay respectively (P-value was 0.52). Stratification for dyslipidaemia with respect to prolonged hospital stay showed that patients who had dyslipidaemia, 17 (65.4%) and 39 (62.9%) had and did not have prolonged hospital stay respectively. Whereas patients who did not have dyslipidaemia, 09 (34.6%) and 23 (37.1%) had and did not have prolonged hospital stay respectively (P-value was 0.51). Stratification for obesity status with respect to prolonged hospital stay showed that patients who were obese, 10 (38.5%) and 28 (45.2%) had and did not have prolonged hospital stay respectively. Whereas patients who were not obese, 16 (61.5%) and 34 (54.8%) had and did not have prolonged hospital stay respectively (P-value was 0.36). Stratification for postoperative nausea and vomiting ≥ 2 with respect to prolonged hospital stay showed that patients who had postoperative nausea and vomiting ≥ 2, 23 (88.5%) and 11 (17.7%) had and did not have prolonged hospital stay respectively. Whereas patients who did not have postoperative nausea and vomiting ≥ 2, 03 (11.5%) and 51 (82.3%) had and did not have prolonged hospital stay respectively (P-value was 0.01). Stratification for postoperative pain ≥ 3 with respect to prolonged hospital stay showed that patients who had postoperative pain ≥ 3, 22 (84.6%) and 18 (29%) had and did not have prolonged hospital stay respectively. Whereas patients who did not have postoperative pain ≥ 3, 04 (15.4%) and 44 (71%) had and did not have prolonged hospital stay respectively (P-value was 0.01). Stratification for smoking status with respect to prolonged hospital stay showed that patients who smoked, 11 (42.3%) and 21 (33.9%) had and did not have prolonged hospital stay respectively. Whereas patients who did not smoke, 15 (57.7%) and 41 (66.1%) had and did not have prolonged hospital stay respectively (P-value was 0.30). Stratification for anaemia status with respect to prolonged hospital stay showed that patients who had anaemia, 14

(53.8%) and 30 (48.4%) had and did not have prolonged hospital stay respectively. Whereas patients who did not have anaemia, 12 (46.2%) and 32 (51.6%) had and did not have prolonged hospital stay respectively (P-value was 0.40). Stratification for family monthly income status with respect to prolonged hospital stay showed 01 (3.8%), 12 (46.2%) and 13 (50%) had prolonged hospital stay in patients who belonged to monthly income of ≤ 25000, 25001-50000 and > 50000 respectively. Whereas, 07 (11.3%), 19 (30.6%) and 36 (58.1%) did not have prolonged hospital stay in patients who belonged to monthly income of ≤ 25000, 25001-50000 and > 50000 respectively (P-value was 0.27). Stratification for occupational status with respect to prolonged hospital stay showed that patients who were employed, 12 (46.2%) and 40 (64.5%) had and did not have prolonged hospital stay respectively. Whereas patients who were unemployed, 14 (53.8%) and 22 (35.5%) had and did not have prolonged hospital stay respectively (P-value was 0.08). Stratification for educational status with respect to prolonged hospital stay showed 00 (00%), 08 (30.8%), 08 (30.8%) and 10 (38.5%) had prolonged hospital stay in patients who belonged to illiterate, primary, secondary and higher educational group respectively. Whereas, 05 (8.1%), 01 (1.6%), 24 (38.7%) and 32 (51.6%) had prolonged hospital stay in patients who belonged to illiterate, primary, secondary and higher educational group respectively (P-value was 0.00).

Table 1: clinical and demographic parameters of study patients

| Parameters | Mean± S.D or n (%) (N=88) |
|---|---|
| Age (years) | 50.14 ±10.49 |
| Gender | |
| Male | 43 (48.86%) |
| Female | 45 (51.14%0 |
| BMI (kg/m$^2$) | 29.66±2.56 |
| Height (cm) | 152.3±10.28 |
| Weight (kg) | 76.9±8.87 |
| Duration of surgery (minutes) | 75.25±20.87 |
| Prolonged hospital stay | |
| Yes | 26 (29.55%) |
| No | 62 (70.45%) |
| Diabetes | 61 (69.32%) |
| Hypertension | 73 (82.95%) |
| Dyslipidaemia | 56 (63.64%) |
| Smokers | 32 (36.36%) |
| Obesity | 38 (43.18%) |
| Anaemia | 44 (50%) |
| PONV ≥ 2 | 34 (38.64%) |
| Postoperative pain NRS ≥3 | 40 (45.45%) |
| Residence | |
| Rural | 17 (19.32%) |
| Urban | 71 (80.68%) |
| Surgery type | |
| Elective | 51 (57.95%) |
| Emergency | 37 (42.05%) |
| Family income status | |
| ≤ 25000 | 8 (9.09%) |
| 25001-50000 | 31 (35.23%) |
| >50000 | 49(55.68%) |
| Occupational status | |
| Employed | 52 (59.09%) |
| Unemployed | 36 (40.91%) |
| Educational Status | |
| Illiterate | 5 (5.68%) |
| Primary | 9 (10.23%) |
| Secondary | 32 (36.36%) |
| Higher | 42 (47.73%) |

Table 2: Stratification of prolonged hospital stay in study patients

| Categorization | Prolonged hospital stay | | P value |
|---|---|---|---|
| | Yes | NO | |
| Age | | | |
| 20-40 | 08 (30.8%) | 09 (14.5%) | 0.20 |
| 41-60 | 09 (34.6%) | 29 (46.8%) | |
| > 60 | 09 (34.6%) | 24 (38.7%) | |
| Gender | | | |
| MALE | 10 (38.5%) | 33 (53.2%) | 0.15 |
| FEMALE | 16 (61.5%) | 29 (46.8%) | |
| Residence | | | |
| URBAN | 21 (80.8%) | 50 (80.6%) | 0.62 |
| RURAL | 05 (19.2%) | 12 (19.4%) | |
| Duration of surgery | | | |
| < 60 MINUTES | 10 (38.5%) | 21 (33.9%) | 0.43 |
| ≥ 60 MINUTES | 16 (61.5%) | 41 (66.1%) | |
| Type of surgery | | | |
| ELECTIVE | 17 (65.4%) | 34 (54.8%) | 0.25 |
| EMERGENCY | 09 (34.6%) | 28 (45.2%) | |
| Diabetes | | | |
| YES | 20 (76.9%) | 41 (66.1%) | O.22 |
| NO | 06 (23.1%) | 21 (33.9%) | |
| Hypertension | | | |
| YES | 22 (84.6%) | 51 (82.3%) | 0.52 |
| NO | 04 (15.4%) | 11 (17.7%) | |
| Dyslipidaemia | | | |
| YES | 17 (65.4%) | 39 (62.9%) | 0.51 |
| NO | 09 (34.6%) | 23 (37.1%) | |
| Obesity | | | |
| YES | 10 (38.5%) | 28 (45.2%) | 0.36 |
| NO | 16 (61.5%) | 34 (54.8%) | |
| PONV ≥ 2 | | | |
| YES | 23 (88.5%) | 11 (17.7%) | 0.01 |
| NO | 03 (11.5%) | 51 (82.3%) | |
| Postoperative pain NRS ≥3 | | | |
| YES | 22 (84.6%) | 18 (29%) | 0.01 |
| NO | 04 (15.4%) | 44 (71%) | |
| Smoking | | | |
| YES | 11 (42.3%) | 21 (33.9%) | 0.30 |
| NO | 15 (57.7%) | 41 (66.1%) | |
| Anaemia | | | |
| YES | 14 (53.8%) | 30 (48.4%) | 0.40 |
| NO | 12 (46.2%) | 32 (51.6%) | |
| Family Monthly Income | | | |
| ≤ 25000 | 01 (3.8%) | 07 (11.3%) | 0.27 |
| 25001-50000 | 12 (46.2%) | 19 (30.6%) | |
| > 50000 | 13 (50%) | 36 (58.1%) | |
| Occupational Status | | | |
| EMPLOYED | 12 (46.2%) | 40 (64.5%) | 0.08 |
| UNEMPLOYED | 14 (53.8%) | 22 (35.5%) | |
| Educational Status | | | |
| ILLITERATE | 00 (00%) | 05 (8.1%) | 0.01 |
| PRIMARY | 08 (30.8%) | 01 (1.6%) | |
| SECONDARY | 08 (30.8%) | 24 (38.7%) | |
| HIGHER | 10 (38.5%) | 32 (51.6%) | |

## DISCUSSION

Due to its low risk of complications, short healing time, and low discomfort level, laparoscopic cholecystectomy has become the therapy of choice for severe gallstones. The presence and severity of inflammation, advanced patient age, male sex, and greater body mass index have a disproportionately large impact on the outcome of laparoscopic cholecystectomy, despite the procedure's generally low incidence of morbidity and mortality and of conversion rate to open surgery. Unfortunately, complications during laparoscopic cholecystectomy are not uncommon. Longer recovery times are common, and change to open cholecystectomy may be necessary if bile or stones leak out during the procedure. This procedure's ease or difficulty in a given subject may be hard to predict before surgery. Although it is hard to foresee how challenging a procedure will be, knowing that a change to open may be necessary will help the physician be better prepared and will allow the patient to make an informed decision. For common surgeries like laparoscopic cholecystectomy, a preoperative evaluation of complexity factors is required to prevent problems and delays and ensure a smooth surgical path.

Eighty-eight individuals who fulfilled the study's inclusion and rejection conditions were included. Across all participants in our research, the mean values for age, surgical time in minutes, body mass index, height, and weight were as follows: 50.14±10.49; 75.25±20.87; 29.66±2.56; 152.3±10.28; 76.9±8.87. Of the total 88

cases, 26 had a lengthy inpatient stay (29.5%), while 62 did not (70.5%).

500 individuals who had planned LC and had good outcomes were included in this retrospective cohort research. One was considered to have a short hospital stay if they were released from the hospital within 24 hours of their surgery, while one with a lengthy hospital stay if they stayed longer than that. Using a multivariate analysis, ten separate variables that could lead to a lengthy medical stay were found. Patients with cirrhosis, acute cholecystitis, cholangitis, or pancreatitis in the past, patients on anticoagulation with warfarin, patients with standard-pressure pneumoperitoneum, patients who were given metoclopramide as an intraoperative antiemetic drug, patients who were using an abdominal drain, patients with a numeric rating scale for pain greater than 3, patients who required more than two doses of oral analgesia (15).

Yet another prospective cohort research with 580 patients with clinical cholelithiasis who were hospitalised and managed with laparoscopic surgery was performed over a five-year span (January 2005 to December 2010) at a university medical centre. Some 187 (5.84%) of the total 580 patients had stays of three weeks or more. The right hypochondrial pain was the most common presenting symptom (58.79%), followed by right hypochondrial pain and epigastric pain (27.6%). Twenty-eight factors were found as contributors to the lengthened length of hospital stay, including ten patient-related (15.86%), twelve surgical (16.55%), and six post-surgical (16.38%) factors. Co pathological conditions, a challenging surgical process, and significant postoperative problems were key contributors to the length of patients' hospital stays (16).

Between November 2000 and August 2003, another research analysed 130 patients who had received complex laparoscopic operations. A total of 81 patients (62.3% of the total) were released from the hospital within 3 days of operation, with the median following hospital stay being 3 days (interquartile range 2-5). Both a higher ASA score (3 or 4) and a longer prior hospital stay (OR = 0.151 per day, P = 0.001) were significant indicators of a longer postpartum hospital stay. Both emergency admittance (OR = 9.516, 95% CI 5.770-13.261, P 0.0001) and underlying cancer disease (OR = 7.948, 95% CI 3.623-12.271, P = 0.0004) were independent indicators of length of preoperative hospital stay. Most people who have modern laparoscopic procedure have a speedy recovery and discharge from the hospital. Patients with high disability and those who have been hospitalised for more than 6 days for an acute or invasive illness before operation are at increased risk for a prolonged postpartum hospital stay (greater than 3 days). Hospital stays following operation are independent of the length of the initial surgical procedure (17).

There were 236 individuals in the control group with typical durations and 134 in the LD group. One hundred and seventeen patients (4.6%) needed to have their procedures switched from laparoscopic to open. The average length of stay (LOS) in the control group was 4.82 days, while the LD group's LOS was 12.08 days. Patients in the LD group remained longer than 14 days at a time, but nobody had to be readmitted. There were statistically significant differences between the groups on thirteen clinical variables. The ASA score and the complexity of the LC were the most reliable predictors of a longer LOS. The length of stay (LOS) predictor score was comprised of eight variables chosen from a total of thirteen factors, and it was used to identify whether or not a patient's medical stay would be longer than expected (sensitivity, 82.1%; specificity, 75.0%) (18).

## CONCLUSION

To alleviate symptoms, laparoscopic cholecystectomy is typically performed, but in some cases conversion is necessary. In order to improve patient care and shorten hospital stays, risk classification based on patient- and surgeon-dependent factors may be useful. Longer hospital stays were associated with more adverse events (PONV > 2, postoperative pain > 3), higher rates of diabetes, hypertension, and cholesterol, and longer surgical times. Reducing the length of time spent in the hospital after surgery requires thorough pre-operative evaluation, precise surgical execution, and well-thought-out post-operative treatment.

## REFERENCES


1 Sangers G, Kingsnorth AN. Gallstones. BMJ. 2007;335:295-299.
2 Shaffer EA. Gallstone disease: epidemiology of gallbladder stone disease. Best Pract Res Clin Gastroenterol. 2006;20(6):981-996.
3 Hu ASY, Menon R, Gunnarsson R, de Costa A. Risk factors for conversion of laparoscopic cholecystectomy to open surgery: A systematic literature review of 30 studies. Am J Surg. 2017;214(5):920-930.
4 Scott TR, Zucker KA, Bailey RW. Laparoscopic cholecystectomy: A review of 12,397 patients. Surg Laparosc Endosc. 1992;2(3):191-198.
5 Nikfarjam M, Niumsawatt V, Sethu A, Fink MA, Muralidharan V, Starkey G, et al. Outcomes of contemporary management of gangrenous and non-gangrenous acute cholecystitis. HPB. 2011;13(8):551-558.
6 Menahem B, Mulliri A, Fohlen A, Guittet L, Alves A, Lubrano J. Delayed laparoscopic cholecystectomy increases the total hospital stay compared to an early laparoscopic cholecystectomy after acute cholecystitis: An updated meta-analysis of randomized controlled trials. HPB. 2015;17(10):857-862.
7 Schwartz DA, Shah AA, Zogg CK, Nicholas LH, Velopulos CG, Efron DT, et al. Operative delay to laparoscopic cholecystectomy: Racking up the cost of health care. J Trauma Acute Care Surg. 2015;79(1):15-21.
8 Michailidou M, Kulvatunyou N, Friese RS, Gries L, Green DJ, Joseph B, et al. Time and cost analysis of gallbladder surgery under the acute care surgery model. J Trauma Acute Care Surg. 2014;76(3):710-714.
9 Murata A, Okamoto K, Matsuda S, Kuwabara K, Ichimiya Y, Matsuda Y, et al. Multivariate analysis of factors influencing length of hospitalization and medical costs of cholecystectomy for acute cholecystitis in Japan: A national database analysis. Keio J Med. 2013;62(3):83-84.
10 Ciftci F, Abdurrahman I, Girgin S. The outcome of early laparoscopic surgery to treat acute cholecystitis: A single-center experience. Int J Clin Exp Med. 2005;8:4563-4568.
11 Gurusamy KS, Davidson C, Gluud C, Davidson BR. Early versus delayed laparoscopic cholecystectomy for people with acute cholecystitis. Cochr Database System Rev.
12 Cao AM, Eslick GD, Cox MR. Early laparoscopic cholecystectomy is superior to delayed acute cholecystitis: a meta-analysis of case--control studies. Surg Endosc. 2016;30(3):1172-1182.
13 Cheng WC, Chiu YC, Chuang CH, Chen CY. Assessing clinical outcomes of patients with acute calculous cholecystitis in addition to the Tokyo grading: A retrospective study. Kaohsiung J Med Sci. 2014;30(9):459-465.
14 Wright GP, Stilwell K, Johnson J, Hefty MT, Chung MH. Predicting length of stay and conversion to open cholecystectomy for acute cholecystitis using the 2013 Tokyo Guidelines in a US population. J Hepatobil Pancreat Sci. 2015;22(11):795-801.
15 Ko-Iam W, Sandhu T, Paiboonworachat S, Pongchairerks P, Chotirosniramit A, Chotirosniramit N et al. Predictive factors for a long hospital stay in patients undergoing laparoscopic cholecystectomy. Int J Hepatol. 2017;2017:5497936.
16 Talpur KAAH, Malik AM, Memon IQ, Laghari AA, Qureshi JN, Sangrasi AK. Factors responsible for prolonged postoperative hospital stay after laparoscopic cholecystectomy. Pak J Med Sci 2011;27(4):759-62.
17 Issa ME, Al-Rashedy M, Ballester P, Ammori BJ. Predictors of duration of postoperative hospital stay in patients undergoing advanced laparoscopic surgery. Surg Lap Endosc & Percut Tech 2005;15(1):90-93.
18 Morimoto Y, Mizuno H, Akamaru Y, Yasumasa K, Noro H, Kono E, Yamasaki Y. Predicting prolonged hospital stay after laparoscopic cholecystectomy. Asian J Endosc Surg. 2015 Aug;8(3):289-95.