

## Original Article

# Impacts of PDCA circle's clinical nursing path on the postoperative recovery and life quality of gastric patients

Liping Ma<sup>1</sup>, Xiaoli Hu<sup>1</sup>, Chunyan Hao<sup>1</sup>, Fang Liu<sup>1</sup>, Tian Tian<sup>2</sup>

Departments of <sup>1</sup>Nursing, <sup>2</sup>Endoscope, China-Japan Union Hospital of Jilin University, 1028 Dong Street, Nanhu, Changchun 130000, Jilin, China

Received November 18, 2016; Accepted December 8, 2016; Epub February 15, 2017; Published February 28, 2017

**Abstract:** Objective: PDCA circle is a quality management circle including Plan, Do, Check and Act. This study examines the impacts of PDCA circle's clinical nursing path on the postoperative recovery and life quality of gastric cancer patients. Methods: Select 100 cases of gastric cancer patients on the Department of General Surgery in our hospital from July 2015 to July 2016. In accordance with the random number table, the patients were divided into PDCA group and control group, with 50 cases in each group. Control group was treated with conventional nursing. Besides the treatment above, PDCA group was applied with the intervention of PDCA circle's clinical nursing path. During the period, make preoperative preparation and guidance, strengthen the postoperative drainage tube nursing, encourage early activities from patients, enhance the extent of healthy education and offer positive and effective mental nursing. To be continued, observe the gastrointestinal function recovery, postoperative rehabilitation and life quality of patients. Then investigate the patient's mastery of health knowledge and satisfaction. Results: The recovery time of postoperative borborygmus, postoperative restart of anal exhaust, diet recovery and defecation function of patients in PDCA group were dramatically less than that of control group. And the difference was statistically significant ( $P < 0.05$ ). The time of indwelling urethral catheter, out-of-bed activity and stay in hospital of patients in PDCA group were less than that in control group. And the difference was statistically significant ( $P < 0.05$ ). On admission, the difference of the life quality scores between two groups was not statistically significant ( $P > 0.05$ ). After implementing PDCA clinical nursing path, the patients in PDCA group had higher scores in the life quality such as physical function, role function, emotional function, cognitive function, social function than the control group did ( $P < 0.05$ ). After the intervention in the PDCA group, the patients had higher scores in physical function, role function, emotional function, cognitive function, social function than before ( $P < 0.05$ ). The patients in the PDCA group had higher qualified healthy education rates and degree of satisfaction ( $P < 0.05$ ). Conclusion: Implement of PDCA circle's clinical nursing path has positive effects on the improvement of gastric patients' gastrointestinal function, postoperative recovery, satisfaction and the mastery of disease knowledge.

**Keywords:** Clinical nursing path, PDCA management, gastric cancer, life quality

## Introduction

Surgical treatment is an important treatment for gastric cancer [1-3]. According to the research, scientific nursing management is an important guarantee for patients to recover rapidly after operation [4]. Meanwhile, operations such as digestive tract reconstruction after gastrectomy affect the patients' postoperative life quality severely. How to improve the gastric patients' life quality is a focus of the current research [5, 6]. Clinical nursing path can promote the patient's recovery, reduce their

cost, and improve their life quality and satisfaction. And, it is also widely applied to the gastric postoperative nursing [7, 8]. Besides, as a good continuous quality improvement model, the application of PDCA circle has been increased in clinical nursing.

PDCA circle is the overall quality management including Plan, Do, Check and Act. It's the scientific method which enables to carry out all quality activities. P: Plan for the potential causes and resolutions after defining problems; D: Implement the action plan; C: Check the results;

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A: If the result is satisfying, standardize the solution, if not, return to the Plan phase. PDCA circulation is that small cycle was beheld around the big cycle and it protects big cycle. They promote each other and cooperate repeatedly. Each repeated time will create a higher quality for the clinical nursing, which contributed to the quality rising in continuous spiral type. The primary study founded that PDCA circulation was conducive to establish and develop the procedure of clinical nursing path so that it could be implemented smoothly, which was beneficial for patients to get the best quality of nursing service.

This research aimed to explore the function that PDCA circulation management made in clinical nursing path about postoperative rehabilitation and quality of life of patients with gastric cancer.

### Materials and methods

#### Research object

Choose 100 patients with gastric cancer who were applied to general surgery in our hospital from July 2015 to July 2016 including 58 cases of male, and 42 cases of female aged from 52 to 69 and the average was  $57.9 \pm 4.0$  years old. Inclusion criteria: 1) The patients were diagnosed with stomach cancer after going through the preoperative gastroscopic biopsy and postoperative pathology. 2) The expected lifetime was more than 12 months. 3) The patients recovered well after operation and were discharged after two weeks or so without any complications such as digestive tract fistula. 4) Elementary school and above culture. 5) The patients volunteered to be the participants and signed the informed consent. Exclusion criteria: 1) The patients had severe physical or mental illness, severe intelligence or cognitive impairments. 2) The patients had severe complications after surgery. 3) The patients had communication barriers. 4) The patients refused to participate in the research. Number the 100 cases of gastric cancer patients from 1 to 100. And then start from an arbitrary number in random number table and get the random number of each patient along the same direction. The patients whose random numbers were even number were assigned to the team of PDCA and odd number were assigned to the control group. While two sets of numbers were not equal and the number of the PDCA team

was one more than that of control group. After that, according to the principle of completely random, extract one patient from PDCA team to the control team. At last, the number of patients in two groups was 50.

#### Methods

Two groups of patients all were applied to conventional therapy and care and were given health education. Meanwhile, they were informed of the surgery matters, and were performed preoperative nursing, psychological care and so on. On this basis, PDCA group was interfered by PDCA circulation management of clinical nursing path. The methods were as follows.

#### Formulate clinical nursing path (Plan)

Firstly, establish clinical nursing path group which was managed by head nurse. By looking up literature and referring to clinical pathway forms that were released by ministry of health, then combining specific circumstance of our department and the need of patients, this group enacted "Gastric Cancer Clinical Nursing Pathway", "Gastric Cancer Nursing Standard" and "Gastric Cancer Nursing Process" and they also defined their job responsibilities and related work system. The path was suitable for patients with gastric cancer who removed their stomach by operation. The content mainly included the first day care in hospital, preoperative nursing care, postoperative nursing care, discharge guidance and so on. Clinical nursing path group organized clinical nursing path training for the nursing staff. They had meeting of clinical nursing path report and shared successful experience. They discussed patients' needs in various periods and problems during the nursing. Then they could come up with best solutions and optimize nursing service process to ensure the smooth progress in clinical nursing path.

#### Implementation of clinical nursing path (Do)

Nursing staff were responsible for the implementation of clinical nursing path. Implement nursing for patients according to the standardized nursing process. Fill in the clinical nursing path chart according to the specific circumstances of the patients, then collect relevant information continuously, and sum up experience as well. In the implementation of clinical

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nursing path, ensure the implementation of nursing measures, at the same time, pay attention to the patients' psychological care, relieve the anxiety and depression of the patients. It was beneficial for patients to face the disease positively and to improve their life quality [11]. Preoperative care [12]: Evaluate in time after admission, and give health education; Observe the changes of disease carefully; According to the condition of patients, guide them to have proper diet with high protein, high calorie, high vitamin diet, and parenteral nutrition support should be given to those with malnutrition; Guide them to take medicine on time. If there is gastric outlet obstruction, the patients were applied to gastrointestinal decompression; The patients were informed what kind of check need to do and how to match it and were assisted to check blood routine examination, blood type, routine urinalysis, stool routine examination and occult blood tests, coagulation function, blood electrolytes, liver and renal functions, tumor markers, infectious diseases screening and so on, as well as to help patients to check electrocardiogram, chest radiography, gastric endoscope, upper abdominal CT scan + enhancement, B-mode ultrasonography examination of pelvis, etc. If necessary, patients were adopted blood gas analysis, pulmonary function, echocardiography, endoscopic ultrasonography and barium meal etc. Inform the patients and their family members of preoperative process and matters that should pay attention to, complete the preoperative preparation, keep patients fast for 4 to 6 hours before operation, prohibit patients from drinking for 2 to 4 hours, then apply the patients to intestinal lavage and gastric tube and urinary catheter indwelling in need. Postoperative care [12]: Put the patients in pillow-free horizontal position for 6 hours after operation, then put them in semi-sitting or slope lying position, which was conducive for drainage tube to drainage, after that observe the nature and amount of drainage fluid, keep the drainage tube unobstructed, and shorten the indwelling time; guide and assist the patients to change body position, encourage them to have early bed or bedside activities, and gradually to carry out out-of-bed activities, which took advantages to promote disease recovery and reduce the complications; Observe the vital signs of the patients carefully, and the recovery of abdominal signs and intestinal function as well, in case of the occurrence of complications; Fast after operation until the gastrointestinal function of pati-

ents recovered, then guide them to have proper diet, including having a small amount of meals spread throughout the day, and having liquid diet at the beginning then gradually transiting to the normal diet, besides, if the nutritional intake is insufficient, strengthen the parenteral nutrition support; Strengthen the wound care and carry out aseptic manipulation strictly to promote wound healing; Record the input and output liquid in 24 hours; Strengthen communication with patients, and apply them to actively and effectively psychological care and counseling [11]; During the hospitalization, educate patients with disease related knowledge through many kinds of forms such as explanation, the exquisite disease knowledge manual, answering questions, etc., and complete discharge guidance.

### *Check on the clinical nursing path (Check)*

Quality control team was responsible to supervise and check the quality of nursing for patients with gastric cancer, and they focus on the implementation of clinical nursing path, evaluate the postoperative recovery of gastrointestinal function in patients, and observe the postoperative rehabilitation of patients. Based on the conditions above, evaluate the life quality of patients after surgery, investigate patients' mastery of knowledge about disease and their satisfaction on nursing work. Report and summarize the nursing work of each stage, then feedback, discuss and correct the difficulties encountered in the work and the existing problems timely.

### *Deal with the existing problems in the clinical nursing pathway (Act)*

Quality control team collected and analyzed information from on-site investigation, then summarized the causes of variation and took corresponding measures to avoid its recurrence, promoted the continuous improvement of nursing quality and made the continuous improvement of clinical nursing pathway.

### *Observation index*

Observe the change of patients' condition carefully, and record the gastrointestinal function index between two groups of patients, such as diet recovery time, recovery time of bowel sound, restart time of postoperative anal exhaust etc., and postoperative recovery index such as the indwelling catheter time ambula-

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**Table 1.** Comparison on basic data between two groups of patients (cases,  $\bar{x} \pm s$ )

Projects		PDCA group (n=50)	Control group (n=50)	T or $\chi^2$ value	P value
Gender	Male	31	27	0.657	0.418
	Female	19	23		
Age	Years old	57.2 $\pm$ 4.2	58.6 $\pm$ 3.7	1.802	0.075
TNM stage	Stage I	13	12	0.280	0.869
	Stage II	8	10		
	Stage III	29	28		
Surgical approach	Proximal gastrectomy	5	3	1.033	0.597
	Distal gastrectomy	38	42		
	Total gastrectomy	7	5		
Education level	Primary to high school	28	31	0.372	0.542
	University and above	22	19		

tion time, hospitalization time. And the observation time split by days. The life quality of the patients was evaluated at admission and 1 month after operation. Evaluation tool is life quality instrument for cancer patients EORTC QLQ-C30 developed by European Organization for Research on Treatment of Cancer (EORTC) [13]. This scale consisted of 5 functional scales, in which evaluated role, cognition, emotion and society. Items rated from 4 grades: 1- none, 2- a little, 3- rather, 4- very. The higher the score was, the better the life quality of patients were. The test-retest reliability of QLQ-C30 questionnaire was equal or more than 0.73 and the internal consistency reliability of each scale is equal or more than 0.5, thus it was credible, valid and sensitive for the domestic patients with cancer [13]. Design the questionnaire for patients' health knowledge mastery and satisfaction. Health knowledge questionnaire included 25 items knowledge of disease, diet, medication, complications and postoperative rehabilitation in five dimensions. 1 point could be recorded for each correct answer and wrong answers led to no points, and the higher the score was, the higher the degree of knowledge was. The qualified health education mark was more than 20 points. Satisfaction questionnaire included service quality, technical quality, care and love, environment and guidance from four aspects and items rated from 5 grades: 0- very dissatisfied, 1- dissatisfied, 2- partly satisfied, 3- satisfied, 4- highly satisfied, and the higher the score was, the higher satisfaction was. The total score is 100 points, 85 points or more were satisfying. The reliabilities of repeated measures on the two questionnaires were respectively 0.89 and 0.91. The internal con-

sistency reliabilities of the questionnaire were respectively 0.76 and 0.81. The two questionnaires were used to investigate the health education compliance and satisfaction degree of patients.

### Statistical methods

SPSS 17.00 software was used for data analysis, mean and standard deviation ( $\bar{x} \pm s$ ) was adopted for data measurement and t test of independent samples was used for the group comparison. The enumeration data was calculated by frequency analysis, chi square test was used for the group comparison.  $P < 0.05$  (bilateral) was considered as statistically significant.

### Results

#### Comparison of basic data between two groups of patients

There was no significant difference in gender, age, TNM stage and operation mode between the two groups, and it was comparable ( $P > 0.05$ ). See **Table 1**.

#### Comparison of postoperative recovery of gastrointestinal function between two groups of patients

Postoperative recovery time of bowel sound, anal exhaust recovery time, postoperative recovery time of and defecation and diet recovery time of patients in PDCA group were significantly shorter than that in the control group. The difference was statistically significant in **Table 2**.

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**Table 2.** Comparison of postoperative recovery of gastrointestinal function in patients between two groups (days,  $\bar{x} \pm s$ )

Group	Cases	The recovery time of bowel sound	Anal exhaust recovery time	Diet recovery time	Defecation recovery time
PDCA group	50	1.0 ± 0.5*	2.1 ± 0.9*	2.3 ± 0.9*	2.9 ± 1.3*
Control group	50	2.0 ± 0.7	3.5 ± 1.1	4.1 ± 1.2	4.7 ± 1.2

Note: \*compared with the control group,  $P < 0.05$ .

**Table 3.** Comparison of postoperative recovery between two groups (days,  $\bar{x} \pm s$ )

Group	Cases	Indwelling time of catheter	Time to get out of bed	Average length of stay
PACD group	50	0.9 ± 0.5*	1.9 ± 0.8*	12.8 ± 2.0*
Control group	50	2.0 ± 0.8	4.0 ± 1.4	17.8 ± 2.6

Note: \*compared with the control group,  $P < 0.05$ .

### *Comparison of postoperative recovery between two groups*

Indwelling catheter time, ambulation time and hospitalization time of patients in PDCA group were lower than that in the control group. The difference was statistically significant ( $P < 0.05$ ). See **Table 3**.

### *Comparison of the life quality between two groups of patients before and after intervention*

At the time of admission, patients in two groups had no significant differences in physical function, role function, emotional function, cognitive function and social function. The scores of life quality in applying clinical nursing path for the PDCA cycle management, physical function, role function, emotional function, cognitive function, social function and life quality of patients in PDCA group were significantly higher than those in control group. After the intervention, in PDCA control group, scores of physical function, role function, emotional function, cognitive function, social function and life quality were significantly higher than those before intervention from **Table 4**.

### *Comparison of health education compliance rates and satisfaction of patients between two groups*

The qualified health education rates and degree of satisfaction in PDCA group were significantly improved than that in control group ( $P < 0.05$ ). See **Table 5**.

## Discussion

Study confirmed that the PDCA circulation could accelerate the speed of improving quality of gastric cancer patients' clinical nursing pathway continuously, promote the recovery of gastrointestinal function of patients, and could make patients recover quickly, which helped improve the quality of patients' life [5].

This study found that after operation, the recovery of gastrointestinal function in PDCA group was better than that in control group, and postoperative rehabilitation in PDCA group was obviously better than that in control group. It shows that using clinical nursing pathway of PDCA circulation could ensure the quality of postoperative care and could make recovery of gastrointestinal function for patients in a rapid way, so that patients could recover soon after operation, and could take underground activities more earlier. Therefore, the time of hospital stay would be shortened. All above owing that the clinical nursing pathway is a standardized nursing quality management mode, and it can regulate the behavior of nursing service and improve the quality of care [7, 8]. Gastric cancer clinical nursing pathway has many problems to solve during the process of formulating and implementing, and it needs to use scientific management methods. Building gastric cancer clinical nursing pathway based on PDCA circulation can improve the process of gastric cancer clinical nursing pathway and promote its implementation smoothly. In the process of implementation, once there was a problem, enter into a new PDCA circulation promptly to improve the nursing quality continuously and bring the best nursing service to gastric cancer patients. After that, gastrointestinal function of patients restores faster. Thus, this way can promote patients recover quickly, which is consistent with the results [4, 13, 14].

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**Table 4.** Comparison of the life quality between two groups of patients before and after intervention (min,  $\bar{x} \pm s$ )

Dimensions		PDCA group (n=50)	Control group (n=50)	The value of T	The value of P
Physical function	Before intervention	52.9 ± 12.0	52.1 ± 9.8	0.356	0.722
	After the intervention	70.5 ± 11.2	57.0 ± 7.0	7.188	<0.001
	T value	7.574	2.855		
	P value	<0.001	0.005		
Role function	Before intervention	53.5 ± 14.6	54.7 ± 10.5	0.473	0.637
	After the intervention	68.0 ± 12.6	56.2 ± 10.5	5.102	<0.001
	T value	5.321	0.697		
	P value	<0.001	0.487		
Emotional function	Before intervention	52.5 ± 16.6	51.0 ± 13.6	0.496	0.621
	After the intervention	67.7 ± 17.0	54.4 ± 14.3	4.215	<0.001
	T value	4.511	1.220		
	P value	,0.001	0.225		
Cognitive function	Before intervention	65.5 ± 14.4	64.5 ± 13.0	0.357	0.722
	After the intervention	77.8 ± 14.6	67.1 ± 11.3	4.149	<0.001
	T value	2.672	0.263		
	P value	0.01	0.794		
Social function	Before intervention	42.1 ± 11.0	40.5 ± 11.4	0.815	0.418
	After the intervention	54.5 ± 10.4	43.2 ± 10.5	5.414	<0.001
	T value	5.749	1.211		
	P value	<0.001	0.229		

**Table 5.** Comparison of patients with on health education compliance rate and satisfaction between two groups (%)

Group	Cases	Health education compliance rate	Satisfaction degree
PDCA group	50	96	98
Control group	50	84	86
$\chi^2$ value		4.000	4.891
P value		0.046	0.027

This research showed that the quality of patients' life improved obviously in PDCA group, and qualified health education rates and degree of satisfaction were significantly higher than that in control group. It was visible that using clinical nursing pathway in PDCA circulation management could provide the best care for patients. And the continuous strengthening health education make the patients have better understand of the basic knowledge and enlarge the confidence in conquering disease. So it can make patients cooperate with us on treatment and nursing actively, and can effectively accelerate the recovery of gastric bowel function, then make the patients recover quick-

ly and improve life quality significantly. So the patient's degree of satisfaction will increase. A study showed, clinical nursing pathway of PDCA circulation management can improve the life quality of life for patients with gastric cancer, which is consistent with the conclusion of this research [15, 16]. Also a study found that clinical pathway in combination with PDCA circulation quality management could effectively improve the efficiency and effects of health education, could reduce the rates of complications, and could increase patient satisfaction, which were similar to the conclusion of this research [17-20].

In conclusion, PDCA clinical nursing path is an ongoing nursing process with continuous improvement. It can constantly increase the level of gastric cancer care, so as to effectively promote the recovery of gastrointestinal function after surgery as well as postoperative recovery to improve the quality of life. Thanks to this, patients have better understanding of the disease knowledge with high degree of satisfaction, so it is worth promoting. The quantity of samples on the study are little, and the time for research is short, therefore, in further study,

the quantity of samples can be enlarged, or multicenter joint research can be carried out, follow-up periods can be prolonged, so that the effects of the research can be observed easily.

### Disclosure of conflict of interest

None.

**Address correspondence to:** Tian Tian, Department of Endoscope, China-Japan Union Hospital of Jilin University, 1028 Dong Street, Nanhu, Changchun 130000, Jilin, China. Tel: +0431-89208016; E-mail: tiantian1q2w3e@163.com

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