ORIGINAL RESEARCH ARTICLE

Effectiveness of cluster nursing intervention in preventing urinary catheter-related urinary tract infections

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Li Wang[*], *Yuanyuan Liu and Shuangshuang Li*

Department of Hospital Infection Control, Funan County Hospital of Traditional Chinese Medicine, Funan, Anhui 236300, China.

***For Correspondence:** Email: *wanglifunan@hotmail.com*

Abstract

The objective of the study was to investigate the effectiveness of cluster nursing intervention in preventing urinary catheter-related urinary tract infections. Seventy-eight patients with indwelling urethral catheters admitted to Funan County Hospital of Traditional Chinese Medicine from January 2020 to December 2020 were recruited as study participants. They were randomly divided into a control group (routine nursing intervention) and an observation group (cluster nursing intervention). The results showed that compared with the control group, the observation group had better total effectiveness rate, shorter indwelling catheter time, shorter disappearance time of bladder irritation symptoms, higher scores of emotional role, physical health, cognitive ability, social function and quality of life, lower occurrence of adverse catheter events, and higher nursing satisfaction. We conclude that clustered nursing can reduce the occurrence of urinary catheter-related urinary tract infections, promote the quality of life, shorten the duration of catheter indwelling and bladder irritation symptoms, prevent adverse catheter events, and improve nursing satisfaction of patients with patients with indwelling urinary catheters. *(Afr J Reprod Health 2025; 29 [10]: 83-89).*

Keywords: Clustered nursing; Urinary catheter-related urinary tract infections; Bladder irritation symptoms; Quality of life

Résumé

L'objectif de l'étude était d'évaluer l'efficacité des interventions infirmières groupées dans la prévention des infections urinaires liées aux sondes urinaires. Soixante-dix-huit patients porteurs de sondes urétrales à demeure, admis à l'hôpital de médecine traditionnelle chinoise du comté de Funan entre janvier et décembre 2020, ont été recrutés comme participants à l'étude. Ils ont été répartis aléatoirement en un groupe témoin (intervention infirmière de routine) et un groupe d'observation (intervention infirmière groupée). Les résultats ont montré que, par rapport au groupe témoin, le groupe d'observation présentait un meilleur taux d'efficacité globale, une durée de sonde à demeure plus courte, un délai de disparition des symptômes d'irritation vésicale plus court, des scores plus élevés en termes de rôle émotionnel, de santé physique, de capacités cognitives, de fonction sociale et de qualité de vie, une fréquence plus faible d'événements indésirables liés aux sondes et une plus grande satisfaction des infirmières. Nous concluons que les soins infirmiers groupés peuvent réduire la fréquence des infections urinaires liées aux sondes urinaires, améliorer la qualité de vie, raccourcir la durée de la sonde et les symptômes d'irritation vésicale, prévenir les effets indésirables liés aux sondes et améliorer la satisfaction des patients porteurs de sondes urinaires à demeure *(Afr J Reprod Health 2025; 29 [10]: 83-89).*

Mots-clés: Soins infirmiers groupés ; Infections urinaires liées aux sondes urinaires ; Symptômes d'irritation vésicale ; Qualité de vie

Introduction

To ensure the therapeutic effect and prevent postoperative complications, it is common practice in clinical settings to insert a urinary catheter for patients.[1] Urinary tract infections (UTIs) are common condition among hospital-acquired infections, and most of these infections are caused by the use of indwelling urinary catheters.[2] Indwelling urinary catheters are prone to bacterial invasion, which can lead to UTIs, sepsis, or bacteremia.[3] Besides, UTIs not only prolong the length of hospital stay, but also significantly increase the suffering of patients, causing serious psychological and economic burdens for patients and their families.[4] Therefore, effective prevention, control, and nursing measures are the key to prevent the occurrence of urinary catheter-related infections.

Cluster nursing, as a new nursing model in clinical practice, refers to the integration of a series of evidence-based nursing and treatment measures to

address some stubborn clinical diseases.[5] Its main purpose is to assist healthcare professionals in providing effective, optimized, and scientific medical care services and outcomes for patients.[6] Clinically, it is believed that effective cluster nursing measures are critical for reducing urinary catheter-related UTIs. These measures include specialized nursing teams, standardized operation procedures, multidisciplinary collaboration and quality control, patient education and psychological support, information-based management and data-driven decision-making and environment and equipment management. These measures not only effectively shortens the hospital stay of patients but also improves their prognosis.[7] The purpose of this study was to investigate the effectiveness of cluster intervention in preventing urinary catheter-related UTIs.

Methods

Seventy-eight patients with indwelling urinary catheters admitted to Funan County Hospital of Traditional Chinese Medicine from January 2020 to December 2020 were chosen as research participants. They were randomly divided into a control group (CG) and an observation group (OG) according to the random number table method, with 39 cases in each group. The inclusion criteria were: (1) The urine culture result before intubation was negative for bacteriuria. (2) Urethra without obstruction. (3) Patients signed the informed consent form. The exclusion criteria were: (1) The patient had received anti-infection treatment in the past month. (2) severe hepatic and renal dysfunction. (3) urethra inflammation. (4) menstruating women. (5) patients with urethral injury.

Patients in the CG accepted routine nursing intervention: The urinary catheter drainage was kept to be unobstructed to prevent compression and obstruction. Nurses cleaned the patient's perineal area every day to keep the urethral opening and the perineal area dry and clean.

Patients in the OG received cluster nursing intervention:

(1) Due to a lack of understanding of the use of indwelling catheters, patients were prone to develop anxiety and tension. Nurses promptly communicated with them, listened to their needs, provided targeted psychological counseling, and explained the reasons and effects of the indwelling urinary catheter in detail to alleviate their tension and anxiety, and encouraged the patients to cooperate actively.

(2) Nurses assisted the patient in cleaning their bladder and encouraged them to drink more water based on their specific medical condition. This helped to dilute the urine, wash away the sediment in the bladder, prevent the urinary catheter from getting blocked, and keep the bladder clean.

(3) Nurses observed whether the patient's urinary catheter was folded, detached, or bent, and promptly corrected any abnormalities. At the same time, nurses recorded the color, volume and nature of the patient's urine to prevent retrograde bacterial infection due to excessive urine accumulation. Nurses regularly assessed the possibility of UTIs in the patient and reported the condition to the doctor in a timely manner to avoid unnecessary infections caused by the indwelling urinary catheter.

(4) Before conducting the catheterization procedure, nurses used 0.5% iodophor to disinfect the patient's external genitalia, vaginal opening, and urethral opening, following the strict operation procedures. Nurses selected the appropriate size and model of urinary catheter for the patient for catheterization, and properly fixed the urine bag and the urinary catheter to ensure the sealing of the urinary system. After catheterization, the patient's external genitalia, vaginal opening and urethral opening were disinfected again, twice a day.

Observed outcomes

(1) The therapeutic effects of both groups were compared. Obvious effect: there was no urinary-related infection, and the symptoms of urinary system disappeared completely. Effective: there are urinary symptoms, but they are mild and can be effectively controlled. Ineffective: The patient's clinical symptoms remained unchanged or even worsened.

(2) The indwelling catheter time and the disappearance time of bladder irritation were recorded in both groups.

(3) SF-36 questionnaire was adopted for assessing quality of life,[8] including four dimensions of emotional role, physical health, cognitive ability,

and social function, with 100 points for each dimension. Higher score represented higher quality of life.

(4) Incidence of adverse catheter events (detachment, blockage, and pain) in both groups was compared.

(5) A self-made questionnaire was used to evaluate patients' nursing satisfaction, including nursing skills, communication skills, service attitude, etc., with a total score of 0-100, which was separated into very satisfied (≥85 points), generally satisfied (60-84 points) and dissatisfied (≤59 points). Satisfaction = (very satisfied + generally satisfied)/Total cases ×100%.

Statistical analysis

SPSS 19.0 statistical software was adopted for statistical analysis, and the enumeration data was represented by the number of cases n (%), and χ^2 test was implemented for comparison between groups. Measurement data with mean ± standard deviation, compared with t test between groups, $P < 0.05$ for the difference was statistically significant.

Ethical considerations

This study was approved by the ethics committee of Funan County Hospital of Traditional Chinese Medicine on December 27, 2019, and the approval number was 201912.

Results

General information in both groups

As Table 1 displayed, no significant difference was seen in gender and age between both groups (P>0.05).

Curative effect in both groups

Relative to the CG (27/39, 69.2%), the OG had higher total effectiveness rate (38/39, 97.4%), with statistic difference (χ^2=7.34, P<0.05, Figure 1).

Table 1: General information in both groups

Groups	Gender		Age (years)
	Male	Female	
Control group (n=39)	24 (61.5)	15 (38.5)	72.3±7.5
Observation group (n=39)	26 (66.7)	13 (33.3)	71.4±7.4
χ^2/t	0.22		0.53
P	0.63		0.59

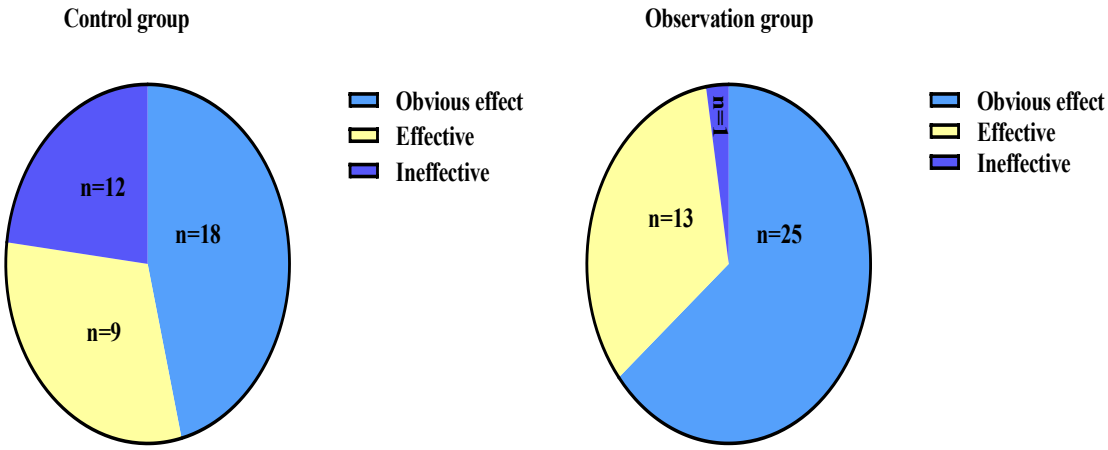

Figure 1: Curative effect in both groups.

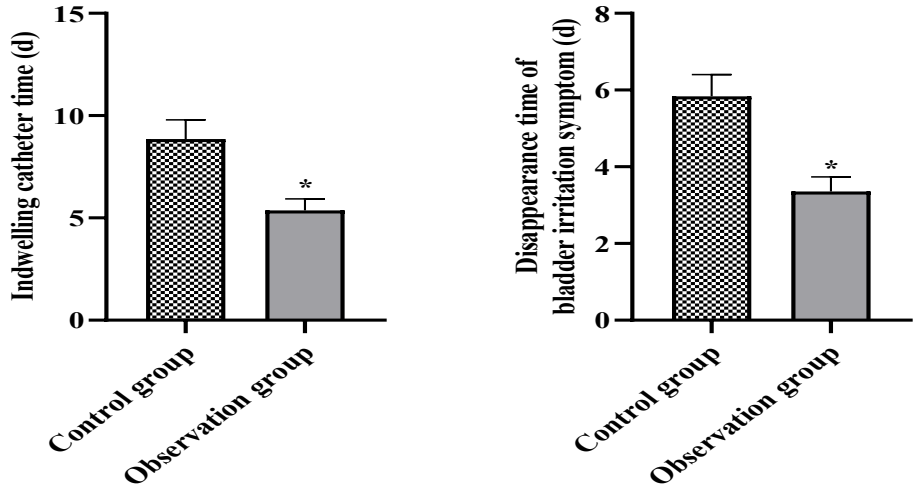

Figure 2: Indwelling catheter time and the disappearance time of bladder irritation in both groups. *P<0.05

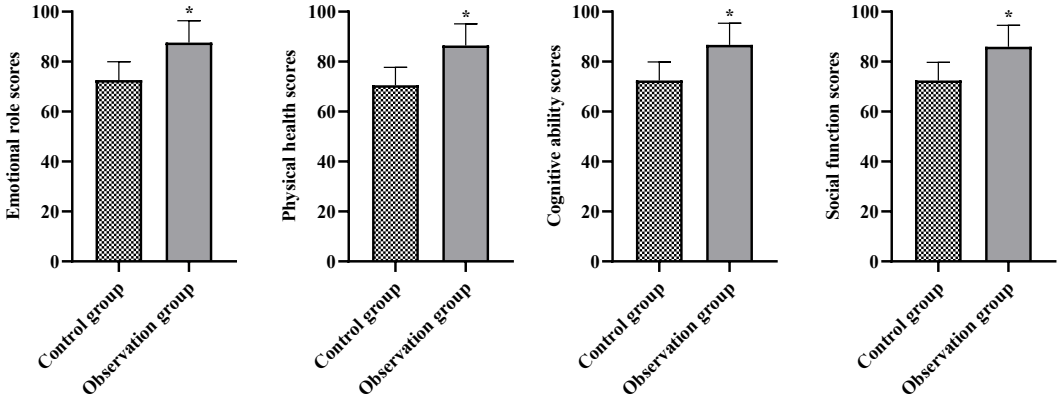

Figure 3: Quality of life in both groups. *P<0.05

Indwelling catheter time and the disappearance time of bladder irritation in both groups

Compared to the CG, the OG had shorter indwelling catheter time and shorter disappearance time of bladder irritation symptom (P<0.05, Figure 2).

Quality of life in both groups

Compared to the CG, the OG had higher scores of emotional role, physical health, cognitive ability and social function (P<0.05, Figure 3).

Incidence of adverse catheter events in both groups

The incidence of adverse catheter events in the CG was 15.4% (6/39), and that in the OG was 2.6% (1/39). Relative to the CG, the OG had lower incidence of adverse catheter events (P<0.05, Table 2).

Nursing satisfaction in both groups

Relative to the CG (33/39, 84.62%), the OG had higher nursing satisfaction (38/39, 97.44%), with statistic difference (χ^2=3.92, P<0.05, Figure 4)

Table 2: Incidence of adverse catheter events in both groups

Groups	Catheter detachment	Catheter blockage	Pain	Total incidence rate
Control group (n=39)	3 (7.7)	2 (5.1)	1 (2.6)	6 (15.4)
Observation group (n=39)	1 (2.6)	0 (0.0)	0 (0.0)	1 (2.6)
χ^2	3.92			
P	<0.05			

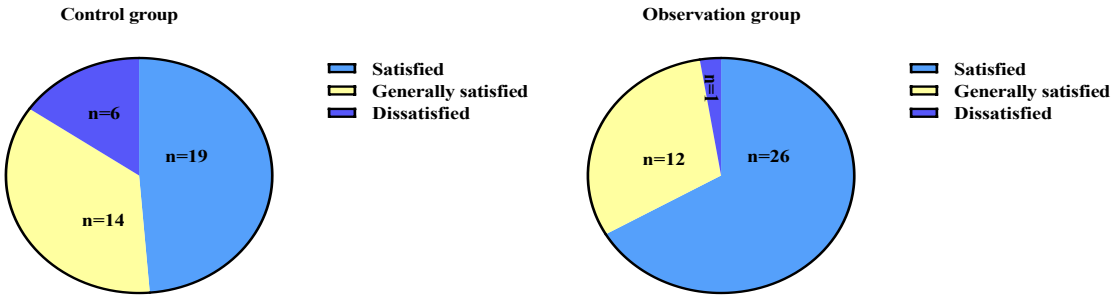

Figure 4: Nursing satisfaction in both groups.

Discussion

Relevant studies have shown that the incidence of UTI in hospital-acquired infections is as high as 30%, and most patients are caused by indwelling urinary catheter.[9,10] Urinary tract catheter-related infections not only affect the therapeutic effect, but also increase the physical and mental burden of patients, prolong the recovery time of patients, increase the length of hospital stay, and aggravate the economic burden on patients' families and society.[11] Therefore, effective prevention of urinary tract catheter-related infections is of vital importance for improving patients' prognosis.

Cluster nursing has been widely applied in clinical practice. It mainly refers to a treatment plan that combines or integrates multiple treatment options for a certain disease based on the guiding principles of evidence-based medicine and the specific circumstances of the medical institution.[12] This is a process of gradually implementing effective treatment measures within the framework of guidelines. It has multiple advantages such as practicality, assessability, sequentiality, goal orientation, and effectiveness.[13] For patients with indwelling urinary catheters, cluster nursing can reduce the incidence of urinary tract infections to varying degrees. The main reason is that patients with urinary incontinence after indwelling urinary catheters will have urine spill over from the urethral opening along the catheter wall, or experience difficulty in urination. For patients with urine leakage, the urethral opening is more relaxed, and a moist environment around the urethral opening is more likely to form, which is conducive to the reproduction and proliferation of bacteria.[14] At the same time, patients with urine leakage from the catheter will damage the physiological environment around the urethral opening and the mucosa, and the bladder in a state of complete urination for a long time will have blood leakage due to the blockage of capillaries and small veins, which is conducive to the reproduction of bacteria and leads to a very high infection rate.[15] By promptly performing urine drainage and urethral opening care for patients, keeping the catheter unobstructed, can reduce the infection rate, fully demonstrating the crucial role of cluster care in preventing urinary catheter-related UTIs.[16]

In this research, the total effective rate of the OG was higher than the CG, which indicated that cluster nursing measures could effectively reduce the incidence of urinary catheter-related UTIs and improve the therapeutic effect of patients, which was in line with previous studies.[17] Besides, in this study, nurses provided timely perineal

cleaning and wiping of the urethral opening after each defecation through the hygienic cleaning care of the patients' urethral opening. Compared to the CG, the OG had shorter indwelling time of urethral catheter and shorter disappearance time of bladder irritation symptoms, which suggested cluster nursing could shorten the indwelling time of catheter, reduce the duration of bladder irritation symptoms and prevent the occurrence of catheter-related UTIs. Compared to the CG, the OG had lower incidence of adverse catheter events, indicating that the application of this nursing could decrease the occurrence of adverse catheter events, prevent the occurrence of adverse events, and contribute to the smooth indwelling of the catheter. The quality of life and nursing satisfaction in the OG were higher relative to the CG, indicating clustered nursing could promote the quality of life and promote the nursing satisfaction, thereby promoting the formation of good prognosis.

Study strengths and limitations

Strengths of the study were that it was a randomized clinical trial that included multiple observation indicators. The main limitation is the lack of long-term follow-up. Our research may provide clinical nursing references for preventing urinary tract infections in patients with indwelling urinary catheters.

Conclusion

Clustered nursing can reduce the incidence of urinary catheter-related UTIs in patients, promote the quality of life of patients, shorten the duration of catheter indwelling and bladder irritation symptoms, prevent adverse catheter events, and improve nursing satisfaction, which is valuable for promotion.

Competing interests

The authors report no actual or potential conflicts of interest.

Acknowledgement

None

Authors contribution

Li Wang and Yuanyuan Liu: conceived and designed the study. Yuanyuan Liu and Shuangshuang Li: collected and analysed the data. Li Wang and Shuangshuang Li: prepared the manuscript. All authors mentioned in the article approved the manuscript.

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