Nursing actions to prevent urinary tract infection associated with long-standing bladder catheter

Ações de enfermagem para prevenção de infecção do trato urinário relacionada ao cateter vesical de demora

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ABSTRACT
During hospital stay at the Intensive Care Unit (ICU), many treatments and procedures can breakdown the body defense mechanisms leading to infections. Urinary tract infections are the most frequent. This study was carried out in order to emphasize the standardization of nurse care, with the aim of reducing the ICU patient risk of developing urinary tract infections associated with indwelling bladder catheters.

Keywords: Urinary tract infections; Catheters, indwelling; Intensive care units

INTRODUCTION
Urinary tract infection is characterized by microorganisms invading any urinary tract tissue; it is within the group of the four most frequent types of hospital infections. According to epidemiological data, 35 to 45% of all hospital-acquired infections occur in the urinary tract, and 80% are associated with indwelling bladder catheter(1).

Infections are frequent events at the Intensive Care Unit (ICU), because of the severe condition of patients, greater microbial diversity and more intense exposure to invasive procedures, such as the use of indwelling bladder catheter, most of the times indicated to assess urinary output and in comatose and sedated patients(2). Some studies demonstrated that within a short time of bladder catheterization, the previously sterile urine is colonized by bacteria. The germs most frequently involved in urinary tract infections in severely ill patients associated with bladder catheterization are enterobacteriae, Pseudomonas aeruginosa and Enterococcus spp(3).

For most patients at the ICU, urinary tract infection is related to the use of indwelling bladder catheters and associated with the following: bacterial factors, such as urothelial receptor adherence and virulence(4); host factors, such as normal bacterial flora, vaginal acid and urinary pH, high urea concentration, organic acids and the very act of micturition that removes bacteria from the bladder wall; as well as genetic, anatomic and functional factors associated with the urinary tract, which usually impair the adherence of uropathogens to the urothelium, and are reduced in these patients(5); predisposing factors are antisepsis and bladder catheterization techniques; and catheter indwelling time.

Considering the nurse team action during bladder catheterization, it is necessary for the ICU nurse manager to implement actions aimed at minimizing the incidence and the risks associated with such infections, preventing them through technical and scientific training of the team, pursuing a balance between patient safety and cost-effectiveness.

OBJECTIVE
To study nursing actions aiming to prevent urinary tract infection associated with indwelling bladder catheter, and to describe the importance of these
nursing intervention actions in reducing urinary tract infections associated with indwelling bladder catheters in critically-ill patients admitted to the ICU.

JUSTIFICATION

It is noticeable that ICU patients with indwelling bladder catheters have a higher incidence of urinary tract infections and that nursing intervention actions can reduce this incidence.

METHODS

An explanatory literature review using Pubmed and LILACS databases, as well as textbooks published from 1998 to 2007, were carried out. The following keywords were crossed: urinary tract infection, indwelling bladder catheters and Intensive Care Unit. Later, the available publications were contextualized in a direct and indirect fashion, and mentioned them directly and indirectly throughout the text.

RESULTS

Chart I shows the summary of the explanatory literature reviews carried out, with their respective outcomes.

DISCUSSION

The ICU is the hospital area bearing higher risks for patients acquiring hospital infection for the following reasons:
- ICU patients are severely ill and usually suffer from more than one disease when compared to other patients\(^6\),\(^5\);
- invasive procedures, such as bladder catheterization, are more often carried out at the ICU\(^6\),\(^5\);
- the excessive use of broad spectrum antibiotics leads to the selection of resistant microorganisms which cause infections\(^3\),\(^5\),\(^7\);
- the pace of ICU activities can usually make nurses and other healthcare professionals less diligent as far as aseptic techniques are concerned\(^6\),\(^7\).

Having in mind that these factors predispose patients to infections in ICU, nurses play the role of adopting measures to reduce the incidence of these infections, especially urinary tract infections (UTI) associated with bladder catheterization, since it is a task predominantly performed by nurses. Within the context of multidisciplinarity, as far as ICU are concerned, it is necessary for the nurse to play a crucial role in the prevention and treatment of hospital infections, by means of team training, continuing education and better interaction and communication with the medical team and the Nosocomial Infection Control Committee of the institution.

Nursing team training is based on enabling licensed practical nurses and technicians to perform bladder catheterization in an aseptic way, educating them as to hand washing, knowing that these are the major culprits for crossed infections and UTI outbreaks at the ICU, pointing to the need for proper antisepsis when caring for patients\(^3\). Together with the medical team, nurses must discuss the criteria for bladder catheterization, its need and how long the catheter will remain in place, knowing that the longer the catheter stays, the greater the likelihood of patients developing UTI. Some studies show a risk of 2.5% for one day of catheterization, 10% for two to three days, 12.2% for four to five days, reaching up to 26.9% with six or more days of catheter dwelling\(^6\).

Within this context, it must be stressed the management role nurses play and the benefits their efficient work bring to patients and the institution. This is clear as policies are set in hospitals to prevent nosocomial infections, because prevention still is the best way to reduce ICU cost and, consequently, morbidity and mortality related to UTI.

The following factors predispose UTI in patients with bladder indwelling urinary catheters at ICU\(^5\): inadequate hand-washing; urinary catheter insertion without the proper technique and antisepsis; bladder tube detached from the urine bag; urine bag outlet touching the contaminated surface; urine from the bladder catheter or from the urine bag reentering the bladder (reflux); repeated bladder tube flushing with solutions; injudicious use of bladder catheter, without proper indication; bladder catheter indwelling beyond patient’s need; catheter size greater than the patient needs damaging tissue and favoring colonization; the use of larger than ideal cuffs increases the amount of residual urine, thus increasing the risk of infection. Catheters with cuffs larger than 10 ml must be used only under specific indications as the cases of specific procedures, or in women with pelvic muscle rupture.

Based on the results, studies and researches performed showed that the risk of infection reduces after standardization of antisepctic techniques for bladder catheter insertion and maintenance\(^4\),\(^7\)-\(^10\); hence, some strategies have been devised to prevent UTI associated with bladder catheterization: trained team to antiseptically insert urinary catheters; to properly wash hands before and after performing the task; to properly clean the urethral meatus with soap and water at least twice-a-day; to empty the urine bag following the department routine schedule, at frequent intervals; the urine bag must be sealed and changed should it rupture;
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<th>Author</th>
<th>Objective</th>
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<tr>
<td>1. David(9)</td>
<td>To review some aspects involving different infections presented by critical patients and to address controversies about antibiotic therapy used to control the most frequent pathogens.</td>
<td>Literature review</td>
<td>Infections happen frequently in severely ill patients and represent one of the major causes of mortality in hospitalized patients at the ICU – mainly due to the constant use of invasive methods such as urinary catheterization, tracheal intubation and intravascular catheters.</td>
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<td>2. Marra A, Barbosa O, Barsanti WS(10)</td>
<td>To address control of infection through epidemiological surveillance, and prevention of infection inside the ICU.</td>
<td>Literature review</td>
<td>A search for the infection site in sepsis and the actions to be taken towards its prevention are specific actions which should be taken in order to control the source of the infection.</td>
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<td>3. Lucchetti et al.(8)</td>
<td>To assess the frequency and sensitivity profile of UTI agents in patients under chronic use of bladder catheterization in the urology ward of Hospital Irmandade da Santa Casa de Misericórdia de São Paulo.</td>
<td>This study was divided into two stages: laboratory data collection and medical chart analysis.</td>
<td>Among patients submitted to bladder catheterization, 10% of them are prior bearers of bacteria. Of those without bacteria in the pre-catheterization stage, 10 to 20% will develop bacteriuria during catheterization and, from this group 20 to 30% (2 to 6% of all catheterized patients) will have UTI symptoms. Indwelling bladder catheters cause significant morbidity, such as repetition infections, and intensify social living difficulties.</td>
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<td>4. Stamm(4)</td>
<td>To demonstrate the risk factors related to onset of urinary tract infections at the ICU.</td>
<td>Literature review</td>
<td>There is a high incidence of UTI at the hospital setting, especially in patients under intensive care since they frequently use indwelling bladder catheters, most of the times for a long time, representing a source of infection.</td>
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<td>5. Knobel(4)</td>
<td>To standardize nursing care to ICU patients contributing with rehabilitation and cure processes, meeting basic human needs and keeping a holistic understanding of the individual.</td>
<td>Literature review</td>
<td>Considering the clinical instability potential of intensive care patients, constant watch and basic care are paramount in order to provide quality nursing care.</td>
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<td>6. Heilberg and Schor(6)</td>
<td>To revise recent aspects in the diagnostic and clinical treatment of urinary tract infections, the different forms of UTI presentation – here the authors discuss the pathophysiological aspects associated with bacterial virulence and host predisposing factors to UTI, such as urinary tract obstruction, bladder-ureteral reflux, urinary catheterization, etc.</td>
<td>Literature review</td>
<td>The authors concluded that it is important to understand these different aspects associated with management and prevention of recurrence in patients with UTI.</td>
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<td>7. Perry and Potter(3)</td>
<td>To educate nursing professionals as to the possible indications for indwelling bladder catheters, procedure technique and care taken to avoid contamination and consequently, UTI.</td>
<td>Literature review</td>
<td>UTI can be developed in many ways in a catheterized patient. It is important to maintain a closed urinary drainage system in order to control infection. Using antisepsis techniques will reduce the number of microorganisms.</td>
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<td>8. Stamm and Coutinho(9)</td>
<td>To determine the incidence and risk factors associated with urinary tract infections in patients submitted to indwelling bladder catheters (IBC).</td>
<td>A total of 136 patients submitted to IBC between May and December of 1993 at the Hospital of the Universidade Federal de Santa Catarina (HU-UFSC). Contemporary observational cohort uncontrolled study in patients submitted to IBC, who were followed-up from tube insertion to removal.</td>
<td>The incidence of UTI associated with IBC in the sample analyzed was of 11%, because at the UH-UFSC there is a control of alterable risk factors. The bladder catheterization duration is an important risk factor for this problem. It is recommended to keep it in the shortest time possible in hospitalized patients.</td>
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<td>9. Alves, Luppi and Paker(8)</td>
<td>To identify the epidemiological aspects associated with hospital infections and check the actions taken by nurses in hospital units to control urinary infection.</td>
<td>It was collected data through a semi-structured interview using a questionnaire. We interviewed 15 nurses responsible for the many University Hospital wards.</td>
<td>The nurses showed that they are taking proper prevention and treatment actions regarding the risk and benefit of the bladder catheterization procedure, thus guiding individualization of nursing care.</td>
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<td>10. Smeltzer and Bare(10)</td>
<td>To discuss interdisciplinary clinical strategies and the surgical and nursing treatment (e.g. catheters, dialysis and surgery) for a large group of renal and urological disorders and diseases.</td>
<td>Literature review</td>
<td>Patients under high risk of urinary tract infection because of indwelling urinary catheters must be identified and carefully monitored. They must be watched as to signs and symptoms of urinary tract infection: febrile and blurred urine, hematuria, fever, chills, anorexia and malaise.</td>
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the system must not be disconnected unless there is the need for flushing it; patients with bladder catheter must have their urine collected for culture at the tube distal end; as the urine bag is emptied, hands must be washed, proper gloves must be worn, and the urine of each bag must be discarded separately, always washing hands and changing gloves in order to avoid crossed contamination; during patient transportation, the urine bag must be fastened to the gurney, or wheelchair in order to prevent urine reflux as well as tube pulling; use proper criteria to indicate bladder catheterization; the bladder catheter should remain for just as long as it is necessary according to the treatment proposed.

**Surveillance**

Nurses must take measures for proper prevention and treatment regarding the risks and benefits of bladder catheterization, thus guiding the customization of nurse care. It may also be stressed that preventive actions and alternatives to the use of bladder catheters are equivalent, thus nurses can prevent the occurrence of UTI. These strategies allow the nursing team to work with more knowledge, making their care more individualized and efficient(9).

Thus, among risk factors for urinary tract infection, multivariate analyses have constantly shown that catheter dwelling, inadequate antiseptic technique or inadequate hand washing are the main factors predisposing ICU patients to develop urinary tract infections, thus pointing to the need to train nursing personnel in the proper techniques for hand washing and catheter insertion, prioritizing good hygiene in caring for a patient(3,8).

There must be an invest in knowledge in order to better care for our patients using indwelling bladder catheters, providing the nursing team with more information, safety and practical tips, resulting in reduced urinary tract infection rates and less complications in critically ill patients.

A single action will not be enough, it is necessary to use a more problem-solving approach in order to prevent urinary tract infections in ICU, therefore, creating constant information flow programs to monitor and assess knowledge and work routines of nursing processions taking care of patients. Hence, a multidisciplinary team work is paramount to guarantee a reduction in the rate of urinary tract infections rate associated with indwelling bladder catheter.

**REFERENCES**