Research Progress of Urinary Tract Infection Associated with Urinary Catheter in Urology

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Abstract: Urethral infections caused by catheters rank first in hospitals, while urethral infections caused by catheters dominate. In order to better understand and master urethral infections related to catheters in the urinary system, the author reviewed a large amount of relevant data to provide an overview of the epidemiology, pathogenesis, influencing factors, and prevention and treatment measures of their occurrence. The author hopes to provide valuable information on how to effectively prevent catheter-related urethral infections in clinical practice and how to improve the quality of nursing work.
Keywords: Catheter; Urinary; Prevention and Treatment

1. Introduction

Catheter-related urinary tract infection (CAUTI) is a type of urinary tract infection that arises within 48 hours after Catheter insertion or catheter removal[1]. The occurrence of CAUTI not only increases the morbidity, mortality, medical expenses, but also increases the number of hospital days for patients. Studies have shown that urinary tract infections account for the first place of nosocomial infections, among which indignant catheters are the most important pathogenic factors, and 70%-80% of urinary tract infections are related to urinary catheter-associated urinary tract infections. According to the data, if targeted prevention and control, 65-70% can be effectively prevented. The transformation of clinical evidence refers to the systematic transformation based on scientific basis, with teamwork as the core, to promote the continuous improvement of medical service quality. Although the work of evidence-based nursing in China has just begun, after reviewing a large number of relevant literatures, we can see that the research results on evidence-based nursing (including catheter) in recent years have become the third research hotspot after “syndromic nursing” and “perioperative nursing”. This article summarizes recent advances in practical measures of clinical care for adults

2. Mechanism of catheter-associated Urinary tract infection (CAUTI)

CAUTI is caused by the combination of three factors: catheter, bacteria and host. A large number of clinical trial results show that when inserting or leaving the catheter, due to different pressures, it will lead to tissue and pathological changes in the bladder, and damage to the bladder’s immune system, and in serious cases, there will be cell shedding, bladder edema, mucosal damage, and finally will spread to the kidney. In addition, long-term placement of the catheter can cause persistent inflammation of the skin mucosa. Among them, the catheter can cause chronic inflammation, affect the patient’s normal urination, and destroy the body’s immune barrier, leading to the colonization and proliferation of bacteria in the bladder. Recent animal studies have shown that the catheter-induced inflammatory response leads to the secretion of fibrinogen (Fibro blasts), which can then transfer to the bladder. Because of long-term mechanical stimulation, resulting in the rupture of the catheter, coupled with injury, resulting in a large amount of fibrinogen accumulation in the bladder, and when its concentration is increased, it is easy to lead to the colonization and proliferation of urinary system pathogens such as Escherichia coli, Enterococcus faecalis, Staphylococcus aureus, candida alba. Therefore, the catheter and the associated

inflammatory response will lead to changes in bladder homeostasis, creating conditions for bacterial “colonization”.

3. Preventive measures for catheter-associated urinary tract infections (CAUTI)

3.1 Shortening the indwelling catheter time

In different patients, the occurrence of CAUTI is related to the time of indwelling catheter. It has been reported in the literature that the chance of bacterial urinary tract infection increases by 6 times after being retained for more than 6 days, and the chance of bacterial urinary tract infection for more than 30 days reaches 100%. Since the early CAUTIBF formation can be reversed, early extubation can prevent the formation of CAUTIBF, thus achieving the purpose of preventing CAUTI.But now, many hospitals in our country have a large number of catheters, overdue use of the phenomenon. Therefore, in the actual work, the rationality of the timing of the indwelling urinary tube should be carefully analyzed, the duration of the indwelling urinary tube should be reduced as much as possible, and the catheter should be removed as soon as possible to reduce the risk of CAUTI. Extubation cue system is a new nursing method to prevent urinary tract infection caused by indwelling catheter. The system can accurately prompt the nurse to remove the catheter, prevent the nurse from forgetting the time to remove the catheter, and reduce urinary tract infection. The experiment indicated that the use of the CAUTI ICU indentable catheter extubation evaluation monitor can significantly reduce the mean catheter indenture time of patients and reduce the incidence of CAUTI. At present, nurse-led catheter removal has an impact on the nursing outcomes of patients with indentured catheterization, which is a preliminary attempt to professionalize and standardize nursing. Although there are still some controversies, we expect more studies to confirm the feasibility and safety of nurse-led catheter removal mode in the future[2].

3.2 Securing devices properly

Through the analysis of relevant data, the results show that different types of urinary catheter have different degrees of influence on urinary tract infection. If the choice is too large, it will be harmful to the patients’ urethra and bring more pressure to the patient’s bladder, thus giving the patient more living space. If the catheter is too thin, it is easy to cause the catheter to slip and leak urine. Therefore, the correct selection of the appropriate catheter is very important. However, at present, there is no unified norm and rule in clinical practice. In the future, we can carry out relevant research on the selection of catheter models to clarify how to provide a scientific basis for catheter models under these different factors, such as age, gender, disease, patient’s physical condition, urethral condition, previous history of catheter insertion, urine PH value, etc. In the selection of catheter materials, silica gel material is widely used at present. In recent years, due to the progress of science and technology and the continuous development of new medical materials, there have been some new types of tubes containing antibacterial agents and tubes containing bioactive substances. Studies at home and abroad have confirmed that urinary catheters containing silver compound furacillin have significant effect in reducing CAUTI, but there is also a risk of inducing drug resistance. Novel medical catheters containing antimicrobial peptides have been shown to have good anti-CAUti effects, but are still in the research and development stage, and more animal and clinical trials are needed to prove their effectiveness. After selecting the appropriate catheter, the catheter is fixed internally and externally. The results of this experiment showed that the occurrence and urine leakage rate of CAUTI could be effectively reduced by intra-femoral fixation from upper to lower than intra-femoral fixation. The incidence of CAUTI was significantly reduced ($P<0.05$) after the application of improved conventional fixation, that is, the use of transparent dressing, pressure fixation glue and thin edge band on the outside of the catheter. Therefore, it is suggested that in nursing, it should be improved and optimized as far as possible under the premise of ensuring safety and comfort. In addition, after using the catheter for a long time, it is best to avoid frequent replacement, because this will lead to the destruction of the closed drainage system, but also lead to increased contact with outside microorganisms.

3.3 Maintaining the hygiene of the urethral opening

In order to reduce the incidence of CAUTI, attention must be paid to the hygiene of the urethral opening. Some studies have shown that urethral infection in some patients is due to poor hygienic conditions around the urethral opening. In the relevant norms of our country, there are clear regulations that require patients to do a good job of cleaning the urethral opening every day. However, there is insufficient evidence to prove that urinary tract cleaning can effectively reduce the occurrence of CAUTI. After the investigation and the CAUTI meta-analysis， the conclusion is drawn:There was no significant difference in the prevention of CAUTI when using iodoprene disinfectant, chlorhexidine disinfectant, normal saline and sterile water to clean the urethral meatus, but chlorhexidine disinfectant had a better preventive effect. If it is in some patients with fecal incontinence, or severe patients, and in places with poor sanitary conditions, it is recommended to use chlorhexidine disinfectant to help patients clean and disinfect, so as to reduce the risk of CAUTI. According to expert opinion, for patients with indurating catheters, generally can not use disinfectant to disinfect the urethral orifice, otherwise it will cause damage to the urethral orifice. Patients can use clean water, soapy water, etc., to clean and clean the surface of the catheter and urethral orifice, and maintain local cleanliness and comfort. For patients with stool incontinence, Iodophor can be used to clean and disinfect the perineum, perianal and catheter surfaces. At the same time, traditional Chinese medicine cleaning solution has also been widely used. According to our study, perineal washing with heat-clearing and dampness-removing traditional Chinese medicine lotion has a good effect on preventing CAUTI and can improve the cleanliness of perineum without any side effects, which is much better than traditional iodor scrubbing[3].

4. Conclusion

Indwelling catheters are an important cause of urinary tract infections, and the duration of indwelling catheters and the presence of indwelling catheters are two independent risk factors for urinary tract infections. The use rate of urinary catheter is high, CAUTI is the first category of nosocomial infection, with high CAUTI and high drug resistance, which seriously affects the comfort and pain degree of patients. Therefore, on the basis of mastering the indications of CAUTI catheter placement, the prevention and control of CAUTI will become better. In order to reduce the incidence of catheter-associated urinary tract infections (CAUTI), it is necessary to adopt strict surgical indications, strict disinfection and avoid unnecessary surgery.

References

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