

Preoperative Fasting and Drinking Compliance Under the ERAS Framework: Current Status, Barriers, and Optimization Strategies — A Cross-Sectional Study

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Abstract

Background Optimizing preoperative fasting and drinking practices is an essential component of Enhanced Recovery After Surgery (ERAS). However, substantial discrepancies persist between guideline recommendations and actual patient behavior. This study aimed to evaluate compliance with preoperative fasting and drinking guidelines among elective surgical patients, identify influencing factors, and explore potential strategies to improve individualized perioperative dietary management.

Methods This cross-sectional study was conducted from June 2024 to March 2025 in the anesthesiology and operating room setting of a tertiary care institution. A total of 398 elective surgical patients were recruited through convenience sampling. Data were collected using a structured questionnaire capturing demographic characteristics, preoperative education, fasting and drinking behavior, and perceived barriers. According to ERAS recommendations, patients were categorized into four groups: fully compliant, under-compliant, over-fasting, and dual violations. Statistical analyses included t tests, chi-square tests, and multinomial logistic regression, with a significance level of $\alpha=0.05$.

Results Among the 398 valid responses, 39.4% were fully compliant, 11.3% under-compliant, 45.0% over-fasting, and 4.3% presented dual violations. Patients in the over-fasting group had prolonged fasting durations (solid food: 13.7 ± 3.0 hours; clear liquids: 10.0 ± 3.1 hours), exceeding ERAS recommendations ($P<0.001$). Multivariable logistic regression identified lower education level (OR=3.64, 95% CI 1.10–8.19, $P=0.002$) and diabetes (OR=5.86, 95% CI 1.74–19.73, $P=0.004$) as independent risk factors for poor compliance, while receiving multimodal preoperative education (OR=0.18, 95% CI 0.08–0.39, $P<0.001$) and understanding the purpose of fasting (OR=0.39, 95% CI 0.24–0.64, $P<0.001$) were protective factors. Preoperative discomfort was common, with thirst (37.4%), hunger (33.4%), and anxiety (26.9%) being the most frequently reported symptoms; these were significantly more prevalent in the over-fasting group ($P<0.001$).

Conclusions Suboptimal and excessive fasting remain widespread under ERAS-based perioperative care. Inadequate patient understanding, inconsistent education, and procedural inertia contribute to poor compliance. Extended fasting times confer no additional safety benefit and are associated with increased discomfort and metabolic risk. Strengthening multimodal education, improving workflow consistency, and integrating digital decision-support tools may enhance adherence and support individualized fasting management. These findings provide evidence to inform quality improvement in ERAS implementation.

Clinical trial number: not applicable.

Introduction

Preoperative fasting and fluid restriction remain fundamental components of anesthetic safety management, primarily aiming to reduce the risk of gastric content regurgitation and aspiration during anesthesia induction[1]. Traditional fasting practices have historically prioritized maximal risk avoidance. However, with the advancement of evidence-based perioperative care and the widespread adoption of Enhanced Recovery After Surgery (ERAS) principles, preoperative fasting has undergone a paradigm shift from purely risk prevention toward a balanced focus on metabolic optimization and patient comfort[2]. Recent guidelines from major international societies, including the American Society of Anesthesiologists and the European Society of Anaesthesiology, consistently recommend fasting from solid foods for at least 6 hours while permitting clear fluids up to 2 hours before anesthesia in healthy adults[3]. For patients without delayed gastric emptying, ingestion of carbohydrate-containing clear fluids before surgery has been shown to be safe and beneficial, alleviating preoperative hunger, thirst, and anxiety, improving perioperative insulin sensitivity, and promoting early postoperative recovery[4]. These evidence-driven recommendations reflect an evolving understanding of fasting as a multidimensional intervention with physiologic, metabolic, and experiential implications.

Despite robust evidence and consistent guideline updates, prolonged fasting remains common worldwide. Multicenter studies have reported that actual fasting durations often exceed recommendations by considerable margins, with clear-fluid fasting extending beyond 8–12 hours and solid-food fasting frequently surpassing 12 hours[5]. Multiple factors contribute to this discrepancy, including clinicians' heightened fear of aspiration risk, inconsistent patient education, uncertainty surrounding surgical scheduling, and institutionalized workflow inertia[6,7]. Importantly, studies have demonstrated that prolonged fasting

does not confer additional safety benefits; rather, it exacerbates preoperative discomfort, increases anxiety, induces metabolic disturbances, and may negatively impact postoperative recovery[8]. This defensive fasting pattern runs counter to ERAS principles and undermines their intended benefit.

Recent research has further confirmed the safety of allowing clear-fluid intake within 2 hours before anesthesia in low-risk elective surgical patients[9,10]. Randomized controlled trials and systematic reviews consistently show that liberalized fluid intake improves patient comfort—reducing thirst, hunger, and anxiety—without increasing respiratory complications or aspiration events[10,11]. Moreover, preoperative carbohydrate loading improves insulin sensitivity, reduces perioperative insulin requirements, and facilitates gastrointestinal recovery, providing additional metabolic support for individualized fasting strategies[12].

Gastric ultrasound (GUS) has emerged as a promising tool for objective assessment of gastric content and volume, enabling differentiation between low- and high-risk patients[13]. Although GUS offers real-time, patient-specific data to support tailored fasting decisions, its broader implementation is limited by training requirements, operator dependence, and integration challenges within existing clinical pathways.

Despite well-established international guidelines, inadequate compliance with fasting recommendations continues to hinder ERAS implementation. Existing studies predominantly describe the phenomenon of excessive fasting, while the multidimensional barriers—including patient knowledge gaps, inconsistent provider education, deficits in digital information management, and culturally reinforced risk-avoidance behaviors—have not been comprehensively examined. As primary providers of perioperative education and behavior reinforcement, nursing staff play a critical role in improving patient adherence. Evidence suggests that multimodal educational approaches, such as combined visual, audio, and video-based interventions, significantly enhance patients' understanding and execution of preoperative instructions, particularly when admission education time is limited or surgical schedules are condensed[14].

However, systematic investigations into preoperative fasting and drinking compliance remain insufficient, especially from a nursing perspective. Few studies simultaneously evaluate compliance status, identify barriers, and develop targeted improvement strategies. Therefore, guided by ERAS principles, this study aims to provide a structured assessment of the current status of preoperative fasting and drinking compliance, explore associated barriers, and propose feasible optimization strategies. The findings intend to clarify mechanisms underlying non-compliance and establish an evidence-based framework to support standardized, individualized, and operationally feasible fasting management in clinical practice.

Methods

Study design and patients

This cross-sectional observational study was conducted from June 2024 to March 2025 in the Department of Anesthesiology and Operating Rooms at a tertiary comprehensive hospital in Gansu Province, China. Using a convenience sampling approach, we recruited hospitalized adults scheduled for elective surgery under general anesthesia. Patients were eligible for inclusion if they were 18 years or older, planned to undergo elective surgery, had received preoperative education regarding fasting and clear-fluid intake, and possessed adequate cognitive and communicative ability to complete the questionnaire either independently or with guidance. Patients were excluded if they were undergoing emergency surgery or had not received preoperative dietary instructions, or if they presented with cognitive impairment, psychiatric illness, or severe communication difficulties that could interfere with questionnaire completion. Individuals with medical conditions requiring deviation from standard fasting protocols—such as gastric retention or intestinal obstruction—were also excluded. In addition, pregnant patients and older adults with a high likelihood of delayed gastric emptying were not considered for enrollment due to safety concerns related to fasting physiology.

Data collection tools and procedures

Data were collected using a structured questionnaire developed by the research team based on ERAS pathway recommendations and relevant national and international literature (see supplementary file). The questionnaire consisted of five major sections: (1) demographic characteristics, including age, sex, educational level, diabetes status, previous surgical history, and surgical department; (2) surgical and anesthetic information, including ASA physical status classification and surgical scheduling order; (3) receipt of preoperative education and level of understanding; (4) actual fasting and drinking behaviors, such as timing of last solid intake, timing and type of clear-fluid intake, and volume consumed; and (5) self-assessed adherence, perceived barriers, and preoperative discomfort symptoms.

The questionnaire was reviewed by two experts in perioperative and anesthesia nursing and subsequently pilot-tested in 20 patients. The instrument demonstrated good internal consistency, with a Cronbach's α coefficient of 0.82. The formal survey was administered by research nurses who had received standardized training. All questionnaires were completed prior to the patient's entry into the operating room, with on-site guidance provided by the investigators to ensure data accuracy, completeness, and immediate verification upon collection.

Variable Definitions

The primary study variable was patient compliance with preoperative fasting and drinking recommendations. A multidimensional classification framework was constructed based on ERAS guideline thresholds. Compliance categories were defined as follows: (1) Full compliance: No solid food intake within ≥ 6 hours before anesthesia induction and no liquid intake within ≥ 2 hours before the procedure. (2) Insufficient compliance: Any violation of minimum fasting standards, including ingestion of solid food within 6 hours or liquid intake within 2 hours prior to anesthesia. (3) Prolonged fasting: Abstaining from solid food for more than 12 hours or from clear liquids for more than 8 hours. Although these behaviors do not breach minimum safety requirements, they exceed ERAS-recommended upper limits. (4) Dual noncompliance: Concurrent occurrence of guideline-violating behavior and prolonged fasting, characterized by both inadequate compliance and excessive restriction.

Information on fasting and drinking behavior was obtained from patient self-reported "last intake time" and cross-checked against the scheduled anesthesia start time. Two independent investigators performed all calculations to ensure accuracy and consistency of classification.

Statistical analysis

All data were double-entered independently and imported into SPSS version 26.0 for analysis. Continuous variables were assessed for normality and presented as mean $\pm$ standard deviation (SD); between-group comparisons were performed using independent-samples *t* tests. Categorical variables were summarized as frequencies and percentages, and differences among groups were examined using the χ^2 test.

To identify factors associated with compliance behavior, a multinomial logistic regression model was constructed with "full compliance" as the reference category. Variables with $P < 0.05$ in univariable analyses were entered into the multivariable model for adjustment. Results are reported as odds ratios (ORs) with corresponding 95% confidence intervals (CIs). A two-tailed significance level of $\alpha = 0.05$ was applied for all analyses.

Ethics Approval

The study protocol was reviewed and approved by the Medical Ethics Committee of the First Hospital of Lanzhou University. Written informed consent was obtained from all participants prior to enrollment, and participation was entirely voluntary. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. All data were anonymized at the time of collection, and strict measures were implemented to ensure confidentiality throughout data handling and analysis.

Results

General Characteristics

A total of 410 questionnaires were distributed, of which 398 were valid and included in the final analysis, yielding a response rate of 97.1%. The mean age of participants was 50.6 ± 13.3 years, and 55% were female. Approximately 22.4% had an education level of undergraduate or above, and 17.8% reported a history of diabetes. Most patients were classified as ASA I–II (82.7%). The distribution of baseline characteristics and their associations with preoperative fasting and drinking compliance are presented in Table 1.

Table 1. Univariate analysis of demographic and clinical characteristics with preoperative fasting and clear fluid intake adherence (n=398)

Variable	Category	Full Adherence	Insufficient Fasting	Prolonged Fasting	Dual Non-adherence	χ^2 /F value	P value
Sex	Male	70 (39.1%)	19 (10.6%)	82 (45.8%)	8 (4.5%)	0.228	0.973
	Female	87 (39.7%)	26 (11.9%)	97 (44.3%)	9 (4.1%)		
	Age	51.20±13.480	50.20±12.31	50.65±12.679	48.41±14.331	0.275	0.843
Department	General Surgery	24 (47.1%)	4 (7.8%)	18 (35.3%)	5 (9.8%)	27.731	0.066
	Thoracic Surgery	13 (28.3%)	7 (15.2%)	22 (47.8%)	4 (8.7%)		
	Cardiac Surgery	25 (46.3%)	5 (9.3%)	23 (42.6%)	1 (1.9%)		
	Orthopedics	20 (31.70)	7 (11.1%)	35 (55.6%)	1 (1.6%)		
	Neurosurgery	25 (46.3%)	4 (7.4%)	25 (46.3%)	0 (0%)		
	Gynecology	26 (39.4%)	5 (7.6%)	30 (45.5%)	5 (7.6%)		
	Urology	24 (37.5%)	13 (20.3%)	26 (40.6%)	1 (1.6%)		
Education Level	Primary school or below	15 (22.7%)	12 (18.2%)	34 (51.5%)	5 (7.6%)	23.260	0.006
	High school or below	48 (34.3%)	21 (15%)	67 (47.9%)	4 (2.9%)		
	Associate degree	49 (47.6%)	6 (5.8%)	44 (42.7%)	4 (3.9%)		
	Bachelor's degree or above	45 (50.6%)	6 (6.7%)	34 (38.2%)	4 (4.5%)		
ASA	I	73 (34.9%)	23 (11.0%)	104 (49.8%)	9 (4.3%)	6.422	0.378
	II	50 (41.7%)	13 (10.8%)	51 (42.5%)	6 (5.0%)		
	III	34 (49.3%)	9 (13.0%)	24 (34.8%)	2 (2.9%)		
Diabetes Mellitus	Yes	21 (29.6%)	6 (8.5%)	37 (52.1%)	7 (9.9%)	10.053	0.018
	No	136 (41.6%)	39 (11.9%)	142 (43.4%)	10 (3.1%)		
Previous Surgery History	Yes	73 (44.2%)	16 (9.7%)	74 (44.8%)	2 (1.2%)	8.465	0.037
	No	84 (36.1%)	29 (12.4%)	105 (45.1%)	15 (6.4%)		
Operation Turn	1	31 (42.5%)	8 (11.0%)	31 (42.5%)	3 (4.1%)	5.825	0.925
	2	33 (45.2%)	8 (11.0%)	31 (42.5%)	1 (1.4%)		
	3	33 (37.9%)	8 (9.2%)	42 (48.3%)	4 (4.6%)		
	4	32 (37.6%)	11 (12.9%)	36 (42.4%)	6 (7.1%)		
	Other	28 (35.0%)	10 (12.5%)	39 (48.8%)	3 (3.8%)		

Multi-channel Education	Yes	109[55.3]	14[7.1]	67[34.0]	7[3.6]	41.929	<0.001
	No	48[23.90]	31[15.4]	112[55.7]	10[5.0]		
Understanding of Fasting Purpose	Yes	112[50.5]	20[9.0]	85[38.3]	5[2.3]	27.534	<0.001
	No	45[25.6]	25[14.2]	94[53.4]	10[5.0]		

Preoperative Fasting and Drinking Compliance

Based on ERAS recommendations, the preoperative fasting and drinking behavior of all 398 patients was classified into four categories. A total of 157 patients (39.4%) demonstrated full compliance, whereas 45 patients (11.3%) showed insufficient compliance. Over half of the cohort exhibited prolonged fasting, with 179 patients (45.0%) meeting the criteria for overfasting. In addition, 17 patients (4.3%) demonstrated dual non-compliance.

Among those with insufficient compliance, 91.1% consumed liquids within 2 hours before anesthesia induction, and 24.4% ingested solid food within 6 hours preoperatively. Several cases experienced delays or rescheduling of surgery due to dietary violations. Patients categorized as overfasting were predominantly characterized by fasting more than 12 hours (82.1%) or abstaining from liquids for more than 8 hours (83.7%), with both phenomena frequently occurring concomitantly. Although the proportion of patients with dual non-compliance was relatively small, these individuals exhibited more pronounced deviations from recommended practices and were more likely to demonstrate misinterpretation of preoperative instructions and significant preoperative discomfort.

Detailed Analysis of Preoperative Dietary Behavior

Further analysis revealed significant differences in actual preoperative dietary behaviors across the compliance groups (see Table 2). Patients in the fully compliant group reported an average solid-food fasting duration of 9.0 ± 1.1 hours and clear-fluid restriction of 3.8 ± 2.1 hours. In contrast, the overfasting group exhibited markedly prolonged intervals, with mean solid fasting of 13.7 ± 3.0 hours and clear-fluid abstinence of 10.0 ± 3.1 hours, both exceeding the upper thresholds recommended by ERAS. The dual non-compliance group demonstrated both extended fasting periods and non-adherent drinking behavior before anesthesia, highlighting a dual barrier in both comprehension and implementation of preoperative dietary instructions.

Table 2. Comparison of preoperative dietary behaviors across adherence groups (n=398)

	Full Adherence	Insufficient Fasting	Prolonged Fasting	Dual Non-adherence	F value	P value
Fasting duration for solids (h)	8.97±2.098	7.13±2.141	13.73±3.016	9.053±5.216	121.286	<0.001
Fasting duration for clear fluids (h)	3.79±2.107	1.39 ± 0.481	10.02±3.129	5.64± 5.513	203.755	<0.001
Volume of last fluid intake (mL),	206.02±74.267	174.56±70.015	167.80±71.382	93.35±26.098	17.243	<0.001

Preoperative Discomfort Symptoms

A total of 282 patients (70.1%) reported at least one preoperative discomfort symptom, with thirst (37.4%), hunger (33.4%), and anxiety (26.9%) being the most frequently reported complaints (Table 3). The distribution of discomfort symptoms differed significantly across compliance categories. In the dual non-compliance group, 41.2% of patients experienced three or more discomfort symptoms, a proportion significantly higher than that of the other groups ($P < 0.01$). Patients in the overfasting group showed particularly elevated rates of hunger and dizziness, consistent with the prolonged fasting and fluid restriction observed in this subgroup.

Table 3. Distribution of preoperative discomfort experiences across adherence groups (n=398)

Discomfort Experience	Full Adherence	Insufficient Fasting	Prolonged Fasting	Dual Non-adherence	χ^2	P
Thirst	41(27.5%)	12(8.1%)	79(53.0%)	17(11.4%)	42.659	<0.001
Hunger	36(27.1%)	11(8.3%)	71(53.4%)	15(11.3%)	35.489	<0.001
Anxiety	29(27.1%)	16(15.0%)	50(46.7%)	12(11.2%)	23.993	<0.001
Dizziness	13(31.0%)	3(7.1%)	23(54.8%)	3(7.1%)	3.485	0.323
Hypoglycemic symptoms	3(9.1%)	6(18.2%)	17(51.5%)	7(21.2%)	34.430	<0.001

Multivariable Logistic Regression Analysis

Variables with a P value < 0.05 in the univariate analysis were included in the multinomial logistic regression model. The results showed that, compared with the fully compliant group, lower educational level, lack of multimodal preoperative education, insufficient understanding of the purpose of fasting, and the presence of diabetes were independent predictors of non-compliant behaviors (Table 4).

Table 4. Multinomial logistic regression analysis of factors associated with patient outcomes (Reference group: Group 1).

Factor	Category	Group 2 vs. 1		Group 3 vs. 1		Group 4 vs. 1	
		OR(95%CI)	p-value	OR(95%CI)	p-value	OR(95%CI)	p-value
Education	Primary school or below	7.91 (2.38-26.34)	< 0.001	3.64 (1.61-8.19)	0.002	5.98 (1.24-28.92)	0.026
	High school or below	3.11 (1.10-8.79)	.033	1.63 (0.87-3.05)	.130	0.98 (0.21-4.54);	0.977
	Associate degree	1.01 (0.29-3.49)	.994	1.36 (0.71-2.63)	.356	1.33 (0.28-6.37)	0.722
Diabetes	Yes	0.84 (0.30-2.36)	.736	1.59 (0.84-3.03)	.155	5.86 (1.74-19.73)	0.004
Previous Surgery	Yes	0.43 (0.20-0.91)	.027	0.63 (0.39-1.02)	.060	0.10 (0.02-0.48)	0.004
Multi-channel Edu.	Yes	0.18 (0.08-0.39)	< .001	0.26 (0.16-0.43)	< 0.001	0.36 (0.12-1.10)	0.074
Understand Fasting	Yes	0.37 (0.18-0.77)	.008	0.39 (0.24-0.64)	< 0.001	0.13 (0.04-0.43)	< 0.001

Notes: Group 1 (Reference group): Full Adherence; Group 2: Insufficient Fasting; Group 3: Prolonged Fasting; Group 4: Dual Non-adherence. OR, odds ratio; CI, confidence interval. Statistically significant results ($p < 0.05$) are presented in bold.

Discussion

This study systematically investigated the current status and influencing factors of preoperative fasting and drinking compliance under the ERAS framework. The findings revealed that overall compliance was suboptimal, with overfasting being highly prevalent. A proportion of patients exhibited dual non-compliance, characterized by both premature intake of food or fluids that interfered with surgical preparation and excessively prolonged fasting durations that exceeded ERAS recommendations.

The results further suggest that insufficient patient understanding, inconsistency in educational sources, uncertainty in surgical scheduling, and the absence of dynamic monitoring mechanisms within nursing workflows were major contributing barriers.

These findings indicate that, although the ERAS concept has been widely promoted domestically and internationally, a gap persists between guideline recommendations and clinical practice. The evidence-based principles of ERAS have not yet been fully translated into consistent patient behaviors, reflecting a lag in the practical implementation of guideline-driven perioperative dietary management.

Compared with previously published research, the findings of our study show a high degree of concordance. Multicenter surveys conducted in Europe and Australia have similarly demonstrated that actual preoperative fluid fasting times frequently exceed the 2-hour standard recommended by the ASA and ESA, with a proportion of patients fasting for more than 8 to 10 hours[15]. Some surveys have further indicated that more than 70% of patients experience varying degrees of prolonged fluid fasting, primarily attributable to inconsistent nursing education, delays in surgical scheduling, and exaggerated concerns regarding the risk of aspiration[6]. In our study, the mean duration of preoperative clear-fluid fasting exceeded eight hours, closely aligning with the findings reported in previous investigations. The fasting period for solid foods was also substantially longer than the recommended six hours, indicating that “experience-based fasting” continues to dominate clinical practice. Although prolonged fasting is often perceived as a “safer” strategy, the evidence does not support this assumption. No cases of aspiration or anesthesia-related complications attributable to preoperative fluid intake were observed in our cohort. This is consistent with conclusions from the Cochrane systematic review and the work of Rüggeberg et al., both of which demonstrate that consuming an appropriate amount of clear fluids within two hours before anesthesia does not significantly increase gastric volume or the risk of aspiration[16,17]. On the contrary, extending the duration of preoperative fluid fasting offers no additional safety benefit and instead increases the risk of thirst, hunger, hypoglycemia, and anxiety, ultimately compromising the stability of anesthesia induction and slowing postoperative recovery[18].

Notably, our study identified a significant positive correlation between the duration of preoperative fasting and the incidence of patient-reported discomfort. Patients in the prolonged-fasting group exhibited substantially higher thirst and hunger scores, along with an increased prevalence of anxiety, compared with those who adhered to the recommended fasting guidelines. These findings are consistent with results reported in studies published in BJA Open and other journals[19]. Excessive preoperative fasting has been shown to exacerbate the physiological stress response, increase insulin resistance, and delay the recovery of gastrointestinal function, thereby undermining the overall effectiveness of ERAS pathways. At the same time, a subset of patients consumed food or fluids within a period shorter than the recommended safety window, resulting in surgical delays or cancellations. This pattern underscores a persistent gap between the content of preoperative education and patient comprehension. Information asymmetry, insufficient reinforcement, and reliance on single-mode education are all potential contributors to poor adherence. In our study, patients who received multimodal education—incorporating verbal instruction, written materials, and electronic reminders—demonstrated significantly higher adherence compared with those who received a single form of education. This finding suggests that delivering information through multiple channels enhances recall and execution accuracy, with particularly pronounced benefits among older adults and individuals with lower educational levels.

The mechanisms underlying non-adherence exhibit a distinctly multilayered pattern. At the patient level, pervasive cognitive misconceptions were evident. Confusion between the concepts of clear fluids and solid foods, along with persistent concerns that drinking water might lead to surgical cancellation, emerged as key psychological drivers of prolonged fasting[20]. Second, at the nursing level, the absence of standardized educational messaging and unified written protocols leads to variability in implementation across different shifts[21]. Third, from a systems perspective, uncertainty in surgical scheduling and the traditional “nil per os after midnight” approach contribute to passive prolongation of fasting times, reinforcing an entrenched institutional habit. Driven by a heightened sense of responsibility, healthcare providers often adopt defensive strategies and tend to “err on the side of longer rather than shorter” fasting durations. This overly conservative practice—framed as a safety measure—actually reflects a combination of insufficient risk communication and suboptimal process design.

Within the ERAS framework, preoperative dietary management should shift from a singular focus on “risk prevention” toward a more refined model that balances safety with metabolic optimization. Drawing on both domestic and international evidence, this study highlights several directions for improvement. First, a tiered and multimodal education system should be established, with repeated instructions delivered the evening before surgery, on the morning of surgery, and again in the preoperative waiting area, using verbal communication, written materials, and digital reminders to reinforce patient understanding and adherence.

Second, fasting-time management should be integrated into information systems capable of automatically calculating individualized fasting start and end times and generating patient-specific alerts for nursing verification. Third, a nursing-led checklist and clearance process should be implemented, incorporating bedside gastric ultrasonography for high-risk patients—such as those with diabetes, obesity, or delayed gastric emptying—to enable individualized safety assessment. Fourth, adoption of the validated “Sip-til-Send” approach should be promoted, allowing patients to take small sips of clear fluids before transfer to the operating room to alleviate thirst and anxiety. Studies from Australia and Northern Europe have demonstrated that this model significantly reduces preoperative discomfort scores and procedural delays without increasing the risk of aspiration or respiratory complications[22]. All of these measures emphasize a core focus on standardized processes, information integration, and patient-centered experience, thereby facilitating the translation of the ERAS principles from general guidelines into routine clinical practice.

The findings of this study also carry important implications for nursing practice. Nurses serve as key implementers of preoperative fasting management, with their role evolving from mere educators to active facilitators of behavioral interventions and quality monitoring. Our study demonstrates that nursing-led, time-staggered education combined with electronic reminder systems can significantly improve adherence and reduce errors[23]. Future nursing quality management should incorporate fasting adherence into performance evaluation systems and establish continuous quality monitoring and feedback mechanisms. Improvement can be assessed using quantitative metrics such as actual fasting duration, education compliance rates, and rates of surgical delays. In addition, ongoing education is needed to correct the “defensive fasting” mindset and to cultivate a nursing culture guided by evidence, with dual priorities of patient safety and comfort.

This study has several limitations. As a single-center, cross-sectional investigation, the generalizability of the findings requires validation in multicenter settings. Some data were self-reported by patients, which may introduce recall bias; future studies could incorporate objective measures—such as gastric ultrasonography, intraoperative blood glucose levels, and the incidence of postoperative nausea and vomiting (PONV)—to further examine the relationship between adherence and clinical outcomes. In addition, this study did not include long-term follow-up indicators of postoperative recovery. Subsequent prospective studies could explore the comprehensive effects of “precision fasting” on postoperative metabolic, immunological, and psychological recovery.

Conclusions

In summary, this study elucidates the multidimensional status and underlying barriers of preoperative fasting adherence under the ERAS framework, highlighting the coexistence of prolonged fasting and insufficient adherence as a prominent challenge in perioperative management. Implementation of multimodal education, information-driven workflow management, nursing-led verification systems, and individualized risk assessment can significantly improve adherence, enhance patient experience, and promote postoperative recovery while ensuring safety. These findings provide important empirical evidence for optimizing preoperative dietary management within ERAS pathways and offer both theoretical and practical support for developing a nursing model that integrates “precision fasting” with patient-centered care. Future efforts in intelligent surgical scheduling may further enhance adherence, and we look forward to exploring these possibilities.

Abbreviations

ERAS
Enhanced Recovery After Surgery
ASA
American Society of Anesthesiologists
ESA
European Society of Anaesthesiology
GUS
Gastric ultrasound
OR

Odds Ratio
CI
Confidence Interval

Declarations

Human Ethics and Consent to Participate declarations

The study protocol was reviewed and approved by the Medical Ethics Committee of the First Hospital of Lanzhou University. Written informed consent was obtained from all participants prior to enrollment, and participation was entirely voluntary. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. All data were anonymized at the time of collection, and strict measures were implemented to ensure confidentiality throughout data handling and analysis.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare no competing interests.

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Authors' contributions

Ying Liu, Fanfan Li, and YaTao Liu contributed to the study conception and design. Data collection and analysis were performed by Can Huang, Peng Liu, Jun Zheng, Yaqin Tian, Qiaoli Chen, Xuan Ren, and Guiyan Tao. Ying Liu, Fanfan Li and Lili Xie drafted the manuscript. All authors reviewed and approved the final version of the manuscript.

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