

Implementation of Pathway-Based Care for Patients Undergoing Daytime Cholecystectomy

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Objective: To investigate the impact of pathway-based care on patients with cholelithiasis undergoing daytime cholecystectomy.

Methods: Two hundred fifty-eight patients scheduled for daytime cholecystectomy were randomly assigned to a pathway care group and a control group (129 each). The control group received standard care, while the pathway care group received additional pathway-based care to assess its effectiveness.

Results: Before surgery (T_0), there were no significant differences between the groups in stress response indicators, including body temperature (T), heart rate (HR), blood oxygen saturation (SpO_2), and blood glucose levels ($P > 0.05$). Ten minutes after the onset of intraoperative pneumoperitoneum (T_1), the pathway care group did not exhibit significant changes in T, HR, or blood glucose levels compared to pre-surgery values ($P > 0.05$), but SpO_2 significantly improved ($P < 0.05$). In contrast, all stress response indicators in the control group worsened at T_1 compared to baseline ($P < 0.05$). At the end of surgery (T_2), the pathway care group maintained stable stress response indicators relative to baseline ($P > 0.05$), while the control group showed significant increases ($P < 0.05$). Additionally, hospitalization time in the pathway care group was significantly lower compared to the control group ($P < 0.05$). Comparisons of postoperative complication rates in the pathway care group revealed that the pathway care group had significantly lower incidences of abdominal pain, incisional infection, and venous thrombosis compared to the control group ($P < 0.05$). When comparing the postoperative quality of life (SF-36) scores, the pathway care group had higher quality of life scores than the control group ($P < 0.05$), as well as in scores across all dimensions ($P < 0.05$).

Conclusion: Pathway-based care for cholecystectomy patients enhances operating room nursing quality and efficiency. It minimizes intraoperative stress response, reduces complications, and improves patient quality of life.

Keywords: cholecystectomy, clinical care pathway, concept of enhanced recovery after surgery, daycare pathway, laparoscopic surgery, perioperative stress condition

Introduction

Cholelithiasis, a prevalent digestive system disease,^{1,2} often manifests with biliary colic lasting 15–30 minutes and can radiate to the right back or shoulder, prompting emergency admissions for acute abdominal pain.³ Surgical removal is recommended for gallbladder sludge and stones due to their recurrent and potentially hazardous nature, particularly if the stones recur or are associated with gallbladder polyps, particularly adenomatous ones larger than 1 cm, as they pose an increased malignancy risk. Larger gallstones and their prolonged presence heighten the risk of cholecystitis associated with cholelithiasis. Chronic congestion, gallbladder swelling, thickened inner walls, and diminished function all contribute to an increased cancer risk, further advocating for gallbladder removal. Optimal intraoperative nursing collaboration is of paramount importance. Studies indicate that the suboptimal outcomes of laparoscopic cholecystectomy during the COVID-19 pandemic, as detailed in the literature are partly due to shifts in patient case profiles, but also significantly impacted by a shortage of competent nursing staff in the operating room.⁴ Furthermore, the role of proactive

intraoperative suction in preventing common post-laparoscopic shoulder pain, underscores the critical importance of high-quality nursing support.⁵ Therefore, the nursing collaboration for day-case cholecystectomy warrants ongoing refinement and exploration to ensure the best patient outcomes. Shandong Provincial Third Hospital, designated as the stone disease prevention center for Shandong province, features well-equipped operating rooms with hepatobiliary laparoscopes, facilitating minimally invasive cholecystectomy. This approach minimizes trauma and lowers postoperative complication risks, leading to functional recovery post-surgery. Prior research underscores the significant influence of nursing strategies on surgical outcomes and prognosis during gallbladder removal.^{6–8} Pathway-based care, featuring a staged nursing plan tailored to the perioperative period, addresses patients' psychological states and needs, mitigating mental stress, enhancing clinical compliance, and presenting an efficient, cost-effective, and high-quality nursing plan.⁹ This study examines the impact of operating room pathway care on patients undergoing daytime cholecystectomy through a controlled trial. Detailed findings will follow in the subsequent report.

Materials and Methods

Clinical Data

A total of 258 patients undergoing daytime cholecystectomy at Shandong Provincial Third Hospital between July 2019 and July 2022 were included in the study. Inclusion criteria encompassed patients clinically diagnosed with acute and chronic cholecystitis, gallbladder stones, gallbladder polyps, and benign gallbladder space-occupying lesions who required laparoscopic cholecystectomy, those with inadequate response to medication thereby necessitating surgical intervention, and individuals with complete clinical data who were well-informed about the surgery and willingly signed an informed consent form. Additionally, patients needed to be capable of independently using smartphone features such as WeChat. Exclusion criteria involved patients with cognitive impairment or other mental disorders; patients concurrently affected by conditions such as hypertension, diabetes, hematological, immune, or neoplastic disorders; patients with acute cholecystitis, acute severe cholangitis or acute gallstone pancreatitis that developed severe complications; patients with gallbladder cancer or gallbladder lesions suspected to be cancerous; or patients who required conversion to open surgery during the procedure. Using the random digit table method, the patients were assigned randomly to either an pathway care group or a control group, with each group comprising 129 patients. In the pathway care group: the average age was (52.96 ± 2.35) years; the duration of illness was (2.03 ± 0.11) years; there were 57 cases of gallstones, 20 cases of multiple gallbladder polyps, and 52 cases of chronic cholecystitis. In the control group: the average age was (53.24 ± 2.19) years; the duration of illness was (1.97 ± 0.13) years; there were 54 cases of gallstones, 21 cases of multiple gallbladder polyps, and 54 cases of chronic cholecystitis. There was no statistical significance in general data between the two groups ($P > 0.05$). This study was approved by our hospital's ethics committee.

Methods

Surgical Steps and Intraoperative Events

The preoperative assessment was performed by physicians for the inclusion of patients in the hepatobiliary laparoscopic day-case surgery program was based on stringent scientific criteria and strict admission pathway standards. The day-case LC at our hospital was performed in one of the four operating rooms dedicated to the hepatobiliary specialty within a comprehensive operating suite that comprises 20 operating rooms. The scheduling was based on the principle of prioritizing day-case surgeries followed by elective surgeries. The surgical procedure for day-case cholecystectomy began with preoperative preparations, where it was not routine to place gastric and urinary catheters. Following this, abdominal exploration was conducted at the commencement of the surgery prior to proceeding with the cholecystectomy. The exposure of the key surgical field adhered to Strasberg's "critical view of safety", wherein the cystic duct and cystic artery were identified and separated in advance to effectively prevent intraoperative injuries. Intraoperative assessment was conducted by the surgeon to reassess the patient during the surgery; should complex situations or accidents such as severe adhesions, significant inflammation, bile duct injury, or uncontrollable bleeding occur, the day-case surgery process was to be terminated, and a switch to a conventional surgical procedure was made.

Lastly, to avoid unnecessary pain for the patient, it was not recommended to routinely place abdominal drainage tubes after the day-case LC.

During the surgical procedure, gallbladder rupture was primarily noted to occur due to rough manipulation and excessive traction on the gallbladder, which, being thin and congested as a result of inflammation, led to its rupture. Once a rupture had occurred, a negative pressure suction device was promptly utilized to aspirate the spilled bile, pus, and sludge-like stones. Subsequently, larger stones were grasped and removed, followed by a thorough irrigation of the abdominal cavity with copious amounts of clear water, culminating in the placement of an abdominal overflow tube to manage any postoperative complications.

Control Group

The control group received routine clinical care, which included the following steps. (1) Upon admission, patients underwent medical history interviews to collect pertinent information about their medical and medication history. Subsequently, comprehensive examinations were performed to exclude any potential influence of other diseases on the planned surgery. (2) Before the surgery, preoperative health education sessions were conducted to inform patients about the necessity of the surgical procedure and the possible adverse reactions they might experience postoperatively. This education aimed to bolster their psychological resilience in preparation for the upcoming surgery. (3) Thorough disinfection and sterilization procedures were carried out in the operating room and for all surgical instruments in anticipation of the surgery. (4) Prior to administering deep anesthesia, extensive communication with patients was conducted to alleviate any psychological stress they may be experiencing. The level of anesthesia was then adjusted based on the patients' responses to determine the appropriate surgery duration. (5) Before patients regained consciousness after surgery, their vital signs such as body temperature, blood pressure, and heart rate were diligently monitored to safeguard the patient's well-being. (6) Postoperative care involved providing regular support and this included changing sterile dressings to alleviate any postoperative discomfort and ensure cleanliness and hygiene at the surgical site. (7) The ward underwent disinfection and sterilization three times a day—morning, noon, and evening—while also being regularly ventilated to establish an optimal resting environment for patients.

Pathway Care Group

Apart from standard care, the pathway care group received operating room pathway care. This care pathway was formulated based on charts developed by the American Association of Surgical Health Care, with time represented on the horizontal axis, encompassing preoperative, intraoperative, and postoperative medical and nursing interventions, while examination indicators and health education guidance were featured on the vertical axis. The detailed nursing plan is outlined below: (1) Preoperative: A day surgery pathway care team was assembled, consisting of six clinical nurses, each possessing three years of experience in cholecystectomy nursing. An experienced nurse was appointed as the team leader to oversee nursing duties. Prior to surgery, a general meeting was convened among the medical staff to discuss the patient's condition and formulate a surgical plan tailored to their needs. Subsequently, the treatment plan was conveyed to the patient, who then provided informed consent by signing the requisite form if they agreed to the plan. Detailed information regarding the patient's condition, treatment plan, its advantages and disadvantages, was meticulously provided, with any queries addressed patiently. Close observation of the patient's facial expressions during this phase enabled prompt identification and resolution of any psychological concerns. A day before surgery, the benefits and safety aspects of laparoscopic surgery were explained through PowerPoint presentations, visual aids, and educational videos within the operating room. Patients were briefed on postoperative precautions to secure their comprehension and cooperation. Text messages or reminders via WeChat were dispatched to patients scheduled for laparoscopic cholecystectomy (LC), instructing them to observe a 6-hour fasting period before surgery, refrain from consuming liquids 2 hours before the procedure, and administer 500 mL of 5–10% glucose solution orally 4 hours prior to surgery to fulfill preoperative requisites during the pre-hospitalization period outside the hospital. Thirty minutes before surgery started, necessary arrangements for managing the operating room temperature were completed. Patients undergoing day surgery can also communicate with their surgeons and nurses via WeChat during their hospital stay to express their needs. From the pre-admission period, when patients' diagnoses and related examinations are

completed before admission, there is already a WeChat connection established with the medical staff. Subsequently, designated operating room doctors and nurses are responsible for following up, investigating satisfaction, feedback, and addressing any nursing issues the patients may have. (2) Intraoperative. 1) The circulating nurse aids the patient in assuming the supine position, with a reverse Trendelenburg inclination, and the operating table angled 15 degrees to the left, while ensuring the arms and body form an angle of 45~60 degrees.¹⁰ Pneumoperitoneum pressure is regulated to 14 mmHg (1 mmHg = 0.133 kPa). Additionally, a hollow warming blanket, preheated to 37 degrees Celsius in a centralized thermostatic cabinet, is utilized, alongside an infusion warmer for heating abdominal lavage fluid. The patient's vital signs are continuously monitored, and any deviations are promptly reported and addressed; 2) The scrub nurse actively assists the physician in establishing pneumoperitoneum, swiftly and accurately providing instruments and essential items. In the event of a blurry camera lens or unclear surgical field, the nurse promptly wipes the lens. Special attention is paid during gallbladder removal to safeguard the wound and prevent infection; 3) Surgical instruments are thoroughly scrutinized and sterilized to prevent any unforeseen complications during the surgery. Intraoperative nursing staff are tasked with accurately evaluating the physician's requirements, whether it is adjusting the room lighting or the equipment illumination to ensure the procedure progresses seamlessly and systematically. Nursing personnel assist the physician with fundamental tasks, adhering strictly to aseptic protocols, and meticulously maintaining precise surgical records. (3) Postoperative: After the surgery is completed, the surgical gauze and supplies are immediately cleared away, ensuring that the patient's various tubes are properly labeled and secured. Subsequently, the patient is safely escorted to the recovery room. Before the patient regains consciousness postoperatively, it is crucial to monitor their basic vital signs in the recovery room, promptly addressing any notable abnormalities in body temperature, heart rate, or blood pressure. Intravenous fluid replacement is administered as necessary, tailored to the patient's physical condition to uphold normal vital functions.

Six hours after surgery, the patient is introduced to a fat-free liquid diet, progressing to a semi-liquid diet within 2–3 days postoperatively. Specific dietary advancements are gradually adjusted based on the recovery of gastrointestinal function. Typically, a return to a regular diet occurs between three months and half a year post-surgery. After the patient regains consciousness postoperatively, health education sessions are conducted for both the patient and their family members. The patient is offered support for regular position changes to prevent pressure injuries, and they are encouraged to engage in suitable movements of the upper limbs, head, neck, and ankle joints as much as they can. This includes daily ankle pump exercises to enhance blood circulation. The patient's postoperative condition is evaluated daily to promptly identify any complications and offer targeted interventions to mitigate their occurrence. If the patient's health remains stable and there are no significant symptoms of nausea or vomiting within 5–7 days post-surgery, the follow-up period may be extended.

On the first day following surgery, patients were assessed using the Post-Anesthesia Discharge Scoring System (PADSS). This evaluation is based on five main criteria: vital signs (heart rate, temperature, blood pressure), mobility and mental status, pain and gastrointestinal symptoms such as nausea and vomiting, surgical wound bleeding, and fluid intake and output. Each item is scored from 0 to 2, with a maximum total score of 10. If a patient scores 9 or above and has no postoperative complications, they are cleared for discharge. If a patient scores below 9 or experiences postoperative complications, an emergency postoperative response mechanism is activated, and they are transferred to a regular bed for further observation. During this period, WeChat communication was also performed. (4) Safety hazard prevention: ① Incomplete preparation of surgical instruments: Prior to surgery, ensure thorough preparation of all relevant surgical instruments and equipment. Conduct a thorough examination of the functionality and integrity of gallbladder forceps, separation forceps, clipping forceps, and Haber forceps, as well as the performance of the gallbladder scope and hepatobiliary laparoscope. Promptly address any identified abnormalities. ② Tissue pathology specimens must be promptly fixed with formalin within 30 minutes of removal from the body. It is essential to fully submerge the specimens in formaldehyde, ensuring that the volume of the liquid is 5–10 times that of the specimen. It is crucial for preventing contamination, degradation, or autolysis of the specimens to immerse pathological specimens in formalin within 30 minutes after being removed from the body.

Observation Indicators

(1) Compare perioperative stress conditions between the two groups. Stress response indicators such as body temperature, heart rate, blood oxygen saturation, and blood glucose levels are used as assessment criteria before and after surgery to evaluate the effect of the nursing plan on patients' stress levels. These indicators are assessed before surgery (T_0), 10 minutes after intraoperative pneumoperitoneum (T_1), and at the conclusion of the surgery (T_2). (2) Compare the rates of postoperative complications between the two groups, focusing on subcutaneous edema, increased frequency of urination, abdominal pain, incision infection, intestinal obstruction, and venous thrombosis as the primary observation indicators. (3) Compare the quality-of-life scores before and after surgery between the two groups. The assessment of quality of life involves using the Health Survey (SF-36 scale) developed by the Boston Institute, USA. This scale evaluates physical health, social function, and mental state as assessment dimensions. Each dimension is assigned a score out of 100 points, with higher scores indicating a better quality of life for the patient.¹¹

Statistical Methods

The SPSS 22.0 statistical software was used to conduct data analysis. Measurement data were expressed as mean \pm standard deviation ($\bar{x} \pm s$) and analyzed using the t -test, while categorical data were presented as percentages and analyzed using the χ^2 test. A p -value of less than 0.05 was considered statistically significant.

Results

Comparison of Perioperative Stress Conditions Between the Two Groups

During the T_0 phase, both groups displayed stable stress conditions, with no significant differences observed ($P > 0.05$). However, in the T_1 phase, all stress indicators notably increased in the control group ($P < 0.05$), with a greater variability observed compared to the pathway care group ($P < 0.05$). Moving to the T_2 phase, the pathway care group exhibited no significant changes in stress indicators compared to pre-surgery levels ($P > 0.05$), while the control group manifested a more pronounced stress response, significantly differing from pre-surgery levels ($P < 0.05$). Further details are provided in Table 1.

Comparison of Surgery and Hospitalization Time

The average surgery duration for the pathway care group was 81 ± 96.4 hours, compared to 87 ± 90.6 hours for the control group ($P > 0.05$). The average hospital stay duration for the pathway care group was 82 ± 97.6 days, significantly shorter than the control group's 85 ± 88.5 days ($P < 0.05$). Further details are provided in Table 2.

Table 1 Assessing Perioperative Stress Levels in Both Groups EQN)

Indicator	Pathway Care Group (n=129)			Control Group (n=129)		
	T_0	T_1	T_2	T_0	T_1	T_2
$T(^{\circ}\text{C})$	36.31 ± 4.35	$36.59 \pm 4.86^*$	$36.61 \pm 4.92^*$	36.29 ± 2.61	$37.84 \pm 3.06^{\#}$	$37.22 \pm 4.08^{\#}$
HR (beats/min)	78.39 ± 3.57	$79.08 \pm 4.08^*$	$78.57 \pm 4.13^*$	77.67 ± 4.32	$87.08 \pm 4.03^{\#}$	$83.46 \pm 4.11^{\#}$
$\text{SPO}_2(\%)$	78.59 ± 4.23	$92.05 \pm 4.48^{\#}$	$79.21 \pm 4.17^*$	70.13 ± 5.97	$90.05 \pm 5.57^{\#}$	$93.10 \pm 7.02^{\#}$
Blood glucose (mg/dl)	5.28 ± 0.22	$5.41 \pm 0.19^{\#}$	5.31 ± 0.08^1	5.34 ± 0.23	5.84 ± 0.18^2	$5.63 \pm 0.12^{\#}$

Notes: Compared to the control group during the same period, $^*P < 0.05$; compared to pre-surgery within the same group, $^{\#}P < 0.05$; T_0 : Preoperative; T_1 : 10 minutes after intraoperative pneumoperitoneum; T_2 : End of surgery.

Table 2 Comparison of Surgery and Hospitalization Time in Both Groups (timeEQN)

Item	Pathway Care Group (n = 129)	Control Group (n = 129)	χ^2 value	P value
Surgery time (hour)	81.0 ± 96.4	87.0 ± 90.6	1.818	>0.05
Hospitalization time (day)	82.0 ± 97.6	85.0 ± 88.5	5.509	<0.05

Comparison of Postoperative Complication Rates Between the Two Groups

Typical postoperative complications among patients undergoing LC encompass skin edema, frequent urination, abdominal pain, incision infection, intestinal obstruction, and lower limb venous thrombosis. Within the pathway care group, there were 2 instances of skin edema and 2 cases of lower limb venous thrombosis, resulting in an overall complication rate of 3.1%. Conversely, the control group encountered 4 cases of skin edema, 7 instances of frequent urination, 4 cases of abdominal pain, 2 occurrences of incision infection, 3 cases of intestinal obstruction, and 5 instances of lower limb venous thrombosis, culminating in a total complication rate of 19.38%. Consequently, the incidence of postoperative complications was significantly lower in the pathway care group compared to the control group ($P < 0.05$). Further details are provided in Table 3.

Comparison of Quality-of-Life Scores of the Two Groups Before and After Surgery

Before surgery, there were no notable differences in the scores pertaining to physical health, social function, and mental state between the two groups ($P > 0.05$), and all scores fell below the national standard ($P < 0.05$). Nevertheless, one week after the procedure, considerable disparities emerged in physical health, social function, and mental state compared to preoperative scores ($P < 0.05$), with the pathway care group exhibiting superior enhancement relative to the control group ($P < 0.05$). Further details are provided in Table 4.

Discussion

The improved clinical pathway-based care focuses on integrating the actual conditions of patients, providing nursing services based on considerations of patient comfort and needs. The improved pathway incorporates health education and psychological nursing, which are integral to the enhanced recovery after surgery (ERAS) concept, and moves these measures forward to further refine preoperative preparations. Additionally, it strengthens pain management, which is beneficial for further alleviating patient suffering. By combining postoperative nursing and dietary guidance, the level of nursing service is enhanced, contributing to the improvement of patients' quality of life. In this study, complications for both groups of patients were primarily manifested in edema, abdominal pain, frequent urination, incisional infection, intestinal obstruction, and venous thrombosis. The total incidence of complications in the control group was 19.38%,

Table 3 Postoperative Complication Rate Comparison (Cases)

Group	Edema	Frequent Urination	Abdominal Pain	Incision Infection	Intestinal Obstruction	Venous Thrombosis	Total (%)
Pathway care group (n=129)	2	0	0	0	0	2	3.10
Control group (n=129)	4	7	4	2	3	5	19.38
χ^2 value							16.384
P value							<0.001

Table 4 Comparison of Quality-of-Life Scores Pre- and Post-Surgery in Both Groups (scoreEQN)

Item	Pathway Care Group (n = 129)		T value	P value	Control Group (n = 129)		T value	P value
	Pre-Surgery	1 week Postoperative			Pre-Surgery	1 week Postoperative		
Physical health	52.69±5.52	75.06±7.87*	18.394	0.012	52.76±5.49	65.78±5.76	21.673	<0.001
Social function	53.72±4.46	77.18±6.92*	22.271	<0.001	53.67±4.41	65.69±5.91	19.687	0.006
Mental state	54.19±4.36	78.76±6.48*	24.318	<0.001	54.22±4.33	66.98±5.42	22.964	<0.001

Note: Compared to the control group during the same period, * $P < 0.05$.

while in the pathway care group it was 3.10%. The incidence of complications in the pathway care group was significantly lower than in the control group ($P < 0.05$), indicating that the improved nursing clinical pathway can reduce the incidence of postoperative complications in LC surgery patients. After nursing intervention, the quality of life of patients in the pathway care group was significantly higher than that in the control group ($P < 0.05$). It is evident that the improved nursing clinical pathway can enhance the quality of life for patients.

Cholecystectomy has become the standard treatment for cholelithiasis-induced chronic cholecystitis and suspected malignant transformation of gallbladder polyps. This approach is known for its high success rate in lesion clearance, efficient postoperative patient recovery, and low recurrence rate.¹² Laparoscopic surgery is the preferred technique for treating gallstones.¹³ Compared to conventional methods, laparoscopic surgery, typically performed with three abdominal ports (or four if necessary), significantly reduces patient pain during surgery and facilitates postoperative recovery. However, the success of surgery, the rate of postoperative complications, and the long-term prognosis of patients are significantly influenced by factors such as the quality of intraoperative nursing care, patient compliance post-surgery, and the nursing proficiency of medical staff.¹⁴ Despite being minimally invasive and involving only a few ports, LC still exhibits some characteristics associated with invasive procedures.

The surgery itself can be a significant stressor, triggering stress responses in patients and posing certain safety risks. It can also induce substantial psychological and mental burdens, leading to adverse emotions such as anxiety and fear, particularly in patients with multiple underlying conditions or poor surgical tolerance. Additionally, factors such as inadequate awareness of responsibility among surgical room staff and poor patient cooperation can further impact surgical outcomes. Therefore, it is important to consider strategies to mitigate stress responses in patients undergoing LC and facilitate their swift recovery.

Introduced by surgical nursing experts from the American Surgical Association (ASOCOG) in 2002, the clinical care pathway chart has emerged as a pioneering humanized nursing approach. By 2010, it had shown notable benefits in enhancing nursing quality and reducing hospital costs through human care and health education methods, as highlighted by Schwarzbach M.¹⁵ A subset of this approach, the operating room care pathway, follows the principles of evidence-based medicine and nursing, and is tailored to the specific circumstances of the hospital by a team of multidisciplinary nursing professionals. Known for its strong predictability and standardization, this nursing model has been instrumental in early detection and treatment of complications, thus significantly improving patient prognosis.¹⁶

In 1999, Danish anesthesiologist Dr. Henrik Kehlet introduced the concepts of fast-track surgery (FTS) and ERAS as strategies to promote swift and safe postoperative recovery. FTS integrates multidisciplinary care pathways across the surgical continuum, encompassing preoperative, intraoperative, and postoperative strategies. Its goal is to improve patient experience, reduce hospital stays, facilitate early return to normal activities, and minimize surgical complications. The operating room care pathway embodies this approach as a standard practice, contrasting with conventional surgical nursing, which often relies on experience and lacks standardization, potentially resulting in overlooked care and suboptimal nursing effectiveness.¹⁷ The emergence and adoption of the operating room care pathway have significantly enhanced the quality of surgical nursing and contributed to improved surgical treatment outcomes.

Operating room pathway nursing streamlines perioperative patient care through a detailed, phased approach to clinical nursing implementation. This nursing strategy holds significant clinical relevance, as it aims to reduce surgical duration, shorten patient hospital stays, and enhance prognosis.^{16,18} The phased approach of operating room pathway care allows for targeted and personalized nursing interventions tailored to the diverse psychological needs of patients at different stages of the perioperative period. The safety and efficacy of the ERAS concept in LC have been proven, but its application is still in the exploratory stage, and there is no unified ERAS guideline specifically for LC, which affects its development. Since the inception of ERAS, the published expert consensus and guidelines have been for medical fields other than nursing. Nurses refer to the expert consensus and guidelines from other medical professions, and they need to convey a substantial amount of information to patients and their families, including the advantages of surgery, preoperative and postoperative education, discharge and recovery plans, and addressing patient inquiries. Nurses do not have clear nursing guidelines to direct their work, which poses certain difficulties when caring for patients. Moreover, some nurses have not fully grasped the ERAS concept. By training ERAS-specialized nurses and enhancing their professional knowledge, they can better address patient questions and meet clinical patient needs. With the rapid development of day surgery and the continuous emergence of

research on the application of ERAS in LC, it is possible to gradually formulate nursing guidelines for the application of ERAS in LC, standardize the implementation of ERAS, pursue the optimization of day-surgery nursing strategies, ensure a positive surgical experience for patients, and promote the development of day-case LC. This approach not only improves nursing efficiency but also positively impacts patients' psychological well-being at every phase, leading to improved patient compliance with treatment and enhanced clinical treatment efficiency. Additionally, from a nursing quality analysis perspective, operating room pathway nursing aids healthcare professionals in synthesizing experiences from each phase of the nursing process and addressing any shortcomings in the formulation of the clinical nursing plan. This continuous refinement of the nursing plan ultimately enhances nursing quality and improves patient prognosis.

The findings of this study indicate that the pathway care group displayed reduced stress responses compared to pre-surgery levels, a shorter hospitalization time, a lower postoperative complication rate, and a superior postoperative quality-of-life score compared to the control group. This aligns with the results reported by Wei et al, who found that implementing the operating room care pathway intervention in patients undergoing LC led to improved collaboration between nurses and patients, decreased surgery duration, and reduced surgical complication rates from 10% to 1.33%.¹⁹ Similarly, research by Pang et al showed that systematically performing nursing tasks according to the operating room care pathway for patients undergoing LC significantly reduced nursing errors, ensured favorable surgical outcomes, and accelerated postoperative recovery.²⁰ An analysis of the nursing plan reveals that the daytime pathway nursing plan for the operating room is more comprehensive in preoperative care formulation, emphasizing not only physiological care but also psychological support and the enhancement of patients' self-care capabilities. Consequently, patients in the pathway care group exhibited significantly higher psychological resilience towards surgical treatment compared to the control group, effectively mitigating the shortcomings of conventional nursing plans and contributed to a reduction in complications.^{16,18} Moreover, daytime pathway nursing in the operating room entails detailed planning and organization of postoperative care, dietary management, and exercise regimens for patients. Compared to conventional nursing plans, this approach not only enhances psychological compliance but also provides more effective rehabilitation guidance postoperatively, ultimately contributing to improved patient prognosis outcomes.

While our study provides valuable insights, it is important to acknowledge its limitations. Firstly, as a single-center retrospective study, it is subject to selection bias and the limitations imposed by a modest sample size. This restricts the generalizability of our findings to other healthcare settings or regions, given that patient demographics, medical resources, and nursing practices can vary significantly between hospitals. Secondly, the limited sample size hampers the statistical power of our results and their extrapolation to broader populations, which may also introduce a higher likelihood of chance findings, potentially affecting the reliability of our conclusions. Regarding patient selection criteria, our study may have overlooked cases suitable for emergency day-case LC that experienced unexpected delays in discharge postoperatively. This suggests that our study may not have captured the full spectrum of patients eligible for day-case cholecystectomy, which could impact the comprehensiveness of our results. To enhance the contributions to the field, future research should focus on rigorous, randomized, double-blind clinical controlled trials to broaden the generalizability of findings and optimize patient selection criteria for day-case cholecystectomy. Additionally, long-term follow-up studies are needed to assess the procedure's long-term outcomes and safety.

In summary, the integration of pathway nursing into daytime cholecystectomy procedures significantly improves surgical outcomes and prognosis, underscoring its considerable clinical significance and advocating for the broader adoption of ERAS and FTS nursing models.

In the context of our nation's current situation, adopting a day-surgery model is both viable and essential. Consequently, the development of a day-surgery pathway-based care is crucial. The evolution of this nursing process is not an overnight task; it necessitates the exploration and establishment of an intelligent day-surgery quality control platform to offer innovative approaches for the secure and swift advancement of day-case LC. Additionally, the post-discharge recovery and follow-up mechanisms for day surgery, along with addressing perioperative psychological needs and disseminating health education, are pivotal initiatives. The pathway-based care for day-case LC promotes the wider implementation of the ERAS nursing management model. In conclusion, the refinement of the day-surgery pathway-based care is significantly and positively correlated with the postoperative benefits and outcomes for patients who undergo day-case LC.

Abbreviations

LC, Laparoscopic cholecystectomy; FTS, Fast track surgery; ERAS, Enhanced recovery after surgery; CNP, Clinical nursing pathway; ASOCOG, American surgical association.

Ethics Approval

The study was conducted in accordance with the Declaration of Helsinki (as was revised in 2013). The study was approved by Ethics Committee of the Shandong Provincial Third Hospital.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Zdanowicz K, Daniluk J, Lebensztejn DM, et al. The etiology of cholelithiasis in children and adolescents-a literature review. *Int J mol Sci.* **2022**;23(21):13376. doi:10.3390/ijms232113376
2. Francesca V, Francesco F, Eugenio C, et al. Management of cholelithiasis in cirrhotic patients. *J Pers Med.* **2022**;12(12):2060. doi:10.3390/jpm12122060
3. Shabanzadeh DM. The symptomatic outcomes of cholecystectomy for gallstones. *J Clin Med.* **2023**;12(5):1897. doi:10.3390/jcm12051897
4. Abdelsamad A, Ibrahim E, Elsheikh A, et al. Worse cholecystectomy outcomes during the COVID-19 pandemic: were staff shortages or a change in patient case-mix the culprit? *Surg Endosc.* **2024**;38(12):7389–7398. doi:10.1007/s00464-024-11337-1
5. Abdelsamad A, Ruehe L, Lerch LP, Ibrahim E, Daenenfaust L, Langenbach MR. Active aspiration versus simple compression to remove residual gas from the abdominal cavity after laparoscopic cholecystectomy: a randomized clinical trial. *Langenbecks Arch Surg.* **2022**;407(5):1797–1804. doi:10.1007/s00423-022-02522-8
6. Lee J, Hur MH. The effects of aroma essential oil inhalation on stress, pain, and sleep quality in laparoscopic cholecystectomy patients: a randomized controlled trial. *Asian Nurs Res.* **2022**;16(1):1–8. doi:10.1016/j.anr.2021.11.002
7. Wang P, Ma S, Yu L. Study on the application effect of personalized nursing in the operating room of laparoscopic cholecystectomy for gallstone. *Panminerva Med.* **2022**;64(2):302–303. doi:10.23736/S0031-0808.21.04419-0
8. Cheng L, Wang L, Xu W. Effect of clinical nursing pathway guided by Omaha system in patients with calculous cholecystitis undergoing laparoscopic cholecystectomy. *Minerva Pediatr.* **2023**;75(1):152–155. doi:10.23736/S2724-5276.22.07101-4
9. He GL, Hong H, Cheng Y, et al. Application of fast track surgery in laparoscopic liver resection. *Chinese J of General Sur.* **2018**;33(8):635–637.
10. Liu H. Application of nursing pathway in laparoscopic surgery for patients with gallstone and hypertension. *Know Prev Treat Cardiovascu Dis.* **2023**;5(14):93–96.
11. Lins L, Carvalho FM. SF-36 total score as a single measure of health-related quality of life: scoping review. *SAGE Open Med.* **2016**;4:2050312116671725. doi:10.1177/2050312116671725
12. Lamberts MP. Indications of cholecystectomy in gallstone disease. *Curr Opin Gastroenterol.* **2018**;34(2):97–102. doi:10.1097/MOG.0000000000000419
13. Mannam R, Sankara Narayanan R, Bansal A, et al. Laparoscopic cholecystectomy versus open cholecystectomy in acute cholecystitis: a literature review. *Cureus.* **2023**;15(9):e45704. doi:10.7759/cureus.45704
14. Qiu LR, Zhou LJ, Wang BY. Clinical effect of nursing intervention for patients undergoing laparoscopic cholecystectomy. *J Biol Regul Homeost Agents.* **2019**;33(1):231–235.
15. Schwarzbach M, Rssner E, Schattenberg T, et al. Effects of a clinical pathway of pulmonary lobectomy and bilobectomy on quality and cost of care. *Langenbecks Arch Surg.* **2010**;395(8):1139–1146. doi:10.1007/s00423-010-0600-y
16. Yu L, Ma S, Wang S, Li M. Application of clinical nursing pathway in nursing care of patients undergoing gastric cancer surgery. *Minerva Gastroenterol.* **2022**;68(2):249–251. doi:10.23736/S2724-5985.21.03079-5
17. Grant MC, Yang D, Wu CL, et al. Impact of enhanced recovery after surgery and fast track surgery pathways on healthcare-associated infections: results from a systematic review and meta-analysis. *Ann Surg.* **2017**;265(1):68–79. doi:10.1097/SLA.0000000000001703
18. Zhao B, Wang K, Jiang B. Application of clinical nursing pathway in bladder cancer patients undergoing ureteroperitoneostomy. *Panminerva Med.* **2020**. doi:10.23736/s0031-0808.20.04010-0.
19. Wei SJ, Wang H, Yao XH. Application of the operating room nursing pathway in laparoscopic cholecystectomy patients. *Qilu Nurs J.* **2021**;27(14):101–104.
20. Pang MM. The impact of the operating room nursing pathway on postoperative recovery and safety incidents in patients undergoing laparoscopic cholecystectomy. *Prac Med Tech.* **2021**;28(11):1383–1384.

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