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Application of PDCA-Based Comprehensive Nursing in Patients with Intestinal Obstruction

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ABSTRACT

Objective To explore the application effect of the comprehensive nursing model based on the PDCA cycle in patients with intestinal obstruction.Methods: A prospective controlled experimental design was adopted. A total of 86 patients with intestinal obstruction admitted to our hospital were selected as research samples. The research period was from March 2023 to June 2025. The patients were divided into the control group (43 cases) and the PDCA group (43 cases) using the random number table method. The control group received routine care, while the PDCA group received comprehensive care based on the PDCA cycle. The clinical indicators, incidence of complications and nursing satisfaction of the two groups of patients were compared. The recovery time of the first anal exhaust, the first defecation and bowel sounds, and the hospital stay of patients in the PDCA group were (49.55±12.36) h, (66.93±15.48) h, (36.74±8.59) h and (7.48±1.65) d, respectively. All were shorter than those of the control group [(65.82±15.47) h, (85.71±17.92) h, (50.38±11.25) h and (10.25±2.14) d], with significant differences (P<0.05); The total incidence of complications in the PDCA group was 6.98% (3/43), including 1 case each of intestinal dilation, aspiration pneumonia, and water and electrolyte imbalance, and no deep vein thrombosis occurred. The total incidence of complications in the control group was 23.26% (10/43), including 3 cases of intestinal dilation, 3 cases of aspiration pneumonia, 1 case of deep vein thrombosis, and 3 cases of water and electrolyte imbalance. The total incidence of complications in the PDCA group was significantly lower than that in the control group, with a significant difference (P<0.05). The total satisfaction rate of nursing in the PDCA group was 95.35% (41/43), significantly higher than 79.07% (34/43) in the control group, with a significant difference (P <0.05). Conclusion: The application of PDCA cycle in the nursing of patients with intestinal obstruction can accelerate the recovery of gastrointestinal function, shorten the length of hospital stay, reduce the occurrence of complications, and better improve the quality and satisfaction of nursing. It has important value for promotion and application.

KEYWORDS

PDCA cycle; Intestinal obstruction; Comprehensive nursing; Gastrointestinal function; Complications

1 Introduction

Intestinal obstruction arises from the obstruction of intestinal contents, presenting primarily with abdominal pain, distension, vomiting, and cessation of flatus and stool passage. It constitutes a common acute abdominal inflammatory condition in surgical practice [1]. This condition is complex and progresses rapidly; if not managed promptly, it may lead to intestinal dilatation, electrolyte imbalance, infectious shock, and in severe cases, intestinal necrosis or perforation, posing a life-threatening risk [2]. Clinically, simple intestinal obstruction is initially managed with measures such as fasting, gastrointestinal decompression, and fluid resuscitation to alleviate intestinal pressure. However, in critical situations like strangulated or complete intestinal obstruction, early surgical intervention to relieve the obstruction is considered [3]. However, both conservative and surgical treatments necessitate nursing support. High-quality care not only accurately executes medical orders but also, through systematic assessment and dynamic monitoring, promptly detects changes in the condition, providing a crucial basis for treatment decisions. Current traditional nursing models often rely on experience-based practices, featuring fragmented and rigid procedures that hinder flexible planning and adaptation to patients' current needs. Applying the PDCA cycle to the nursing care of intestinal obstruction patients addresses this issue. The PDCA cycle is a scientific quality management methodology comprising four stages: Plan, Do, Check, and Act. Through continuous iteration and stepwise advancement, it facilitates problem identification, measure implementation, outcome evaluation, and process optimisation, thereby driving sustained improvements in nursing quality [4]. This model has demonstrated favourable outcomes in pressure ulcer prevention, catheter care, and chronic disease education. However, its efficacy within the systematic care of acute intestinal obstruction patients requires further validation. Consequently, this study will conduct a controlled trial to systematically evaluate the effectiveness of a PDCA-based integrated care model for intestinal obstruction patients, thereby providing evidence-based guidance for optimising clinical nursing interventions.

2 Materials and Methods

2.1 General Data

Between March 2023 and June 2025, 86 cases of intestinal obstruction patients admitted to the General Surgery Department of our hospital were selected as the study sample. Inclusion criteria: (1) Clinical manifestations consistent with intestinal obstruction, confirmed by abdominal imaging; (2) Age 18 years or above; (3) Being conscious and

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possessing normal communication abilities; (4) Understanding the study content and voluntarily signing the informed consent form. Exclusion criteria: (1) Severe strangulating intestinal obstruction requiring immediate surgery; (2) Concurrent dysfunction of vital organs; (3) Comorbid conditions such as malignant tumours or nosocomial infections; (4) Psychiatric or cognitive abnormalities preventing cooperation with intervention measures. Patients were randomly assigned to either the control group or the PDCA group, comprising 43 patients in each group. Comparison of baseline characteristics revealed no significant differences between groups ($P > 0.05$), rendering them comparable (see Table 1). This study was approved by our hospital's Ethics Committee (Approval No.: XXX).

Table 1 Comparison of General Patient Characteristics Between Groups [n, (x ±s)]

Item	Control group (n=43)	PDCA group (n=43)	χ^2/t	P
Gender (Female/Male)	20/23	22/21	0.094	0.759
Age (years)	61.34 ± 12.57	61.34 ± 12.57	0.523	0.602
BMI (kg/m^2)	23.45±3.16	23.89±2.97	0.669	0.505
Obstruction type (n)			0.235	0.889
Mechanical	31 (72.09%)	31 (72.09%)		
Power-driven	12 (27.91%)	13 (30.23%)		

2.2 Methods

Both groups of patients received identical baseline assessment and supportive treatment protocols for intestinal obstruction upon admission, specifically including: fasting and fluid restriction, gastrointestinal decompression, fluid resuscitation to correct electrolyte imbalances, nutritional support, and administration of antispasmodic analgesics and prophylactic antibiotics as clinically indicated. The control group received conventional nursing care comprising: (1) Admission assessment and monitoring: close observation of vital signs and changes in abdominal symptoms and signs; (2) Basic treatment coordination: strict adherence to medical orders for fasting, gastrointestinal decompression, recording 24-hour fluid intake and output, fluid replacement to correct electrolyte imbalances, and antibiotic administration; (3) Basic daily care: Assisting patients with repositioning and performing oral hygiene care. (4) Basic health education: Verbally informing patients and their families about disease-related knowledge and precautions.

The PDCA team implements comprehensive nursing based on the PDCA cycle. It is carried out by a PDCA team composed of one head nurse and four experienced senior nurses. The specific steps are as follows: (1) P (Planning) stage: ① Problem assessment: Within 24 hours after the patient's admission, the PDCA team comprehensively collects data by reviewing medical records, conducting physical examinations, and conducting in-depth interviews with the patient and their family. Identify the main problems existing in the nursing of patients with intestinal obstruction, such as poor compliance of patients with important treatments like gastrointestinal decompression, widespread insufficient awareness of the disease, fear and anxiety, inadequate implementation of preventive measures for complications, and lack of systematic rehabilitation guidance, etc. At the same time, a comprehensive analysis should be conducted in combination with laboratory tests (such as electrolytes and blood routine tests) and imaging results (such as upright abdominal radiographs) to ensure the accuracy and comprehensiveness of identifying nursing issues. ② Develop personalized care plans: Based on the above issues and the patient's type of obstruction, disease changes, and psychological state, develop individualized care plans. The plan includes: gastrointestinal decompression compliance management program, structured health education program, psychological counseling program, complication prevention program, and phased rehabilitation exercise program. During the planning process, particular emphasis is placed on setting quantifiable and assessable short-term and long-term care goals, such as the degree of abdominal pain relief within 24 hours and the recovery of bowel sounds within 72 hours. (2) D (Execution) Stage: ① Gastrointestinal decompression Management: Strictly implement gastrointestinal decompression. Regularly assess the patency of the gastrointestinal drainage tube, the color, quality and quantity of the drainage fluid three times a day. Through abdominal auscultation and palpation, dynamically evaluate the changes in bowel sounds and abdominal distension to prevent and identify intestinal dilation at an early stage. Educate patients and their families on the methods and importance of fixing the tubing, and instruct them to avoid pulling it. For patients without peritonitis but with severe abdominal pain, guide them to massage their abdomen in a clockwise direction 2 to 3 times a day, each time for 5 to 10 minutes. During the massage process, closely observe the patient's reaction. If the pain intensifies, stop immediately. ② Systematic psychological intervention and health education: Nurses within the PDCA team regularly explain to patients and their families the causes of intestinal obstruction, treatment principles, the importance of gastrointestinal decompression, the expected course of the disease, and key points of rehabilitation at different stages through graphic brochures, videos, etc. ③ Prevention of predictive complications: When the condition permits, raise the head of the bed by 30° to 45° and place the patient in a lateral position when they feel like vomiting to prevent reflux and aspiration pneumonia. During the period of gastrointestinal decompression, enhance oral care 2 to 3 times a day to prevent infection. Strictly record the volume of intake and output, observe the amount, nature of vomiting and the condition of the skin and lips, and replenish fluids in a timely manner as prescribed by the doctor to prevent water and electrolyte imbalance. In addition, assess the skin's pressure condition daily, establish a turning card, and assist with turning every two hours to prevent pressure injuries. ④ Phased rehabilitation guidance: During the acute phase, instruct the patient to stay in bed absolutely. When the condition permits, provide early guidance and assistance to the patient to perform ankle pump exercises and isometric contractions

of the quadriceps femoris, 3 to 4 times a day, each time for 10 to 15 minutes, to prevent deep vein thrombosis. Monitor the patient's vital signs during the exercise to ensure the safety of the activity. During the recovery period, after the patient passes gas through the anus and the gastric tube is removed, guide the patient to start with liquid diet and gradually transition to soft food. Encourage family members to help the patient get out of bed and move around, gradually increase the amount of activity, and formulate a personalized activity schedule to dynamically adjust the intensity and duration of activities according to the patient's tolerance. (3) C (Inspection) Stage: The PDCA team holds a regular meeting once a week to inspect the implementation of the nursing plan through reviewing nursing records, bedside visits, and communication with patients and their families. Compare the inspection results with the planned goals and analyze the reasons for not achieving the goals. At the same time, standardized assessment tools such as the numerical pain scoring method are adopted for quantitative evaluation to ensure the objectivity and comparability of the assessment results. (4) Stage A (Treatment) : Standardize the effective measures identified during the examination stage and incorporate them into the routine care process for such patients. For new or unresolved issues identified during the inspection, they will be regarded as the focus of improvement for the next PDCA cycle, re-planned, and executed and verified in the next cycle. Establish a PDCA cycle file, detailing the problems, measures, effects and improvement plans of each cycle, to form a traceable and replicable nursing quality management system. Regularly organize training for nursing staff, promote standardized procedures and successful experiences within the department, and continuously improve the quality of nursing.

2.3 Observation Indicators

(1) Clinical Indicators: Record the time to first anal flatus, first bowel movement, and restoration of bowel sounds, along with total hospitalisation duration for both patient groups. Restoration of bowel sounds is defined as ⩾3 sounds per minute with normal pitch.

(2) Incidence of complications: The occurrence of complications such as intestinal dilatation, aspiration pneumonia, deep vein thrombosis, and electrolyte imbalance during hospitalisation was recorded for both groups.

(3) Nursing satisfaction: At the conclusion of nursing care for both groups, an in-house nursing satisfaction questionnaire was administered. This 100-point scale, with a Cronbach's α coefficient of 0.89, assessed dimensions including service attitude, technical proficiency, health education, environmental management, and overall evaluation. Scores ⩾90 indicated 'highly satisfied', 80–89 'satisfied', and <80 'dissatisfied'.

2.4 Statistical Methods

Data analysis was performed using SPSS 26.0 software. Quantitative data were presented as (x ±s) *and* analysed using t-tests; categorical data were presented as [n(%)] and analysed using χ^2 tests. A P value < 0.05 was considered statistically significant.

3 Results

3.1 Comparison of Clinical Indicators Between Groups

The PDCA group exhibited shorter times to first anal flatus, first bowel movement, and return of bowel sounds, as well as shorter hospital stays: (49.55 ± 12.36) hours, (66.93 ± 15.48) hours, (36.74 ± 8.59) hours, and (7.48 ± 1.65) days, respectively, all shorter than the control group's (65.82 ± 15.47) hours, (85.71 ± 17.92) hours, (50.38 ± 11.25) hours, and (10.25 ± 2.14) days in the control group, representing significant differences (P < 0.05). See Table 2 for details.

Table 2 Comparison of clinical indicators between patient groups (x ±s)

Group	Number of Cases	Time to first anal flatus (h)	Time to first bowel movement (h)	Time to Return of Bowel Sounds (h)	Length of Hospital Stay (days)
Control group	43	65.82 ± 15.47	85.71 ± 17.92	50.38 ± 11.25	10.25±2.14
PDCA group	43	49.55 ± 12.36	66.93 ± 15.48	36.74±8.59	7.48±1.65
t	-	5.482	5.297	6.384	6.917
P	-	<0.001	<0.001	<0.001	<0.001

3.2 Comparison of complication rates between the two groups

The overall complication rate in the PDCA group was 6.98% (3/43), comprising one case each of intestinal dilatation, aspiration pneumonia, and electrolyte imbalance; no cases of deep vein thrombosis occurred. The overall complication rate in the control group was 23.26% (10/43), including three cases of intestinal dilatation, three cases of aspiration pneumonia, one case of deep vein thrombosis, and three cases of electrolyte imbalance. The overall complication rate in the PDCA group was significantly lower than that in the control group, demonstrating a marked difference (P<0.05). See Table 3 for details.

3.3 Comparison of Nursing Satisfaction Between the Two Groups

The PDCA group exhibited an overall nursing satisfaction rate of 95.35% (41/43), significantly higher than the control group's 79.07% (34/43), demonstrating a marked difference (P<0.05). See Table 4 for details.

Table 3 Comparison of complication rates between patient groups [n(%)]

Group	Number of Cases	Complications				Overall Incidence
		Intestinal Dilatation	Aspiration pneumonia	Deep vein thrombosis	Electrolyte imbalance	
Control group	43	3 (6.98)	3 (4.65)	1 (4.65)	3 (4.65)	10 (23.26)
PDCA group	43	1 (2.33)	1 (2.33)	0(0.00)	1(2.33)	3(6.98)
χ^2						4.441
P						0.035

Table 4 Comparison of Nursing Satisfaction Between Patient Groups [n(%)]

Group	Number of Cases	Very satisfied (≥90 points)	Satisfied (80–89 points)	Dissatisfied (<80 points)	Overall Satisfaction
Control group	43	16 (37.21%)	18 (41.86%)	9 (20.93%)	34 (79.07%)
PDCA group	43	26 (60.47%)	15 (34.88%)	2 (4.65%)	41 (95.35%)
χ^2	-				5.144
P	-				0.023

4 Discussion and Conclusion

The care for intestinal obstruction is a dynamic and continuous process, and its quality directly affects the patient's recovery progress. This study applied the comprehensive nursing model based on PDCA to the clinical care of patients with intestinal obstruction. The results showed that compared with the conventional nursing group, the PDCA group achieved significant improvements in the recovery time of gastrointestinal function, complication control, and nursing satisfaction ($P<0.05$). It indicates that this model has significant clinical application value in the systematic nursing of patients with intestinal obstruction. By analyzing the reasons, during the planning stage of the PDCA cycle, the nursing team can accurately identify individual problems of patients in terms of gastrointestinal decompression compliance, knowledge of complication prevention, and rehabilitation guidance needs through systematic assessment, and thereby formulate more targeted nursing plans. This evidence-based precise assessment provides a clear direction for subsequent nursing intervention. During the implementation stage, nursing staff strictly follow the plan to implement all measures and ensure that the nursing measures are effectively implemented and their effects are traceable through detailed nursing records and regular evaluations. This problem-oriented and continuously optimized nursing process has achieved a transformation from passive observation to active intervention, which is conducive to enhancing patients' compliance with treatments such as gastrointestinal decompression and accelerating the recovery process. Chen et al. [5] demonstrated through a controlled trial involving 112 paediatric patients that the PDCA cycle nursing model effectively improves clinical indicators, reduces inflammation levels, and shortens both symptom resolution time and hospitalisation duration. Furthermore, the PDCA cycle establishes a proactive nursing mechanism. Through multifaceted optimisations—including head-of-bed elevation and positional management to prevent aspiration pneumonia, strict fluid intake/output monitoring to maintain electrolyte balance, and early, phased rehabilitation activities to prevent deep vein thrombosis—it systematically reduces complication risks[6] . This was confirmed by the significantly lower complication rate in the PDCA group compared to the control group ($P<0.05$). Finally, PDCA integrated nursing incorporates continuous quality monitoring and real-time feedback mechanisms, ensuring dynamic optimisation of care services according to patient needs. This dual enhancement of process efficiency and patient experience ultimately manifests as markedly improved satisfaction levels[7] .

In summary, PDCA-based integrated nursing exhibits systematic, standardised, and continuously improving characteristics. It effectively promotes gastrointestinal function recovery in patients with intestinal obstruction, reduces complications, and enhances patient and family satisfaction. It warrants widespread application in the clinical nursing of intestinal obstruction and other acute abdominal conditions.

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