

Study on the Application of Stepwise Nursing Intervention in Abdominal Distension after Enteral Nutrition for Elderly Bedridden Patients

Yang Xu*

Taizhou Second People's Hospital Affiliated to Yangzhou University, Taizhou 225500, Jiangsu, China

*Author to whom correspondence should be addressed.

Copyright: © 2025 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: *Objective:* To explore the effect of stepwise nursing intervention in abdominal distension after enteral nutrition for elderly bedridden patients. *Methods:* Seventy elderly bedridden patients who received enteral nutrition and developed abdominal distension in the hospital from April 2024 to April 2025 were selected and divided into an observation group ($n=35$) and a control group ($n=35$) based on differences in nursing methods. The control group received routine nursing intervention, while the observation group received stepwise nursing intervention. After the same nursing duration, the self-care ability, psychological status, nursing effect, gastrointestinal function, and nursing satisfaction of the two groups were compared. *Results:* After nursing, the self-care ability scores of both groups increased significantly, and the improvement in each dimension of the observation group was better than that of the control group ($P < 0.05$). After nursing, the SDS and SAS scores of the observation group were significantly lower than those of the control group, and the time for abdominal distension relief and anal exhaust was significantly shorter than that of the control group ($P < 0.05$). After nursing, the four indicators of GAS, MOT, neuropeptide Y, and substance P in the observation group were significantly higher than those in the control group ($P < 0.05$). The total satisfaction rate of patients in the observation group was significantly higher than that in the control group ($P < 0.05$). *Conclusion:* Stepwise nursing intervention can significantly improve the self-care ability and nursing satisfaction of elderly bedridden patients, improve their psychological status and gastrointestinal function, shorten the time of exhaust, and accelerate the relief of abdominal distension.

Keywords: Stepwise nursing; Elderly; Bedridden; Enteral nutrition; Abdominal distension

Online publication: September 8, 2025

1. Introduction

Enteral nutrition (EN) is widely used as an important means of life support for elderly bedridden patients. However, numerous studies have shown that the incidence of abdominal distension after enteral nutrition (ADEN) is as high as 30% to 50%, which seriously affects patients' comfort and nutrient absorption^[1]. Although routine

nursing measures are available, they are mostly single interventions that lack graded management and dynamic adjustment, making it difficult to meet the nursing needs of different stages of illness. The stepwise nursing intervention program is based on condition assessment and utilizes evidence-based nursing theory and intelligent monitoring technology to provide hierarchical and individualized nursing strategies for elderly bedridden patients. This approach may effectively alleviate ADEN and improve nursing quality ^[2]. Therefore, in this study, 70 elderly bedridden patients who received enteral nutrition and developed abdominal distension in the hospital from April 2024 to April 2025 were selected and divided into different nursing groups to explore the application effects of the stepwise nursing intervention program. The report is as follows.

2. Materials and methods

2.1. General information

Seventy elderly bedridden patients who experienced abdominal distension after receiving enteral nutrition in the hospital from April 2024 to April 2025 were selected as the study subjects. The patients and their families signed consent forms. Relevant written materials for this study have been submitted to the ethics committee of the hospital for review, approval, and clearance.

Inclusion criteria: (1) Elderly bedridden patients hospitalized in the hospital; (2) Patients who developed abdominal distension after receiving enteral nutrition; (3) Complete medical records.

Exclusion criteria: (1) Patients with malignant tumors; (2) Patients with severe cardiopulmonary insufficiency; (3) Patients with severe coagulation dysfunction; (4) Patients with consciousness disorders or mental abnormalities.

2.2. Methods

The control group received routine nursing intervention: daily assessment of enteral nutrition tolerance, instructing patients to sit in a 30° semi-reclined position, regular gentle rubbing and hot compresses on the abdomen, monitoring changes in abdominal circumference, recording bowel movements and flatulence, and providing health education and psychological comfort.

The observation group received stepped nursing intervention: On the basis of routine care, a four-step “assessment-grading-intervention-feedback” approach was established. The first step involved early monitoring of gastric residual volume and initiation of low-dose prokinetic agents. The second step combined a bedside ultrasound assessment of gas distribution with intermittent intestinal decompression and vibration exercises for gas expulsion. The third step consisted of high-frequency transcutaneous electrical nerve stimulation and time-segmented abdominal breathing training. The fourth step involved organizing multidisciplinary consultations, dynamically adjusting nutritional formulas and infusion rates, and conducting rolling evaluations of intervention effectiveness every 6 hours to ensure precise nursing care.

2.3. Observation indicators

(1) Self-care ability: Evaluated using the Self-Care Ability Scale, which includes four dimensions with a total score of 100 ^[3]. A higher score represents stronger ability, while a lower score represents weaker ability. (2) Psychological state and nursing effect: Assessed using the SDS and SAS scales ^[4]. The SDS has a maximum score of 80, with scores below 53 indicating lower depression. The Cronbach’s α coefficient is 0.782, indicating good reliability. The SAS has a maximum score of 80, with scores of 50–59 considered mild, 60–69 moderate, and

>70 severe. The Cronbach's α coefficient is 0.777, indicating good reliability. The nursing intervention effects, including time to relief of abdominal distension and time to anal exhaust, were recorded. (3) Gastrointestinal function: Before and after nursing, 4 ml of fasting venous blood was collected from patients and centrifuged (3000 r/min, 10 minutes, radius 10 cm). Gastrin (GAS), motilin (MOT), neuropeptide Y, and substance P were measured using radioimmunoassay, with a GC-911 γ radioimmunoassay counter^[5]. (4) Nursing satisfaction: Evaluated and compared using a self-made nursing satisfaction survey questionnaire. The questionnaire validity was 0.896, with a maximum score of 100. Satisfaction results included very satisfied (over 90 points), satisfied (75–89 points), and dissatisfied (below 75 points). Satisfaction was calculated as 1 - dissatisfaction rate.

2.4. Statistical methods

Analyzed using SPSS 21.0, normally distributed measurement data were expressed as (Mean \pm SD), and the t-test was used for comparison between groups. Count data were expressed as relative numbers and tested using χ^2 ; $P < 0.05$ was considered statistically significant.

3. Results

3.1. Comparison of baseline data between the two groups

There was no statistically significant difference in baseline data between the two groups ($P > 0.05$), as shown in Table 1.

Table 1. Comparison of baseline data between two groups [Mean \pm SD, n(%)]

Group	n	Gender (%)		Age (years)	Disease duration (weeks)
		Male	Female		
Control	35	19 (54.29)	16 (45.71)	68.92 \pm 3.46	3.41 \pm 1.06
Observation	35	18 (51.43)	17 (48.57)	69.25 \pm 3.42	3.48 \pm 0.99
t/χ^2		0.164		0.401	0.286
P -value		0.685		0.690	0.776

3.2. Comparison of self-care ability between the two groups

After nursing intervention, the self-care ability scores of both groups increased significantly, and the improvement in various dimensions of the observation group was better than that of the control group ($P < 0.05$), as shown in Table 2.

Table 2. Comparison of self-care ability between the two groups (Mean \pm SD, score)

Group	n	Self-concept		Self-care skills		Self-care responsibility		Health knowledge	
		Pre-care	Post-care	Pre-care	Post-care	Pre-care	Post-care	Pre-care	Post-care
Control	35	13.36 \pm 2.28	16.57 \pm 2.25*	16.12 \pm 2.13	20.23 \pm 2.08*	9.52 \pm 3.25	14.56 \pm 1.48*	15.68 \pm 2.23	18.57 \pm 2.29*
Observation	35	13.34 \pm 2.29	21.05 \pm 2.38*	15.89 \pm 0.15	25.41 \pm 2.11*	9.46 \pm 3.28	19.37 \pm 2.25*	15.61 \pm 2.28	23.46 \pm 2.24*
t-value		0.037	8.092	0.637	10.343	0.077	10.566	0.130	9.031
P -value		0.971	<0.001	0.526	<0.001	0.939	<0.001	0.897	<0.001

Note: Compared with the same group before nursing, * $P < 0.05$

3.3. Comparison of psychological state and nursing effect between the two groups

After nursing, the SDS and SAS scores of the observation group were significantly lower than those of the control group, and the time of abdominal distension relief and anal exhaust was significantly shorter than that of the control group ($P < 0.05$), as shown in **Table 3**.

Table 3. Comparison of psychological state and nursing effect between the two groups (Mean \pm SD, score)

Group	n	SDS Score		SAS Score		Abdominal Distension Relief Time (h)	Time to First Flatus (h)
		Pre-care	Post-care	Pre-care	Post-care		
Control	35	50.07 \pm 6.38	27.45 \pm 5.21*	55.28 \pm 7.45	30.85 \pm 5.04*	28.94 \pm 4.25	31.76 \pm 4.81
Observation	35	50.89 \pm 7.05	39.49 \pm 5.08*	54.96 \pm 8.17	40.35 \pm 5.37*	18.23 \pm 3.67	17.62 \pm 3.94
t-value		0.510	9.789	0.171	7.631	11.284	13.454
P-value		0.612	<0.001	0.865	<0.001	<0.001	<0.001

Note: Compared with the same group before nursing, * $P < 0.05$

3.4. Comparison of gastrointestinal function between the two groups

After nursing, the four indicators of GAS, MOT, neuropeptide Y, and substance P in the observation group were significantly higher than those in the control group ($P < 0.05$), as shown in **Table 4**.

Table 4. Comparison of gastrointestinal function between the two groups (Mean \pm SD, pg/ml)

Group	n	GAS (pg/mL)		MOT (pg/mL)		Neuropeptide Y (ng/mL)		Substance P (ng/mL)	
		Pre-care	Post-care	Pre-care	Post-care	Pre-care	Post-care	Pre-care	Post-care
Control	35	17.24 \pm 3.23	32.85 \pm 4.12*	225.37 \pm 19.44	296.85 \pm 27.71*	1.36 \pm 0.35	1.97 \pm 0.42*	34.31 \pm 5.22	41.79 \pm 4.38*
Observation	35	17.15 \pm 3.26	39.47 \pm 4.21*	225.64 \pm 20.17	331.42 \pm 30.05*	1.39 \pm 0.42	2.35 \pm 0.63*	34.24 \pm 5.12	45.20 \pm 5.53*
t-value		0.116	6.649	0.057	5.003	0.325	2.969	0.057	2.860
P-value		0.908	<0.001	0.955	<0.001	0.747	0.004	0.955	0.006

Note: Compared with before nursing in the same group, * $P < 0.05$

3.5. Comparison of nursing satisfaction between the two groups

The overall satisfaction rate of the observation group was significantly higher than that of the control group ($P < 0.05$), as shown in **Table 5**.

Table 5. Comparison of nursing satisfaction between the two groups [n(%)]

Group	n	Very Satisfied n (%)	Somewhat Satisfied n (%)	Dissatisfied n (%)	Total Satisfaction Rate n (%)
Control	35	18 (51.43)	10 (28.57)	7 (20.00)	28 (80.00)
Observation	35	26 (74.29)	7 (20.00)	2 (5.71)	33 (94.29)
Z/ χ^2			1.828		9.114
P-value			0.068		0.003

4. Discussion

Abdominal Distension after Enteral Nutrition (ADEN) refers to a syndrome characterized by abdominal fullness, difficulty in passing gas, and gastrointestinal discomfort during continuous enteral nutrition support, primarily caused by weakened intestinal motility, gas retention, and increased osmotic pressure ^[6]. Elderly bedridden patients are particularly susceptible to ADEN due to decreased metabolic rate, declining gastrointestinal motility, weakened hunger reflexes, and reduced abdominal blood perfusion associated with underlying diseases and prolonged immobility ^[7]. For ADEN management, nursing care should focus not only on symptom relief but also on integrated physiological and psychological interventions to improve overall prognosis in elderly patients.

The results of this study showed that the stepped nursing intervention significantly improved patients' self-care ability scores in four dimensions and was superior to the control group. The analysis indicated that the stepped nursing intervention program incorporated individualized assessment and graded intervention based on basic nursing care. From the early intervention of prokinetic drugs in the first level, to bedside ultrasound and decompression exercise in the second level, to transcutaneous electrical nerve stimulation combined with abdominal breathing training in the third level, and finally to dynamic adjustment through multidisciplinary consultation in the fourth level, this model not only broadened nursing methods but also strengthened patients' sense of participation and responsibility. The combination of prokinetic drugs and electrical stimulation accelerated gastrointestinal motility. After patients' self-perceived symptom improvement, they were more willing to cooperate with nursing staff in self-training, forming a virtuous cycle. Simultaneously, health knowledge education and real-time feedback mechanisms enhanced patients' trust in their own care strategies, thereby improving self-care compliance and satisfaction ^[8].

The SDS and SAS scores, as well as the time to relieve abdominal distension and anal exhaust time, were significantly better in the observation group than in the control group ($P < 0.05$). The analysis showed that, on the one hand, psychological counseling and multidisciplinary consultation provided patients with channels to understand their condition and express emotions, effectively improving their anxiety and depression levels. On the other hand, timely abdominal decompression, vibration exhaust exercise, and nerve stimulation could rapidly relieve abdominal pressure and reduce discomfort, thus breaking the vicious cycle of "abdominal distension— anxiety—abdominal distension." Dynamic adjustment of nutritional formulas and infusion rates allowed precise medication based on patient tolerance, avoiding a new round of abdominal distension caused by too fast or excessive nutrient infusion and improving the safety and comfort of the intervention ^[9].

Additionally, the levels of GAS, MOT, NPY, and SP in the observation group were higher than those in the control group after nursing ($P < 0.05$). The combined effect of prokinetic drugs and transcutaneous electrical nerve stimulation promoted the secretion of motilin and gastrin, enhancing intestinal smooth muscle contraction. Vibration, exhaust, and abdominal breathing training could activate the parasympathetic nervous system, further enhancing intestinal motility and eliminating gas retention based on the synthesis and secretion of neuropeptide Y and substance P ^[10]. Furthermore, ultrasound evaluation enabled the healthcare team to accurately locate gas accumulation areas and implement targeted intermittent decompression, reducing the risk of secondary bloating caused by blind nursing care. This approach optimized gastrointestinal dynamics at both the molecular and functional levels.

5. Conclusion

In summary, the stepped nursing intervention program has a significant effect on abdominal distension after enteral nutrition in elderly bedridden patients. It balances physiological treatment and psychological support, significantly improving patients' self-care ability and satisfaction, and enhancing gastrointestinal function.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Li J, Yang L, 2024, Study on the Effects of Cluster Nursing Combined with Traditional Chinese Medicine Nursing Intervention on Abdominal Distension and Constipation in Bedridden Orthopedic Patients. *Chinese Health Care*, 42(22): 100–103.
- [2] Fang WQ, Yang J, 2023, Analysis of the Effects of Different Enteral Nutrition Feeding Methods in Long-Term Bedridden Elderly Patients. *Zhejiang Clinical Medicine*, 25(12): 1868–1869.
- [3] Yang NN, Lu SS, Du CX, et al., 2023, The Effect of 5A Rehabilitation Nursing Model Combined with Stepwise Advanced Nursing Model on Preventing Deep Venous Thrombosis in Long-Term Bedridden Patients. *Clinical Medical Research and Practice*, 8(33): 154–157.
- [4] Qiu XM, Zheng XJ, Huang HQ, 2023, Exploring the Effects of Predictive Nursing Intervention for Long-Term Bedridden Elderly Patients. *Chinese and Foreign Medical Treatment*, 42(31): 120–123 + 128.
- [5] Hong ZY, Cheng L, 2023, Effects of Individualized Enteral Nutrition Combined with Electric Standing Bed Training on Organ Function in Elderly Bedridden Stroke Patients. *Guangzhou Medical Journal*, 54(10): 90–94.
- [6] Liu YF, Li SY, Yu JH, et al., 2022, Establishment of Risk Warning Classification Standards and Intervention Plans for Enteral Nutrition-Related Diarrhea and Abdominal Distension. *Nursing Research*, 36(20): 3701–3705.
- [7] Wang X, Xu L, Zhang JW, 2022, Application Effects of Enteral Nutrition Support Combined with Precision Nursing in Elderly Bedridden Patients. *Modern Nurse (First Edition)*, 29(1): 61–64.
- [8] Zhou PF, Dong L, 2021, The Effect of Stepwise Advanced Nursing Model in Preventing Deep Venous Thrombosis in Bedridden Elderly Inpatients. *Thrombosis and Hemostasis*, 27(4): 692–693.
- [9] Wu YM, Deng X, Wu WY, 2020, The Effect of Enteral Nutrition Support Combined with Personalized Nursing Model on Reducing the Incidence of Pressure Ulcers in Elderly Bedridden Patients. *China Medical Herald*, 17(13): 189–192 + 196.
- [10] Zang YJ, 2019, Analysis of the Causes of Abdominal Distension after Adult Cardiac Surgery and Nursing Countermeasures. *Electronic Journal of Integrated Traditional Chinese and Western Medicine in Cardiovascular Diseases*, 7(36): 126.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.