SIN-CHN SCIENTIFIC PRESS PTE.LTD.

Molecular & Cellular Biomechanics 2025, 22(1), 948.
https://doi.org/10.62617/mcb948

Article

Effect of biomechanics-correlated integrated nursing mode of physician and nursing on operation process, intraoperative and postoperative adverse reactions and resuscitation quality of elderly patients with painless gastroscopy

Ziyan Liu[1], Fenghong Gao[1], Jing Jin[1], Wenbo Wang[1], Xuyang Zhao[1], Qi Liang[1], Jing Wang[1], Lina Wei[2,*]

[1] Endoscopy center, Second Hospital of Lanzhou University, Lanzhou 730030, China
[2] Department of gastroenterology, Second Hospital of Lanzhou University, Lanzhou 730030, China
*** Corresponding author:** Lina Wei, wei_ln@126.com

CITATION

Liu Z, Gao F, Jin J. Effect of biomechanics-correlated integrated nursing mode of physician and nursing on operation process, intraoperative and postoperative adverse reactions and resuscitation quality of elderly patients with painless gastroscopy. Molecular & Cellular Biomechanics. 2025; 22(1): 948.
https://doi.org/10.62617/mcb948

ARTICLE INFO

Received: 29 November 2024
Accepted: 12 December 2024
Available online: 10 January 2025

COPYRIGHT

Copyright © 2025 by author(s). *Molecular & Cellular Biomechanics* is published by Sin-Chn Scientific Press Pte. Ltd. This work is licensed under the Creative Commons Attribution (CC BY) license.
https://creativecommons.org/licenses/by/4.0/

Abstract: Background: The elderly commonly exhibit stressful responses during painless gastroscopy. At the cellular molecular biomechanics level, this stress activates the sympathetic nervous system, leading to the release of catecholamines like adrenaline. These molecules bind to adrenergic receptors on cells, initiating a cascade of intracellular signaling events. The integrated medical and nursing care model is a modern nursing approach that has been gradually applied in clinical practice over the last few years. This study was conducted to survey the value of this nursing model in elderly patients undergoing painless gastroscopy. **Objective:** To survey the impact of the integrated medical and nursing care model in painless gastroscopy in the elderly on the quality of surgical procedures, intraoperative and postoperative adverse effects and resuscitation. **Methods:** From August 2020 to August 2022, eighty elderly patients who underwent painless gastroscopy in our hospital were enrolled. The patients were randomly allocated into two groups of 40 cases each. In the control group, the patients accepted routine intervention, and in the observation group, the patients accepted the intervention of the physician-nursing integrated nursing model. The differences of nursing effects were compared between the two groups. Statistical analysis was conducted to determine nursing satisfaction and adverse reactions. **Results:** The examination time, fully awake time, and residence time of resuscitation room in the observation group were remarkably shorter ($P < 0.05$). After the failure of 5min and anesthetics before the examination, the scores of SAS and SDS in the observation group were remarkably lower ($P < 0.05$), suggest that the model might impact the balance of neurotransmitters such as serotonin and dopamine. These neurotransmitters play crucial roles in mood regulation and are regulated by complex molecular mechanisms involving transporters and enzymes. In GCQ score, the physiological, psychological, social, and cultural, total environmental scores of the patients in the observation group were remarkably higher. After nursing, the VAS score of the observation group was lower, and the Ramsay score was higher. The total nursing satisfaction rate of the observation group was 97.50%, while that of the control group was 67.50%. Adverse reactions were recorded in both the observation group and the control group at a rate of 7.50% and 30.00%, respectively. **Conclusion:** The integrated medical and nursing care model holds significant value for elderly painless gastroscopy patients by potentially modulating diverse cellular molecular biomechanical aspects, alleviating negative emotions, decreasing adverse reaction risks, and enhancing nursing satisfaction.

Keywords: integrated nursing model of physician and nursing; painless gastroscopy; adverse reactions; resuscitation quality; cellular molecular biomechanics; intracellular signaling

1. Introduction

The incidence of digestive system diseases is increasing with the change of eating habits and lifestyle. At present, the common way of clinical examination for this kind of disease is gastroscopy. At the same time, it is also the examination with the highest diagnostic accuracy. Gastroscopy is a common method in clinical examination of gastrointestinal diseases, which can directly observe the size, shape and type of lesions, and pathological biopsy can also be taken through endoscope for uncertain lesions. In the diagnosis of gastrointestinal diseases, it has a high application value. However, gastroscopy is invasive and can cause pain, nausea and discomfort, which in turn induces anxiety, fear and worry, leading to a remarkable decrease in patient compliance.

The gastroscopy of diagnosis and treatment has been widely used in elderly patients [1–2]. However, gastroscopy is prone to vomiting and coughing, and colonoscopy pulls on the colon causing pain, which can be very painful for the patients. With the development of anesthesiology and people's pursuit of perioperative comfort treatment, painless gastroscopy is more and more widely used. Anesthesia and sedation can not only enable patients to avoid discomfort in the process of gastroscopy, but also provide a suitable operating environment for endoscopic doctors, shorten the duration of operation and reduce accidents. However, the respiratory and circulatory variations in patients under anesthesia pose a range of potential risks, particularly in elderly patients with many underlying conditions. Due to the high incidence of chronic hypertension and the changes of organ blood flow autoregulation with age, elderly patients are easily affected by perioperative hemodynamic fluctuations. The systemic vasodilation caused by anesthetics, hypotension and bradycardia caused by decreased peripheral circulatory resistance and myocardial inhibition are very harmful to elderly patients. These circulatory fluctuations can elevate the risk of cardiovascular and cerebrovascular events in elderly patients [3–4]. Anesthetics and analgesics can inhibit respiration in varying degrees, and respiratory depression and hypoxemia are more likely to occur in elderly patients [5]. Moreover, insufficient analgesia will lead to intraoperative vomiting and body movement, which increases the incidence of aspiration pneumonia and digestive tract injury. Elderly patients with a high incidence of chronic bronchitis and relatively poor lung function are prone to reflex vomiting and reflux aspiration once analgesia is inadequate, which can be serious or even life-threatening.

The appearance of painless gastrointestinal endoscopy can ensure patients to participate in the examination in a painless state based on traditional gastrointestinal endoscopy, which can effectively reduce patients' worries, reduce their psychological burden [6–8] and effectively improve their compliance. However, some patients may experience adverse psychological reactions such as anxiety, worry and fear, which, together with a poor understanding of their illness, can have an impact on the examination time and anesthetic dose, leading to undesirable consequences. Recent literature has provided additional evidence supporting the optimization of nursing care models for elderly patients undergoing painless gastroscopy. For example, new findings indicate that targeted psychological interventions can effectively reduce patients' perioperative anxiety, while integrated sedation management protocols have

been shown to decrease the incidence of anesthesia-related complications [9]. Additionally, the latest systematic reviews emphasize the value of multidisciplinary approaches—such as nurse-led patient education and real-time vital sign monitoring—in enhancing patient comfort and safety [10]. These insights build upon earlier research and reinforce the necessity of continually refining clinical protocols to ensure improved, patient-centered care in endoscopic procedures [11].

It is thus necessary for patients undergoing painless gastrointestinal endoscopy to receive corresponding nursing interventions. Physician-nursing integrated nursing is a new nursing model. In the old days, there were many reports on the application value of physician-nursing integrated nursing model to elderly painless gastroscopy patients, but there were some limitations in previous studies, such as incomplete observation index, imprecise data collection and so on. Under this background, it is still necessary to carry out further research to fully demonstrate the application value of this nursing model and lay a theoretical foundation for its popularization and application. We classified 80 patients who underwent painless gastroscopy from August 2020 to August 2022 into two groups. 40 cases were intervened using an integrated physician care model of care to explore the psychological status and adverse outcomes of patients who received conventional nursing interventions.

2. Patients and methods

2.1. General information

During August 2020 to August 2022, eighty elderly patients with painless gastroscopy cured in our hospital were arbitrarily classified into two groups with 40 cases in each group. In the control group, the patients accepted routine intervention, and the patients in the observation group accepted the intervention of physician nursing integrated nursing mode. A total of 27 men and 13 women comprised the control group. Among the participants, the age ranged from 64 to 87 years, with an average of (65.92 ± 5.09) years. The patients' conditions included gastric ulcer (15 cases), duodenal ulcer (16 cases) and chronic gastritis (9 cases), and the course of disease ranged from 1 to 10 months, with an average course of (5.46 ±0.32) months. A total of 28 men and 12 women comprised the study group. Among the participants, the age ranged from 65 to 86 years, with an average of (66.32 ± 4.55) years. The patients' conditions included gastric ulcer (13 cases), duodenal ulcer (20 cases) and chronic gastritis (7 cases), and the course of disease ranged from 1 to 12 months, with an average course of (5.53 ± 0.29) months. No remarkable difference was found in the baseline data ($P > 0.05$), which was comparable in **Table 1**. We obtained informed consent from all of the patients for this study, which was approved by our hospital's Medical Ethics Council.

Inclusion criteria: (1) patients with painless gastroscopy indications; (2) patients with certain reading comprehension ability; (3) no history of allergy to anesthetic drugs adopted in this study; (4) patients with good compliance and high matching(i.e., the patient could strictly adhere to preoperative fasting instructions, attend follow-up visits punctually, cooperate with clinical guidance, and demonstrate both physical and psychological conditions closely aligned with the study requirements); (5) patients agreed to take part in the study and sign voluntarily.

Table 1. General data of patients.

Group	*N*	Gender		Age (years)	Body mass index (kg)	Course of disease (month)	Disease type		
		Male	Female				Gastric ulcer	Duodenal ulcer	Chronic gastritis
Observation group	40	28 (70.00)	12 (30.00)	76.32 ± 4.55	62.71 ± 1.83	5.53 ± 0.29	13 (32.50)	20 (50.00)	7 (17.50)
Control group	40	27 (67.50)	13 (32.50)	75.92 ± 5.09	63.05 ± 2.01	5.46 ± 0.32	15（37.50)	16 (40.00)	9 (22.50)
t/$\chi 2$		0.058		0.371	0.791	1.025	0.837		
P		>0.05		>0.05	>0.05	>0.05	>0.05		

Exclusion criteria: (1) patients with abnormal structure of digestive system; (2) patients with mental diseases; (3) patients with diseases of important organs; (4) patients who had received other general anesthesia 15 days before the implementation of the study.

Calculation formula of sample size:

$$n = 2 \times \left[\frac{(u_\alpha + u_\beta) \times \sigma}{\delta}\right]^2$$

U α-the *u* value corresponding to the level α;

U value corresponding to the error probability β of type U β-*II*;

δ-the difference between the two populations, $\delta = 1 - 2$;

σ-population standard deviation;

The bilateral α is 0.05, β is 0.1, u0.05/2 = 1.96, u0.1 = 1.282, and the retention time in resuscitation room is taken as the effect index. The parameter was set as δ = 3.44, $n1 = n2 = 45$, S1 = 5.23, S2 = 6.32, and the substituted $\sigma = 4.12$.

2.2. Treatment methods

Routine nursing intervention was applied to patients in the control group. Patients should eat mainly liquid or semi-liquid food 3 days before the examination, drink plenty of water and refrain from eating 12 h before the examination. The patient was confirmed to have no history of drug allergy and a history of anesthesia. The patient was assisted with routine blood and ECG tests. The patient should be informed of the precautions to be taken during the examination and verbally informed of the precautions to be taken during painless gastroscopy. The nurse properly prepared the relevant instruments and disinfected them. Once the painless gastroscopy began, vital signs were closely monitored and the doctor was informed promptly if abnormalities were detected. After the examination, the patient was escorted back to the ward and advised of the precautions related to diet once the patient was clear.

In the observation group, an integrated medical and nursing care model was used to enhance risk management in terms of continuous diagnosis and care in gastroscopy to avoid complications and to develop individualized treatment plans. The specific measures were as follows:

1) Formation of an integrated care team consisting of doctors and nurses. The members of the group included endoscopic doctors, anesthesiologists, and nurses, which were organized by the head of the department and the head nurse. A medical

team leader with the title of deputy chief physician and a nurse with the title of chief nurse or above head the integrated team of doctors and nurses.

2) Medical and nursing training. All members of the team participated in core competency training, thematic case analysis discussions and academic lectures organized by the department to keep abreast of cutting-edge information on treatment and care and to improve their professional skills to ensure health education for patients. In addition, standardized training sessions totaling at least 20 h were conducted by experienced senior clinicians and nurse specialists, covering patient safety measures, emergency response protocols, sedation management, psychological counseling, and advanced life support techniques. Team members were required to pass written and practical examinations to demonstrate competency, with regular refresher courses and quarterly assessments implemented to maintain high standards of care. The medical and anesthetic personnel formulate the flow chart of painless gastroscopy and the examination flow of general anesthesia painless gastroscopy, and match the new technology of endoscopic treatment and related indications with pictures on the wall, to achieve intuitive and visual health education, so that patients can watch in the waiting area to meet the psychological needs of patients and their families.

3) Doctors in the medical team accessed the relevant medical records of all general, critical, and special patients through the electronic medical record to understand the dynamics of the patients. The informed consent form of gastroscopy, preoperative blood coagulation function, ECG examination and other reports should be checked. To formulate the principle of cooperation between medical and anesthesia, we must be methodical, serious, and unified first aid consciousness. All medical ordered relating to the diagnosis and treatment of gastroenterology were issued by a specialist doctor. In this process, one order and two feedbacks (confirmation and execution) were strictly followed. The doctor could only give one medical order at a time and the medical order is complete.

4) The nurse would admit the patient to the anesthetic preparation room and patiently and carefully explain to the patient the meaning and purpose of the gastroscopy, the adverse effects, and the reliability of the current technique. The anesthetist was responsible for explaining the possible complications of anesthesia, the procedure, the requirements for cooperation and the appropriate safety measures.

5) Each patient was thoroughly assessed by the anesthetist. Preoperative anesthetic risk assessment and graded management were recognized and widely implemented as effective measures to control anesthetic risks and improve safety. Our hospital has adopted the American Society of Anesthesiologists (ASA) Anesthesia Risk Scale to effectively identify risk factors in high-risk groups and to divide patients into five groups. Basic precautions were taken for the low-risk group, while resuscitation equipment and pharmacological precautions were added for the intermediate and high-risk groups. The anesthetists administered medication accurately according to the patient's age and weight to reduce the impact on the patient's respiratory and circulatory function.

6) Nursing care during the examination. Pre-examination nursing care: nurses should do a good job of assessing nursing risks and predictive preventive nursing measures for the focus and difficulties of examinations of difficult and critically ill patients based on feedback from the patient dynamics of the medical team, and

feedback the patient dynamics to the head nurse and assign additional staff if necessary. Nursing care during the examination: guiding the patient to adopt the correct posture, instructing the patient to wear an occlusal pad, unfastening the collar, relaxing the belt, guiding the patient to breathe deeply, helping the patient to relax, and diverting the patient's attention. The patient's respiratory rate was observed during the operation, and continuous monitoring of oxygen saturation, non-invasive blood pressure, and heart rate was performed every 5 min or as per hospital guidelines. In the event of critical changes, such as severe hypoxia (SpO2 < 90%), significant hypotension (systolic blood pressure < 90 mmHg), or bradycardia (heart rate < 50 bpm), a predefined emergency response protocol was immediately activated. An anesthesiologist and an experienced endoscopy nurse, both with advanced life support certification, were present to handle any emergencies. The monitoring personnel were all trained nurses qualified in advanced life support, ensuring that they could promptly identify and respond to physiological disturbances or complications during the procedure. The patient was alerted to sudden changes in oxygen saturation and the occurrence of tongue loss, and cooperated with the operation during the operation. Post-examination care: after the examination, the patient was monitored with ECG and oxygen inhalation and sent to the resuscitation room for observation. When the patient left the ward, a standardized score was performed by the anesthetist. When the patient met the criteria of Steward awakening score >4, consciousness, no vertigo, no nausea, stable blood pressure and heart rate, the nurse could call him out of the ward until the relevant health education on diet and activity was done.

2.3. Observation index

(1) The resuscitation conditions were compared, including the time of full awakening, the residence time of resuscitation room and the time of examination.

(2) The adverse emotions (anxiety and depression) were scored at admission, 5min before examination and after waking up. Anxiety state was evaluated by anxiety rating scale (SAS), ≥50 as existence of anxiety, depression assessment scale (SDS) [12] as depression, ≥53 as existence of depression, and scores higher indicate more severe anxiety or depression.

(3) The comfort between the two groups: after nursing care, the simplified comfort scale (GCQ) [13] was used to evaluate the comfort during the examination. There were 30 items, including physiology (5 items), psychology and spirit (10 items), social culture (7 items) and environment (8 items). A higher score indicates a greater level of patient comfort.

(4) Pain visual analogue scale (VAS) [14] was adopted to assess the degree of pain before and after nursing: painless= 0 score, mild pain= 1 − 3, moderate pain =4 − 6, strong pain =7 − 10. The more severe the pain, the higher the score.

(5) The Ramsay sedation score was adopted to assess the level of sedation in both groups before and after care: restlessness as 1, awake and quiet as 2, drowsy and responsive to commands as 3, light sleep and awakening as 4, sleep and slow response as 5 and deep sleep and unresponsive to calls as 6 [15].

(6) Nursing satisfaction: after the nursing intervention, the self-made nursing satisfaction questionnaire was adopted to assess the nursing satisfaction of patients.

The specific items of the questionnaire form include patients' working attitude towards nurses, nursing quality, etc., with a total of 10 items, and each item is 1 point, with a total score of 10 points, of which very pleased ≥8 points, 5 points ≤ pleased < 7 points; dissatisfaction < 4 points. The total satisfaction rate = (very pleased cases + pleased cases)/total cases × 100%. The Cronbachα coefficient of the scale is 0.93, the Cronbachα coefficient of each factor is 0.82~0.88, and the CVI value is 0.9016. The reliability and validity were ideal, and the stability and reliability were high. Before the formal implementation, the questionnaire underwent a pilot testing phase on a small group of patients (n = 15) to identify ambiguities or overly complex wording. Feedback from these patients, along with input from an expert panel consisting of senior nurses and anesthesiologists, led to the revision or removal of certain items to enhance clarity and practical relevance. A subsequent pilot test (n = 30) confirmed the improved clarity, internal consistency, and relevance of the questionnaire. This iterative validation process ensured that the final questionnaire was both reliable and context-appropriate for accurately assessing nursing satisfaction in patients undergoing painless gastroscopy.

(7) Adverse reactions: the adverse reactions were recorded during the diagnosis and treatment of painless gastroscopy. The common adverse reactions were hypotension, hypoglycemia, nausea and vomiting, pain and so on. The incidence of adverse reactions was analyzed and compared. The total incidence of adverse reactions = the sum of all kinds of adverse reactions/the total number of cases × 100%. A hypotensive state is defined as blood pressure lower than 90 mmHg at the systolic level and below 60 mmHg at the diastolic level. Hypoglycaemia was defined as adult plasma glucose <2.8 mmol/L. Nausea was defined as an upset stomach that could cause an urge to vomit. Vomiting was defined as a strong excretion of stomach contents through the mouth.

2.4. Statistical analysis

The data were analyzed and processed by SPSS22.0 statistical software. A ($\overline{x} \pm s$) symbol is used to indicate measurements with a normal distribution or approximate normal distribution. Comparing the two groups was done using paired t-tests, while comparing the two groups separately using independent sample t-tests. The n (%) was adopted to represent the counting data, and χ^2 test was adopted. $P < 0.05$ was the differences were statistically remarkable.

3. Results

3.1. General data of patients

No remarkable difference was found in sex, age, course of disease, course of disease and type of disease (all $P > 0.05$). In **Table 1**, you can see all the results.

3.2. Nursing effect of patients

The examination time, fully awake time, and residence time of resuscitation room in the observation group were remarkably shorter ($P < 0.05$). In **Table 2**, you can see all the results.

Table 2. Nursing effects of patients ($\overline{x} \pm s$, points).

Group	*N*	Check time (min)	Fully awake time (min)	Residence time of resuscitation room (min)
Observation group	40	23.71 ± 3.05	6.27 ± 1.38	8.39 ± 1.38
Control group	40	29.83 ± 3.26	9.39 ± 1.77	17.85 ± 3.01
t		8.670	8.792	18.069
P		<0.05	<0.05	<0.05

3.3. The negative emotion before and after nursing

At the time of admission, no remarkable difference was found in SAS score and SDS score ($P > 0.05$). After the failure of 5min and anesthetics before the examination, the scores of SAS and SDS in the observation group were remarkably lower ($P < 0.05$). In **Table 3**, you can see all the results.

Table 3. The blood pressure before and after nursing ($n = 40$, points, $\overline{x} \pm s$).

Group	SAS			SDS		
	When admitted to hospital	Before inspection 5 min	After waking up	When admitted to hospital	Before inspection 5 min	After waking up
Observation group	51.34 ± 3.29	41.54 ± 3.71[a]	38.04 ± 4.11[a]	53.06 ± 5.01	42.36 ± 3.42[a]	39.28 ± 3.15[a]
Control group	51.66 ± 2.31	48.85 ± 4.26[b]	46.51 ± 3.27[b]	53.21 ± 5.07	37.86 ± 5.01[b]	46.07 ± 4.22[b]
Time (F Value/P Value)	13.035/0.000			13.498/0.000		
Intergroup (F Value /P Value)	14.321/0.000			13.203/0.000		
Time × inter-group (F Value /P Value)	15.829/0.000			13.262/0.000		

Note: compared with the observation group at admission, a$P < 0.05$; compared with the control group at admission, b$P < 0.05$.

3.4. The comfort score

The physical, psychological, social, and cultural, environmental, and total scores of the patients in the observation group were remarkably higher ($P < 0.05$). In **Figure 1**, you can see all the results.

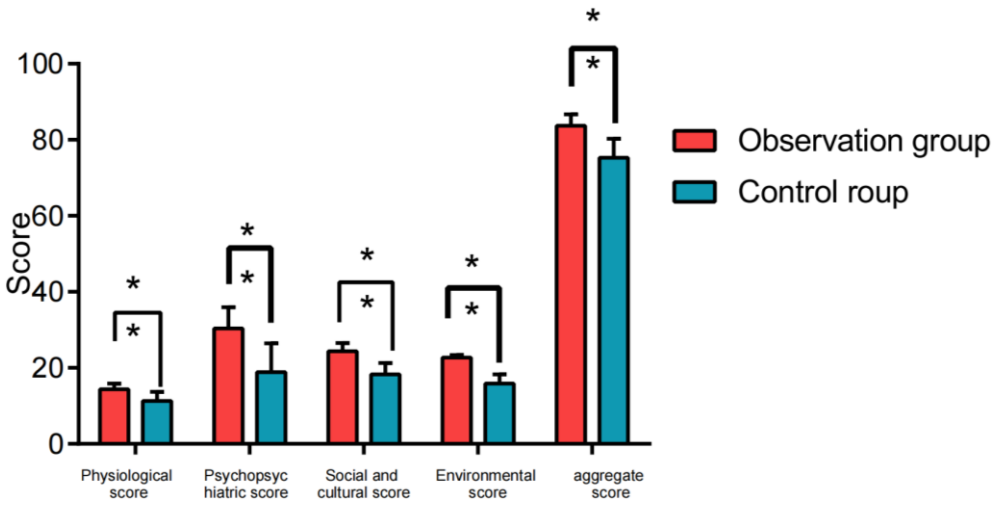

Figure 1. The comfort scores.

3.5. VAS score and Ramsay score before and after nursing

Before nursing, no remarkable difference was found in VAS score and Ramsay score ($P > 0.05$). After nursing, the VAS score of the observation group was lower, and the Ramsay score was higher. In **Table 4**, you can see all the results.

Table 4. VAS score and Ramsay score ($\overline{x} \pm s$, n = 40, points).

Group	VAS		Ramsay	
	Before nursing	After nursing	Before nursing	After nursing
Observation group	6.43 ± 1.87	1.93 ± 0.87[a]	1.02 ± 0.32	3.45 ± 0.68[a]
Control group	6.27 ± 1.35	4.52 ± 1.31[b]	1.08 ± 0.41	1.61 ± 0.43[b]
t	0.439	10.416	0.730	14.464
P	>0.05	<0.05	<0.05	>0.05

Note: compared with the observation group before nursing, a$P < 0.05$; compared with the control group before nursing, b$P < 0.05$.

3.6. The nursing satisfaction of patients

In the observation group, 22 patients were very pleased, 17 patients were pleased, 1 patient was not pleased, the total satisfaction rate was 97.50%. In the control group, 15 patients were very pleased, 12 patients were pleased, 13 patients were not pleased, and the total satisfaction rate was 67.50%. In **Table 5**, you can see all the results.

Table 5. The patient satisfaction (*n*/%).

Group	*N*	Very pleased	Pleased	Not pleased	Total satisfaction rate (%)
Observation group	40	22 (55.00)	17 (42.50)	1 (2.50)	39 (97.50)
Control group	40	15 (37.50)	12 (30.00)	13 (32.50)	27 (67.50)
$\chi 2$					12.468
P					<0.05

3.7. The incidence of adverse reactions

In the observation group, there were 1 people of hypotension, 1 people of hypoglycemia, 1 people of pain, and the total incidence of adverse reactions was 7.50%. In the control group, 5 people of hypotension, 2 people of hypoglycemia, 3 people of nausea and vomiting, 2 people of pain, and the total incidence of adverse reactions was 30.00%. In addition, the severity of these adverse events was assessed. All hypotension cases were mild, requiring only brief fluid supplementation or minimal hemodynamic support without long-term impact. The observed hypoglycemic episodes were mild to moderate and were promptly corrected with intravenous glucose administration. Nausea and vomiting incidents were transient and easily controlled with standard antiemetic treatments. Pain reports were mild and alleviated through short-term analgesics and reassurance. Importantly, no cases of severe or life-threatening complications occurred, and none required intensive intervention beyond routine supportive measures. In **Table 6**, you can see all the results.

Table 6. The adverse reactions (*n*/%).

Group	*N*	Hypotension	low blood sugar	Nausea and vomiting	pain	Total incidence rate (%)
Observation group	40	1 (2.50)	1 (2.50)	0 (0.00)	1 (2.50）	3 (7.50)
Control group	40	5 (12.50)	2 (5.00)	3 (7.50)	2 (5.00）	12 (30.00)
χ^2						6.646
P						<0.05

4. Discussion

Digestive endoscopy is not only the main way to diagnose digestive system diseases, but also the gold standard to diagnose digestive system diseases [16]. When there is discomfort in the gastrointestinal part of the patient, gastroscopy can effectively find the disease and carry out corresponding treatment to achieve the purpose of preventing the disease and preventing the aggravation of the disease [17,18]. Gastroscopy is an invasive test and, combined with patients' concerns about their disease, most patients are more reluctant and unwilling to undergo the test [19,20]. With the continuous development of medical technology, painless gastroscopy came into being [21,22]. Gastroscopy is a kind of endoscope, which can go deep into the esophagus and duodenum of the human body. The resolution and clarity of endoscopy has improved considerably, but this type of examination takes a long time, so there are often patients who are not very cooperative. The painless gastroscopy is different from the ordinary endoscope, a large number of clinical practices can see that during the implementation of painless gastroscopy. Patients complete the examination under anesthesia, with no pain during the procedure and no impression of the examination process after completion, which effectively improves patient comfort during and after the examination [23,24]. During the performance of gastroscopy, foreign body in the throat, nausea and vomiting are the manifestations of some patients after the examination and the use of anesthetic drugs makes the patients prone to adverse reactions such as hypotension, hypoglycemia and respiratory depression [25]. Therefore, the application of scientific and effective nursing intervention is of positive significance to improve patients' reexamination compliance.

Painless gastroscopy has anesthetic risks such as respiratory and circulatory inhibition, and patients generally have anxiety, fear, and even increased heart rate and blood pressure. Severe anxiety and depression can reduce the compliance of treatment and increase the dosage of anesthetics during operation, which affect the effect of examination. Most of the patients were intervened by routine nursing, but the pertinence of this nursing model was poor, which increased the incidence of psychological bad mood and adverse consequences [26–28]. Although the integrated nursing model of physician and nursing is dominated by nurses, patients generally tend to trust doctors, and can make use of the special inner activities of patients to make endoscopic doctors and anesthesiologists intervene in psychological intervention to promote the change of patients' cognitive behavior and eliminate their fear. Through mutual communication between doctors, nurses, and anesthetists, we explain to patients that the risks of endoscopic consultation are preventable and controllable. Dynamic, step-by-step, targeted psychological care and health education is provided

according to the characteristics of each patient to help patients put down their mental baggage and actively cooperate with the examination [29]. The results indicated that the examination time, fully awake time and resuscitation room residence time in the observation group were remarkably shorter. After the failure of 5min and anesthetics before examination, the scores of SAS and SDS in the observation group were remarkably lower. The integrated nursing model of doctors and nursing can actively enhance the psychological state of patients, reduce patients' anxiety, and tension, and then reduce patients to shorten the process of operation and remarkably improve the quality of awakening. In the observation group, patients were given a comprehensive model of care by the physician based on conventional care so that the patients received more comprehensive care interventions during the examination [30]. The nursing model is adapted to the patient's clinical needs and various physical conditions based on the usual nursing content. The needs of the patient at different times are clarified to make the nursing care more specific and can best meet the patient's needs in terms of examination, treatment as well as physical and psychological aspects. Because of its consistency and pertinence, process-based nursing intervention is widely used in clinic, especially for patients undergoing gastroscopy. Personalized and scientific nursing intervention can be given to patients in different time periods to avoid omitting nursing contents in the nursing process. Predictive and comprehensive nursing interventions were provided to the patients, and the medical staff communicated fully with the patients to enhance the tacit understanding of cooperation between the medical staff and the patients. Patients are fully prepared psychologically to minimize their negative emotions, enabling them to better cooperate with the medical staff in the examination and effectively shortening the examination time of the patients. In addition, the results of this study also indicated that the scores and total scores of GCQ in the observation group were higher. It shows that the observation patients have high comfort and good nursing experience. The main reason is that the application of physician-nurse integrated nursing mode pays more attention to patients' physiological and psychological feelings, and can take targeted measures to reduce stress response and improve patients' comfort.

Here, the total incidences of adverse reactions were 7.50% and 30.00% in the observation and control groups. This significant reduction in adverse events within the integrated physician-nursing model group may be influenced by several factors. First, the comprehensive pre-assessment and individualized risk stratification guided by anesthesiologists and endoscopic specialists likely ensured more accurate dosing of sedatives and analgesics, minimizing hemodynamic fluctuations. Second, the continuous and coordinated monitoring by trained nursing staff with advanced life support certification allowed for the early detection and rapid intervention of emerging complications. Additionally, improved communication and workflow efficiency reduced the possibility of procedural delays, which could otherwise contribute to stress-related physiological disturbances. These mechanisms, collectively, create a safer procedural environment and highlight the importance of interdisciplinary collaboration in minimizing adverse reactions. Further research, perhaps incorporating qualitative data from both patients and healthcare providers, could provide deeper insights into the specific elements of this model that most effectively reduce complication rates. There is a possibility of reducing the incidence of adverse

anesthetic reactions using this model. The reasons are analyzed as follows: the focus of the routine nursing model is the implementation of medication and nursing according to the doctor's orders, the lack of timely and effective communication between doctors and nurses, and little understanding of the overall characteristics of the disease, examination plan, anesthetic risk and so on. Lack of ability to predict the changes of the disease during the operation, the respective management mode of medical and nursing anesthesia is not conducive to painless gastroscopy. On the other hand, the integrated nursing mode of physicians and nursing has changed the previous parallel working mode between doctors and nurses. With the active involvement of the doctors and anesthetists, the nurses have a better understanding of the patient's condition and potential anesthetic risks and take preventive measures against complications. The nurses are also able to form an integrated interface with the doctors and anesthetists to maintain a constant dynamic observation of the patient and to help relieve pain and discomfort.

This study indicated that the VAS score of the observation group was lower, while Ramsay's sedation score was higher. It is suggested that the integrated management mode of medical care and anesthesia can achieve satisfactory anesthetic analgesic effect and is conducive to postoperative recovery. Because of the good analgesic effect and quick recovery, patients' satisfaction with the integration of doctors and nurses was remarkably improved. This study indicated that the satisfaction of the observation group was higher. Through the integrated safety management of physicians and nursing, the sedation score system is fully used to monitor the pain management of patients from entering the room to leaving the room in a timely manner, and the psychological stress reaction of patients is greatly alleviated by effectively reducing pain. It can promote patients to wake up and recover from bed activities as soon as possible, so patients' satisfaction with medical and anesthesia is remarkably improved. While these international studies share similarities in demonstrating reduced anxiety, shorter recovery times, and higher satisfaction rates, our research adds further evidence by focusing on an elderly population, who may have more complex comorbidities and higher risks of complications. Additionally, some Asian studies have explored similar integrated nursing models, but differences in healthcare infrastructure, patient education levels, and cultural attitudes toward medical interventions may lead to variations in implementation and effectiveness. Our study, therefore, not only provides a local context for understanding the benefits of physician-nursing integrated care in painless gastroscopy but also contributes to a growing body of international literature, facilitating more comprehensive knowledge exchange and guiding best practices in different healthcare settings worldwide.

From a practical standpoint, the implementation of this integrated physician-nursing model also involves considerations of cost-effectiveness, training, and feasibility. While introducing such a model may require initial investments in staff training, protocol development, and additional monitoring equipment, these costs could be offset by long-term benefits, including reduced complication rates, shorter recovery times, and improved patient satisfaction, potentially lowering overall healthcare expenditures in the long run. Moreover, successful deployment of this integrated model calls for structured and ongoing training programs for medical staff, ensuring that physicians, anesthesiologists, and nurses are all proficient in advanced

sedation management, emergency responses, and patient communication techniques. This can be achieved through regular workshops, simulation-based drills, and peer-review sessions to maintain a consistently high level of care. In terms of practical recommendations, healthcare institutions looking to adopt this model should start with a pilot phase, evaluating resource allocation, workflow adaptations, and staff feedback before full-scale implementation. It may be helpful to establish clear clinical pathways, develop standardized checklists, and create interprofessional communication platforms. By doing so, institutions can refine procedures, reinforce team synergy, and ultimately cultivate a patient-centered environment that maximizes the clinical benefits of painless gastroscopy.

In this study, the sample size was small, regional differences were not present and feedback was not provided. It is suggested that there can be cross-regional, multi-center, large sample research in the future research to get more accurate evidence to better serve the clinic.

4. Conclusion

In conclusion, the integrated medical and nursing care model can effectively address patients' adverse emotions in a timely manner, enhance the quality of patients' recovery and remarkably lessen the occurrence of anesthetic complications. Good cooperation between medical and nursing not only brings better services to patients, but also mobilizes the subjective initiative of nurses and promotes the overall professionalism of the medical and anesthesia team, and this intervention is worth promoting and applying in clinical practice.

Author contributions: Conceptualization, ZL; methodology, FG; software, JJ; validation, WW; formal analysis, ZL; investigation, XZ; resources, QL; data curation, LW; writing—original draft preparation, ZL; writing—review and editing, WW; visualization, JW; supervision, FG; project administration, LW; funding acquisition, JJ. All authors have read and agreed to the published version of the manuscript.

Ethical approval: The study was conducted in accordance with the Declaration of Helsinki. Approval from the Medical Ethics Committee of the Second Hospital of Lanzhou University. Project No.2024A-011

Conflict of interest: The authors declare no conflict of interest.

References

1. Isoldi S, Cucchiara S, Repici A, Lerner DG, Thomson M, Oliva S. Gastrointestinal endoscopy in children and adults: How do they differ? Digest Liver Dis. 2021;53(6):697-705.
2. Min JK, Kwak MS, Cha JM. Overview of Deep Learning in Gastrointestinal Endoscopy. Gut Liver. 2019;13(4):388-393.
3. Daaboul DG, DiNardo JA, Nasr VG. Anesthesia for high-risk procedures in the catheterization laboratory. Paediatr Anaesth. 2019;29(5):491-498.
4. Taylor D, Habre W. Risk associated with anesthesia for noncardiac surgery in children with congenital heart disease. Paediatr Anaesth. 2019;29(5):426-434.
5. Reale SC, Bauer ME, Klumpner TT, Aziz MF, Fields KG, Hurwitz R, Saad M, Kheterpal S, Bateman BT; Multicenter Perioperative Outcomes Group Collaborators. Frequency and Risk Factors for Difficult Intubation in Women Undergoing

General Anesthesia for Cesarean Delivery: A Multicenter Retrospective Cohort Analysis. Anesthesiology. 2022;136(5):697-708.
6. Nishizawa T, Suzuki H. Propofol for gastrointestinal endoscopy. United Eur Gastroent. 2018;6(6):801-805.
7. Mezoff EA, Williams KC, Erdman SH. Gastrointestinal Endoscopy in the Neonate. Clin Perinatol. 2020;47(2):413-422.
8. Bjørsum-Meyer T, Baatrup G, Koulaouzidis A. Colon Capsule Endoscopy as a Diagnostic Adjunct in Patients with Symptoms from the Lower Gastrointestinal Tract. Diagnostics (Basel). 2021;11(9):1671.
9. Chen, L., Zong, W., Luo, M., & Yu, H. (2024). The impact of comprehensive geriatric assessment on postoperative outcomes in elderly surgery: A systematic review and meta-analysis. PLOS ONE, 19. https://doi.org/10.1371/journal.pone.0306308.
10. Chen, H., & Wang, R. (2024). Effect of Preoperative Accurate Evaluation and Intervention on Prognosis and Outcome in Elderly Patients with Painless Gastroenteroscopy: Protocol for A Single-Centre Randomized Controlled Trial. Asploro Journal of Biomedical and Clinical Case Reports. https://doi.org/10.36502/2024/asjbccr.6336.
11. Wu, Z., & Han, Q. (2024). Effects of high-quality nursing interventions on outcomes and complication rate of elderly patients undergoing painless gastrointestinal endoscopy. Acta Paulista de Enfermagem. https://doi.org/10.37689/acta-ape/2024ao00014633.
12. Jokelainen J, Timonen M, Keinänen-Kiukaanniemi S, Härkönen P, Jurvelin H, Suija K. Validation of the Zung self-rating depression scale (SDS) in older adults. Scand J Prim Health. 2019;37(3):353-357.
13. Alp FY, Yucel SC. The Effect of Therapeutic Touch on the Comfort and Anxiety of Nursing Home Residents. J Relig Health. 2021;60(3):2037-2050.
14. Chiarotto A, Maxwell LJ, Ostelo RW, Boers M, Tugwell P, Terwee CB. Measurement Properties of Visual Analogue Scale, Numeric Rating Scale, and Pain Severity Subscale of the Brief Pain Inventory in Patients With Low Back Pain: A Systematic Review. J Pain. 2019;20(3):245-263.
15. Rasheed AM, Amirah MF, Abdallah M, P J P, Issa M, Alharthy A. Ramsay Sedation Scale and Richmond Agitation Sedation Scale: A Cross-sectional Study. Dimens Crit Care Nur. 2019;38(2):90-95.
16. Pardo E, Camus M, Verdonk F. Anesthesia for digestive tract endoscopy. Curr Opin Anaesthesiol. 2022;35(4):528-535.
17. Romano M, Gravina AG, Eusebi LH, Pellegrino R, Palladino G, Frazzoni L, Dajti E, Gasbarrini A, Di Mario F, Zagari RM; Members of SIGE; Members of SIED National Council. Management of Helicobacter pylori infection: Guidelines of the Italian Society of Gastroenterology (SIGE) and the Italian Society of Digestive Endoscopy (SIED). Digest Liver Dis. 2022;54(9):1153-1161.
18. Lahner E, Zagari RM, Zullo A, Di Sabatino A, Meggio A, Cesaro P, Lenti MV, Annibale B, Corazza GR. Chronic atrophic gastritis: Natural history, diagnosis and therapeutic management. A position paper by the Italian Society of Hospital Gastroenterologists and Digestive Endoscopists [AIGO], the Italian Society of Digestive Endoscopy [SIED], the Italian Society of Gastroenterology [SIGE], and the Italian Society of Internal Medicine [SIMI]. Digest Liver Dis. 2019;51(12):1621-1632.
19. Candia R. Herramientas para la interpretación de informes endoscópicos: clasificaciones y escalas en endoscopía digestiva [Classifications and scores used in digestive endoscopy]. Rev Med Chile. 2020;148(7):992-1003.
20. Cyrany J, Malý R, Rejchrt S, Tachecí I. Antithrombotic therapy and digestive endoscopy. Vnitr Lek. 2022;68(8):538-542.
21. Khader Y, Burmeister C, Patel D, Ambati A, Altorok N. Henoch-Schonlein Purpura Presenting as Upper Gastrointestinal Bleed in an Adult Patient. Cureus. 2021;13(3):13879.
22. Matli VVK, Zibari GB, Wellman G, Ramadas P, Pandit S, Morris J. A rare synchrony of adenocarcinoma of the ampulla with an ileal gastrointestinal stromal tumor: A case report. World J Gastro Oncol. 2022;14(11):2253-2265.
23. Yang Junna,Yang Jing,Guo Dongmei,Zhao Qingchao & Chen Yang.(2022).Outcome of Nursing Based on Health Belief United with Knowledge, Belief, and Practice Mode on Gastroscopy of Patients with Gastric Cancer..Computational and mathematical methods in medicine9491454-9491454.
24. Guo Qi,Jiang Wenhao,Wang Yu,Xue Xiaoqiang,Mu Dongdong,Chen Nanmei & Wang Ping.(2021).Observation on the effect, satisfaction and nursing quality of whole-course nursing in patients undergoing electronic gastroscopy..Minerva surgery(1),
25. Papaefthymiou A, Koffas A, Laskaratos FM, Epstein O. Upper gastrointestinal video capsule endoscopy: The state of the art. Clin Res Hepatol Gas. 2022;46(3):101798.

26. McGoran JJ, McAlindon ME, Iyer PG, Seibel EJ, Haidry R, Lovat LB, Sami SS. Miniature gastrointestinal endoscopy: Now and the future. World J Gastroenterol. 2019;25(30):4051-4060.
27. Peterson LL, Lustberg M, Tolaney SM, Ross M, Salehi E, Isakoff SJ. Integration of Physician and Nursing Professional Efforts to Deliver Supportive Scalp Cooling Care to Oncology Patients at Risk for Alopecia. Oncol Ther. 2020;8(2):325-332.
28. Kruser TJ, Kruser JM, Gross JP, Moran M, Kaiser K, Szmuilowicz E, Kircher SM. Medical oncologist perspectives on palliative care reveal physician-centered barriers to early integration. Ann Palliat Med. 2020;9(5):2800-2808.
29. Mchugh J, Shay P, Flansbaum B. The Critical Role of Hospitalists for Successful Hospital-SNF Integration Hospitalists and Hospital/SNF Integration. J Hosp Med. 2019;14(3):192-193.
30. Havreng-Théry C, Giner-Perot J, Zawieja P, Bertin-Hugault F, Belmin J, Rothan-Tondeur M. Expectations and Needs of Families in Nursing Homes: An Integrative Review. Med Care Res Rev. 2021;78(4):311-325.