Am J Transl Res 2021;13(7):8102-8109
www.ajtr.org /ISSN:1943-8141/AJTR0128561

Original Article

Study on parental satisfaction and clinical treatment outcomes of 128 diarrheic children receiving comprehensive nursing

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Received December 18, 2020; Accepted April 3, 2021; Epub July 15, 2021; Published July 30, 2021

Abstract: Objective: To explore the clinical treatment outcomes and parental satisfaction of children with diarrhea receiving comprehensive nursing intervention. Methods: A total of 128 diarrheic children treated in our hospital from June 2016 to June 2017 were recruited and divided into a control group (n=64) receiving conventional nursing and an observation group (n=64) receiving comprehensive nursing intervention, as per a random number table. The clinical outcomes, electrolyte disorders, recovery of gastrointestinal function, quality of life and parental satisfaction were compared between the two groups after nursing. Results: The overall response rate of the observation group was higher than that of the control group (81.25% vs. 51.56%) ($P < 0.05$). Nursing satisfaction in the observation group was higher than that in the control group (100.00% vs. 75.00%) ($P < 0.05$). However, the time to resolution of clinical symptoms and time to return of bowel sounds in the observation group were shorter than those in the control group ($P < 0.05$). After nursing, the incidence of electrolyte disorders in the observation group was lower than that in the control group. The scores of physical symptoms, physical functioning, emotional functioning, cognitive functioning and social functioning in PedsQLTM Measurement Model were higher than those in the control group, and the electrolyte index monitoring results were better than those in the control group ($P < 0.05$). Conclusion: Comprehensive nursing intervention can effectively reduce the incidence of electrolyte disorders, improve parental satisfaction, accelerate the recovery of gastrointestinal function and improve the quality of life in the treatment of pediatric diarrhea.

Keywords: Pediatric diarrhea, comprehensive nursing, parental satisfaction, gastrointestinal function, quality of life

Introduction

Pediatric diarrhea is a relatively common digestive disease in clinical pediatrics, with a high incidence in children under 2 years old. The clinical manifestations are mainly increased bowel movement frequency, change in stool shape, fever, abdominal pain, electrolyte disorders and vomiting. The etiology of pediatric diarrhea is complex and is mainly related to bacterial and viral infection, as well as to the vulnerability of the digestive system of children [1, 2]. Long-term diarrhea can lead to loss of nutrients, water-electrolyte disorders and dehydration. Due to the immaturity of systems and organs of children, their tolerance to the disease is poor, and if the disease is not controlled effectively and timely, the condition will gradually deteriorate, which may lead to serious consequences [3, 4], or even death.

Due to the young age of children with diarrhea and poor treatment compliance, effective nursing intervention should be considered in conjunction with other treatment to improve the treatment effect. Xie et al. [5] reported that the application of a fine nursing model could significantly shorten the time to reduction of fever, time to cessation of diarrhea and hospital stays of diarrheic children, and improve the clini-

cal efficacy. Zhu et al. [6] reported that targeted dietary care should be considered for diarrheic children on the basis of routine nursing, which could rapidly improve the clinical symptoms of children and improve the treatment effect. Although the above nursing measures improve the recovery of children to a certain extent, the current clinical nursing care for pediatric diarrhea focuses more on such details as prevention of electrolyte disorders and avoidance of gastrointestinal infection, and pays less attention to the education of children's family members and their mental health.

Comprehensive nursing is a more comprehensive and systematic patient-centered nursing model. Through comprehensive and systematic nursing, the nursing needs of patients can be met to the great extent, and their adverse psychological state is improved, thereby promoting physical recovery [7]. In view of this, to further improve the clinical treatment effect of pediatric diarrhea, alleviate clinical symptoms and improve the relationship between patients and nurses, this study recruited 128 diarrheic children treated in our hospital and analyzed the feasibility of comprehensive nursing intervention measures.

Materials and methods

Clinical data

A total of 128 children diagnosed with diarrhea in our hospital from June 2016 to June 2017 were recruited and divided into two groups as per a number table. (1) Diagnostic criteria. The most common causes of diarrhea in children included abdominal chill, improper feeding and urinary system or extraintestinal infection. Children with milder diarrhea had diarrhea 3-5 times in a day, and children with severe diarrhea had yellowish egg drop soup stools more than 10 times in a day, in some cases, accompanied by nausea and vomiting, fever and electrolyte disorder. Auxiliary examination: routine stool examination showed significant increase in red and white blood cells; blood biochemical examination included serum sodium, potassium, calcium and chlorine; routine blood examination: white blood cells were significantly increased in patients with bacterial infection [8]. (2) Inclusion criteria: diagnosis of pediatric diarrhea, parents' signature of informed consent. (3) Exclusion criteria: children with poor compliance or midway transfer, complicated with serious diseases such as myocarditis; severe cardiac, hepatic and renal insufficiency and those complicated with malignant tumor. This study was approved by Ethic Committee of Dongying People's Hospital. Parents of children signed the written informed consent.

Methods

(1) Treatment method. The children in both groups were treated with intravenous injection combined with oral medication. Oral medication: zinc preparation, hypotonic ORS, as prescribed by the doctor; intravenous injection: electrolyte rehydration solution. Children with hematochezia were treated with antibiotics according to their condition, and children with severe vomiting were given morpholine orally to stop vomiting.

(2) Nursing method. Routine nursing: the children's diet was adjusted, except for those with severe vomiting who fasted, all children ate normally, and bedside isolation was required for severe cases. Comprehensive nursing intervention: ① Rehydration nursing: oral rehydration salts were given to children with mild, moderate and severe dehydration, as per 50-80 mL/kg, 120-150 mL/kg and 150-180 mL/kg respectively. Intravenous rehydration salts were injected on the first day at a fixed quantity and rate and hypocalcemia, hypokalemia and hypomagnesemia were corrected. ② Condition monitoring: The frequency, shape, odor and volume of stool of the children were recorded in detail after admission. Foamy or oily stool, foul-smelling stool, watery or egg drop stool with abdominal pain and nausea and vomiting suggested fermentation and indigestion, protein indigestion and *Escherichia coli* enteritis, respectively. The onset of diarrhea in children with white or watery yellowish stool in the autumn and winter may be caused by rotavirus enteritis. The pediatric diarrhea was closely observed and reported to the attending physician in time if he or she appeared to be in poor spirits or the diarrhea suddenly stopped and changed to vomiting. ③ Nutrition guidance: After diarrhea occurs, the children's daily diet should be adjusted to avoid aggravation of diarrhea. During treatment period, the children's nutritional supply during recovery period should be ensured to

accelerate recovery and prevent malnutrition. Breast-fed children could continue to be breast-fed according to the individual conditions, but mothers should avoid spicy and greasy food and keep a positive mood. The children with diarrhea and dehydration were fasted for 4-6 h. After the decrease of frequency of diarrhea, the children were given some liquid food such as porridge and soup in appropriate amount, and gradually returned to a normal diet. ④ Psychological nursing: The medical staff should pay more attention and care to the children, understand their emotional needs through the parents, try to make the children happy, communicate with the parents in real time and explain in detail the development of the children's condition and follow-up treatment plan, so that the family members could better cooperate with the medical staff for treatment. The parents should be informed to wash their hands with hand sanitizer before contacting the children, and develop the habit of washing hands before eating and after leaving the bathroom to avoid re-infection of the digestive tract. The children should increase outdoor activities and avoid exposure to cold and heat. ⑤ Hygienic disinfection: Bedside isolation was mandatory for children after admission, and the children with normal stool upon examination were released from isolation. The humidity, air and environment of the children's ward were kept hygienic and the air was disinfected daily by ultraviolet lamps. Medical and nursing staff washed their hands before contacting the children, and the children's daily necessities should also be disinfected frequently to prevent cross-infection. ⑥ Skin care. Since the skin of children is delicate, and frequent diarrhea is prone to irritate the skin around buttocks, causing ulceration and redness on the skin around buttocks, it is necessary to keep the skin dry, change diapers frequently, wash the buttocks with warm water after defecation, and dip dry with a soft cotton towel. If a red rash showed up around the buttocks, 40% zinc oxide oil should be applied. ⑦ Abdominal massage. After 2 h of feeding, the children were given abdominal massage for 5-10 min. The hands should be fully lubricated with baby oil, and the massage should be done three times a day with the navel as the center in a clockwise motion outward. ⑧ Heat-sensitive moxibustion. The acupoints including Zhongwan, Dachangyu and Zusanli were selected for suspended moxibustion at a distance of 20 mm from the skin, in the order of circling moxibustion, sparrow-pecking moxibustion and back-and-forth moxa stick moxibustion along the meridians for 2 min, respectively, 1 time a day.

Evaluation indices

(1) The evaluation criteria of "Guiding Principles for Clinical Research on New Drugs (Traditional Chinese Medicine) for Treatment of Pediatric Diarrhea" issued by the Ministry of Health of China [9] was applicable. Marked response: after treatment, the bowel movement frequency was reduced by < 1/3, the main symptom score was reduced by < 90%, ≥ 67%, and all symptoms and signs were significantly relieved. Response: after treatment, the bowel movement frequency was reduced by < 1/2, the main symptom score was reduced by < 90%, ≥ 67%, and all symptoms and signs were relieved. No response: the above criteria were not met.

(2) The time to resolution of diarrhea, abdominal distension and abdominal pain and time to return of bowel sound were recorded in the two groups.

(3) Nursing satisfaction. Our hospital's self-designed questionnaire was provided to the family members of children, covering such aspects as health education, nursing attitude, communication method and medical environment, to assess the level of satisfaction including "very satisfied", "satisfied" and "dissatisfied".

(4) Electrolyte disorder. The incidence of hypokalemia, hypomagnesemia, hypocalcemia and hypochloridemia and the monitoring results of electrolyte index before and after (when discharged from hospital) nursing were counted in the two groups.

(5) Quality of life. The pediatric quality of life before nursing and at 1 month after discharge were evaluated by the Pediatric Quality of Life Inventory (PedsQLTM), including cognitive functioning, emotional functioning, social functioning, physical functioning and physical symptoms. Higher score indicates good quality of life.

Statistical analysis

SPSS 22.0 software was used. The measurement data (recovery of gastrointestinal function, PedsQLTM scoring, *etc.*) were expressed

Table 1. Comparison of clinical data between the two groups

Group	Male/Female	Age (years)	Median duration (days)	Types of diarrhea (case)		
				Viral diarrhea	Bacterial diarrhea	Improper feeding
Observation group (n=64)	42/22	1.35±0.42	3.15±0.74	23	21	20
Control group (n=64)	38/26	1.43±0.39	2.94±0.64	26	22	16
χ^2/t	0.533	1.112	1.717		0.651	
P	0.465	0.266	0.088		0.722	

Table 2. Comparison of clinical treatment outcome between the two groups of children [n (%)]

Group	Marked response	Response	No response	Overall response rate
Observation group (n=64)	27 (42.19)	25 (39.06)	12 (18.75)	52 (81.25)***
Control group (n=64)	10 (15.62)	23 (35.93)	31 (48.43)	33 (51.56)

Note: Compared with the control group, ***$P < 0.001$.

Table 3. Comparison of recovery of gastrointestinal function between the two groups ($\bar{x} \pm s$, d)

Group	Time to resolution of diarrhea	Time to resolution of abdominal distension	Time to return of bowel sound	Time to resolution of abdominal pain
Observation group (n=64)	1.96±0.37***	2.67±0.45***	1.86±0.44***	1.77±0.34***
Control group (n=64)	3.68±0.74	4.06±0.75	3.42±0.57	3.16±0.43

Note: Compared with the control group, ***$P < 0.001$.

as $\bar{x} \pm s$. Independent sample *t*-test and paired sample *t*-test were used for comparisons between and within groups respectively. The count data (treatment effect, nursing satisfaction, incidence of electrolyte disorder, *etc*.) were expressed as percentage. GraphPad Prism 8 was used to illustrate the data. The difference was statistically significant by χ^2 test, at $P < 0.05$.

Results

Comparison of clinical data

The differences in age, sex, duration of disease and types of diarrhea (including viral, bacterial, and improper feeding) between the two groups were not statistically significant ($P > 0.05$) and as such the groups were comparable, as shown in **Table 1**.

Overall response rate of treatment

The overall response rate was 81.25% in the observation group and 51.56% in the control group ($P < 0.05$), and the difference was statistically significant. This indicated that comprehensive nursing could improve the treatment outcomes of pediatric diarrhea, as shown in **Table 2**.

Recovery of gastrointestinal function

The time to resolution of diarrhea, abdominal distension and abdominal pain and time to return of bowel sounds in the observation group were shorter than those in the control group, and the difference was statistically significant ($P < 0.05$), suggesting that comprehensive nursing could accelerate the relief or elimination of diarrhea, abdominal distension and abdominal pain in children with diarrhea, restore normal intestinal peristalsis, and promote the recovery of children, as shown in **Table 3**.

Nursing satisfaction

The overall parental satisfaction was 100% in the observation group and 92.31% in the control group. The nursing satisfaction of the observation group was significantly higher than that of the control group, and the difference was statistically significant ($P < 0.05$), exhibiting that comprehensive nursing measures could promote the communication between nurses and patients and improve the satisfaction of the parents of children with nursing work, as shown in **Table 4**.

Table 4. Comparison of overall parental satisfaction on nursing between the two groups [n (%)]

Group	Very satisfied	Satisfied	Dissatisfied	Overall satisfaction
Observation group (n=64)	38 (59.39)	26 (40.62)	0 (0.00)	64 (100.00)***
Control group (n=64)	30 (46.87)	18 (28.12)	16 (25.00)	48 (75.00)

Note: Compared with the control group, ***$P < 0.001$.

Table 5. Comparison of electrolyte disorder incidence between the two groups before and after nursing [n (%)]

Group	Hypokalemia		Hypomagnesemia		Hypocalcemia		Hypochloridemia	
	Before nursing	After nursing	Before nursing	After nursing	Before nursing	After nursing	Before nursing	After nursing
Observation group (n=64)	60 (93.75)	5 (7.81)**	63 (98.43)	10 (25.00)*	60 (93.75)	8 (12.50)**	58 (90.62)	5 (7.81)*
Control group (n=64)	61 (95.31)	15 (23.43)	60 (93.75)	19 (29.68)	63 (98.43)	23 (35.93)	59 (92.18)	14 (21.88)

Note: Compared with the control group, *$P < 0.05$, **$P < 0.01$.

Electrolyte disorder

Before nursing, there was no statistical significance in the incidence of hypokalemia, hypomagnesemia, hypocalcemia and hypochloridemia and the monitoring results of the above indicators between the two groups ($P > 0.05$). Compared with before nursing, the incidence of hypokalemia, hypomagnesemia, hypocalcemia and hypochloridemia were significantly decreased in the two groups after nursing, and the monitoring results of electrolyte indexes were significantly improved ($P < 0.05$). The incidence of hypokalemia, hypomagnesemia, hypocalcemia and hypochloridemia in the observation group was lower than that in the control group, and the monitoring results of electrolyte index were better than those in the control group ($P < 0.05$), showing that comprehensive nursing could improve electrolyte disorders in diarrheic children, as shown in **Table 5** and **Figure 1**.

Quality of life

Before nursing, the difference in PedsQLTM scores was not statistically significant between the observation group and the control group ($P > 0.05$). After nursing, the scores of physical symptoms, physical functioning, emotional functioning, cognitive functioning and social functioning in PedsQLTM inventory in the observation group were higher than those in the control group, and the difference was statistically significant ($P < 0.05$), showing that comprehensive nursing could improve the quality of life of diarrheic children, as shown in **Figure 2**.

Discussion

Pediatric diarrhea is a common digestive disease among clinical infants and child related diseases. Due to such factors as weaker development of pediatric digestive system, less secretion and lower vitality of various digestive enzymes in the body than those in adults, this can result in poor tolerance to food quality, and higher demand for nutrients due to faster growth and development of infants and children, all of which increase the burden on digestive system, and the digestive system of infants and children is in a working state for a long time, which can easily lead to the onset of diarrhea due to digestive disorders [10-12]. When infants and young children suffer from diarrhea, scientific treatment should be taken in real time, as any delay may lead to further aggravation, thus inducing serious electrolyte disorders, and even endangering the life of the child in severe cases [13, 14].

In clinical practice, pediatric diarrhea is a multifactorial and multi-causal disease, presenting with a different severity of symptoms [15]. The clinical treatment principles are mostly to continue to guide the child to eat, reasonably organize the daily diet, maintain nutrition required by the body, regulate electrolyte disorders and control intestinal and extraintestinal infection, and strengthen clinical nursing to prevent further aggravation of the disease [16-18]. In this study, diarrheic children were treated by intravenous injection in conjunction with oral medication, and clinical nursing played an important role in the whole treatment. Due to the poor

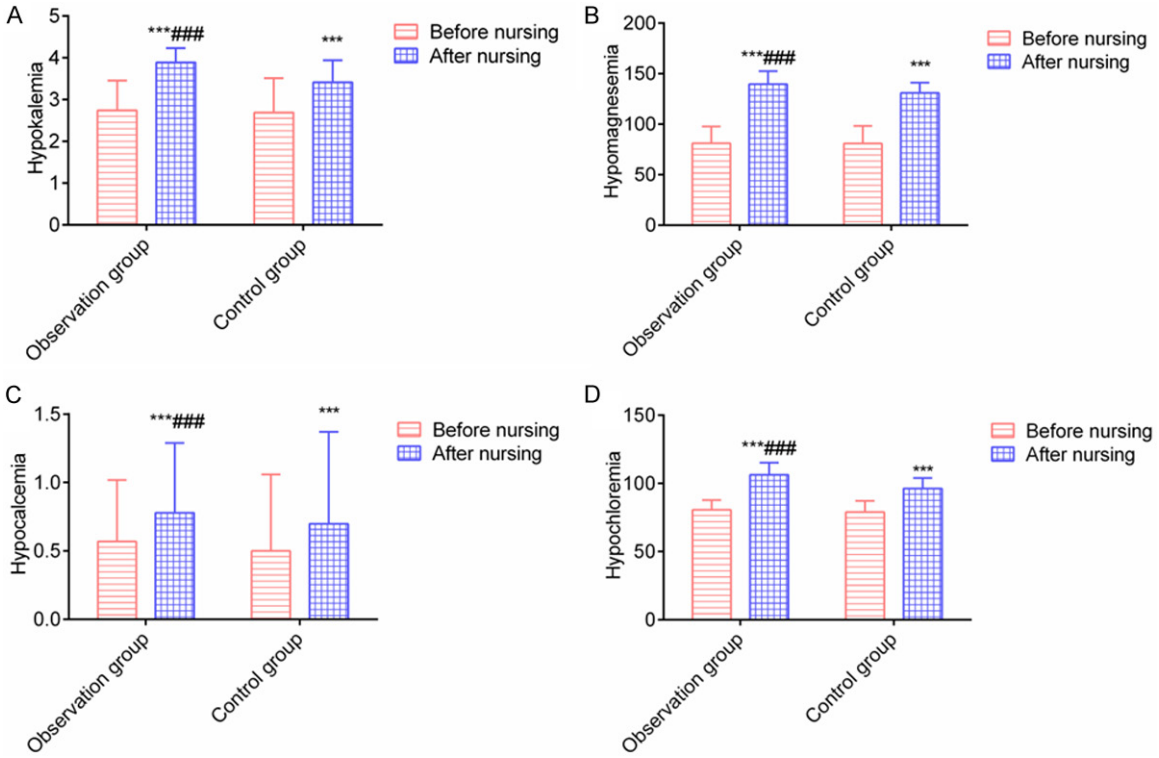

Figure 1. Comparison of monitoring results of electrolyte index between the two groups before and after nursing (mmol/L). Note: A: Hypokalemia; B: Hypomagnesemia; C: Hypocalcemia; D: Hypochloridemia. Compared with the observation group before nursing, $^{***}P < 0.001$; Compared with the control group, $^{\#\#\#}P < 0.001$.

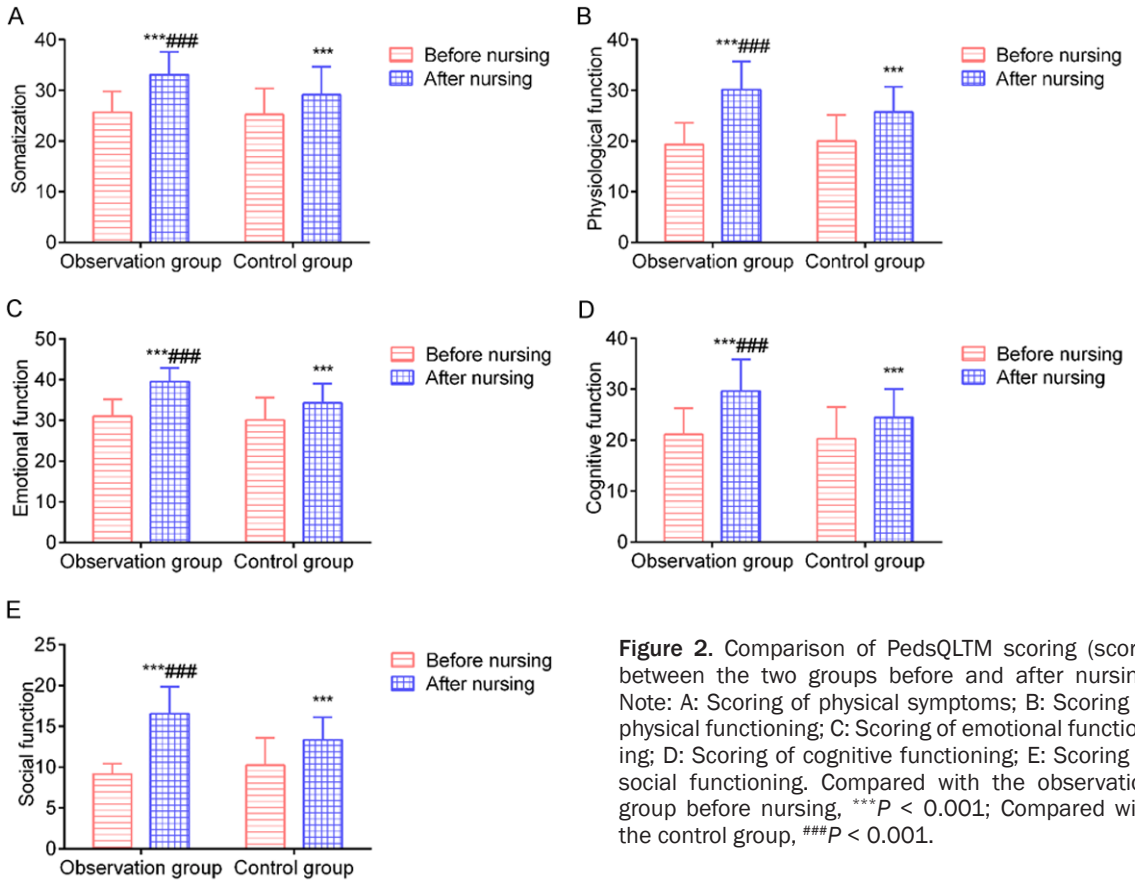

Figure 2. Comparison of PedsQLTM scoring (score) between the two groups before and after nursing. Note: A: Scoring of physical symptoms; B: Scoring of physical functioning; C: Scoring of emotional functioning; D: Scoring of cognitive functioning; E: Scoring of social functioning. Compared with the observation group before nursing, $^{***}P < 0.001$; Compared with the control group, $^{\#\#\#}P < 0.001$.

expression capability of infants and young children, the medical staff does not understand the children's conditions immediately, thus increasing the treatment difficulty for the attending physician. The nursing staff in pediatric wards should be caring and responsible, increase the frequency of rounds and have sufficient nursing knowledge to provide effective nursing for children with diarrhea. In this study, compared with the control group, the observation group had higher clinical efficacy, higher parental satisfaction, shorter time to resolution of clinical symptoms and higher quality of life, and electrolyte indices returned to normal, and as such the electrolyte disorder was relieved. The reason may be that comprehensive nursing intervention combined with conventional nursing methods can provide systematic and comprehensive nursing service for children, including strengthening the conditions and monitoring to find abnormalities in time, rehydration nursing to correct low calcium, potassium and magnesium and avoid electrolyte disorders, and nutritional guidance to avoid diarrhea induced by improper feeding, ensure the nutrition required by children, reduce the risk of malnutrition, improve their body resistance and promote their growth and development [19-21]. It has been reported that mental state is closely related to gastrointestinal state, *i.e.* the so-called "emotion-symptom" which can be a vicious cycle. If the children have adverse psychological states such as fear, tension and worry, it can aggravate the psychological stress response, increasing the burden on the gastrointestinal tract to a certain extent, prolong the healing time and cause disease recurrence [22]. Therefore, on the basis of conventional nursing, giving children more attention and care, understanding the children's emotional needs through their parents, and providing psychological education and health education for their family members can correct previous misconceptions, improve treatment compliance, eliminate negative emotion, promote the recovery of physiological functioning of the children, social functioning and emotional functioning, and improve physical symptoms [23]. In addition, heat-sensitive moxibustion can stimulate sensation transmission activities along the meridian and regulate the vital energy, viscera and gut of the body, so as to achieve the effects of regulating the vital energy and blood in the viscera and meridians, supporting Yang and strengthening body resistance, enhancing the immunity of the body and improving the symptoms of diarrhea. Regular abdominal massage can promote gastrointestinal peristalsis and improve peristaltic function, so as to accelerate the rehabilitation process of gastrointestinal function [24, 25].

This study was designed for only 1 year with a short study time and small number of cases, which makes the data representation not fully robust. In addition, children have not been followed up for a long time after discharge, and the long-term effect of comprehensive nursing intervention on children with diarrhea was not observed. In the next study, we will expand the number of cases and prolong the observation time for further analysis and discussion.

To sum up, comprehensive nursing intervention for diarrheic children can effectively improve the gastrointestinal function of children, correct electrolyte disorders, improve the quality of life, and prompt parents to recognize nursing better services.

Disclosure of conflict of interest

None.

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