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Research on the Application of Precision Nursing in Pediatric Intravenous Infusion

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Abstract: *Objective*: To investigate the clinical effect of precision nursing in pediatric intravenous infusion. *Methods*: A total of 120 children who received intravenous infusion in The Second Affiliated Hospital of Guilin Medical University from October 2025 to December 2025 were selected and divided into a control group and an observation group, with 60 children in each group. The control group received routine nursing, while the observation group received precision nursing. The nursing effects of the two groups were compared. *Results*: The compliance of children during infusion in the observation group was higher than that in the control group, the incidence of adverse events was lower, the success rate of one-time puncture was higher, and the nursing satisfaction was higher than that in the control group. *Conclusion*: Precision nursing can eliminate children's resistance to intravenous infusion, make them cooperate better with nurses' operations, reduce children's pain, improve the success rate of one-time puncture in intravenous infusion, and increase parents' satisfaction with intravenous infusion nursing. It is worthy of promotion in clinical practice.

Keywords: Precision nursing; Pediatric intravenous infusion; Puncture success rate; Nursing satisfaction

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1. Introduction

Intravenous infusion is one of the most commonly used administration methods in pediatric clinical treatment. Its safety and standardization directly affect the clinical treatment effect and rehabilitation progress of children. Children are in the developmental stage, with thin blood vessels, delicate skin, and they are active and have low compliance, making it difficult for them to cooperate well with nurses during intravenous infusion. This easily leads to adverse events such as puncture failure, liquid medicine extravasation, and unplanned needle extraction, which not only aggravate children's pain but also may cause nurse-patient conflicts. Therefore, nursing staff should provide more humanistic care to children based on the physical and mental development characteristics of children of different ages, improve their compliance in intravenous infusion, standardize the operation details of pediatric intravenous infusion, pay close attention to

detailed management such as aseptic operation and puncture, further improve the nursing quality of pediatric intravenous infusion, and help children recover as soon as possible.

2. Materials and methods

2.1. General information

A total of 120 children who received intravenous infusion in The Second Affiliated Hospital of Guilin Medical University from October 2025 to December 2025 were selected as the research subjects, with the voluntary consent of their parents to participate in this study. The 120 children were randomly divided into a control group and an observation group, with 60 children in each group. In the control group, there were 30 boys and 30 girls, with an average age of (5.41 ± 2.06) years old. In the observation group, there were 28 boys and 32 girls, with an average age of (5.36 ± 1.16) years old.

2.1.1. Inclusion criteria

All 120 children were under 12 years old, with clear consciousness and basic communication ability; they needed intravenous infusion treatment due to infections, fever and other diseases.

2.1.2. Exclusion criteria

Children with severe coagulation disorders, organ diseases or congenital diseases; unconscious children [1].

2.2. Nursing methods

The control group received routine nursing. Nurses strictly checked the medical orders, prepared intravenous injection liquid and instruments, guided parents to comfort children's emotions, disinfected the intravenous puncture site of children, performed puncture with appropriate force, selected suitable blood vessels, controlled the needle insertion angle between 15–30°, quickly fixed the needle with sterile dressing after seeing blood return, and observed whether the administration was smooth [2]. During the intravenous infusion of children, nurses closely monitored whether there were adverse reactions such as swelling at the infusion site and bleeding at the puncture site, and interrupted the infusion immediately if any abnormality was found. After the infusion was completed, nurses removed the infusion set in time, and guided parents to gently press the puncture site of children for 5–10 minutes to avoid bleeding at the puncture site [3].

The observation group received precision nursing, and the pediatric intravenous infusion process was refined.

(1) Nurses regularly disinfected and ventilated the infusion room, pasted cartoons on the wall of the infusion room, and placed plush toys, building blocks and other toys to create a childlike and warm infusion environment, relieving children's tension, fear and anxiety during intravenous infusion.

(2) Nurses strictly implemented the checking system, prepared liquid medicine accurately, infused slowly for 15 minutes before the first infusion, and closely observed whether children had allergic reactions.

(3) Intravenous puncture nursing [4]. Before intravenous puncture, nurses patiently inquired about children's health conditions, used toys to divert children's attention, guided parents to adjust children's body positions to prepare for intravenous puncture, and selected suitable needles according to children's age. During puncture, nurses skillfully used medicine boxes, hand boards and other items to fix the children's hand to be punctured, carefully observed the blood vessels in children's hands to find the best

puncture position, inserted the needle at an angle of about 15–30°, fixed the needle with tension-free fixation after successful puncture, and individually controlled the infusion speed according to children's age, weight and condition: 1–2 mL/(kg·h) for ordinary drugs, ≤ 0.5 mL/(kg·h) for irritant drugs. After puncture, nurses encouraged and rewarded children through words, cartoon stickers and other ways to relieve their tension and anxiety.

(4) Nurses also provided good nursing care during children's infusion, closely observed whether there were redness, swelling, effusion, extravasation and other conditions at the puncture site of children to solve problems in time; for crying and irritable children, comfort toys were prepared to guide parents to comfort children's emotions and avoid needle displacement [5]. At the same time, nurses patiently answered parents' questions about intravenous injection and medication precautions to eliminate parents' anxiety.

(5) Nurses provided good health education, urging parents to let children drink more water after infusion treatment, maintain a light diet, eliminate adverse reactions in children, and help them recover soon.

2.3. Observation indicators

The infusion compliance, incidence of adverse events, success rate of one-time puncture and nursing satisfaction of the two groups were counted to evaluate the clinical application effect of precision nursing in pediatric intravenous infusion.

(1) Infusion compliance refers to that children can take the initiative to cooperate with nurses' various operations during infusion without crying.

(2) Incidence of adverse events refers to the probability of problems such as redness and swelling at the puncture site, effusion or needle shedding during intravenous infusion in children.

(3) Success rate of one-time puncture refers to that nurses successfully insert the needle at one time to ensure smooth administration.

(4) Nursing satisfaction refers to the satisfaction of children's parents with nurses' work such as intravenous puncture, psychological nursing, health education and infusion nursing.

2.4. Statistical methods

SPSS 20.0 statistical software was used to process the data. Measurement data were expressed as mean ± standard deviation ($\overline{x}$ ± s) and tested by *t*-test; enumeration data were expressed as percentage and tested by χ^2 test. $p < 0.05$ indicated that the difference was statistically significant.

3. Results

3.1. Comparison of infusion compliance between the two groups

The infusion compliance of children in the observation group was higher than that in the control group ($p < 0.05$), as shown in **Table 1**.

Table 1. Comparison of infusion compliance of children between the two groups (%)

Group	Number of cases	Complete compliance	Basic compliance	Non-compliance	Total infusion compliance
Observation group	60	38 (63.33)	20 (33.33)	2 (3.33)	58 (96.67)
Control group	60	28 (46.67)	24 (40.00)	8 (13.33)	52 (86.67)
Z/χ^2 value	-	-	2.111	-	3.927
p value	-	-	0.035	-	0.047

3.2. Comparison of Total Incidence of Adverse Events Between the Two Groups

The total incidence of adverse events in the observation group was significantly lower than that in the control group ($p < 0.05$), as shown in **Table 2**.

Table 2. Incidence of adverse events of intravenous infusion in children between the two groups (%)

Group	Number of cases	Needle shedding	Liquid extravasation	Subcutaneous hematoma	Total occurrence
Observation group	60	1 (1.67)	0	1 (1.67)	2 (3.33)
Control group	60	3 (5.00)	2 (2.33)	4 (6.67)	9 (15.00)
χ^2 value	-	-	-	-	4.904
p value	-	-	-	-	0.026

3.3. Comparison of one-time puncture success rate between the two groups

The one-time puncture success rate in the observation group was higher than that in the control group, as shown in **Table 3**.

Table 3. One-time puncture success rate of children between the two groups (%)

Group	Number of cases	Successful one-time puncture	One-time puncture success rate
Observation group	60	58	96.67
Control group	60	50	83.33
χ^2 value	-	-	5.925
p value	-	-	0.014

3.4. Comparison of nursing satisfaction between the two groups

The nursing satisfaction in the observation group was higher than that in the control group ($P<0.05$), as shown in **Table 4**.

Table 4. Comparison of nursing satisfaction between the two groups (%)

Group	Number of cases	Very satisfied	Satisfied	Dissatisfied	Total nursing satisfaction
Observation group	60	35 (58.33)	22 (36.67)	3 (5.00)	57 (95.00)
Control group	60	26 (43.33)	24 (40.00)	10 (16.67)	50 (83.33)
Z/χ^2 value	-	-	2.005	-	4.227
p value	-	-	0.045	-	0.039

4. Discussion

Children's thin blood vessels, hyperactivity and low compliance bring great challenges to intravenous infusion operations. Therefore, nurses should actively promote the precision nursing mode, adhere to the child-centered principle, closely integrate daily nursing with humanistic care, refine the pediatric intravenous infusion nursing process, carry out nursing work from the perspectives of environment, puncture, health education, etc., improve the one-time puncture success rate, avoid adverse reactions in children, and improve nursing quality. Based on the research data of this paper, the precision nursing mode can effectively improve the compliance of pediatric intravenous infusion, reduce the occurrence of adverse reactions in children, effectively improve the one-time puncture success rate and the satisfaction of children's parents with intravenous infusion nursing, which is worthy of promotion in clinical practice.

4.1. Prepare well before intravenous infusion and create a good nursing atmosphere

Nurses should optimize the preparation work before pediatric intravenous infusion, not only optimize the infusion room environment, but also do a good job in liquid preparation, inspection and verification to ensure accurate drug preparation, laying a good foundation for pediatric intravenous infusion puncture. Firstly, nurses should prepare liquid medicine strictly in accordance with medical orders, accurately control the drug dilution concentration and dosage, and select needles according to children's age and blood vessel thickness. Generally, 24–26 G needles are selected for newborns, 22–24 G for infants, and 20–22 G for children [6]. Rub children's hands and feet warm before puncture to promote blood vessel dilation, so as to accurately find the best puncture position. Secondly, nurses should formulate a precision nursing mode according to children's age, provide more psychological and emotional comfort to children, make them cooperate better with intravenous puncture, so as to improve the one-time puncture success rate. For infants under 1 year old, nurses can comfort children through gentle touching; for children aged 2–4 years old, nurses can prepare some cartoon fixation stickers and comfort toys to give more encouragement. At the same time, nurses should patiently explain the intravenous infusion process and precautions to parents, guide parents to cooperate in comforting children, eliminate parents' anxiety, and remind parents to let children urinate before infusion to reduce walking during infusion and avoid needle displacement, so as to avoid nurse-patient disputes [7].

4.2. Standardize the infusion nursing process and improve the comfort of children's intravenous infusion

The precision nursing in the process of pediatric intravenous infusion is reflected in three links: puncture operation, infusion inspection and medication safety. Firstly, nurses should carefully observe children's vascular conditions. For children with poor vascular conditions and high puncture difficulty, ultrasound guidance or light transmission can be used to assist puncture, accurately find the best needle insertion position, improve the one-time puncture success rate, and avoid children suffering from multiple punctures [8]. Secondly, head nurses should regularly organize pediatric intravenous infusion training, and key nurses should explain the essentials of pediatric intravenous puncture techniques and explain with models to help young nurses and intern nurses master puncture skills, so as to improve their pediatric intravenous infusion puncture ability. For example, key nurses can explain the essentials of neonatal intravenous puncture techniques, emphasizing that puncture actions should be gentle and rapid, and the needle should be fixed as soon as possible after successful puncture to avoid directly sticking adhesive tape on children's skin

and damaging the delicate skin of newborns. In addition, nurses should also master the skills of pediatric intravenous puncture with indwelling needles, find the puncture position accurately, select clearly visible blood vessels, prolong the service time of indwelling needles, reduce the number of intravenous punctures in children, and relieve their puncture pain. Thirdly, nurses should strengthen the inspection during children's intravenous infusion, focus on observing whether there are redness, swelling, effusion and other problems at the puncture site of children, observe the liquid dripping speed, ask children about their feelings during intravenous infusion, and reasonably adjust the intravenous infusion speed [9]. In this process, nurses should urge parents of children to comfort their emotions, avoid crying and frequent movement of the punctured hand, so as to improve the comfort of children's intravenous infusion.

4.3. Precision nursing after infusion to help children recover soon

Nurses should pay attention to the nursing work after pediatric intravenous infusion, formulate a precision nursing plan, and patiently urge parents of children to pay attention to the matters after infusion, which can not only help children recover soon, but also improve the nursing satisfaction of children's family members. For example, nurses should urge parents to gently press the puncture site of children for 5–10 minutes after infusion, avoid rubbing the puncture site, and tell parents to keep the puncture site dry within 24 hours to avoid contact with water sources. If there is bruising at the puncture site of children, nurses can advise parents to apply potato slices to the bruising area to avoid further expansion of the bruising range. At the same time, nurses should also ask children whether there are pricking, pain or burning sensations at the puncture site, make good nursing records, and give oral praise and small stickers to children to stimulate their enthusiasm for cooperating with infusion treatment; urge parents of children to provide a light diet for children, avoid spicy and irritating food, and urge young children to drink more water [10]. In addition, nurses should ask parents of children for suggestions on intravenous infusion nursing work, such as suggestions on the infusion room environment, nurses' puncture operations, humanistic care and health guidance, timely answer parents' questions about children's daily diet and activities after infusion, enhance parents' health awareness, build a harmonious nurse-patient relationship, so as to help children recover as soon as possible.

5. Conclusion

To sum up, the precision nursing mode has obvious advantages in pediatric intravenous infusion nursing work. It can not only relieve children's fear of intravenous infusion, make them cooperate better with nurses' puncture operations, so as to improve the one-time puncture success rate and reduce the incidence of adverse reactions, but also reduce children's discomfort during puncture and improve parents' satisfaction with nursing work. Therefore, hospitals should actively promote the precision nursing mode in pediatrics and emergency departments, do a good job in pediatric intravenous infusion publicity and education, and continuously improve nurses' pediatric intravenous infusion puncture ability to provide more humanized and professional nursing services for children and improve the quality of nursing services.

Disclosure statement

The authors declare no conflict of interest.

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