

Original Article

A feasibility analysis of the pathway management nursing mode in pituitary adenoma patients

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Abstract: Objective: This study aimed to explore the feasibility of pathway management nursing among pituitary adenoma (PA) patients and to analyze the influence of the pathway management mode on the general treatment indicators, the patients' quality of life (QOL), satisfaction with medical service, self-care abilities, degree of mastering health knowledge, and incidences of postoperative complications. Methods: 156 PA patients who were diagnosed and treated in our hospital in 2019 were recruited as the study cohort. Among the 156 patients, 78 patients who were received and cured before the pathway management started were included in the control group (CG), and the other 78 patients who were received and cured after the pathway management started were included in the study group (SG). The two groups were compared in terms of their preoperative waiting times, lengths of hospitalization (LOH), hospital costs, and their satisfaction with the medical service. After the 6-month postoperative follow-up, the two groups were compared in terms of their Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36) scores, their self-care abilities, degree of mastering health knowledge, and their incidences of all complications. Results: The hospital costs and LOH in the SG were lower than they were in the CG ($P<0.05$). The patients' satisfaction with the medical environment, their medical service, medical expenses, diagnosis and treatment results, and the informed consent of the SG were higher than they were in the CG ($P<0.05$). The SF-36 scores of the SG were higher than they were in the CG at 1-6 months after the operations ($P<0.05$). The self-care abilities and degree of mastering health knowledge in the SG were higher than they were in the CG at 1 month after the operations ($P<0.05$). The incidences of postoperative complications in the SG were lower in the SG than they were in the CG ($P<0.05$). Conclusion: Clinical pathway management can significantly accelerate PA patients' postoperative outcomes and enhance their satisfaction with medical service and improve their self-care abilities. Meanwhile, it is also conducive to reducing the incidence of postoperative complications and improving the QOL of patients in the long term.

Keywords: Pituitary adenoma, pathway management, nursing mode, feasibility analysis

Introduction

Pituitary adenoma (PA) is a tumor derived from pituitary cells in the sella region, which mainly occurs in the anterior pituitary cells, pituitary cells, and residual cells of the craniopharyngeal epithelium [1]. The incidence of this tumor is high, accounting for about 10%-25% of all intracranial tumors. But it is generally benign. Only 0.1%-0.2% of them are invasive. Middle-aged people are most susceptible to this disease. The incidence is almost the same in women and men [2, 3]. An epidemiological survey indicated that about 25 million Americans suffer from PA every year and about

199,000/100,000 people worldwide suffer from this disease each year. In general, the incidence is high [4]. According to clinical studies, PA influences one's health mainly by affecting the level of hormone secretions and constricting the structures of the surrounding tissues. With the development of PA, normal pituitary tissues will be atrophic under pressure. As a result, the pituitary hormone secretions are reduced, and the target gland becomes atrophic. This can lead to amenorrhea, sterility and infertility, and impotence, etc. At the same time, a large-sized tumor can also compress the surrounding tissues, and thus induce a symptom of nerve stimulation and a compres-

sion of the optic nerves. Finally, the abnormal hormone secretions can lead to gigantism and hyperthyroidism, etc. It is clinically suggested that PA patients receive the intervention treatment as soon as possible [5-7].

Clinical pathway management is a set of standardized treatment models and protocols for a certain disease. It is not only an integrated model related to clinical treatment, but it is also a method of promoting organization and disease management using evidence-based medicine and guidance [8]. This intervention mode aims to normalize medical treatment, reduce medical costs, decrease medical negligence, and enhance medical quality. Compared with disease guidance, the clinical pathway is more concise and easier to understand, so it is applicable to multidisciplinary treatment and multi-sector cooperation. In the treatment of targeted diseases, the clinical pathway lays more emphasis on the therapeutic outcomes, timeliness, and multidisciplinary collaboration [9, 10]. Pathway management was first applied in clinical practice in America in 1985 and proved to be effective in reducing patients' lengths of hospitalization (LOH) and improving the treatment effect. Later, this idea was promoted and applied globally and gradually expanded from surgical diseases to internal diseases and from chronic diseases to acute diseases. In general, its effect has been relatively good [11].

This study aimed to analyze the feasibility of the nursing mode based on clinical pathway management with PA patients, so as to provide a clinical reference to improve prognoses and to accelerate postoperative outcomes.

Materials and methods

General materials

A total of 156 PA patients who were diagnosed and treated in our hospital in 2019 were recruited as the study cohort. Among them, 78 patients who were received and cured before the pathway management started were included in the control group (CG) and the other 78 who were received and cured after the pathway management started were included in the study group (SG).

Inclusion criteria: This study included (1) patients who were definitely diagnosed with PA

and treated through surgery, (2) patients 18 years old or above, (3) patients who were conscious enough to fill out the survey questionnaire, (4) patients who were able to read, write and communicate, and (5) patients with complete medical records. All the patients signed the written informed consent form. Also, the survey was conducted with the approval of the Hospital Ethics Committee of The Second Affiliated Hospital of Hainan Medical University.

Exclusion criteria: This study excluded (1) patients with mental diseases, (2) patients suffering from other malignant tumors in addition to PA, (3) patients with sequelae caused by severely disability, major surgery, acute infection, acute heart failure, or severe cerebrovascular disease, (4) patients who were pregnant or lactating, and (5) patients with poor survey compliance.

Removal criteria: This study removed (1) patients who asked to quit the study and (2) patients who died during the study.

Intervention methods

The CG only received routine nursing intervention during the PA perioperative period, mainly including medication guidance, clinical disease detection, the prevention of postoperative complications, and appropriate health education, etc.

The SG received clinical pathway management nursing in addition to the care received by the CG. The detailed measures are shown below. (1) First, a clinical pathway management team was set up. The team members included doctors, nurses, and nutritionists. After searching for the patients' previous medical records and references and noting the common complications, nursing requirements, and failed cases of PA during the perioperative period, they summarized and analyzed the nursing highlights during the perioperative period of PA and formulated a table for the clinical pathway management with evidence-based medicine as the nursing basis. The specific time started before operation and lasted until six months after the operation. During this period, a full set of standardized nursing plans was formulated. (2) Preoperative pathway management. This phase started one day before the operation and went to the time of the operation. The patients were prone to severe mental instability, an-

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xiety, and irritability during this period. Therefore, the nurses selected the health education materials according to the PA therapeutic schedule. Also, the mental endurance of the patients was improved through the psychological adaptation training that was conducted based on a variety of educational methods. Meanwhile, the patients' vital signs were monitored closely. All kinds of preoperative examinations were made, and the operation was actively prepared. (3) Intraoperative pathway management. Because the patients were prone to experience low temperatures during the operations, their body temperatures were protected in the operation process. Intraoperative low temperatures in the patients were prevented to accelerate the postoperative outcomes. The specific measures included warming blankets and warm fluid. (4) Pathway management 1-2 days after the operations. The nurses handed over the nursing job to those working in the operating rooms. In addition, they needed to determine the patients' surgical situations, such as the withdrawal times of the anesthetics, the infusion quantities, and the urine volumes, etc. They monitored the patients' postoperative signs and symptoms, kept their venous channels unobstructed, and recorded their intake and output volumes, urine specific gravity, urine osmotic pressure, and electrolytes, etc. The doctors were informed immediately in the case of any abnormality. At the same time, any symptoms of cerebrospinal fluid leakage were monitored closely, and the recovery of their pupils, consciousness, and muscle force was observed regularly. (5) Pathway management 3-5 days after the operation. This phase emphasized the persistent observation of the disease condition and vital signs. The patients learned to use the naristilae properly with the help of the nurses. The nurses not only closely observed the patients' vital signs, but they also provided targeted health education and explained the nursing highlights to the patients and their families. What's more, all kinds of complications had to be prevented, especially cerebrospinal fluid leakage and diabetes insipidus. The former was prevented mainly by using intracranial hypotensive drugs and antibiotics in strict accordance with medical advice. The latter was prevented mainly by monitoring the daily intake and output volumes. Intervention had to be performed as early as possible in the case of

any abnormality. (6) Out-of-hospital pathway management. This phase mainly focused on the training of wound care abilities and self-care abilities. Before discharge, the nurses issued health handbooks to the patients and advised them to follow the WeChat public account. After the patients were discharged, the nurses informed them of the key points related to self-care through online answering and message notification and helped them establish a good living habit so as to improve their postoperative quality of life (QOL).

Observation targets and evaluation standards

General treatment indicators: The primary nurse recorded the preoperative waiting times, the LOH, and the hospital costs of the two groups, which was followed by a comparison and analysis of the differences between the two groups.

Evaluation of the satisfaction with the medical service: The Medical Service Satisfaction Scale made by this hospital was used to evaluate the satisfaction of the two groups. This scale covered the medical environment, the medical service, the medical expenses, the diagnosis and treatment results, and the informed consent. Each dimension had 20 scores, for a total of 100 points on this scale. The higher the score, the higher the satisfaction with the medical service.

Analysis of the QOL changes before and after the intervention: The Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36) was used to evaluate the QOL of the two groups before the intervention, and at 1, 3, and 6 months after the operations. There are 8 dimensions in the SF-36 survey, including physical performance, role physical, body pain, overall health, vitality, social function, role emotional, and mental health. Each dimension has 2-10 items, for a total of 36 items. The SF-36 was also divided into physical health assessment and mental health assessment. Each aspect had a final score of 0-100 points. The higher the score, the better the QOL. The SF-36 has been widely used to evaluate the QOL of different groups of people. With good reliability and validity, it is a universal assessment scale for QOL that has been recognized globally [12].

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Table 1. Comparison of the general clinical data in the two groups ($\bar{x} \pm s$)/[n (%)]

General clinical data		SG (n=78)	CG (n=78)	t/X ²	P
Gender	Male	40	38	0.051	0.821
	Female	38	40		
Average age (years)		45.91±3.44	46.01±3.21	0.133	0.895
Average weight (kg)		62.18±3.22	62.21±3.19	0.041	0.967
Average BMI (kg/m ²)		22.11±2.31	22.09±2.19	0.039	0.969
Residence	City	22	20	0.221	0.822
	Town	40	40		
	Country	16	18		
Educational level	Illiteracy	4	2	0.334	0.781
	Primary school	8	10		
	Junior high school	16	18		
	Senior high school or above	50	48		
Marital status	Married	66	68	0.106	0.745
	Single	12	10		
Job	Cadre	10	12	0.443	0.718
	Worker	18	20		
	Farmer	24	22		
	Retired	20	20		
	Others	6	4		

Comparison of the self-care abilities and degrees of mastering health knowledge of the two groups at 1 month after the operations: A survey and an analysis were conducted focusing on the self-care abilities and degrees of mastering health knowledge at one month after the operations. The differences between the groups were analyzed. The self-care ability was evaluated using the Appraisal of Self-care Agency Scale (ASA). This scale includes three dimensions, including universal self-care requisites, development self-care requisites, and health deviation self-care requisites, and 15 items. The Liker5 scoring method was adopted here, for a total of 15-75 points. The higher the score, the better the self-care ability [13]. The degree of mastering health knowledge was evaluated through a scale developed by this hospital. This scale included 5 aspects, such as regular medication, regular subsequent visits, and nursing highlights, etc., for a total of 100 points. The higher the scores, the better the degree of mastering health knowledge.

Comparison of the incidences of postoperative complications: The incidences of all postoperative complications were recorded, including water and electrolyte disorders, cerebrospinal fluid leakage, diabetes insipidus, hypopituita-

ism, and bleeding and infection. The differences between the two groups were analyzed.

Statistical analysis

The data collected were input into SPSS 22.0 for processing. The measurement data were represented by ($\bar{x} \pm s$). *t* tests were used for the comparisons between groups and within groups. The enumeration data were represented by [n (%)]. Chi-square tests were used for the comparisons between groups and within groups. The multi-point comparisons between groups were analyzed through ANOVA. Student's *t* tests were used to analyze the variability of the continuous variables. *P*<0.05 meant that a difference showed statistical significance [14].

Results

Comparison of the general clinical data between the two groups

According to the records and comparisons, there were no significant differences in the general clinical data between the two groups, including average age, gender ratio, average disease course, or Wagner grading (*P*>0.05).

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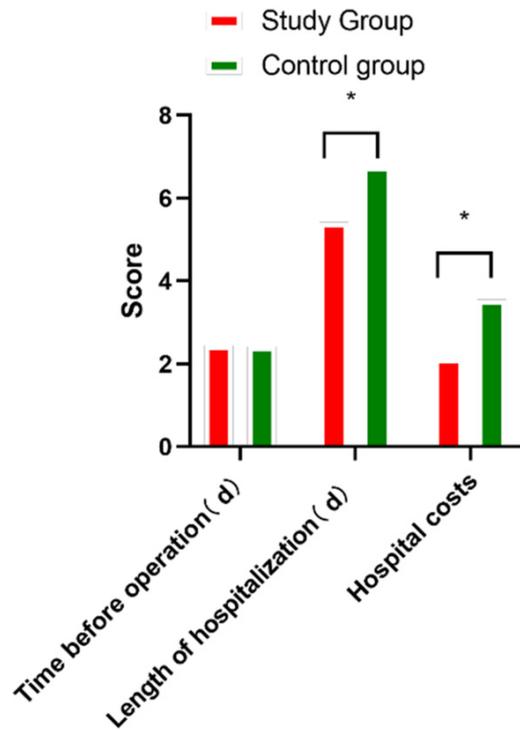


Figure 1. Comparison of the general treatment indicators in the two groups. According to our comparison, the LOH and hospital costs of the SG were much lower than they were in the CG, showing a significant difference ($P<0.05$). There was little difference in the preoperative waiting times between the two groups ($P>0.05$). * meant that the same indicator showed a statistical difference between the groups.

This implied that the two groups were comparable (**Table 1**).

Comparison of the general treatment indicators between the two groups

According to our comparisons, the LOH and hospital costs of the SG were much lower than they were in the CG, showing a significant difference ($P<0.05$). The preoperative waiting times were similar in the two groups and had no statistical significance ($P>0.05$) (**Figure 1**).

Comparison of the satisfaction with the medical service between the two groups

According to surveys, the satisfaction with the medical service in the SG was much higher than it was in the CG, including the medical environment, medical service, medical expenses, diagnosis and treatment results, and the

informed consent. The two groups showed a significant difference ($P<0.05$) (**Figure 2**).

Analysis of the changes in the QOL of the two groups before and after the intervention

According to our analysis, there was little difference in the QOL scores in the two groups before the intervention ($P>0.05$). The scores of the SG for physical health assessment and mental health assessment as reported on the SF-36 were much higher than they were of the CG at 1, 3, and 6 months after the operations ($P<0.05$) (**Figure 3**).

Comparison of the self-care abilities and degree of mastering health knowledge of the two groups at 1 month after the operation

According to our comparison, the self-care abilities and the degree of mastering health knowledge in the SG were much higher than they were in the CG, and they had a significant difference ($P<0.05$) (**Table 2**).

Comparison of the incidences of postoperative complications between the two groups

According to the data we gathered, there were 2 cases of water and electrolyte disorders, 2 cases of cerebrospinal fluid leakage, and 2 cases of bleeding and infection in the SG after the operation, for a total incidence of 7.69%. There were 6 cases of water and electrolyte disorders, 4 cases of cerebrospinal fluid leakage, 4 cases of diabetes insipidus, 2 cases of hypopituitarism, and 2 cases of bleeding and infection in the CG after the operations, for a total incidence of 23.08%. The incidences of complications in the SG were significantly lower than they were in the CG ($P<0.05$) (**Table 3**).

Discussion

The pituitary gland is the most important and complex endocrine gland in the human body. It can not only secrete various hormones with crucial physiological functions, but it can also regulate the secretions of other endocrine glands. The pituitary gland plays an important role in the interactions between the nervous system and the endocrine glands. PA is a common benign intracranial tumor. Its main clinical symptom is intracranial compression, such as headache, impaired vision, and visual field

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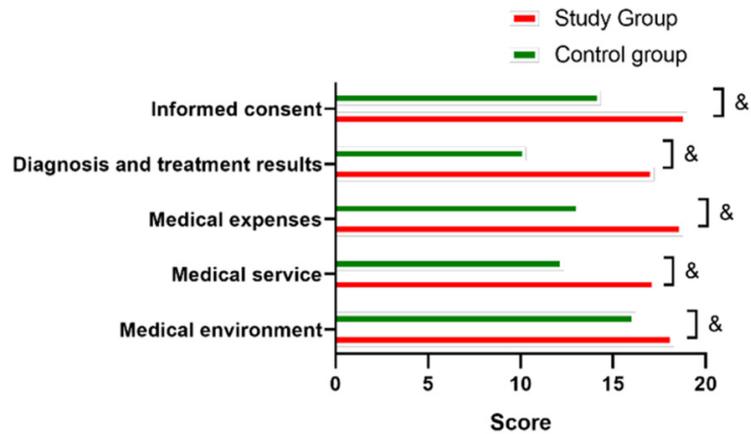


Figure 2. Comparison of the levels of satisfaction with the medical service between the two groups. According to our comparison, the satisfaction with medical service in the SG was much higher than it was in the CG, including the medical environment, medical service, medical expenses, diagnosis and treatment results, and the informed consent. The two groups showed a significant difference ($P < 0.05$). & meant that the same indicator showed a statistical difference between the groups.

defects, etc. Some functional pituitary adenomas have different symptoms of endocrine dyscrasia due to their being different types, such as menolipsis, lactation, acromegalia, hyperthyroidism, sexual dysfunction, and metabolic disturbances. With the development of PA, patients will have a series of symptoms caused by nerve and brain damage [15, 16]. PA mostly occurs in young adults. It has a significant influence on individuals' growth, development, and ability to work. Some patients may face social and mental function-related problems due to their symptoms. Therefore, early intervention is recommended in clinical practice [17].

Surgery is currently one of the main treatment methods for PA. With the continuous development of microscopical techniques, modern endoscopic techniques, and neuronavigation techniques in recent years, the PA success rate and the patient survival rate have been significantly improved. A survey of 420 PA patients treated surgically showed that the overall improvement rate of the postoperative symptoms was as high as 98% during the 6-24-month postoperative follow-up [18]. The success rate of PA is high in clinical practice, but the operation is relatively complex, and most patients suffer from significant endocrine disorders caused by intracranial space-occupying lesions. Hence, the PA operation is relatively

difficult with a higher incidence of postoperative complications. This influences patient prognosis to a certain extent [19].

Pathway management was first applied in clinical practice in America in the 1990s. This nursing mode aims to accelerate the postoperative outcomes, reduce the incidence of complications, and improve patient prognosis through scientific and chronological care plans. Pathway management is a quality management mode based on system management, process management, and other scientific methods. It is a standardized quality control tool. It is reported that

clinical pathway management is currently used in about 60% hospitals in the United States. Moreover, this management concept has also been clinically promoted in many European and Asian countries. The basis of its clinical application is good [20].

In this study, two groups were set up to analyze the feasibility of the pathway management nursing mode in PA patients. The results showed that the LOH and hospital costs of the SG that received pathway management nursing were much lower than they were in the CG that received routine perioperative nursing. This implied that pathway management accelerates the postoperative outcomes and reduces the medical costs. Some studies have pointed out that the traditional nursing mode for craniocerebral surgery lacks standardization, leading to unclear procedure specifications and arbitrariness in practical application, which to a certain extent wastes medical resources and prolongs the postoperative recovery time [21, 22]. The pathway management used in this study is a standardized intervention mode based on evidence-based medicine. Its design is similar to an assembly line and provides a "standard flow chart" for PA and achieves an effect that "the same disease with the same symptoms is treated in the same way." In this way, the use ratio of medical resources is enhanced; the medical expenses are reduced;

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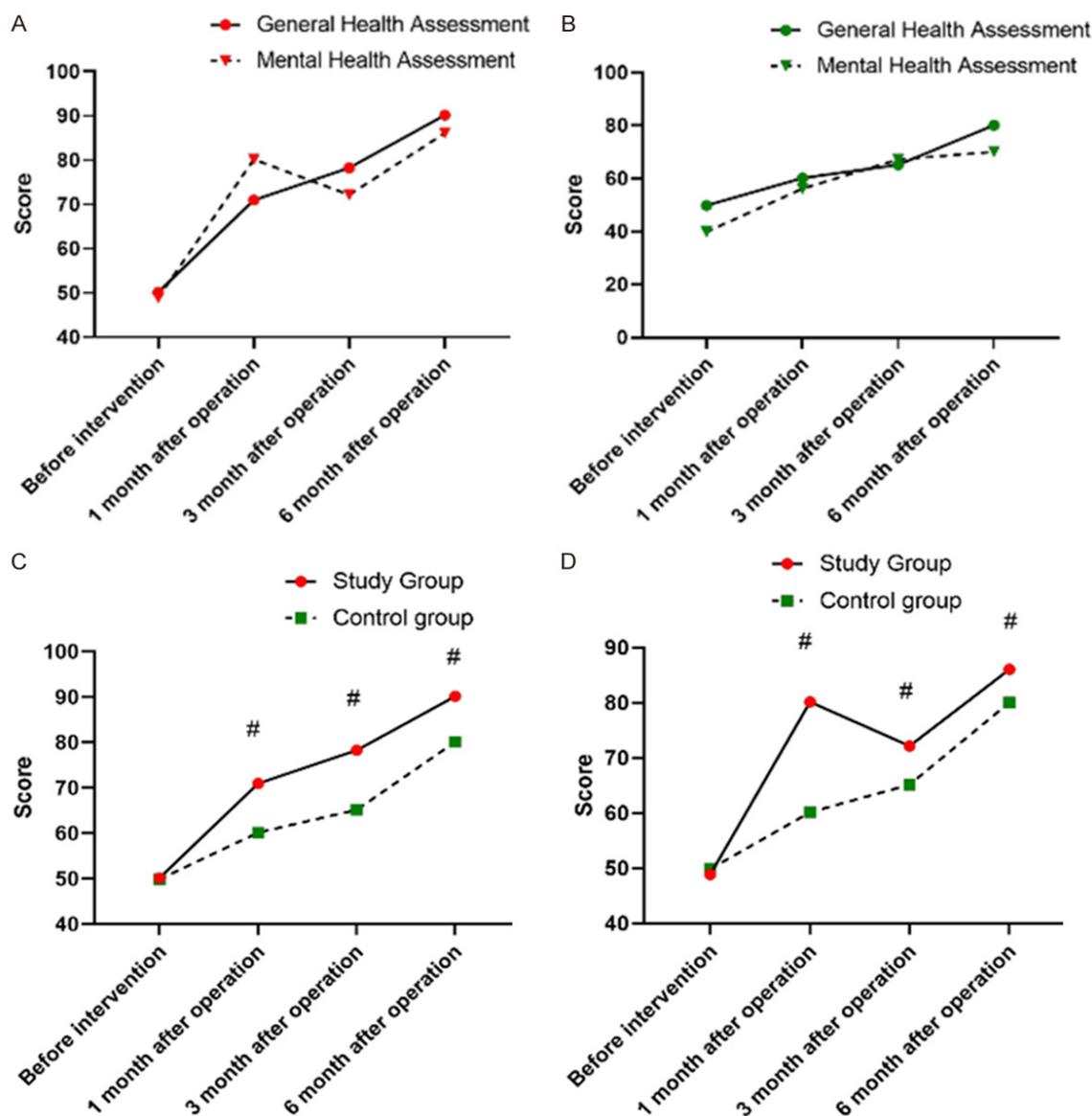


Figure 3. Analysis of the changes in the QOL of the two groups before and after the intervention. It was found through our analysis that the physical health assessment and mental health assessment in the SF-36 was gradually enhanced in the two groups with the progression of the intervention (A and B). Based on the comparison, the SF-36 scores were similar in the two groups before the intervention ($P>0.05$). The scores of the SG for physical health assessment (C) and mental health assessment (D) were higher than they were in the CG at 1, 2, and 3 months after the operation. # meant that the same indicator showed a statistical difference between the groups at the same time point.

Table 2. Comparison of the self-care abilities and degree of mastering health knowledge in the two groups at 1 month after the operations ($\bar{x} \pm s$)

Group	Number of cases	Self-care ability	Degree of mastering health knowledge
SG	78	62.38±2.22	89.89±3.43
CG	78	54.18±2.19	80.19±2.21
t	-	16.421	14.846
P	-	<0.001	<0.001

the postoperative outcome is accelerated; the nursing difficulty is lowered; and predictive nursing is achieved [23, 24]. The survey instrument used in this study showed that the satisfaction in the SG was higher than it was of the CG with respect to the medical environment, medical service, medical expenses, diagnosis and treatment results, and informed consent, but the incidence of complications in the SG is much lower than it was in the CG. This result verified, from our perspective, the validity and

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Table 3. Comparison of the incidences of postoperative complications in the two groups [n (%)]

Group	Number of cases	Water and electrolyte disorders	Cerebrospinal fluid leakage	Bleeding and infection	Diabetes insipidus	Hypopituitarism	Total incidence
SG	78	2	2	2	0	0	6 (7.69)
CG	78	6	4	2	4	2	18 (23.08)
χ^2	-	-	-	-	-	-	7.091
<i>P</i>	-	-	-	-	-	-	0.008

feasibility of pathway management. It also implies that pathway management is conducive to the harmony of the doctor-patient relationship. It fully reflects the humanistic approach to nursing and medical work.

In this study, the QOL of the PA patients was analyzed through pathway management. The results showed that the QOL of the SG was significantly improved after the pathway management. According to our comparison, the scores for both the physical health and mental health of the SG were higher than the scores in the CG. As shown in a survey, the postoperative QOL of the PA patients was low because of endocrine dyscrasia and intracranial space-occupying lesions, but these factors were fully considered in the implementation of pathway management in this study. A survey of 90 patients with PA found that patients with PA often have a poor QOL and poor mental statuses after surgery, which may be related to individual endocrine disorders or to intracranial space-occupying lesions. The path management used in this study fully takes the above factors into consideration and provides intensive out-of-hospital nursing guidance for patients with PA through targeted continuing nursing care, which have laid a solid foundation for self-care and self-intervention, so that the QOL of patients and the degree of health knowledge have been significantly improved [25, 26]. In this study, our comparison of SF-36 scores between the two groups also confirmed this view.

In conclusion, clinical pathway management significantly accelerates the postoperative outcomes and enhances the satisfaction with medical service and self-care abilities in PA patients. Meanwhile, it is also conducive to reducing the incidence of postoperative complications and improving the QOL of patients in the long term. The innovative point of this study lay in the out-of-hospital nursing inter-

vention provided for the PA patients in addition to the traditional pathway management. It provided a theoretical reference for continuing nursing care based on pathway management. The deficiency of this study was the small sample size within a limited time frame, so the results were not comprehensive enough. We plan to carry out a survey with a larger sample size to address the above deficiencies and thus provide more detailed data for the perioperative nursing of PA patients.

Disclosure of conflict of interest

None.

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