



INCIDENCE OF URINARY TRACT INFECTION AFTER THE IMPLANTATION OF CLINICAL PROTOCOL

INCIDÊNCIA DE INFECÇÃO DO TRATO URINÁRIO APÓS A IMPLANTAÇÃO DE PROTOCOLO CLÍNICO

INCIDENCIA DE INFECCIÓN DEL TRACTO URINARIO DESPUÉS DE LA IMPLANTACIÓN DEL PROTOCOLO CLÍNICO

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ABSTRACT

Objective: to analyze the incidence of Urinary Tract Infections (UTI) after the implantation of a clinical protocol for the prevention of UTI associated with the use of late bladder catheters in hospitalization units.

Method: descriptive and analytical study, with quantitative, retrospective and of documentary analysis, with 100 patients hospitalized at a General Hospital. A form was used for data collection. The data was analyzed identifying the cases of UTI by the ICSH operational program of the hospital under study, and subsequently, organized, analyzed and presented in figures. **Results:** there were 100 cases of UTIs distributed in hospitalization units, most frequently in the Medical Clinic sector. The overall UTI rate for hospitalization units was five (0.05%) in the first year of the study, with reduction in subsequent years. The most frequently isolated microorganism was *Klebsiella pneumoniae*. **Conclusion:** there was a reduction in the UTI index after the implementation of the protocol, which demonstrates the effectiveness of the prevention measure.

Descriptors: Urinary Tract Infections; Catheters; Incidence.

RESUMO

Objetivo: analisar a incidência de Infecções do Trato Urinário (ITU) após a implantação de um protocolo clínico para a prevenção de ITU associada ao uso de cateter vesical de demora em unidades de internação.

Método: estudo descritivo e analítico, com abordagem quantitativa, retrospectivo e de análise documental, com 100 pacientes internados nas unidades de internação de um Hospital Geral. Na coleta de dados, foi empregado um formulário. Os dados foram analisados identificando os casos de ITU pelo do programa operacional do SCIH do hospital em estudo e, posteriormente, organizados, analisados e apresentados em figuras. **Resultados:** verificaram-se 100 casos de ITU distribuídos nas unidades de internação, com maior frequência no setor de Clínica Médica. A taxa geral de ITU das unidades de internação foi cinco (0,05%) no primeiro ano da pesquisa, com redução nos anos subsequentes. O microorganismo isolado com maior frequência foi a *Klebsiella pneumoniae*. **Conclusão:** houve redução do índice de ITU após a implementação do protocolo, o que demonstra a eficácia da medida de prevenção. **Descritores:** Infecções Urinárias; Cateteres de Demora; Incidência.

RESUMEN

Objetivo: analizar la incidencia de Infecciones del Tracto Urinario (ITU) después de la implementación de un protocolo clínico para la prevención de ITU asociada al uso de catéter vesical de retraso en unidades de internación. **Método:** estudio descriptivo y analítico, con un enfoque cuantitativo, retrospectivo y análisis documental, con 100 pacientes hospitalizados en las unidades de internación de un Hospital General. En la recolección de datos, fue empleado un formulario. Los datos fueron analizados mediante la identificación de los casos de ITU por el programa operativo del SCIH del hospital en estudio, y posteriormente, organizados, analizados y presentados en figuras. **Resultados:** se verificó que de 100 casos de ITU distribuidos en las unidades de hospitalización, más a menudo en la Clínica Médica. La tasa general de ITU en las unidades de internación fue cinco (0.05%) en el primer año de la encuesta, con reducción en los años siguientes. El microorganismo aislado con más frecuencia fue la *Klebsiella Pneumoniae*. **Conclusión:** hubo una reducción del índice ITU después de la aplicación del protocolo, lo que demuestra la eficacia de la medida preventiva.

Descriptores: Infecciones del Tracto Urinario; Catéter de Toma; Incidencia.

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INTRODUCTION

Urinary Tract Infection (UTI) is one of the most relevant and present infections in inpatient clinics and most of the time it is related to the use of the bladder catheter. It is characterized by the presence of infectious microorganisms in any part of the urinary tract (urine, bladder and kidneys) and is usually classified according to its site of infection.¹ The urinary tract is one of the most common sites of Infections Related to Health Care Assistance (IRHC), more commonly called Hospital Infections (HI), resulting in potential complications, sequelae and damage to the population, as well as increased costs in patient care.²

According to the National Agency of Sanitary Surveillance (ANVISA), among the main types of IRHC, UTI has an important representation, with about 30 to 50% of the infections acquired in general hospitals, especially when associated with the use of urinary catheters.¹ Among hospitalized patients, about 10% require temporary use of a bladder catheter which, together with prolonged use, contributes to the colonization of the urethral meatus.³ In this sense, the use of the urinary catheter for an extended period of time, without adequate assessment of their need is associated with a greater tendency to develop UTI, which entails high costs with antibiotic treatment and longer hospitalization.⁴

The association between the insertion and maintenance of the urinary catheter and the occurrence of UTI justifies the importance of the participation of health professionals in the adoption of measures that aim at the consistent use of the catheter and the prevention of UTI, aiming at reducing the time of its use, as well as improved procedures for insertion and maintenance of the catheter.²

To that end, scientific evidence shows that the use of protocols is an important and effective measure in reducing the UTI index. However, its implementation requires that all professionals involved adopt evidence-based guidelines,⁵ since evidence-based interventions can promote evaluation of the need for catheterization and withdrawal of the urinary catheter in a timely manner.⁶

Due to the impact of the occurrence of UTI, both for the health of the patient and for the health system, considering cost increases and the emergence of multi-resistant bacteria, there is no doubt that health professionals should focus their efforts on prevention and reduction of the UTI related to the use of the urinary catheter, identifying

the risk factors associated with the infection and performing the care more safely, aiming at decreasing UTI rates.

Thus, the idea of working with this object of study arose from the concern regarding the observation of a high incidence of urinary infections related to late bladder catheterization in the hospital environment, besides the need to know a little more about the subject, as well as the importance of preventive measures that help reduce these infections.

In view of the above, the objective of this study was:

To analyze the incidence of Urinary Tract Infections (UTI) after the implantation of a clinical protocol for the prevention of UTI associated with the use of late bladder catheter in hospitalization units.

METHOD

A descriptive and analytical study, with a quantitative, retrospective and documental analysis, carried out in Passos, a Brazilian municipality located in the interior of the State of Minas Gerais, in the Southern and Southwestern Meso - regions of Minas Gerais. With a population of 106,290 inhabitants (IBGE / 2015), distributed in a total area of 1,338,070 km², it is the 4th largest city in the Mineiro South/Southwest and the 26th in the State. It is located at 745 meters above sea level and has an Tropical Climate Altitude.⁷

The studied hospital holds the title of Accredited with Excellence level III granted by the National Accreditation Organization (NAO). It is a philanthropic institution with care provided to the Unified Health System (UHS) and private agreements, with clinics of various medical specialties and a diversity of complementary diagnostic, therapy and support services. It serves 23 contracted municipalities and 22 agreements. In the emergency sector, five beds are used for clinical and surgical care, which is understood as a stabilization room for diagnosis, treatment and rapid referral of the patient, depending on the severity.

There are 279 beds in total, and it is also composed of two wings to attend the agreements and individuals in surgical and clinical hospitalizations, one of them with 14 beds and the other one with 33 beds. It has a Clinical Medical Ward with 60 beds, with male and female care, separated by rooms; a 45-bed Surgical Ward and a Pediatric Hospital with 24 beds made available to SUS. It also offers care in the maternity sector, including high risk prenatal care, pre-delivery and joint

accommodation, hemodialysis, surgical center and a neonatal and pediatric ICU with 25 beds; a General Adult ICU with 24 beds and a Coronary ICU with eight beds and the Regional Cancer Hospital with 17 beds for hospitalization.

The study population consisted of all 100 patients hospitalized at a General Hospital in the interior of Minas Gerais, from 2006 to 2014, who developed UTIs, which were distributed in the following units: Clinical Medicine (50), Clinical Surgery (17), Ward A (11), Ward F (16) and Regional Cancer Hospital (6), submitted to delayed bladder catheterization.

Patients who developed UTI were excluded from this study and were not in the hospitalization units described in the General Hospital, as well as those cases that were not included in the study period.

To perform the data collection, a form was constructed based on the available fields of the Operational Program of the Hospital Infection Control Service that directed the research. The instrument sought to concentrate data in order to achieve the research objectives. A report was requested from the Hospital Infection Control Service (HICS) of a General Hospital in the interior of Minas Gerais, which was obtained from the HICS Operational Program, the "National Information System for Infection Control in Health Services" (SINAIS), stratifying the variables described in the data collection instrument for the period from 2006 to 2014.

The spreadsheets containing the UTI rate of each hospitalization unit, the antimicrobial susceptibility profile and the distribution of microorganisms by species were analyzed.

A quantitative approach was used to analyze the data, identifying cases of UTIs

through the HICS operational program of the studied hospital, and later organized and analyzed, and presented by means of figures.

The study was approved by the Ethics and Research Committee of the Passos Higher Education Foundation (FESP / UEMG), CAAE: 49539615.5.0000.5112.

RESULTS

A The prevention and control of UTI are of extreme relevance both for the injuries they can cause to the patients, and for the costs that they demand to the hospital, which demands measures of improvement in the quality of the care given to the patient.

The analysis of the incidence of UTI associated with the implantation of the clinical protocol "Prevention of urinary tract infection associated with the use of bladder catheter (ITU-CVD)" in 2012, in hospitalization units of a General Hospital in the interior of Minas Gerais, from 2006 to 2014, showed a higher percentage of UTI in the Medical Clinic sector, totaling 50 (7.61%), than the other hospitalization units, with WARD F with the second highest percentage, 16 (0.69%), according to figure 1.

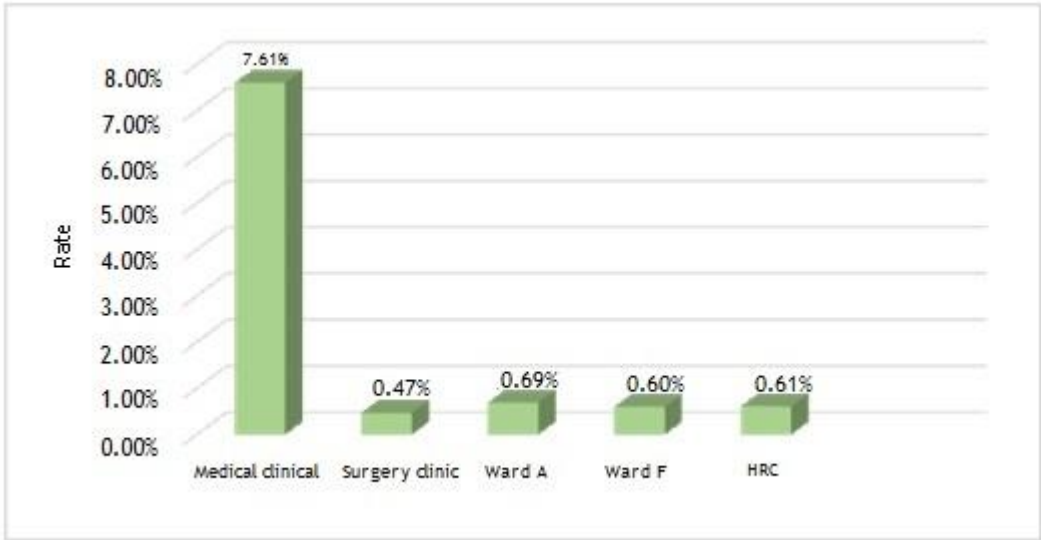


Figure 1. UTI rate related to bladder catheterization of all hospitalization units from 2006 to 2014. General hospital of the interior of Minas Gerais. Passos (MG), Brazil, 2014.

It was observed that, two years after the implantation of the protocol, a very significant reduction tendency was obtained, showing, therefore, that the implantation had positive effects in the reduction of the UTI index.

The Clinical Medical UTI percentage, before the implementation of the protocol, was quite varied and, in the year of implantation, presented a discrepant increase, with reduction in the following years.

In Ward F, in 2012, the year of implementation of the protocol, a zero UTI rate was achieved, and in the following years it remained at a rate at the same level.

The Regional Cancer Hospital unit had a zero ITU rate up to two years before the

protocol was implemented, and thereafter there was a significant UTI rate, with a reduction until the last year of the study.

The Ward A unit had a small percentage of UTI in the years prior to the implementation of the protocol, on average two cases/year and, after it's implantation, a total reduction of cases of UTI was observed.

Figure 2 shows the general UTI rate of all hospitalization units in the period studied. It can be observed that, in 2006, the rate was six (0.05%) and had an important increase in the next year of 2007 to 26 (0.28%) and, later, it was maintained with a similar percentage in the following years: 12 (0.11%) and 13 (0.12%).

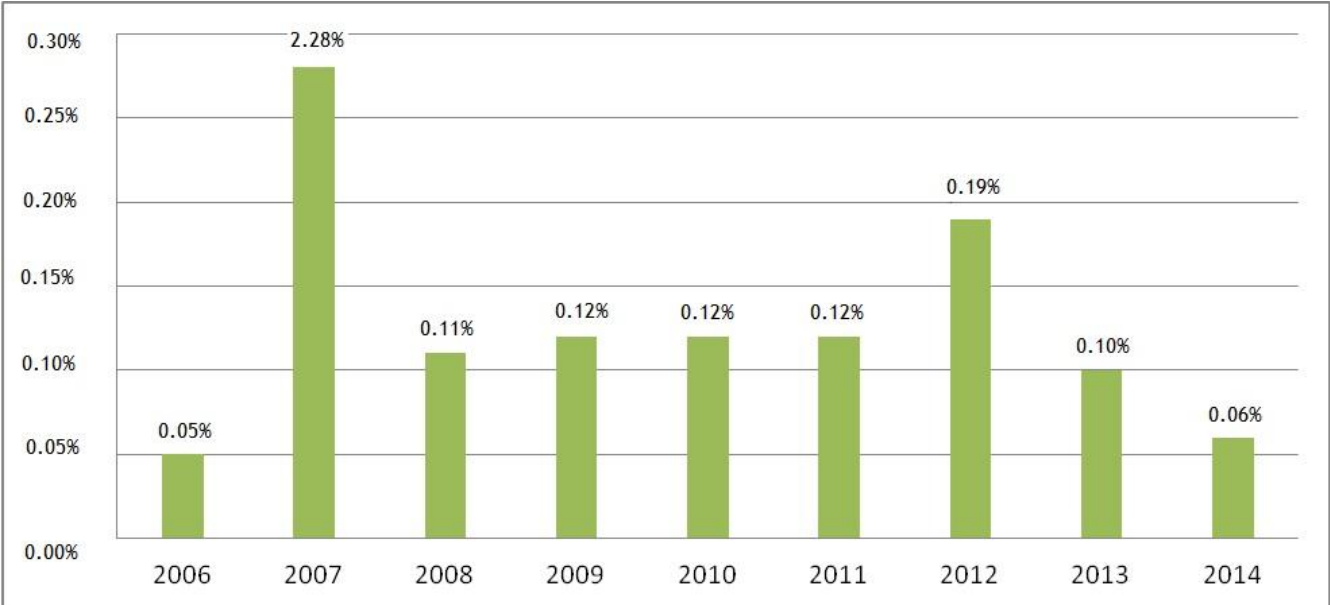


Figure 2. UTI rate of all hospitalization units per year surveyed. General Hospital of the interior of Minas Gerais. Passos (MG), Brazil, 2014.

In the year of implementation of the protocol (2012), there was a significant increase of 0.19% and a tendency to decrease in subsequent years, which is probably due to greater surveillance and notifications of the cases from the protocol.

Klebsiella pneumoniae is the main microorganism isolated with a frequency of nine (21.43%), followed by *Escherichia coli*, with seven (16.67%). Corresponds to 38.1% of the total. The third largest was *Acinetobacter baumannii*, with a frequency of five (9.52%).

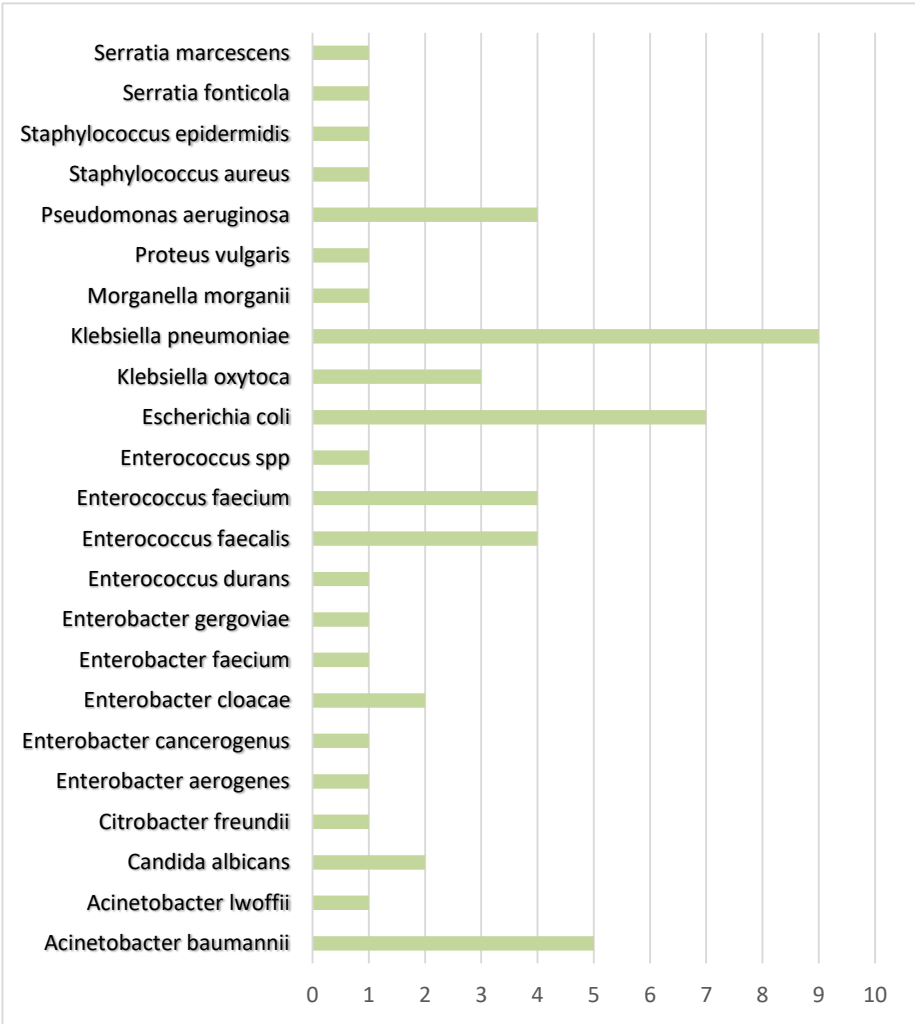


Figure 3. Distribution of micro-organisms by causing species of UTIs of all hospitalization units. General Hospital of the interior of Minas Gerais. Passos (MG), Brazil, 2014.

The results show that the control and prevention of catheter-related UTIs require a range of measures, and therefore, the nurse's competence, the interventions that may have as the primary goal the quality of life of the patient.

DISCUSSION

As The current predominant activities of IRHC control, including UTIs, are centered on epidemiological surveillance, using epidemiological outcome indicators, that is, measuring how often an event occurs.⁸

The studies show that one of the factors contributing to the occurrence of UTI in the hospital environment is catheterization of the urinary tract.^{3,9-10} The introduction of the catheter into the sterile urinary tract facilitates the penetration of microorganisms into the urethra, of intrinsic defense of the host, such as urination and emptying of the bladder.⁹

As for the microorganisms that cause UTI, the literature results resemble those found in this study, in which it identified the predominant occurrence of the microorganisms, *Escherichia coli* and *Klebsiella pneumoniae*.¹¹

The results found in this study, with regard to the significant increase in cases of UTI after protocol implantation, with decrease in subsequent years, corroborate with the literature data. One study shows a urinary catheter-related UTI rate of 15.71 in the year 2005, with a decreasing trend in subsequent years, reaching a rate of 4.35 in 2014, due to improved prevention practices of hospital infection.³

Another study showed the incidence of positive uroculture in 37.5% of the 56 patients who used a late bladder catheter. Clinical and laboratory diagnosis (simple urine and uroculture examination) are fundamental for the highest diagnostic accuracy when they identify the cause of the infection, the etiologic agent and the bacterial sensitivity/resistance profile. However, in order to classify a uroculture as positive, it is necessary to standardize that the collection of urine is performed aseptically by means of an average jet.⁹

UTIs may still not be identified in some samples due to masking by drugs with broad spectrum coverage used by patients during hospital stay, which is a factor that significantly changes the indicators of UTI occurrence in hospital institutions.⁴

The available scientific evidence on infection prevention practices associated with bladder catheterization is also associated with the implementation of new technologies, such as the use of silver alloy catheters, nitrofurazone-coated silicone catheters, and hydrophilic catheters. Reduce the occurrence of infection.¹⁰

In addition, the use of protocols is fundamental for the standardization of procedures and reduction of UTI in the hospital environment, which, according to the literature, should include methods of continuing education, aimed at directing nurses to the correct handling of the catheters.¹⁰

There is evidence to prove the effectiveness of the protocol in reducing the UTI index, which confirms the data found in this research. To that end, its implementation requires all professionals to adopt evidence-based guidelines to ensure the quality of care and to reduce the occurrence of UTI.⁵

The existence of a protocol is not a guarantee of a qualified clinical practice, and the institutions should implement evaluation processes, since the authors' research evaluated protocols for bladder catheterization in nine hospitals in a city in the interior of São Paulo and identified that 100% of the Institutions had a protocol, but there was a difference between the procedures described in each of them.¹²

Another study also identified that the contents of the protocol on UTI prevention at the institution studied did not meet the recommendations regarding techniques for catheter withdrawal, irrigation (when indicated), replacement of the drainage system with disinfection of the connection for aseptic technique breakdown or in need of disconnection. In addition, techniques and recommendations for handling obstructed flow were not described in case of need.

Thus, the implementation and evaluation of UTI control programs and protocols should be continuous, with a view to providing appropriate patient care,¹⁵ since virtually all UTIs associated with health care are caused by urinary tract instrumentation.¹⁵

It is also verified that the measures of prevention and control of UTI associated with the bladder catheter should be based on those published in the protocols of the Centers for Disease Control (CDC), which are grouped into categories: indication of probing, insertion, maintenance, administrative infrastructure and surveillance strategies. To this end, it is the responsibility of the managers of health

institutions to encourage the creation of a prevention culture, through strategies that seek the education of professionals to acquire an effective posture in the use of procedures that maximize safety for them and the patient.¹⁶

It is also worth mentioning the benefits of the correct habit of hand hygiene by the Nursing professionals before and after handling the catheter or performing any procedure as a way to prevent UTIs and other IRHC, since the hands are configured as a possible reservoir of microorganisms that cause infections, besides being a simple, quick and low-cost action. In addition, the creation of protocols and preventive measures constitute resources to minimize the occurrence of UTIs, such as the use of gloves for the procedure, sterile technique and equipment, urine collectors with closed circuit and antireflux valve and evaluation for the removal of the bladder catheter as soon as possible.^{3,10,17} The use of bundles as an effective measure that contributes to good practices of control of IRHC, especially UTI, in the hospital environment.^{14,18}

A study showed that the use of bundles are strategies found by nurses to respond effectively to this problem, with the involvement of the health team, based on prevention and control of infection and improvement of the safety of the person who uses health services, through the provision of uniform assistance.¹⁸

Urinary catheterization is a practice present in the daily routine of Nursing professionals from its insertion to the handling of the drainage system, it is up to the nurses to evaluate the pertinence of the continued use of the catheter and the risks of complications, aiming at the adoption of preventive measures of UTI. In this sense, there is still a need to incorporate into the body of Nursing knowledge discussions, guidelines and training of the team on the current issue, proposing current guidelines, protocols and appropriate materials that increase the safety of professionals and patients.²

In this perspective, the importance of nurses is evident not only in the execution of the procedure, but also as a facilitator of educational support for their staff, with a view to improving the care provided to the patient.¹⁶ It is important to emphasize the nurse's performance of procedures of manipulation of the urinary tract for safe practices of care, in order to support the Nursing assistance ahead of the scientific knowledge allied with the clinical care, thus

tending towards the teaching-learning of the team and the provision of a holistic, humanistic assistance and with greater security for the professional-patient dyad.¹⁹

Considering the occurrence of UTI in the hospital setting, as well as its consequences for the patient's health, the impact of this infection and the risks involved in hospitalization and the manipulation of diagnostic and clinical procedures that contribute to its development. In this logic, Nursing care is confirmed in the development of care practices as a key element in the implementation of preventive measures or that minimize the impairment of the UTI, with mechanisms such as: continuing education, implementation of guidelines, norms and assistance protocols, with a view to offer the patient comfort, well-being and safety in the procedures to which they are submitted.²⁰

CONCLUSION

The UTI represents one of the most representative HIs and is associated, in most cases, with bladder catheterization of delay.

Among the hospitalization units analyzed in the studied hospital, it is identified that the Medical Clinic had the highest percentage of UTI (28.62%). It is also verified that, after the implantation of the protocol, the Ward A hospitalization unit managed to zero the number of UTI cases.

This study showed that it is possible to reduce the UTI index through the intervention of a protocol in order to make the whole team aware to work together towards the same purpose.

It is clear that protocol is an important and effective measure in reducing the UTI index and its implementation requires that all professionals must adopt evidence-based guidelines to ensure the quality of care and to minimize UTI occurrence.

Nurses' reflection on the importance of correct handling of bladder catheters is necessary, emphasizing the knowledge about the indications and the risk of this procedure, together with the responsibility in the manipulation of this device.

It is evident in this study that the study of the antimicrobial susceptibility profile of the isolated microorganisms with the highest number of occurrences can help the clinicians in the therapeutic follow-up and orientation of the patients, since the prescription of medicines without the knowledge of the profile of antimicrobial susceptibility of the bacterium causing the infection can mean an unnecessary expense with antibiotics and a

therapeutic error and, more seriously, would be the multi-resistance of these microorganisms due to the indiscriminate use of antibiotics.

Prevention is the best way to reduce the morbidity, mortality, and costs of treating infection associated with the bladder catheter. An effective strategy includes catheter insertion care, the earliest possible removal of the catheter, and the use of a closed system for urine drainage and proper care in maintaining the catheter.

REFERENCES

1. Anvisa. Agência Nacional de Vigilância Sanitária. Medidas de prevenção de infecção relacionada à assistência à saúde. 1 ed. Brasília: Anvisa; 2013.
2. Jorge BM, Mazzo A, Mendes IAC, Trevizan MA, Martins JCA. Infecção do trato urinário relacionada com o uso do cateter: revisão integrativa. Referencia [Internet]. 2013 Dec [cited 2016 May 23];31(11):125-32. Available from: http://www.scielo.mec.pt/scielo.php?script=sci_arttext&pid=S0874-02832013000300014&lng=pt
3. Butzke BL, Jimenez LF, Butzke M, Butzke M, Uzeika L, Marimon MM. Avaliação da taxa de infecção urinária associada a sonda vesical de demora em hospital universitário. In: II Congresso Brasileiro de Medicina Hospitalar- II CBMH [Blucher Medical Proceedings]. São Paulo: Blucher; 2014.
4. Tolentino ACMS, Silva RCL, Peregrino AAF, Schutz V. Epidemiological Profile of patients in the ICU, in use of Indwelling Vesical Catheter. J Nurs UFPE on line [Internet]. 2014 Oct [cited 2016 May 23];8(10):3256-65. Available from: http://www.revista.ufpe.br/revistaenfermagem/index.php/revista/article/view/6002/pdf_6203
5. Programa Brasileiro de Segurança do Paciente (PBSP). Prevenção de infecção do trato urinário associada ao uso de cateter. Brasília: PBSP; 2011.
6. Andrade VLF, Fernandes FAV. Acesso à assistência cirúrgica: desafios e perspectivas. Rev Latino-Am Enfermagem [Internet]. 2016 [cited 2016 May 23];24:e2678. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-11692016000100311&lng=en
7. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Estabelecimento de Saúde. Passos-MG; 2015 [cited 2016 May 23]. Available from: http://cnes.datasus.gov.br/Exibe_57Ficha_Est

[abelecimento.asp?VCo_Unidade=4212276383882.](http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-07072011000200016)

8. Fernandes MV, Lacerda RA, Hallage NM. Construção e validação de indicadores de avaliação de práticas de controle e prevenção de infecção do trato urinário associada a cateter. *Acta Paul Enferm* [Internet]. 2006 [cited 2016 May 23];19(2):174-89. Available from:

<http://www.scielo.br/pdf/ape/v19n2/a09v19n2.pdf>

9. Gomes AC, Carvalho PO de, Lima ETA, Gomes ET, Valença MP, Cavalcanti ATA. Caracterização das Infecções Relacionadas à Assistência à Saúde em Unidade de Terapia Intensiva. *J Nurs UFPE on line* [Internet]. 2014 June [cited 2016 May 23];8(6):1577-85. Available from: <http://web.b.ebscohost.com/>

10. Magalhães SR, Melo EM, Lopes VP, Carvalho ZMF, Barbosa IV, Studart RMB. Evidências para a prevenção de infecção no cateterismo vesical. *J Nurs UFPE on line* [Internet]. 2014 Apr [cited 2016 May 23];8(4):1057-63. Available from: <http://www.revista.ufpe.br/revistaenfermagem/index.php/revista/article/download/4611/8933>

11. Lima KA, Queiroz AC. Análise do perfil dos agentes causadores de infecção do trato urinário e dos pacientes portadores, atendidos no Hospital e Maternidade Metropolitano-SP. *J Health Sci Inst* [Internet]. 2012 [cited 2016 May 23];30(1):7-12. Available from: http://www.unip.br/comunicacao/publicacoes/ics/edicoes/2012/01_jan-mar/V30_n1_2011_p7-12.pdf

12. Mazzo A, Godoy S, Alves LM, Mendes IAC, Trevisan MA, Rangel EML. Cateterismo urinário: facilidades e dificuldades relacionadas à sua padronização. *Texto contexto-enferm* [Internet]. 2011 Apr-June [cited 2016 May 20];20(2):333-9. Available from:

http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-07072011000200016

13. Chaves NMO, Moraes CLK. Controle de infecção em cateterismo vesical de demora em Unidade de Terapia Intensiva. *R enferm Cent-Oeste Min* [Internet]. 2015 May-Aug [cited 2015 Oct 26];5(2):1650-7. Available from:

<http://www.seer.ufsj.edu.br/index.php/recom/article/view/773/0>

14. Ercole FF, Macieira TGR, Wenceslau LCC, Martins AR, Campos CC, Chianca TCM. Integrative review: evidences on the practice of intermittent/indwelling urinary catheterization. *Rev Latino-Am Enfermagem* [Internet]. 2013 Feb [cited 2015 Oct 26];21(1):459-68. Available from:

http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104

15. Center of Diseases Control (CDC). Device-associated Module UTI. Urinary Tract Infection (Catheter-Associated Urinary Tract Infection [CAUTI] and Non-Catheter-Associated Urinary Tract Infection [UTI]) and Other Urinary System Infection [USI]) Events. Jan 2016.

16. Conway LJ, Pogorzelska M, Larson E, Stone PW. Adoption of policies to prevent catheter-associated urinary tract infections in United States intensive care units. *Am J Infect Control* [Internet]. 2012 Oct [cited 2015 Oct 26];40(8):705-10. Available from:

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3644850/pdf/nihms-465192.pdf>

17. Anvisa. Agência Nacional de Vigilância Sanitária. Infecção do Trato Urinário - ITU: critérios Nacionais de Infecções Relacionadas à Assistência à Saúde. Brasília: Anvisa; 2009.

18. Andrade VLF, Fernandes FAV. Prevención de la infección del tracto urinário asociada al cateterismo: estrategias en la implementación de las directrices internacionales. *Rev Latino-Am Enfermagem* [Internet]. 2016 [cited 2015 Oct 26];24:e2678. Available from:

<http://www.revistas.usp.br/rlae/article/view/File/113358/111323>

19. Jorge HMS, Vidal ECF. Infecção do Trato Urinário hospitalar e suas implicações para a gestão do cuidar: revisão integrativa. *Cad Cult Ciênc* [Internet]. 2014 [cited 2015 Oct 26];13(1):40-8. Available from: <http://periodicos.urca.br/ojs/index.php/cadernos/article/view/817>

20. Carraro-Eduardo JC, Alves DSilva, Hinden IE, Toledano IP, Freitas SG, Mondino PJJ et al. Urinary tract infection and indwelling urinary catheters: prospective study in gynecological surgery with antibiotic prophylaxis. *Sao Paulo med j* [Internet]. 2015 Dec [cited 2016 June 02];133(6):517-20. Available from:

http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1516-31802015000600517&lng=en

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