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ORIGINAL RESEARCH

Enhancing Clinical Nursing Guidance and Optimizing Care Processes for Improved Hand-Foot-and-Mouth Disease Treatment Outcomes

Ying Zhao[1], Hao Ju[2]

[1]Department of Dermatology, The Sixth Affiliated Hospital of Harbin Medical University, Harbin, People's Republic of China; [2]Department of Oncology, Harbin Medical University Cancer Hospital, Harbin, People's Republic of China

Correspondence: Hao Ju, Email juhao1986@163.com

Objective: To evaluate the efficacy of modified skin care intervention in pediatric Hand-Foot-and-Mouth Disease (HFMD) patients, focusing on its impact on skin recovery, pain management, and herpes healing.

Methods: Clinical data from 130 HFMD children (February 2023–June 2024) were retrospectively analyzed. Patients were divided into a control group (n=65, routine care) and an observation group (n=65, modified care). Outcomes included herpes healing rate, symptom duration (fever, eating improvement, hospitalization), pain severity (Visual Analog Scale, VAS), skin condition (HFMD skin assessment tool), nursing compliance (medication adherence, skin protection, hygiene practices), and satisfaction (Newcastle Satisfaction with Nursing Services Scale, NSNS).

Results: Clinical Outcomes: The observation group achieved a higher herpes healing rate (95.38% vs 84.62%) and shorter recovery times for herpes relief, fever resolution, eating improvement, and hospitalization (all $P<0.05$). Pain Management: Group-time interaction effects for VAS scores were significant ($F=6.534$, $P<0.05$). Both groups showed reduced pain over time ($P<0.05$), but the observation group reported lower VAS scores on day 3 and at discharge ($P<0.05$ vs control). Skin Recovery: Skin scores improved significantly in both groups (time effect $F=6.623$, $P<0.05$), with the observation group demonstrating superior skin condition on day 3 and discharge ($P<0.05$ vs control). Compliance and Satisfaction: The observation group exhibited better adherence to medication, skin protection, and hygiene protocols ($P<0.05$) and higher satisfaction rates (95.38% vs 81.54%, $P<0.05$).

Conclusion: Modified skin care intervention outperforms routine protocols in accelerating recovery, reducing pain, enhancing skin integrity, improving treatment adherence, and boosting patient/family satisfaction. These findings support its adoption as a superior care model for pediatric HFMD management.

Keywords: modified skin care, hand-foot-and-mouth disease, pediatrics, herpes, pain, nursing outcomes

Introduction

Hand-Foot-and-Mouth Disease (HFMD) is a common infectious disease primarily affecting children under the age of 5.[1] It is mainly caused by enteroviruses (such as Coxsackievirus and Enterovirus 71), and clinical manifestations include fever, skin rashes, and oral ulcers.[2,3] Although most cases of HFMD are self-limiting, the presence of rashes and oral ulcers often causes varying degrees of pain and discomfort for the affected children.[4,5] Particularly, during the healing process of the skin and oral herpes, the quality of life of the children significantly decreases, and the demand for nursing care increases. The clinical management of HFMD includes symptomatic treatment, skin care, and pain management. Routine skin care interventions mainly focus on cleaning, disinfecting, and protecting the herpes lesions. However, due to the special sensitivity and vulnerability of children's skin, conventional care regimens may be limited in relieving pain, accelerating herpes healing, and improving nursing compliance.[6] Therefore, to meet the specific skin, pain, and herpes healing needs of HFMD patients, the application of modified skin care interventions has gained attention. Modified skin

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care interventions aim to provide more personalized and comprehensive care by integrating pharmacological treatment, physical therapy, and psychological support, which helps further accelerate herpes healing, reduce skin pain, improve skin condition, and enhance nursing compliance.[7,8] The aim of this study is to evaluate the effectiveness of improved skin care methods in the treatment of pediatric HFMD. Based on previous research and clinical practice, we hypothesize that improved skin care methods can significantly improve the skin healing rate, shorten recovery time, reduce pain levels, enhance nursing compliance, and improve patient/family satisfaction in children with HFMD compared to conventional skin care methods.

Materials and Methods

Basic Data

A retrospective analysis was conducted on the clinical data of 130 HFMD patients admitted to our hospital from February 2023 to June 2024. Inclusion Criteria: (1) All patients met the relevant diagnostic criteria for HFMD,[9] including the presence of typical rashes, oral ulcers, and fever. (2) Patients aged 1–6 years, regardless of gender. (3) Patients with a disease duration of less than 7 days and no other serious systemic diseases, such as immune deficiency, severe cardiopulmonary diseases, etc. (4) All patients were admitted for treatment and were willing to participate in the intervention program of this study. (5) Parents or legal guardians of the patients were informed about the study and signed the relevant informed consent form. Exclusion Criteria: (1) Patients with other serious complications, such as encephalitis, heart failure, severe dehydration, sepsis, etc, requiring specific treatment or hospitalization for observation. (2) Patients with known immune system deficiencies or a history of immunosuppressive drug treatment. (3) Patients who have been using medications that may affect skin condition, such as steroids, for a long time. (4) Patients with other serious skin diseases, such as allergic skin diseases, eczema, or skin infections, that may affect treatment outcomes and nursing assessments. (5) Parents or guardians unwilling to participate in the study, or those who could not complete necessary follow-up and intervention assessments during the study. (6) Patients or their families with cognitive impairments and/or psychiatric disorders. (7) Patients who have allergic reactions or contraindications to the interventions used in this study. Based on the skin care regimen received by the patients, they were divided into the control group (n=65, receiving routine skin care intervention) and the observation group (n=65, receiving modified skin care intervention). This study was approved by the Sixth Affiliated Hospital of Harbin Medical University Medical Ethics Committee (Approval No. EK-24000012). Ethical approval was adhering to the Declaration of Helsinki and national medical data protection regulations. As this retrospective study utilized preexisting clinical records without introducing additional risks to participants, the ethics committee waived informed consent requirements. Patient privacy was rigorously protected through anonymization of data (removing identifiers such as names and ID numbers), tiered access controls limiting full dataset access to authorized researchers, and aggregated reporting of results to eliminate individual identification risks.

Methods

Both groups of patients received the same treatment regimen, including strict isolation measures, antiviral treatment, etc. In addition, appropriate rehabilitation support was provided based on the patients' age and disease progression to promote rapid physical recovery. Both groups received continuous intervention until discharge, with the maximum intervention duration not exceeding 7 days.

Control Group

The control group received routine skin care interventions, which included the following aspects: (1) Skin Cleansing and Care: Nursing staff guided the family members to use warm water to clean the patient's skin twice daily, avoiding cleaning products that may cause allergies or irritation, such as soap. Emphasis was placed on avoiding excessive friction on the skin, especially in the areas of herpes and ulcers, ensuring that cleanliness was maintained without exacerbating the child's discomfort. (2) Clothing Selection and Change: To reduce skin irritation and promote breathability, family members were advised to select loose cotton clothing for the child and avoid tight-fitting garments, especially in areas

with visible herpes lesions. Nursing staff also recommended regular clothing changes to maintain cleanliness and dryness. (3) Hand Protection and Nail Clipping: Given the issue of frequent scratching, nursing staff advised the family to regularly trim the child's nails and, if necessary, put soft gloves on the child's hands to prevent scratching the herpes and ulcer areas, reducing pain and the risk of secondary infections. (4) Perineal Care: Nursing staff paid special attention to the child's perineal care, guiding family members to keep the genital area clean and dry. If rashes or infections occurred in the perineal area, nursing staff would administer anti-itch and antibacterial medications as per medical advice, ensuring the child's comfort and reducing the risk of secondary infections. (5) Oral and Local Care: Nursing staff educated family members on how to clean the child's mouth, particularly when oral ulcers were present. The recommended oral cleaning method was using warm saline water to avoid irritating the affected areas. For local skin herpes, nurses guided the family to apply gentle topical ointments and advised against using strong irritants. (6) Bedding and Environmental Cleaning: Family members were instructed to keep the child's bedding and surrounding environment clean and dry, especially in humid weather, to prevent the sheets from coming into contact with damaged skin areas and avoid bacterial growth.

Observation Group

The observation group received a modified skin care intervention, which included the following specific measures: (1) Comprehensive Assessment and Dynamic Adjustment of Care Plans: First, a detailed HFMD skin reaction record and nursing observation checklist were established for each child, covering assessment criteria for rashes, oral ulcers, blisters, scratches, and other factors. Nursing staff performed at least three detailed skin assessments daily and adjusted the frequency and methods of care based on the assessment results. During shift handovers, the assessment results were discussed among nurses to ensure the consistency and accuracy of all care measures. (2) Strengthened Family Education and Training: Nursing staff regularly provided family members with basic knowledge education about HFMD during hospitalization, including its etiology, clinical manifestations, treatment methods, and nursing techniques, to help families better understand the child's condition. In particular, for skin care, nursing staff demonstrated and practiced one-on-one guidance to teach family members how to clean the skin, apply medications, choose appropriate clothing, and prevent the child from scratching. (3) Skin Care and Medication Guidance: Nursing interventions were optimized for the treatment of herpes and ulcers, with the medication care plan being improved. For oral ulcers, in addition to routine saline cleaning, a mixture of 1% lidocaine and vitamin B2 was applied three times daily to reduce pain and promote healing. For the rash areas, a mixture of montmorillonite powder and vitamin B2 was applied after washing with warm water, twice daily, to promote skin repair. (4) Local Treatment and Pain Management: For perineal and anal care, the observation group incorporated ribavirin aerosol into the routine care, spraying three times (1.5 mg each time) to effectively relieve infection and pain, promoting local repair. For other rash areas, gentle topical ointments and soothing agents were used to reduce inflammation and speed up the healing process. (5) Personalized Care and Follow-up: The nursing plan was flexibly adjusted based on the specific condition of each child. For children with worse skin conditions, nursing staff increased the frequency of skin care and adjusted the medication regimen based on assessment results to ensure the accuracy and timeliness of the treatment. The daily care plans were discussed and reviewed during shift handovers to ensure the consistency and efficiency of the nursing interventions (Table 1).

According to the diagnosis and treatment guidelines for hand, foot, and mouth disease (2018 edition) released by the National Health Commission, cases with only rash and/or oral ulcers and no complications or organ dysfunction are defined as "mild". Cases with neurological involvement (such as meningitis, encephalitis, acute flaccid paralysis), prodromal symptoms of heart and lung failure, or pulmonary edema/pulmonary hemorrhage are defined as "severe".

Observation Indicators

Treatment Situation

The treatment situations observed in this study included the healing rate of blisters, time for blister relief, fever reduction time, time for improvement in eating, and hospitalization time. These treatment situations were all recorded by the relevant medical staff of our hospital.

Table 1 Detailed Steps for Improving Skin Care Protocol

Step	Nursing Measures	Drugs/Products	Dose	Frequency	Duration
1	Skin cleansing and care	Warm water	–	Twice daily	Until discharge
2	Local treatment and pain management	1% lidocaine+vitamin b_2 mixture	–	Three times a day (for oral ulcers)	Until the ulcer heals
		Montmorillonite powder+vitamin b_2 mixed powder	–	Twice daily (rash area)	Until the rash subsides
		Ribavirin aerosol	1.5mg/time	Three times a day (perineum and anal area)	Until the infection subsides
3	Clothing selection and replacement	Loose cotton clothing	–	–	Replace daily and keep clean and dry
4	Hand protection and nail trimming	Soft gloves (if necessary)	–	–	Trim nails as needed to prevent scratching
5	Perineal care	Antipruritic and antibacterial drugs (doctor's advice)	–	According to medical advice	Keep the perineum clean and dry to prevent infection
6	Oral and local care	Warm salt water	–	Multiple times a day (oral hygiene)	Until the ulcer heals
		Mild topical ointment (medical advice)	–	According to medical advice (local skin care)	Keep the skin moist and promote healing
7	Bed sheets and environmental cleanliness	–	–	–	Clean daily and keep the environment dry

Pain Severity

Pain was assessed using the Visual Analog Scale (VAS, Cronbach's α coefficient = 0.882, validity = 0.863)[10] at admission, 3 days after admission, and at discharge. VAS scores range from 0 to 10, with higher scores indicating more severe pain. The scores were based on a comprehensive judgment of the child's self-report, facial expressions, and reactions.

Skin Condition

Skin conditions were evaluated using the HFMD Skin Observation Form (Cronbach's α coefficient = 0.798, validity = 0.762)[11] at admission, 3 days after admission, and at discharge. The form included items such as rashes, oral ulcers, blisters, scratches, and cleanliness. The scale ranges from 0 to 16, with lower scores indicating more severe symptoms or poorer skin conditions.

Nursing Adherence

Three days after the nursing intervention, medication adherence (Cronbach's α coefficient = 0.811, validity = 0.789, including timeliness, dosage, and compliance), skin protection adherence (Cronbach's α coefficient = 0.823, validity = 0.795, including hygiene practices for urination, clothing choice, and prevention of scratching), and skin cleaning adherence (Cronbach's α coefficient = 0.806, validity = 0.784, including hand and foot washing, mouth rinsing, and cleaning after defecation) were assessed.[12] Each aspect was scored from 0 to 12, with higher scores indicating better adherence.

Satisfaction

After the intervention, family members of the children were asked to assess their satisfaction using the Newcastle Nursing Service Satisfaction Scale (NSNS, Cronbach's α coefficient = 0.838, validity = 0.816).[13] This scale consists of 19 items, scored using a Likert 5-point scale, with higher scores reflecting greater satisfaction. The satisfaction levels were categorized as very satisfied (≥76 points), satisfied (57–75 points), average (38–56 points), and dissatisfied (<38 points). Overall satisfaction = (Number of very satisfied cases + Number of satisfied cases) / Total number of cases × 100%.

Statistical Analysis

GraphPad Prism 8 software was used for drawing graphs, and SPSS 22.0 software was used for data analysis. Count data were expressed as percentages (%), and χ^2-tests were used for comparison. Measurement data were expressed as ($\bar{x} \pm s$). Independent samples *t*-tests were used for comparisons between the two groups, paired *t*-tests for comparisons within groups, and repeated measures ANOVA for comparisons at different time points. A P value of <0.05 was considered statistically significant. Considering the variables involved in the article that vary over time (such as pain score, skin condition score, etc), we used a mixed ANOVA to analyze the changes in these variables between groups and at time points, and reported whether the data met the normality hypothesis. Prior to data analysis, we confirmed through the Shapiro Wilk test that the Pain Scale (VAS) and Skin Condition Score (HFMD Skin Observation Form) met the normality hypothesis (P>0.05) between groups and at time points.

Results

Comparison of Clinical Data

There were no significant differences in the gender, age, course of disease, admission body temperature, and severity of illness between the two groups (P > 0.05), indicating comparability. See Table 2.

Comparison of Treatment Conditions

The healing rate of herpes in the observation group (95.38%) was higher than that in the control group (84.62%). The time for herpes relief, fever reduction, improvement in eating, and hospitalization was shorter in the observation group compared to the control group (P < 0.05). See Table 3.

Comparison of Pain Severity

Inter group comparison: At admission, there was no significant difference in pain score (VAS) and skin condition score (HFMD Skin Observation Form) between the two groups of patients (P>0.05). However, after intervention, the pain score of the observation group was significantly lower than that of the control group (P<0.05), and the skin condition score was significantly higher than that of the control group (P<0.05). Intra group comparison: In the control group, the

Table 2 Comparison of Clinical Data ($\bar{x} \pm s$, n[%])

	Control (n=65)	Observation (n=65)	t/x^2	*P*
Gender	–	–	0.279	0.597
Male	34 (52.31)	37 (56.92)	–	–
Female	31 (47.69)	28 (43.08)	–	–
Age (years)	3.27±1.39	3.34±1.42	0.284	0.776
Course of Disease (hours)	43.59±12.56	45.07±11.83	0.691	0.490
Admission Temperature (°C)	37.59±0.48	37.67±0.44	0.990	0.323
Severity of Illness	–	–	0.130	0.718
Mild	41 (63.08)	39 (60.00)	–	–
Severe	24 (36.92)	26 (40.00)	–	–

Table 3 Comparison of Treatment Conditions ($\bar{x} \pm s$, n[%])

	Control (n=65)	Observation (n=65)	t/x^2	*P*
Herpes Healing Rate	55 (84.62)	62 (95.38)	4.188	0.040
Herpes Relief Time (days)	5.13±0.67	3.29±0.74	14.860	<0.001
Fever Reduction Time (days)	2.76±0.54	2.13±0.42	7.424	<0.001
Improvement in Eating Time (days)	3.29±0.61	2.46±0.53	8.280	<0.001
Hospitalization Time (days)	5.79±0.82	3.82±0.76	14.205	<0.001

pain score (VAS) of patients decreased from admission (specific value) to 3 days after intervention (specific value), and then to discharge (specific value), but the difference did not reach statistical significance (P>0.05). In the observation group, the pain score significantly decreased from admission (specific value) to 3 days after intervention (specific value), and then significantly decreased to discharge (specific value) (P<0.05). Comparison at different time points: Through repeated measures ANOVA analysis, we found significant differences in pain score (VAS) between groups and at different time points (F=6.534, P<0.05). Specifically, there was no significant difference in pain scores between the two groups upon admission; However, after 3 days of intervention and discharge, the pain score of the observation group was significantly lower than that of the control group (P<0.05). See Figure 1.

Comparison of Skin Related Outcomes

The comparison of skin scores between the two groups for group (F = 4.896), time (F = 6.623), and interaction (F = 5.569) was significant (P < 0.05). Within-group: Skin scores in both groups at 3 days after admission and at discharge were higher than at admission, and skin scores at discharge were higher than those at 3 days after admission (P < 0.05). Between-group: There were no significant differences in skin scores between the two groups at admission (P > 0.05). However, the observation group had significantly higher skin scores at 3 days after admission and at discharge compared to the control group (P < 0.05). See Figure 2.

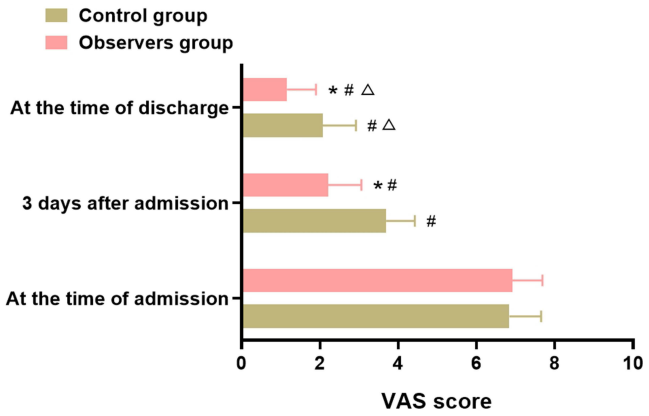

Figure 1 Comparison of Pain severity ($\bar{x} \pm s$, points).
Notes: Compared with the control group at the same time point, *P < 0.05; Compared with admission in the same group, #P < 0.05; Compared with 3 days after admission in the same group, ΔP < 0.05.

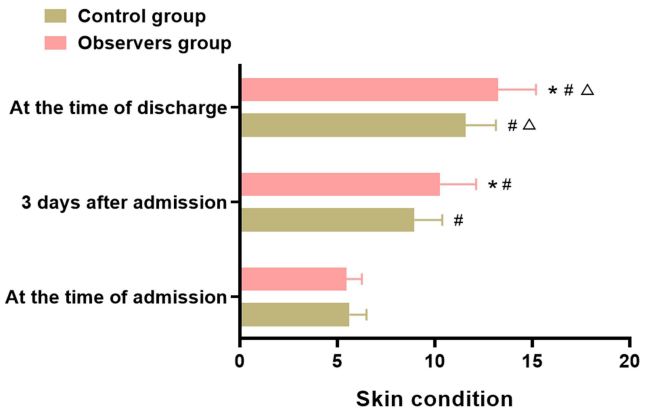

Figure 2 Comparison of skin related outcomes ($\bar{x} \pm s$, points).
Notes: Compared with the control group at the same time point, *P < 0.05; Compared with admission in the same group, #P < 0.05; Compared with 3 days after admission in the same group, ΔP < 0.05.

Table 4 Comparison of Nursing Adherence ($\bar{x} \pm s$, Points)

	Control (n=65)	Observation (n=65)	t	P
Medication Adherence	8.03±1.52	9.25±1.67	4.355	<0.001
Skin Protection Adherence	8.42±1.49	9.38±1.56	3.587	<0.001
Skin Cleaning Adherence	6.47±1.34	7.13±1.42	2.725	0.007

Comparison of Nursing Adherence

The observation group had higher medication adherence, skin protection adherence, and skin cleaning adherence compared to the control group ($P < 0.05$). See Table 4.

Comparison of Satisfaction

In the control group, of 65 children, 15 were very satisfied, 38 were satisfied, 8 were average, and 4 were dissatisfied. In the observation group, 30 children were very satisfied, 32 were satisfied, 2 were average, and 1 was dissatisfied. The satisfaction rate in the observation group (95.38%) was higher than that in the control group (81.54%) ($P < 0.05$). See Figure 3.

Discussion

Hand, Foot, and Mouth Disease (HFMD), a common childhood infectious disease caused by enteroviruses, has shown an increasing incidence globally in recent years, particularly in children under the age of 5.[14,15] Although most children with HFMD can recover within a few days, symptoms such as rashes, oral ulcers, and accompanying fever and pain can significantly impact the physical and psychological well-being of the children.[16,17] Therefore, improving the management and care of children with HFMD, alleviating their discomfort, and promoting early recovery has always been a critical issue in clinical nursing. Existing studies[18,19] indicate that in recent years, the epidemiological characteristics of HFMD and the risk factors for severe cases have been extensively studied (Gao et al, 2024; Li et al, 2021). Effective nursing guidelines are crucial for controlling disease transmission and reducing severe cases, especially in cases of multiple waves and mutations (Duy et al, 2024). This study aims to further optimize the nursing process of children with HFMD and improve treatment outcomes by introducing improved skin care methods.

The results of this study show that the herpes healing rate in the observation group was significantly higher than that in the control group, and the duration of herpes relief, fever reduction, improvement in feeding time, and length of hospital stay were all significantly shorter in the observation group ($P<0.05$). These findings align with previous

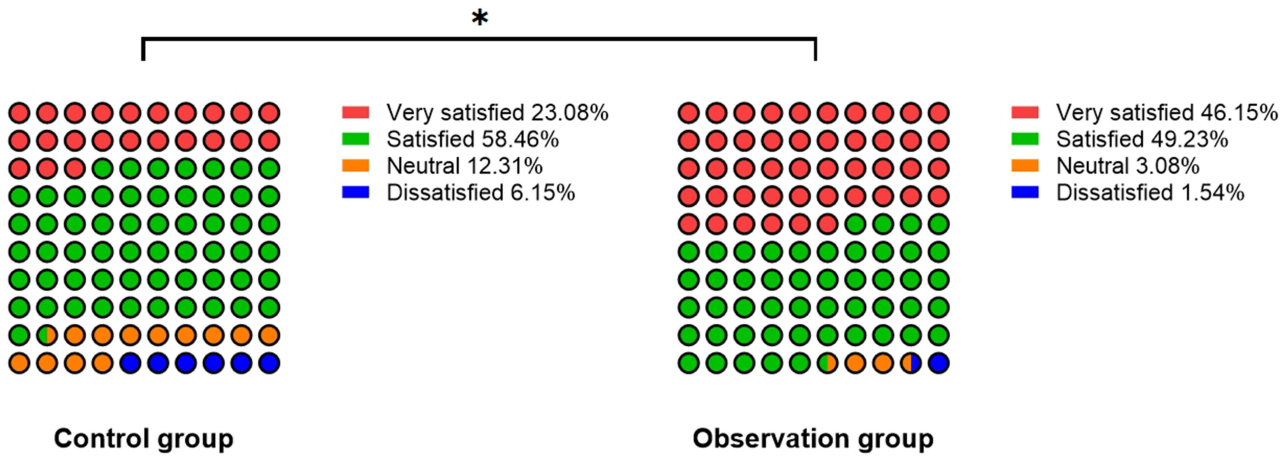

Figure 3 Comparison of Satisfaction (n[%]).
Note: Between-group comparison, *P < 0.05.

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studies,[20,21] suggesting that the modified skin care intervention effectively accelerates the recovery process of children with HFMD. The reason for this may lie in the core focus of the modified nursing protocol on meticulous skin care, which can further reduce skin inflammation and promote faster healing compared to conventional skin care. In addition, the modified protocol emphasizes individualized care, considering the different skin conditions of the children (eg, skin dryness, degree of damage), and tailoring the care measures accordingly, which provides assurance for rapid skin healing. Pain is one of the most common clinical symptoms in children with HFMD, significantly disrupting eating and daily activities.[22] In this study, the VAS scores in the observation group were significantly lower than those in the control group during treatment ($P<0.05$), indicating that the modified nursing intervention had a significant advantage in pain management. This advantage can be attributed to the various pain management strategies used in the modified skin care intervention, such as soothing skincare products, psychological counseling, and nursing guidance for parents, which effectively alleviated the children's anxiety and pain. Research[23] has shown that the speed and condition of skin recovery directly affect the treatment outcomes of HFMD. This study found that the skin score improvement in the observation group was significantly better than that in the control group ($P<0.05$), indicating that the modified skin care intervention effectively improves the skin condition of children with HFMD, promoting faster skin repair. The advantage of the modified care plan lies in its multi-layered care measures. In addition to conventional anti-inflammatory medications and local treatments, the modified plan also includes regular monitoring and adjustment of care measures, the use of skin repair products, and other means to provide more detailed and comprehensive care. Moreover, the modified plan emphasizes maintaining skin moisture, cleanliness, and protection, preventing skin infections and secondary damage. In contrast, while the conventional nursing plan provides some protection for the skin, it lacks precision in the degree of skin repair and optimization of treatment time, particularly when dealing with issues such as dryness, damage, and infection. Patient compliance is a key factor in treatment outcomes, especially in pediatric care, where parental cooperation directly affects the execution of treatment protocols.[24,25] The results of this study showed that the observation group had significantly higher compliance rates for medication, skin protection, and skin cleanliness compared to the control group ($P<0.05$). This suggests that the modified nursing intervention plan can effectively improve parental acceptance and adherence to the care protocol, thereby promoting faster recovery of the children. The reason for this could be that the modified nursing plan enhances parental confidence and compliance through detailed care guidance, regular care assessments, and timely feedback. Additionally, the individualized nature of the modified plan allows parents to better understand the necessity of the care measures, leading to active cooperation with the nursing staff in treatment and care, ensuring the maximization of treatment outcomes. In contrast, conventional care plans typically lack sufficient personalized guidance, which may lead to confusion or difficulties for parents in executing certain aspects of the care, resulting in lower compliance and thus impacting the treatment effects. In terms of patient and family satisfaction, the observation group showed significantly higher satisfaction compared to the control group ($P<0.05$). This difference is primarily attributed to the advantages of the modified nursing plan in terms of care details, service quality, and family support. For both the children and their families, the quality of nursing services has a profound impact on their overall treatment experience.[26] Family satisfaction is not only influenced by treatment outcomes but also closely related to the professional abilities, patience, and communication skills of the nursing staff.[27] The modified nursing plan improves family understanding of the disease and the importance of care, increasing their recognition and cooperation with the treatment protocol, thereby enhancing the smoothness of the treatment process and the children's recovery speed. Moreover, high satisfaction also contributes to improving the children's compliance, creating a positive feedback loop.[28]

In summary, our analysis suggests that vitamin B_2 (riboflavin) participates in various metabolic processes in the body and has anti-inflammatory effects. By locally applying vitamin B_2, skin inflammation can be reduced, and skin repair and regeneration can be promoted. In this study, vitamin B_2 was mixed with montmorillonite powder and applied to the rash area to accelerate skin healing through its anti-inflammatory effect. Lidocaine is a local anesthetic that reduces pain by blocking nerve conduction. In the treatment of oral ulcers, the use of a mixture containing 1% lidocaine can effectively alleviate pain, improve the comfort of the child, promote eating and recovery. And montmorillonite powder is a natural clay mineral with adsorption and convergence properties. In skin care, montmorillonite powder can adsorb moisture and bacteria on the surface of the skin, reducing the risk of skin irritation and infection. At the same time, its astringent effect helps to shrink skin pores, promote skin dryness and healing. In this study, montmorillonite powder was mixed with

vitamin B_2 and applied to the rash area with the aim of improving skin condition through its skincare effect. Therefore, the modified plan is more effective, and the results of this study are consistent with previous research, further confirming the effectiveness of the improved skin care plan in pediatric HFMD management. For example, Zhang et al, A 2021 study found that hand washing interventions involving family participation can improve symptoms of hand, foot, and mouth disease in children, and the improved skin care program in this study also emphasizes the importance of family education and participation. In addition, Wu et al, The 2022 study showed that hand hygiene interventions can effectively reduce the occurrence of hand, foot, and mouth disease in community kindergartens, and the improved skin care plan in this study also includes detailed skin cleaning and care guidance, which together promote rapid recovery of children. Compared with previous literature, the novelty of this study mainly lies in the development of personalized nursing plans, the application of comprehensive nursing measures, and the strengthening of family education and training. Previous studies have mainly focused on routine skin cleansing and protection, while this study dynamically adjusts the nursing plan based on the specific skin condition of each child, forming a more personalized nursing plan. In addition, this study integrated drug therapy, physical therapy, and psychological support to form a multi-level nursing system to further improve treatment effectiveness. At the same time, this study emphasizes the education and training of family members, improving their understanding and nursing skills of HFMD, thereby promoting the recovery of affected children.

Although this study yielded positive results, it still has some limitations. Firstly, this study was a retrospective analysis, which may have inherent selection biases and did not fully reflect the clinical characteristics of all children with HFMD. Secondly, the sample size was relatively small, and future prospective randomized controlled trials could further validate the clinical effects of the modified nursing intervention on a larger scale. Additionally, this study did not explore the effects of the modified nursing plan on different virus types or at different stages of the disease, so future research should consider including more clinical variables to evaluate its efficacy under different conditions. The implementation time of nursing measures has potential impact on the results of this study. Early implementation of nursing measures may be more effective in promoting skin recovery, reducing pain, and improving the satisfaction of children and parents. However, in this study, all patients received corresponding nursing measures as soon as possible after admission, so the impact of implementation time on the results was relatively small. Future research can further explore the differences in the effectiveness of nursing measures implemented at different time points, in order to provide more comprehensive clinical guidance. The results of this study have good applicability under specific conditions, such as studying 1–6 year old children with HFMD in our hospital. However, due to the age range, severity of the disease, and limitations of the research environment, the results of this study may not be fully applicable to all children with HFMD. Future research can further expand the sample size, cover a wider age range and disease severity, and be validated in different medical institutions and environments to improve the generalizability of research results.

This study adopts a retrospective analysis design, which can quickly evaluate the effectiveness of intervention measures using existing clinical data, but may also have the problem of selection bias. The selection bias of retrospective analysis may stem from various factors, such as incomplete data recording, differences in patient screening criteria, and inconsistencies in the implementation of nursing measures. In order to reduce selection bias, this study strictly followed clear inclusion and exclusion criteria in the patient screening process, ensuring comparability of baseline characteristics between the two groups of patients (control group and observation group). In addition, this study further adjusted for confounding factors that may affect the research results, such as age, gender, and disease severity, through matching techniques. However, retrospective analysis still has some inherent limitations, such as the inability to fully control for all potential confounding factors and the inability to fully determine causal relationships. Future research may consider adopting a prospective randomized controlled trial design to more accurately evaluate the effectiveness of improved skin care interventions and further validate the reliability of the results of this study.

Data Sharing Statement

The raw data used in this study can be provided upon request. If you are interested in the data of this study, please contact the corresponding author for more information.

Disclosure

The authors report no conflicts of interest in this work.

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