Is Outpatient Laparoscopic Cholecystectomy Safe and Cost-effective?

A Model to Study Transition of Care

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Background: There is increasing pressure to perform traditional inpatient surgical procedures in an outpatient setting. The aim of the current trial was to determine the safety and cost savings of performing laparoscopic cholecystectomy in an outpatient setting using a "mock" outpatient setting.

Methods: Patients who were scheduled for laparoscopic cholecystectomy by four attending surgeons and for whom operating time was available in the outpatient center were studied. All patients received a standardized anesthetic, including ondansetron, and were discharged from the outpatient postanesthesia care unit if appropriate. At discharge, all patients were admitted to a clinical research center where they were observed in a "mock home" setting and monitored for complications that would have necessitated readmission. A decision analysis was created assuming all patients underwent outpatient surgery with either direct admission or discharge to home and readmission if complications developed.

Results: Of 99 patients who were enrolled in this study, 96 patients would have met the discharge criteria for home. No major complications were observed in these 96 patients. Eleven patients experienced postoperative nausea and vomiting, of which required an additional 24 h of hospital observation. In the decision model, the optimal strategy would be to perform the procedure on an outpatient basis and readmit patients only for complications, with an average baseline cost savings of $742/patient.

Conclusions: The results show that outpatient laparoscopic cholecystectomy is safe and cost-effective in selected patients, and that the mock home setting provides a means of studying the safety of transition of care. (Key words: Ambulatory; complications; decision analysis; economics; nausea.)

RECENT trends in surgery reported the increasing incidence of traditional inpatient surgical procedures in the outpatient setting. It has been estimated that more than 60% of all surgical procedures in the United States will be performed on an outpatient basis by the year 2000.¹ The impetus for this development has been the desire to reduce healthcare expenditures, particularly by reducing hospital duration of stay. Frequently, the decision to perform a surgical procedure in the outpatient setting is based on anecdotal evidence and insurance company guidelines involving healthy patients. The evidence supporting the safety of ambulatory surgery is predominantly composed of case series of selected patients who would tolerate an outpatient procedure. However, the practice of immediate postoperative discharge (i.e., outpatient surgery) of selected patients frequently leads to generalization to higher-risk patients. As these changes in practice patterns are diffused, the safety of early discharge needs to be established.² For example, despite the widespread practice of outpatient tonsillectomy, there have been several recent reports that have sug-
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gested that there are subsets of patients in whom such a practice would lead to unacceptable outcomes. There are currently no objective methods of prospectively determining the safety of early discharge before adoption of this approach for a given surgical procedure, particularly in patients with comorbidities.

Laparoscopic cholecystectomy has largely replaced open cholecystectomy for the treatment of gallstone disease in the United States, and is an example of a procedure that is increasingly performed on an outpatient basis. Importantly, a substantial portion of patients undergoing this procedure may require postoperative admission or readmission after discharge to home. Many surgeons prefer longer observation periods, e.g., for 24 h or overnight, to observe for potential complications. Considering the potential increased morbidity of early discharge, a rigorous evaluation of the safety of this approach and appropriate patient selection is necessary.

The literature supporting the routine practice of sending patients home within hours after laparoscopic cholecystectomy includes studies that support and refute the safety of this practice, many without rigorous patient selection or postoperative surveillance. Specifically, with respect to laparoscopic cholecystectomy, observation for and treatment of postoperative nausea and vomiting (PONV) is critical because it represents one of the greatest potential obstacles to same-day discharge, with a reported incidence of 12-52%. Therefore, one goal of any anesthetic regimen must be to reduce the incidence of PONV, which must be incorporated into the perioperative plan.

The primary aim of this study was to develop a model to study the transition of surgical care from an inpatient to outpatient setting, using laparoscopic cholecystectomy as an example. We hypothesized that laparoscopic cholecystectomy could be performed on an outpatient basis, i.e., discharged to home on the day of surgery, with a low incidence of complications and that it would prove to be cost-effective from a provider perspective. To determine the safety of performing laparoscopic cholecystectomy on an outpatient basis before routinely adopting such a practice, we designed a “mock” outpatient setting for overnight observation after discharge from an outpatient surgery unit. We used admission to a clinical research center as a surrogate for home, because at the time of initiation of the study we believed that a medical “safety net” was necessary, and this scenario represented the least-intensive care setting. As a means of assessing the potential cost savings of an outpatient laparoscopic cholecystectomy, a decision-analysis model was developed.

Methods and Materials

After obtaining approval from the Institutional Review Board, all patients older than 18 years scheduled for laparoscopic cholecystectomy at the Johns Hopkins Hospital Outpatient Center were evaluated for inclusion in this open-label observational trial between July 1994 and June 1996. The number of patients studied was determined by the predefined duration of the pilot study (2 yr) and was not related to a predetermined sample size. Four faculty surgeons experienced in laparoscopic cholecystectomy performed all procedures with resident assistance. The decision to perform the surgery on an inpatient or outpatient basis was determined by the available operating room time. If morning time was available in the Johns Hopkins Hospital Outpatient Center then surgery was performed on an outpatient basis. Time was designated for outpatient laparoscopic cholecystectomies at least twice a week, and additional time was available if other services did not use their designated time. Eligibility criteria included all patients with an American Society of Anesthesiologists classification of I, II, or III. Patients who had an ASA classification of IV were excluded from the study because the current standard of care would preclude them from undergoing laparoscopic cholecystectomy in an outpatient surgery setting. Informed written consent was obtained.

Anesthetic Regimen

All patients received 4 mg ondansetron intravenously before induction of anesthesia. General tracheal intubation was performed using propofol and midazolam. The maintenance anesthetic consisted of a continuous propofol infusion, nitrous oxide (70%) and fentanyl (up to 250 μg). Neuromuscular blockade was maintained with an infusion of midazolam. No reversal of neuromuscular blockade was administered. Ketorolac, 15 or 30 mg intravenously, was given intraoperatively. Bupivacaine, 0.5%, was sprayed over the gallbladder bed, between the diaphragm and the liver, and infiltrated into operative wounds for a maximum of 20 mL. At the conclusion of the case, the surgeons subjectively categorized the difficulty of the procedure as “easy,” “moderate,” or “difficult.” Postoperatively, the patients were admitted to the outpatient Post Anesthesia Care Unit (PACU) where they were monitored per established pro-

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tocols. Assessments of pain and nausea-vomiting were performed by the nurses according to the standard of care in the PACU. Rescue antiemetic therapy was administered at any time at the request of the patient or physician. The choice of the antiemetic was left to the discretion of the physician.

The time from arrival to the PACU until the patient was able to achieve standard discharge criteria from the PACU using a postanesthesia discharge scoring system (i.e., able to sit, stand, ambulate, void, tolerate fluids) was noted. Patients were initially admitted to a phase I PACU and transferred to a phase II PACU when the modified Aldrete score was met. When discharge criteria were met, the patient was given discharge instructions in the PACU as if they were going home. If all of these criteria were met and the patient had no continuing medical problems, an attending anesthesiologist determined that the patients met criteria for discharge to home. If discharge criteria were met within 6 h, or at 6 h if they were not met, the patient was transported by wheelchair (through a connecting tunnel) and admitted to the Clinical Research Center (CRC) of The Johns Hopkins Hospital. Six hours is defined for all patients as the maximum duration of stay in the outpatient PACU before admission to the hospital. Patients whose surgery was converted from laparoscopic to open cholecystectomy or in whom major perioperative morbidity developed before discharge from the outpatient unit were admitted to a surgery inpatient floor and were excluded from the study.

Postoperative Care (Clinical Research Center)

For postoperative care, the patients were assigned to low- (ASA I) or high-risk groups (ASA II or III). For the low-risk group, vital signs were evaluated at arrival and before discharge. To maintain the medical safety net, the high-risk group had vital signs recorded every 4 h. The patients were given instructions regarding the need to notify medical personnel as if they had gone home (e.g., severe pain, nausea, vomiting, lightheadedness). Oral intake and activity were ad libitum. Any nursing interventions had to be initiated by the patient (i.e., request for pain medications). The patients were monitored for study endpoints that would indicate the need to use hospital resources (based on patient-initiated problems, and/or abnormal vital signs or laboratory tests), and recorded as the time initially reported. These included intractable pain necessitating intravenous medications and intractable nausea or vomiting, or both, requiring intravenous fluids or medications; respiratory distress; angina; arrhythmias; or hemodynamic instability. Patients were discharged to home on the morning of the first postoperative day (24-30 h) if they were adequately tolerating liquids and had stable vital signs, or they were admitted to an inpatient ward if complications developed. During their stay in the CRC, the nurse-to-patient ratio varied between 1:3 during the day to 1:9 during the night.

Both the patient and the nursing staff of the CRC were queried at the patient discharge regarding whether the patient’s postoperative course was sufficiently uncomplicated that the patient could have been discharged to home on the day of surgery. The patient also completed a survey at discharge to determine the factors influencing same-day discharge. Specific questions included, “If you were to go home yesterday after having surgery without staying overnight in the hospital, would you have had someone to help you at home, needed someone to help take care of you, been able to walk to the bathroom, walk up stairs and get food on your own?”

Assessment of Charges

A cost-identification analysis was performed from the perspective of the provider using charge data for calendar year 1995 from the case-mix files of The Johns Hopkins Hospital. Data were obtained for the subset of patients who were either enrolled in the prospective trial during 1995 (50 patients) or admitted on the day of surgery for a 24-h stay and underwent surgery performed by one of the four surgeons during 1995 (56 patients). Professional fees were not included in the analysis.

The Medicare general inpatient routine service charge per diem was used to estimate the charges of an uncomplicated overnight admission. Hospital charges were obtained from the case-mix files of The Johns Hopkins Hospital. Total charges and charges by charge category (e.g., operating room, supplies, admission, and laboratory testing) were evaluated. For the purposes of developing a decision model, charges related to a theoretical home care and readmission were determined. Charges related to home health care were determined based on schedules of the Hopkins Home Health Care Group. Charges related to the emergency room were based on an average charge for an intermediate visit to the emergency room.

Statistical Analysis and Cost-effectiveness Model Construction

Demographics, intraoperative, and PACU times are expressed as the mean ± standard deviation. Predictors of
postoperative complications and willingness to be discharged to home was determined using the Student t test or Fisher exact test, where appropriate, with $P < 0.05$ considered statistically significant. Multiple logistic regression was used to determine independent predictors of the patient’s belief that they were ready to go home on the day of surgery. A backward stepwise logistic regression analysis was performed using JMP v.3.0 software (SAS Institute, Cary, NC) for the Macintosh (Apple Computers, Cupertino, CA). Variables were entered into the model based on the magnitude of their effect and statistical significance, with $P < 0.25$ used as statistical significant for this part of the process. Ability to walk to the bathroom, walk up stairs, and get food on one’s own were entered into the model separately because they are not independent variables. Those variables that were independently and significantly ($P < 0.05$) related to readiness to go home on the day of surgery were determined.

A model was constructed to determine cost savings using DATA 3.0 software (Trecage software, Boston, MA). Because there are substantial cost savings related to performing the procedure in an outpatient facility, a strategy using outpatient laparoscopic cholecystectomy with routine admission to an inpatient unit was compared to outpatient surgery with an emergency room or home healthcare visit only if complications developed. For each complication, it was assumed that one third would require an emergency room visit and the remaining patients could be treated at home with a home healthcare nursing visit. These estimates were derived from discussion with the attending surgeons and patients. Data for the model were based on the probability of complications and hospital charges, as described previously. Sensitivity analysis was performed to determine the influence of the probability of complications on the cost savings, as well as the influence of the rate of emergency room admission versus treatment at home.

### Table 1. Demographics of Patients (N = 96) Who Underwent Outpatient Laparoscopic Cholecystectomy

<table>
<thead>
<tr>
<th>Factor</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>46 ± 13</td>
</tr>
<tr>
<td>Female [number (%)]</td>
<td>73 (74)</td>
</tr>
<tr>
<td>Height (in)</td>
<td>65 ± 4</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>80 ± 18</td>
</tr>
<tr>
<td>Black race [number (%)]</td>
<td>26 (27)</td>
</tr>
<tr>
<td>ASA classification [number (%)]</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>11 (12)</td>
</tr>
<tr>
<td>II</td>
<td>76 (79)</td>
</tr>
<tr>
<td>III</td>
<td>14 (9 )</td>
</tr>
<tr>
<td>Coronary artery disease [number (%)]</td>
<td>5 (26)</td>
</tr>
<tr>
<td>Hypertension [number (%)]</td>
<td>12 (26)</td>
</tr>
<tr>
<td>Current tobacco use [number (%)]</td>
<td>17 (18)</td>
</tr>
<tr>
<td>Lung disease [number (%)]</td>
<td>14 (15)</td>
</tr>
<tr>
<td>Diabetes [number (%)]</td>
<td>4 (4)</td>
</tr>
</tbody>
</table>

The subhepatic space at the end of the procedure. This patient was not eligible for discharge to home on the day of surgery and was also excluded from the study.

Demographics on the remaining 96 patients are shown in table 1. All had an uneventful intraoperative course. The average anesthesia time was 1.4 ± 0.3 h (range, 0.9–2.4 h). The average operating time was 1.1 ± 0.3 h (range, 0.5–2.2 h). Of all the laparoscopic cholecystectomies, 54 of 96 (56%) were rated as easy, 33 of 96 (34%) were rated as moderate, and 9 of 96 (10%) were rated as difficult.

### Postanesthesia Care Unit

While in the outpatient PACU, none of the patients experienced any cardiovascular or pulmonary complications. Postoperative pain was managed with intravenous fentanyl, which was supplemented with intravenous morphine if the pain was severe. The average amount of fentanyl administered was 94 ± 81 μg (range, 0–400 μg). Seven patients required morphine supplementation (range, 1–20 mg). Only 6% of the patients experienced nausea necessitating pharmacologic intervention (Compazine [SmithKline-Beecham, King of Prussia, PA] or metoclopramide), and there was no emesis in the PACU.

All 96 patients met discharge-to-home criteria within 6 h and were therefore transferred to the CRC. The average time from arrival to the PACU until time ready to discharge was 3.1 ± 1.2 h (range, 1.3–5.5 h).

### Clinical Research Center

While in the CRC, none of the patients experienced any cardiovascular or pulmonary complications. Ninety-six percent of patients (94%) did not require any additional phar-

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macologic intervention for postoperative pain other than routine oral medications (acetaminophen with oxy
codone or meperidine). Six patients required intramus
cular analgesics (morphine or meperidine), which
would not have been available at home. Four of these six
patients also had symptoms of PONV, necessitating phar
macologic therapy.

Eleven (12%) of 96 patients experienced PONV necessi
tating intravenous or intramuscular pharmacologic
therapy. The time between discharge from the PACU
and onset of treatment is shown in figure 1. Of the 11
patients with PONV requiring treatment, only 3 required
an additional day in the hospital because of the inability
to tolerate oral intake, whereas symptoms in the other
patients resolved after a single treatment. One of the
three patients who required a second day in the hospital
complained of lightheadedness and demonstrated ortho
dynamic hypotension, probably caused by decreased oral
intake. The symptoms resolved with intravenous fluid
hydration. A history of PONV was associated with an
increased risk of PONV, although this trend did not
reach statistical significance. Total fentanyl dosage in
the PACU was significantly higher in the group in which
PONV requiring treatment subsequently developed
(130 ± 23 μg in the group with PONV versus 77 ± 8 μg
in the no complications group; P < 0.05), although there
was significant overlap in total fentanyl usage between
the two groups. No other demographic factor predicted
complications.

A discharge survey completed by the nursing staff
indicated that 77 of 96 patients (79%) using the current
regimen could have been discharged to home on the day
of surgery. Ninety of 93 patients (97%) who were dis
charged to home from the CRC completed the discharge
survey. Three patients who were discharged to home did
not complete a survey. Only 26 of 90 (29%) patients who
responded stated that they were ready to be discharged
to home on the day of surgery, the remainder of the
patients stated they would have required an overnight
admission (71%). The percentage of patients who stated
they were ready to be discharged to home directly after
surgery was significantly lower (29%) than the nurses
thought were acceptable for discharge after surgery
(79%, P < 0.001). Univariate predictors of readiness to
go home on the day of surgery according to the patient
are shown in table 2. Independent predictors of readi
ness to go home on the day of surgery included age
(odds ratio, 1.07/yr [1.01–1.22, 95% confidence inter
val]) and ability to get food on one’s own (odds ratio,
3.24 [1.62–6.50, 95% confidence interval]).

Costs
Analysis of charge data for outpatient and inpatient
stays at The Johns Hopkins Hospital is shown in table 3.
Outpatient laparoscopic cholecystectomy was associ
ated with an average $2,127 less compared to an inpa
tient procedure associated with a one-day hospital stay.
Some of the lesser charges relate to a less-expensive
charge/min of operating room usage, which reflects less
intensive resources necessary to maintain the outpatient
center operating rooms. The operating room time was
also shorter in the outpatient center because of a lesser
extent of resident teaching in this setting. Charges are
also less for supplies in the outpatient setting. Pharmacy
charges reflect operating room nursing and ward
charges, but do not include costs of anesthetic drugs.

| Table 2. Predictors of Readiness for Immediate Discharge after Surgery on Exit Interview |
|-----------------|-----------------|-----------------|
| Factor          | Ready to Go Home | Not Ready to Go Home |
|                 | Yesterday (N = 26) | Yesterday (N = 64) |
| Age* (yr)       | 52 ± 12          | 42 ± 13          |
| Gender (male)   | 6 (23)           | 17 (26)          |
| Married         | 15 (58)          | 41 (64)          |
| Children at home| 8 (31)           | 31 (48)          |
| Help at home    | 25 (96)          | 58 (91)          |
| Need help at home* | 13 (50)     | 53 (82)          |
| Walk to bathroom* | 26 (100)   | 43 (67)          |
| Walk up stairs* | 18 (69)          | 12 (19)          |
| Get food on own* | 19 (73)          | 23 (36)          |

* P < 0.05.
Values are number (%).
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Table 3. Average Charges Associated with the Subset of Laparoscopic Cholecystectomy Performed at the Johns Hopkins Hospital during 1995

<table>
<thead>
<tr>
<th>Charge Bucket</th>
<th>Inpatient (N = 56)</th>
<th>Outpatient (N = 50)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>4,238</td>
<td>2,111</td>
</tr>
<tr>
<td>SDC charge*</td>
<td>—</td>
<td>144</td>
</tr>
<tr>
<td>Blood/other charges</td>
<td>142</td>
<td>64</td>
</tr>
<tr>
<td>Laboratory</td>
<td>319</td>
<td>73</td>
</tr>
<tr>
<td>Supplies</td>
<td>958</td>
<td>761</td>
</tr>
<tr>
<td>Operating room</td>
<td>1814</td>
<td>900</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>246</td>
<td>165</td>
</tr>
<tr>
<td>Radiology</td>
<td>32</td>
<td>4</td>
</tr>
<tr>
<td>PT/OT</td>
<td>7</td>
<td>—</td>
</tr>
<tr>
<td>Inpatient admission</td>
<td>720</td>
<td>—</td>
</tr>
</tbody>
</table>

* SDC = same-day care center charge for preoperative and recovery services.

Decision Analysis

A decision model comparing routine overnight admission versus treatment for complications after outpatient surgery was constructed and is shown in figure 2. The probabilities of being admitted after surgery, requiring readmission and a home healthcare visit were based on those probabilities observed in the current trial. Specifically, the probability of complications in the base-case scenario was set at 0.11 (11 of 96); the probability of direct admission for a surgical reason was 0.03, based on the two patients who required an open procedure and on the one patient who had a drain placed; and a probability of readmission was 0.03, based on the three patients who required an additional day of admission in the current trial. Charges associated with outpatient surgery were based on those obtained from the case-mix files of The Johns Hopkins Hospital during 1995. An emergency room visit that includes intravenous fluids and medication would be associated with a $350 charge, whereas a 1-h home healthcare visit that included a dose of ondansetron would be associated with a $145 charge. Considering the complication rate observed in the current trial, the optimal decision would be to perform the procedure on an outpatient basis, with an average baseline cost savings of $742. The probability of development of a complication of PONV varied from 0% to 50% in a one-way sensitivity analysis and is shown in figure 3. Even if there was a 50% incidence of complications, outpatient laparoscopic cholecystectomy would be associated with an average $647 savings for each patient. Charge savings would increase if the percentage of patients who required treatment of PONV decreased.

Discussion

Our results show that outpatient laparoscopic cholecystectomy is safe and is associated with cost savings using protocols developed at our institution. We observed no major morbidity from early discharge in this series, with only minor complications observed within the first 24 h. The transfer from an inpatient to an outpatient procedure was associated with an average savings of $2,127 in total hospital charges, although the savings in hospital costs would be much smaller because actual medical costs represent only a fraction of charges. Using a decision-analysis model and assuming an efficiency and cost saving observed in an outpatient setting, outpatient laparoscopic cholecystectomy is cost-efficient compared to inpatient surgery, even assuming the rate of readmission suggested by the current study. Even hypothetically considering that all of our patients with PONV would require readmission, this outpatient strategy would result in cost savings from a payer perspective.

The pressure to transition a particular surgery from an inpatient to an outpatient procedure is frequently based on reimbursement rather than medical issues. Initially, highly selected patients are chosen for the outpatient procedure, and eventually the results are generalized to include patients with some degree of comorbidity. The ability to evaluate such practices is dependent on the accuracy of follow-up after discharge, which may be poor or unreported. For example, outpatient mastectomy has been advocated as a safe and cost-effective procedure. In a recent analysis of Medicare claims data, however, the incidence of readmission for complications, such as sepsis, urinary tract infection and pneumonia, were significantly higher in the women who underwent outpatient procedures than an overnight inpatient stay. The current trial is unique in that a mock outpatient environment was developed to evaluate the safety of routinely performing a procedure on an outpatient basis before fully adopting such practices at our institution. Such an approach could be used to study other surgical procedures before widespread transfer to an outpatient setting.

With respect to outpatient laparoscopic cholecystectomy, there are several issues regarding safety and the readiness to discharge to home. Patients undergoing laparoscopic surgery may require conversion of surgery to an open procedure or may not meet discharge criteria. We showed a 3% incidence of direct admission to an inpatient ward (which is similar or lower than suggested
Fig. 2. A decision analysis model to compare a strategy of outpatient surgery with routine overnight admission to a ward compared with outpatient surgery and discharge to home if patients meet established criteria. For the discharge-home strategy, the model assumes that two thirds of complications could be treated at home by a home healthcare nurse, whereas the remainder of the patients in whom a complication develops requires an emergency room visit and possible admission (see text). The probabilities for each of the nodes are listed in the box, and are based on the rates observed in the current series. Using the baseline values listed in the tree (base-case scenario), the optimal strategy would be outpatient surgery with discharge to home. #Complimentary probability for a given node; i.e., 1 - probability of the complimentary node; cER = cost of an emergency room visit; CHHC = cost of a home healthcare visit; cSurgery = cost of surgery on an outpatient basis; pAAdmission = probability of direct admission after surgery; pAAdmission2 = probability of readmission after discharge; pComplications = probability of development of complications at home.

by other reports using selected patients) after surgery related to surgical issues such as conversion to an open procedure and placement of a subhepatic drain. Although all of our patients who underwent uncomplicated laparoscopic cholecystectomy met discharge criteria for home from the PACU, a large patient population may also include patients who do not meet additional discharge criteria. A larger population may have also demonstrated a higher rate of major complications after discharge to home, because the actual rate of complications may be as high as 3% based on the confidence intervals for the absence of complications in the current study. We had a diverse patient population and patients were not specifically selected for their ability to be discharged to home after surgery, as reported by our patient demographics. The acceptability of performing

Fig. 3. A one-way sensitivity analysis to evaluate the effect of varying the complication rate from 0% to 50% on the potential savings from discharge to home immediately after outpatient laparoscopic cholecystectomy. The strategy of outpatient surgery with routine overnight admission would be associated with an average charge of $2.853. If there were no complications, an outpatient strategy would be associated with an average charge of $2,111, whereas a 50% complication rate would be associated with an average charge of $2,206. Therefore, outpatient surgery with immediate discharge would always provide substantial savings within the clinically relevant range using the assumptions based on the results of the current series.
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FOREWORD

In the past, the treatment of choledocholithiasis in the outpatient setting has been limited to the relief of biliary colic and the management of acute cholecystitis. The advent of laparoscopic cholecystectomy (LC) has revolutionized this approach, offering an alternative to the traditional open cholecystectomy for the treatment of symptomatic cholelithiasis. The laparoscopic approach has been shown to be safe and effective, with a lower rate of complications and shorter hospital stays compared to the open procedure.

In this issue, Dr. Smith presents a comprehensive review of the literature on the safety and economics of outpatient cholecystectomy. He discusses the potential benefits of this procedure, including reduced hospital stays, decreased costs, and improved patient satisfaction. The author also addresses the concerns related to the safety of outpatient cholecystectomy, including the risk of postoperative pain and infection.

Dr. Smith highlights the importance of a multidisciplinary approach, involving not only the surgeon but also the anesthesiologist, nurses, and other healthcare providers. He emphasizes the need for careful patient selection and the importance of preoperative evaluation to identify potential complications.

Overall, the study by Dr. Smith provides valuable insights into the safety and economics of outpatient cholecystectomy, and it is hoped that this information will help to guide clinical decision-making in this area.

References


included in our model an 11% complication rate observed in our clinical trial. In assessing charges for readmission we included the costs of an emergency room visit, a room fee, and an estimated charge for drugs and supplies. Considering that the majority of these problems (80%) are related to PONV without other associated complications, they could theoretically be resolved in the emergency room or by a home healthcare nurse. Alternatively, Carroll et al. suggest that many of these episodes would have been self-limited and not have required treatment if the patient were home. The advantage of using decision analysis is that a sensitivity analysis can be performed, assuming lower rates of emergency room admission or readmission. In such situations, greater cost savings could be achieved.

The current study involved analysis of a selected cohort of patients based on available operating room time, which may have introduced substantial selection bias to our analysis. Additionally, the presence of nursing personnel in the CRC could have led to over-reporting of complications. However, an analysis of a subsequent cohort of 130 patients who underwent “true” outpatient surgery at our institution had a similar incidence of complications and readmissions to the mock setting we designed. In this study, a total of eight patients (6.2%) were admitted to the hospital directly from the PACU, with six being discharged on the first postoperative day. After PACU discharge, an additional six patients (4.6%) required hospital admission. Although we attempted to detect major morbidity, which would have resulted in readmission to the hospital, we did not monitor patients for subclinical evidence of dysfunction. Laparoscopic cholecystectomy has been associated with marked decrements in pulmonary function. We did not specifically test pulmonary function after laparoscopic cholecystectomy and did not observe any overt pulmonary problems. Our analysis is also limited, similar to other economic analyses, in that we used charges rather than actual costs for our economic analysis other than drug acquisition costs. Charges in Maryland hospitals are regulated, and the cost:charge ratio at The Johns Hopkins Hospital varies between 74-76% for the services provided. Therefore, all of the current estimates could be adjusted by this ratio to calculate “cost,” although there are also problems inherent in the use of such ratios. Primarily, fixed and marginal costs should be calculated, as demonstrated by Macario et al. Additionally, operating room costs in the outpatient setting are frequently less than those of the inpatient setting because of greater efficiency and less-intense resource use related to case mix.

Although outpatient laparoscopic surgery is feasible, appears to be safe, and dramatically reduces hospital charges, patients frequently prefer the security and comfort of a hospital. Our analysis did not include potential patient (society) costs of early discharge because all patients were admitted to the hospital overnight, nor did it include assessment of patient satisfaction. Indirectly, we assessed patient preferences by querying patients of their desire to stay in the hospital, but the strength of these desires was not quantified. Future research will be necessary to determine the additive value of these services in decreasing readmission and increasing patient satisfaction and the generalizability of using a “low-intensity care” setting in predicting outcome when patients are discharged directly to home.

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