

The Application of Infusion Project Team in the Safety Risk Management of Indwelling Needle Use

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Abstract: *Objective:* To explore the effectiveness of applying an infusion project team in the safety risk management of indwelling needle use. *Methods:* A total of 200 patients who used intravenous indwelling needles during hospital treatment from July to October 2022 were selected and randomly divided into an observation group and a control group, with 100 patients in each group. Patients in the control group received routine nursing methods, while those in the observation group were managed using the safety risk management method of the infusion project team. The tube blocking rate and tube removal rate were compared between the two groups. *Results:* The one-time puncture success rate and the standard implementation rate of intravenous indwelling needle use in the observation group were significantly higher than those in the control group. The total incidence of complications in the observation group was significantly lower than that in the control group, and patient satisfaction in the observation group was notably higher, with statistically significant differences ($P < 0.05$). *Conclusion:* The application of an infusion project team in the safety risk management of indwelling needle use is effective and has positive impacts on improving the one-time puncture success rate, the standard implementation rate of intravenous indwelling needle use, and patient satisfaction. It is a practice worth promoting in clinical settings.

Keywords: Infusion project team; Indwelling needle use; Safety risk management; Application

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1. Introduction

Intravenous indwelling needles are essential tools in clinical infusion therapy, with their safety directly influencing therapeutic outcomes and patient comfort^[1]. However, the use of intravenous indwelling needles is associated with safety risks, such as infection, thrombosis, vascular injury, and other complications^[2]. These risks not only increase patient discomfort but also negatively impact therapeutic effectiveness. Consequently, managing the safety risks associated with indwelling needle use and minimizing complications has become a critical focus in clinical nursing practice.

This study aims to investigate the application and effectiveness of infusion project teams in the safety risk management of indwelling needle use. The goal is to provide scientific and standardized guidance for the clinical use of indwelling needles, thereby enhancing safety and treatment outcomes.

2. Materials and methods

2.1. General information

A total of 200 patients who underwent intravenous indwelling needle treatment during hospitalization from July to October 2022 were selected. The patients were randomly divided into an observation group and a control group, with 100 patients in each group. In the observation group, there were 60 male and 40 female patients, ranging in age from 1 to 6 years, with a mean age of (5.34 ± 0.78) years. The control group comprised 59 male and 41 female patients, aged 1 to 6 years, with a mean age of (5.51 ± 0.66) years.

Inclusion criteria: (1) Met the clinical use criteria for intravenous indwelling needles; (2) Underwent continuous intravenous infusion therapy for more than 72 hours; (3) The patient's guardian voluntarily signed an informed consent form after being fully briefed on the purpose, potential risks, and precautions associated with the intravenous indwelling needle.

Exclusion criteria: (1) Extensive or severe skin damage, inflammation, or infection affecting venipuncture success rates and safety; (2) Allergies to the components of the clear dressing used for securing the indwelling needle; (3) Use of hypertonic solutions or highly chemically irritating medications in treatment protocols.

2.2. Methods

2.2.1. Control group

Patients in the control group received standard nursing care for indwelling needles, which included the following steps:

- (1) Patient education: The procedure and purpose of using intravenous indwelling needles were explained to the patients and their parents, along with precautions during the indwelling period. This ensured that patients and their guardians were adequately informed ^[3].
- (2) Puncture procedure: Based on each patient's condition, appropriate blood vessels and puncture sites were selected. Sterile procedures were strictly followed during the insertion of the indwelling needle. Post-procedure, patients and their parents were reminded of safety and comfort-related precautions ^[4].
- (3) Health education: A 30-minute health education session was conducted for patients and their parents. The session covered the use, maintenance, possible complications, and troubleshooting of the indwelling needle to enhance awareness and self-care capabilities ^[5].
- (4) Routine monitoring: Regular inspections were conducted to monitor the indwelling needle, puncture site, and the patient's overall condition for one week ^[6].

2.2.2. Observation group

In addition to standard nursing care, the observation group adopted a safety risk management approach led by the infusion project team, which entailed the following:

- (1) Establishment of an infusion management project team: A specialized project team comprising experienced nurses was established to develop rules, regulations, operating procedures, and emergency protocols for

indwelling needle use. The team regularly supervised and evaluated implementation to ensure adherence to established measures ^[7].

- (2) Nurse training: Systematic training was provided to nurses, focusing on the “Industry Standard for Intravenous Therapy Nursing.” Training included theoretical sessions, practical exercises, and case analyses to enhance technical skills and awareness of safety risks ^[8].
- (3) Key aspects of detailed nursing: The project team compiled a list of key nursing practices for indwelling needle operation and maintenance. This included selecting and disinfecting puncture sites, securing and protecting the needle, managing extension tubes and joints, and replacing and monitoring dressings. Nurses were trained to focus on these details to minimize errors ^[9].
- (4) Operation video and teaching programs: A detailed video demonstrating the correct procedures for using indwelling needles was produced. The video covered the entire process, from preparation to post-puncture care. Nurses were required to watch the video to refine their skills. Additionally, experienced nurses mentored less experienced staff, sharing effective techniques for puncture and maintenance. Weekly competitions emphasizing “steady, accurate, and fast” puncture techniques were held to improve performance ^[10].
- (5) Systematic nursing interventions: A series of interventions were implemented, including (a) Educating patients and guardians to improve understanding and cooperation; (b) Establishing a registration and tracking system for indwelling needle use to ensure accurate monitoring; (c) Conducting regular safety risk assessments to identify and address potential hazards; (d) Monitoring patients’ skin conditions and using improved dressing materials ^[11].

2.3. Observation indicators

- (1) The one-time puncture success rate and the standard implementation rate of intravenous indwelling needle use were compared between the two groups.
- (2) Complications, such as phlebitis, drug extravasation, and accidental extubation, were recorded for both groups.
- (3) A self-developed nursing satisfaction questionnaire was used to evaluate the satisfaction of patients’ parents. The questionnaire assessed three dimensions—nursing procedures, service attitude, and timeliness—using a score range of 0 to 100, with higher scores indicating greater satisfaction.

2.4. Statistical methods

Data were analyzed using SPSS 20.0 statistical software. Categorical data were expressed as percentages, while continuous data were presented as mean \pm standard deviation (SD). The χ^2 tests and *t*-tests were used for analysis, with statistical significance set at $P < 0.05$.

3. Results

3.1. One-time puncture success rate and standard implementation rate of intravenous indwelling needle

The success rate of one-time puncture and the standard implementation rate of intravenous indwelling needle use was significantly higher in the observation group compared to the control group, with statistical significance ($P <$

0.05). Detailed data are presented in **Table 1**.

Table 1. One-time puncture success rate and standard implementation rate of intravenous indwelling needle in the two groups during the nursing period

Group (n = 100)	One-time puncture success rate (%)	The standard implementation rate of intravenous indwelling needle (%)
Observation group	95.00	94.00
Control group	72.00	73.00

3.2. Occurrence of complications in the two groups

The total incidence of complications in the observation group was significantly lower than that in the control group, with statistical significance ($P < 0.05$). Detailed data are shown in **Table 2**.

Table 2. Incidence of complications in the two groups

Group (n = 100)	Catheter blockage	Phlebitis	Skin reactions	Drug exosmosis	Total
Observation group	1	1	1	1	2
Control group	5	4	6	2	17

3.3. Satisfaction of parents in both groups

Parental satisfaction in the observation group was significantly higher than in the control group, with statistical significance ($P < 0.05$). The comparison of satisfaction scores between the two groups is detailed in **Table 3**.

Table 3. Satisfaction of parents of patients in the two groups (score, mean \pm SD)

Group (n = 100)	Nursing operations	Service attitude	Timeliness of care
Observation group	95.45 \pm 3.55	97.25 \pm 4.25	96.77 \pm 4.23
Control group	70.56 \pm 4.53	74.33 \pm 4.22	75.45 \pm 4.11

4. Discussion

4.1. Influencing factors for the safety risk management of indwelling needle use

Indwelling needles are an essential component of modern medical treatment, and ensuring their safe use is critical. However, their safety is influenced by various factors, such as the duration of indwelling. Prolonged indwelling time increases the risks of infection and thrombosis^[12]. Nursing staff must carefully manage the duration of indwelling and perform timely replacements based on the patient's specific conditions and clinical requirements. To mitigate risks associated with long-term use, continuous observation, and enhanced nursing care are essential to identify and address potential complications promptly^[13].

For instance, the success rate of a puncture is a significant factor. Puncture failure not only causes pain to patients but may also result in vascular damage, bleeding, and an increased risk of infection. Therefore, nursing staff should prioritize training to enhance their puncture skills and adopt correct techniques to ensure a high success rate. Similarly, issues such as blood accumulation or return in the extension tube or joint can impede the patency of the indwelling needle and create an environment conducive to bacterial growth, thus increasing

infection risks. To address this, nurses must strictly adhere to aseptic principles, regularly inspect and clean the extension tube and joint, and ensure internal cleanliness to prevent contamination.

4.2. Application of the infusion project team in safety risk management of indwelling needle use

This study analyzed data obtained from selected patients and highlighted the impact of the infusion project team on the safety risk management of indwelling needle use.

Firstly, the observation group demonstrated a significantly higher one-time puncture success rate and standard implementation rate of intravenous indwelling needle use compared to the control group. This finding underscores the positive role of the infusion project team. Through professional training, guidance, and the establishment of detailed operating procedures and regulations, nursing staff improved their puncture skills substantially. This ensured the standardization and safety of indwelling needle use, reduced puncture failures, and alleviated patient discomfort. By adhering strictly to established guidelines during clinical practice, nurses effectively minimize risks associated with improper procedures.

Secondly, the observation group exhibited a markedly lower total incidence of complications compared to the control group, further confirming the effectiveness of the infusion project team. Enhanced risk monitoring and preventive measures enabled nursing staff to promptly identify and address potential safety hazards, thereby reducing the occurrence of complications ^[14].

Finally, parental satisfaction in the observation group was significantly higher than that in the control group, highlighting the role of the infusion project team in enhancing service quality. By optimizing service workflows and strengthening communication, nursing staff were better equipped to meet the needs of patients and their families, thereby improving the overall medical experience ^[15].

5. Conclusion

In conclusion, the application of the infusion project team in the safety risk management of indwelling needle use has yielded remarkable results. The findings indicate that the infusion project team significantly enhances the professional skills and adherence to operating standards among nursing staff, effectively reduces the incidence of complications, and improves patient and parental satisfaction.

Thus, the infusion project team's approach to managing the safety risks associated with indwelling needle use is both effective and deserving of broader adoption in clinical practice. Moving forward, nursing staff should continue to refine and expand this management model, exploring innovative methods to enhance safety risk management in the use of indwelling needles. This will contribute to delivering safer, more efficient, and higher-quality medical services to patients.

Disclosure statement

The authors declare no conflict of interest.

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