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Original Article

Effect of comprehensive nursing combined with health education on children with hand, foot and mouth disease and treatment of skin rash and oral ulcer

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Abstract: Objective: To explore the effect of comprehensive nursing combined with health education on children with hand, foot and mouth disease (HFMD). Methods: 148 children with HFMD admitted to our hospital were divided into the study group and the control group (n=74). Patients in the control group received routine nursing while patients in the study group received comprehensive nursing combined with health education based on the control group. The nursing efficacy, healing time, rash regression time, oral ulcer healing time, incidence of complications and hospital stays of the two groups were observed. The nursing satisfaction questionnaire was used to evaluate the nursing satisfaction of patients' families. Results: Healing time and rash regression time were significantly shorter than that in the control group (P<0.001). The nursing efficiency of the study group was significantly higher than that of the control group (P<0.05). The skin infection and complications in the study group was significantly lower than that in the control group (P<0.05). The healing time of oral ulcer and hospital stays of the study group were significantly less than those in the control group (P<0.05). The nursing satisfaction in the study group was significantly higher than that in the control group (P<0.05). Conclusion: Comprehensive nursing combined with health education can improve the clinical symptoms of children with HFMD, promote the recovery of skin rash and oral ulcer and reduce the incidence of complications, which is accepted by patients' families and worthy of clinical promotion.

Keywords: Children with hand, foot and mouth disease, comprehensive nursing, health education, complications

Introduction

Hand-foot-mouth disease (HFMD) is a common disease in children, which mainly caused by gastrointestinal virus infection. Children aged 5 or below are prone to the disease because of high infectivity [1]. Children with HFMD often suffered from anorexia, stomatalgia, mild fever, herpes with hands, feet, mouth and mucosa, of which transmission routes are digestive tract, respiratory tract and direct contact [2]. With long course of disease, children with HFMD may suffer from aseptic meningitis, pulmonary edema, myocarditis, which cause harm to the growth and health of children [3, 4]. In recent years, children with HFMD have increased year by year [5]. Therefore, prevention and treatment of HFMD are the focus of medical research. In addition to the specified treatment, a scientific nursing mode should be applied to the disease [6].

Comprehensive nursing is a systematic nursing program that strengthens the initiative and independence of nursing staff through the standardized nursing plans, so as to improve the skills of nursing staff and provide scientific, high-quality and efficient nursing service. With the deepening of nursing service, comfortable nursing service is provided for patients to promote the rehabilitation [7]. Health education is an important way of nursing, but diversity, pertinence, and systematic emphasis of education should be grasped by the medical staff. A comprehensive understanding of conditions and psychologies of patients should be focused during nursing. Through systematic education, patients and their families form correct behaviors and concepts to improve compliance and avoid the risk factors that cause or aggravate the disease, which plays a key role in the treatment and safety of patients [8, 9].

Previously, there are many studies on the clinical application of comprehensive nursing combined with health education [10-14], indicating that the mode brings benefits for the recovery of patients. But few studies have been done on the clinical application of this model in children with HFMD. Therefore, the study aimed at the application of comprehensive nursing combined with health education on children with HFMD, providing feasible nursing intervention for children.

Materials and methods

General data

148 children with HFMD admitted to our hospital were divided into the study group and the control group, 74 cases in each group. The control group received routine nursing while the study group received comprehensive nursing combined with health education. The study has been approved by the ethics committee of the hospital. Patients and their family members signed the informed consent.

Inclusion and exclusion criteria

Inclusion criteria were as follows: patients met the diagnostic criteria of Hand, Foot and Mouth Disease Guidelines [6]. Children with HFMD, aged 2 or above and 10 or below, received specified treatment in the hospital. Presence of fever, papules and herpes on the palms and feet, cough and loss of appetite. Exclusion criteria were as follows: heart, liver and kidney dysfunction, myocarditis, encephalitis, speech dysfunction, consciousness disorder, other eruptive diseases, congenital heart disease, neurological diseases, endocrine and metabolic diseases, connective tissue diseases, severe malnutrition, history of mental illness, the number of white blood cell (WBC) 10×10^9/L, blood glucose (GLU) $\geq$ 6.7 mmol/L.

Nursing methods

Children in the control group were treated with routine nursing such as disinfection in real time, comfortable and clean clothes, bedclothes and rooms, as well as clean nails, thus avoiding skin ulceration and infection caused by scratching. For children with rash, excretion was cleaned to keep the buttocks clean and dry during treatment. If herpes breaks, aciclovir ointment was used and parents were advised to take care of children to avoid accidents. Children brushed teeth after meals. Kangfuxin liquid therapy was given if oral ulcer occurred. Children with mild or severe fever drank more water. Antipyretic was given accordingly if the body temperature reached 38.5°C or above.

On the basis of receiving routine nursing, the study group received comprehensive nursing combined with health education. Main measures were as follows: Psychological nursing: children with HFMD are prone to be nervous and anxious. Based on personality and psychology of children, communicating with them in a friendly manner help them adapt to the treatment and alleviate bad emotions. Dietary nursing: children with HFMD often suffered from oral ulcers and digestive dysfunction. Children were advised to eat light and non-irritating liquid food other than cold and spicy food, and foods rich in protein and vitamins and mild water. Fever nursing: body temperature of children was observed each hour. And children received physical cooling through alcohol and towel therapy. Complication nursing: physical conditions and vital signs of children were observed to judge the possibility of complications. Health education: lectures were given to explain the causes, epidemic mechanism, treatment, prevention and nursing measures to patients with HFMD. Meanwhile, scientific materials were provided to know more about HFMD, especially main transmission routes-droplet transmission and respiratory transmission. Parents pay attention to personal hygiene of children to avoid infection, so as to develop good habits such as regular hand-washing, wearing masks in public places and covering mouth and nose when sneezing. Keeping the room clean and air fresh and exercise regularly enhance the immunity of children.

Observation index

The healing time and rash regression time were observed in the two groups. Nursing efficacy was evaluated accordingly, among which rash regression, 3 days or below, the recovery time, 7 days or below. The body temperature was normal for 3 days and clinical symptoms disappeared indicating significant effect. Rash regression time, 5 days or below, the recovery, 10 days or below. The body temperature was nor-

Table 1. General information of study group and control group [n (%)] (x ± sd)

Category	Study Group (n=74)	Control group (n=74)	t/χ^2 value	*P* value
Gender			0.686	0.408
Male	44 (59.46)	39 (52.70)		
Female	30 (40.54)	35 (47.30)		
Age	5.23 ± 2.31	5.08 ± 2.16	0.408	0.684
Course (d)	3.61 ± 0.74	3.52 ± 0.68	0.770	0.442
body temperature (°C)	38.96 ± 0.52	38.84 ± 0.47	1.473	0.143
BMI (kg/m^2)	15.13 ± 1.24	15.09 ± 1.75	0.160	0.873
Place of residence			0.121	0.728
City	48 (64.86)	50 (67.57)		
Rural	26 (35.14)	24 (32.43)		
Virus type			0.414	0.813
CA25	44 (59.46)	46 (62.16)		
EV71	2 (2.70)	3 (4.05)		
EV89	28 (37.84)	25 (33.78)		
WBC ($10 \times 10^9/L$)	7.91 ± 1.26	7.86 ± 1.63	0.209	0.835
GLU (mmol/L)	5.83 ± 0.49	5.92 ± 0.57	1.030	0.305
AST (U/L)	23.64 ± 10.21	24.59 ± 11.35	0.535	0.593
ALT (U/L)	25.16 ± 9.82	24.86 ± 10.08	0.183	0.855
GGT (U/L)	11.35 ± 4.38	12.16 ± 5.59	0.981	0.328

mal for 3 days and clinical symptoms basically disappeared indicating effective. The rash did not disappear, the body temperature was abnormal and the clinical symptoms were unchanged or aggravated. (significant effect+ effective)/total number of cases × 100% = total efficiency.

The healing time of oral ulcer, hospital stays and the incidence of complications were observed in the two groups. Complications included skin infection, upper respiratory tract infection and heart damage.

The nursing satisfaction was evaluated by self-made nursing satisfaction questionnaire in our hospital. 70 points or below were unsatisfactory, 70 to 89, basically satisfactory, 90 or above, satisfactory. Satisfaction rate = (satisfaction+ basic satisfaction)/total number of cases × 100%.

Statistical methods

SPSS18.0 (Shanghai Information Technology Co., Ltd.) was used for statistical analysis. GraphPad Prism 7 was used to plot the data. The counting data were expressed by n (%) and compared by chi-square test in the two groups. The measurement data were expressed as mean ± standard deviation (x ± sd) and compared by t-test in the two groups. $P<0.05$ indicated statistically significant.

Results

No significant difference in baseline data

There was no significant difference in gender, age, course of disease, body temperature, body mass index (BMI), place of residence, virus type, WBC counts, fasting blood glucose (GLU), glutamic oxaloacetic transaminase (AST), alanine aminotransferase (ALT), glutamyl transpeptidase (GGT) between the study group and the control group ($P>0.05$) (**Table 1**).

The study group exhibited less healing and rash regression time

After nursing, healing time in the study group was 5.61 ± 2.43 days, rash regression, 3.16 ± 0.75 days. Healing time in the control group was 9.26 ± 2.63 days, rash regression, 5.53 ± 0.97 days. Healing time and rash regression time in the study group were significantly shorter than that in the control group ($P<0.001$) (**Figure 1**).

Study group showed higher nursing efficiency

In the study group, there were 61 cases with significant effect (82.43%), 10 cases (13.51%) effective, 3 cases (4.05%) invalid, with the total efficiency accounting for 95.95%. In the control group, there were 36 cases with significant effect (48.65%), 26 cases (35.14%) effective, 12 cases (16.22%) invalid, with the total efficiency accounting for 83.78%. The nursing efficiency of the study group was significantly higher than that of the control group ($P<0.05$) (**Table 2**).

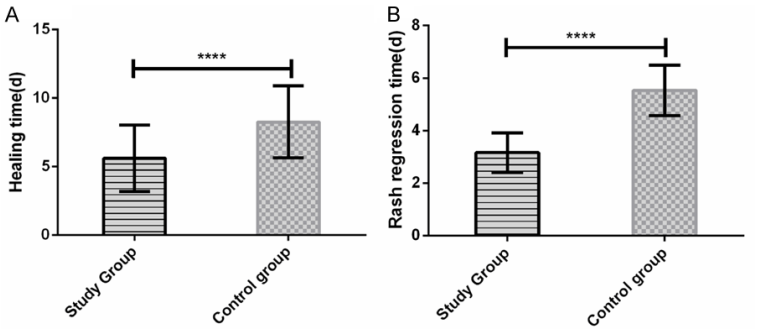

Figure 1. Comparison of healing time and rash regression time between the study group and the control group. Healing time between the study group and the control group (A); Rash regression time between the study group and the control group (B). Note: ****indicates *P*<0.001.

Table 2. Comparison of nursing effect results between study group and control group [n (%)]

Group	n	Significant effect	effective	Invalid	Total efficiency (%)
Study Group	74	61 (82.43)	10 (13.51)	3 (4.05)	95.95
Control group	74	36 (48.65)	26 (35.14)	12 (16.22)	83.78
χ^2 value	-	-	-	-	6.009
P value	-	-	-	-	0.014

Table 3. Comparison of complication rate between study group and control group [n (%)]

Group	n	Skin infection	Upper respiratory tract infection	Heart damage	Total incidence (%)
Study Group	74	2 (2.70)	1 (1.35)	1 (1.35)	5.41
Control group	74	8 (10.81)	4 (5.41)	3 (4.05)	20.27
χ^2 value	-	3.861	1.863	1.028	7.306
P value	-	0.049	0.172	0.311	0.007

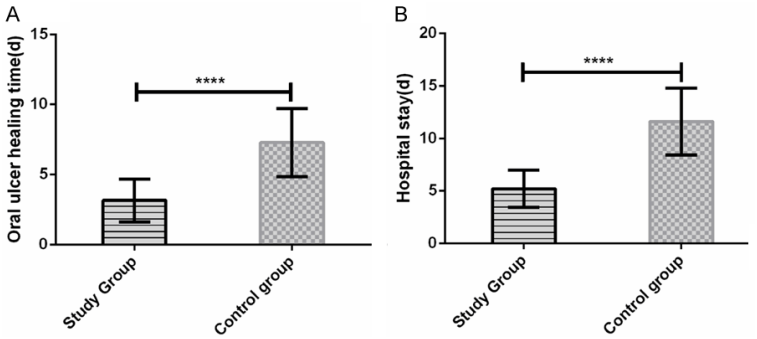

Figure 2. Comparison of healing time of oral ulcer and hospital stays between the study group and the control group. Healing time of oral ulcer between the study group and the control group were compared (A); Hospital stays between the study group and the control group were compared (B). Note: ****indicates *P*<0.001.

Study group showed less complications

There were 2 cases of skin infection (2.70%), 1 case upper respiratory tract infection (1.35%), and 1 case heart damage (1.35%) in the study group, with the total complications of 5.41%. In the control group, there were 8 cases of skin infection (10.81%), 4 cases upper respiratory tract infection (5.41%), and 3 cases heart damage (4.05%), with the total complications of 20.27%. The incidence of skin infection and complications in the study group was significantly lower than that in the control group (*P*<0.05) (**Table 3**).

Study group showed shorter healing time of oral ulcer and hospital stays

After nursing, healing time of oral ulcer was 3.14 ± 1.53 days and hospital stays were 5.21 ± 1.76 days in the study group. And healing time of oral ulcer in the control group was 7.28 ± 2.43 days, hospital stays 11.6 ± 3.20 days. The healing time and hospital stays of oral ulcer in the study group were significantly shorter than those in the control group (*P*<0.05) (**Figure 2**).

Study group has higher nursing satisfaction

After nursing, there were 39 cases (52.70%) indicating satisfaction, 31 cases (41.89%) basic satisfaction, 4 cases (5.41%) not satisfied, with nursing satisfaction accounting for 94.59% in the study group. In the control group, 26 cases (35.14%) indicating satisfaction, 34 cases (45.95%) basic

Table 4. Comparison of nursing satisfaction results between study group and control group [n (%)]

Group	n	Satisfaction	Basic satisfaction	Not satisfied	Satisfaction (%)
Study Group	74	39 (52.70)	31 (41.89)	4 (5.41)	94.59
Control group	74	26 (35.14)	34 (45.95)	14 (18.92)	81.08
χ^2 value	-	-	-	-	6.325
P value	-	-	-	-	0.012

satisfaction, 14 cases (18.92%) not satisfied, with nursing satisfaction in the study group significantly higher than that in the control group ($P<0.05$) (**Table 4**).

Discussion

Hand, foot and mouth disease (HFMD) of highly infectious, is common among children all year round, especially in the spring and summer. Hand, foot and mouth disease is mostly caused by intestinal bacteria, of which symptoms were fever, herpes and ulcers in the skin, hands, feet and mouth. And persistent fever can cause dizziness, vomiting and loss of appetite [15, 16]. Without an effective treatment, children may suffer from complications, or even death [17]. Therefore, targeted therapy with nursing intervention is particularly important [18].

Comprehensive nursing is a new concept that improves the level of nursing by formulating standardized nursing plans, which deepens the connotation of nursing services and adjusts the nursing plans according to the conditions of patients, so as to provide scientific, high-quality and efficient nursing services [19]. Previously, there were many researches on clinical application of comprehensive nursing. For example, Bakon et al. [20] demonstrated that comprehensive nursing could improve the clinical efficacy and quality of life of patients with breast cancer. Xie et al. [21] suggested that comprehensive nursing improved the emergency access and alleviated bad emotions of patients. It can be seen that comprehensive nursing brings benefits in various diseases. However, children have poor compliance with treatment. Parents who lack the related knowledge and health awareness may delay the treatment [22, 23]. In addition to clinical treatment, the level of nursing also affects the treatment efficacy and prognosis of patients with HFMD. Therefore, health education based on nursing intervention is needed to enhance the health awareness of their families. Data showed that the healing time, rash regression time and oral ulcer healing time of the study group were significantly shorter than those of the control group. The nursing efficiency in the study group was significantly higher than that in the control group, indicating that comprehensive nursing combined with health education can alleviate the clinical symptoms of children with HFMD. Wang et al. [24] revealed that interferon combined with psychological intervention can control mental state and clinical symptoms of children with HFMD. In this study, comprehensive nursing is targeted for children with HFMD from psychological, physiological and social aspects, so that children can enjoy better services, thereby improving the treatment and nursing effect. Meanwhile, health education for patients' families enhances the awareness to prevent disease. Complications in children with HFMD are the main factors affecting the curative effect [25]. Data showed that the incidence of complications in the study group is significantly lower than that in the control group, indicating that comprehensive nursing combined with health education can reduce the incidence of complications. This study showed that the nursing satisfaction of the study group was significantly higher than that of the control group, and days of hospital stays was less than that of the control group, indicating that the nursing mode was highly recognized. Also, the shortening of hospital stays reduced the financial burden of patients. Therefore, comprehensive nursing combined with health education provides a feasible nursing approach for children with HFMD.

The study confirmed the value of comprehensive nursing combined with health education for children with HFMD, but there are still some shortcomings. The quality of life of children with HFMD after nursing has not been evaluated. And the risk factors have not been analyzed. All these need to be examined in future studies. And more evidence should be provided to prove the results of this study.

In conclusion, comprehensive nursing combined with health education can alleviate the clinical symptoms, promote the recovery of skin

rash and oral ulcer of children with HFMD and reduce the incidence of complications, which is highly recognized and worthy of clinical promotion.

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Disclosure of conflict of interest

None.

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