

Compliance, Agreement and Reliability of the Assistance Team to Preventive Bundle for Urinary Tract Infections Associated with the Indwelling Bladder Catheter Procedure

Conformidade, Acordo e Confiabilidade da Equipe de Assistência ao Bundle de Prevenção de Infecções do Trato Urinário Associadas ao Cateterismo Vesical

Janaini Brunoski^a; Juliana Carvalho Schleder^a; Débora Melo Mazzo^{*a}; Maria Dagmar da Rocha^a; Paulo Vitor Farago^a; Guilherme Arcaro^a

^aUniversidade Estadual de Ponta Grossa, Hospital Universitário Regional dos Campos Gerais. PR, Brazil.

*E-mail: debora.mazzo@uepg.br

Abstract

Preventive measures to avoid urinary tract infection associated with indwelling bladder catheter (UTI-IBC). Have been associated with significant impact on patient's outcomes. The aim of this study was to verify UTI-IBC prevention bundle compliance, agreement and reliability of the CCU assistance team. Prospective, quantitative, observational research approved by the research ethics committee (number 2.991.245), performed in the adult CCU of a university hospital. Patients hospitalized in the CCU for more than 24 hours who used IBC were included. Data were collected for three months consisted of evaluating bundle care records obtained in two different ways: the registries of IBC care included on the medical records, and the daily bedside IBC bundle checklist. The sample consisted of 40, 77.5% were male and the mean age was 62.05(±15.6) years. The compliance of the CCU healthcare team to the prevention bundle was 100%. For the items "Need to use the catheter" and "Collector bag below 2/3" agreement was very high and reliability was strong. In the item "Catheter properly fixed", although the agreement was high, reliability was slight. The items "Collector bag below the bladder's level" and "Intimate hygiene" agreement were very high, but it was not possible to verify reliability due to the limitation of Kappa's test. The healthcare team adhered to the implementation of prevention bundles. The agreement among the items was high, but not all items presented strong reliability, showing the importance of the continuous formation of the healthcare team.

Keywords: *Urinary Tract Infections. Urinary Catheterization. Patient Care Bundles. Intensive Care Units. Patient Care Team.*

Resumo

Medidas preventivas para evitar a infecção do trato urinário associada ao cateter urinário residente (UTI-IBC) têm sido associadas a um impacto significativo nos resultados dos pacientes. O objetivo deste estudo foi verificar a aderência, concordância e confiabilidade da equipe de assistência da UCC frente aos bundles de prevenção de ITU-CVD. Estudo prospectivo, quantitativo e observacional aprovado pelo comitê de ética (número 2.991.245), realizado na UCC adulto de um hospital universitário. Foram incluídos pacientes hospitalizados na UCC por mais de 24 horas que utilizavam o CVD. Os dados foram coletados por três meses e consistiram na avaliação dos registros obtidos de duas formas diferentes: prontuário eletrônico, e à beira do leito. A amostra foi composta por 40 pacientes, 77,5% eram do sexo masculino, com idade média de 62,05 (±15,6) anos. A adesão da equipe de saúde da UCC aos bundles de prevenção foi de 100%. Para os itens "Necessidade do uso de cateter" e "Bolsa coletora abaixo de 2/3", a concordância foi muito elevada e a confiabilidade foi forte. No item "Cateter devidamente fixado", embora a concordância elevada, a confiabilidade apresentou-se fraca. Os itens "Bolsa coletora abaixo do nível da bexiga" e "Higiene íntima" apresentaram concordância muito elevada, mas não foi possível verificar a confiabilidade devido à limitação do teste Kappa. A equipe de cuidados aderiu aos bundles de prevenção. A concordância entre os itens foi elevada, porém nem todos os itens apresentaram confiabilidade alta, sinalizando a importância da educação permanente da equipe.

Palavras-chave: *Infecções Urinárias. Cateterismo Urinário. Pacotes de Assistência ao Paciente. Unidades de Terapia Intensiva. Equipe de Assistência ao Paciente.*

1 Introduction

There is a need for high attention by the healthcare team in critical care units (CCU) due to the assistance is related to an expensive cost and the work covers critically ill patients. These patients can evolve positively or negatively, thus demanding the existence of a multidisciplinary team and exceptional apparatus for supporting the patient's life¹⁻³.

For the multiprofessional team to be qualified and assertive in its activities, it is very important to have effective communication with each other and mutual respect, working together to achieve a common objective which is the patient's

recovery as soon as possible⁴. This recovery requires complex care and involves new knowledge and updated care based on protocols and guidelines in order to get improvement of care practices¹⁻³. Due to the situation and severity of patients, there is a need to use highly invasive procedures such as indwelling bladder catheter (IBC), mechanical ventilation, and central venous catheter for patient's treatment and monitoring, which can result in infections when these devices are not properly handled⁵.

IBC is reported as the most important risk factor for urinary tract infection (UTI), being a device that should be

used exclusively when insertion criteria and maintenance are met⁶. It is noticed that when inserting this device in the patient, an exponential bacterial growth occurs in a proportion of 5-10% per day⁷. Urinary tract infections associated with the IBC procedure (UTI-IBC) reach several ages, mainly in women due to the shorter urethra and being closer to the anus. In men, the greater urethral length, greater urinary flow and the prostatic antibacterial factor are protective factors.

UTI-IBC, as well as other nosocomial infections, is a suitable indicator of care quality since it is related to adequate care. In addition, the literature shows that healthcare-related infections (HAI) cause a high rate of morbidity and mortality. UTI accounts for 30% of HAI, mainly in CCU, and it is reported that the main problem appears by the catheter permanence beyond the necessary³. Prevention in care is the best alternative to reduce cases of nosocomial infections. The most effective way of prevention is to apply a set of measures also known as “bundle”. Bundles were developed by the *Institute for Healthcare Improvement* to prevent certain nosocomial infections, these measures prevent HAI such as ventilator-associated pneumonia, UTI-IBC, catheter-associated bloodstream infections, among others⁶.

UTI-IBC is related to morbidity and mortality, and can increase the length of stay and costs for public health⁸, thereby justifying the implementation and analysis of these preventative measures and evaluating the effectiveness in their use. So, the aim of this study was to verify UTI-IBC prevention bundle compliance, agreement and reliability of the CCU assistance team.

2 Material and Methods

This investigation was a prospective, quantitative, observational study approved by the research ethics committee of Ponta Grossa State University by the number 2.991.245. It was performed in the adult CCU of the Wallace Thadeu de Mello e Silva Regional University Hospital, in Ponta Grossa, Parana, Brazil, consisting of 10 beds for exclusive public care.

The inclusion criteria were patients hospitalized in the CCU for more than 24 hours who used IBC. Exclusion criteria were: failure to fill the bundle (missing data), death before completing 24 hours of CCU admission, and patients with contraindications to remove the indwelling catheter (cystostomy or medical criteria)⁹. Data were collected from December, 2018 to February, 2019 and patient’s information as, sex, clinical diagnosis, infection presence and hospital outcome (discharge or death) was obtained through medical records.

This study consisted of evaluating bundle care records obtained in two different ways: the registries of IBC care included on the medical records, made by a member of the healthcare team, and the daily bedside IBC bundle checklist, made by a researcher. The bundle care included information of: catheter use; catheter properly fixed; collector bag below

2/3 of its full capacity; collector bag below the bladder’s level and; periurethral hygiene. Although checking for urinary flow obstruction was not foreseen in the service bundle the researcher also evaluated this item. For the bedside bundle, a pilot and suitable calibration of the researchers were carried out before collection in order to adjust the instrument and the researchers. The item “catheter use” verify the suitable indication for the indwelling catheter use was investigated, who are patients with the impossibility of spontaneous urination; hemodynamically unstable patient with need of urinary output monitoring; post-operative for specific urological surgeries; and treatment of female patients, with grade IV pressure ulcer with healing compromised by urine contact⁹.

The data plotted were stored in a *Microsoft Office Excel* spreadsheet and subsequently analyzed using the *Statistical Package for the Social Science* (SPSS) 20 program. A descriptive statistical analysis of all variables was performed. To analyze the agreement and reliability of the bundle records, Cohen’s Kappa test was performed, considering the following values: ≤0.20 (none); 0.21-0.39 (minimum); 0.40-0.59 (weak); 0.60-0.79 (moderate); 0.80-0.90 (strong) ≥0.90 (near perfect). To be considered satisfactory, the cutoff point was 0.60, as recommended by McHugh (2012)¹⁰, and considered a level of significance of 5%.

3 Results and Discussion

A total of 155 patients were admitted to the CCU between the three months of investigation, where 40 (26%) patients required the use of IBC. The mean age was 62.05 (±15.6) years, 77.5% (n=31) were male and 22.50% (n=9) female. Other particular data associated with the patients who underwent IBC are expressed on Table 1.

Table 1 - Sample’s clinical characteristics

Characteristics	n	%
Reason for CCU admission		
Neurological disorders	11	27.50
Cardiological disorders	9	22.50
Surgical procedures	8	20.00
Respiratory disorders	6	15.00
Other disorders	6	15.00
Infection		
Yes	26	65.00
No	14	35.00
Site of infection*		
Respiratory tract	17	62.96
Urinary Tract	5	18.53
Abdominal	4	14.81
Related to mechanical ventilation	1	3.70
Hospitalization outcome		
Hospital discharge	16	40.00
Death	24	60.00

*One patient was diagnosed with two of the mentioned infections.

Source: resource data.

At the bedside, 116 bundle checks were performed, and the same number was found in the medical team's records in the medical charts. Table 2 presents bundle checklist items

response, concordance and reliability from both ways, bedside and medical records. Among the 116 bedside checks, only 2 (1.72%) had urine flow obstruction.

Table 2 - Bundles checklist items, concordance and reliability from medical records and bedside

Bundle item	Bedside		Medical Records		Concordance	k	p
	Yes	No	Yes	No			
Need to use the catheter							
total records	114	2	113	3	99.1%	0.796	<0,001
%	98.28	1.72	97.41	2.59			
Catheter properly fixed							
total records	104	12	115	1	90.6%	0.140	0,003
%	89.66	10.34	99.14	0.86			
Collector bag below 2/3							
total records	111	5	113	3	98.3%	0.742	<0,001
%	95.69	4.31	97.41	2.59			
Collector bag below the bladder's level							
total records	116	0	116	0	100%	*	*
%	100	0	100	0			
Intimate hygiene							
total records	115	1	116	0	99.1%	*	*
%	99.14	0.86	100	0			

Analysis by Cohen's Kappa test. *Unable to compute.

Source: resource data.

It was observed that the male sex and elderly patients prevailed, same characteristics described in a multicenter study conducted in 88 countries¹¹. Other previous studies^{12,13} reported predominant female sex, but also elderly patients. The most frequent reasons for CCU admission (neurological, cardiological and respiratory disorders, and surgical procedures) are explained by the patient's profile that the hospital assists due to being a reference regional health.

In the present study a higher percentage of presence of some type of infection was verified than the absence of it. These findings were also described in a study that aimed to verify the prevalence of infections in CCU involving 15302 patients¹¹. Regarding the sites of infection found, Vicent, Sakr, Singer et al. (2020)¹¹ observed that the main sites of infection were the respiratory tract (60.1%), abdomen (18.3%), bloodstream (15.2%) and genitourinary (10.8%), data similar to the present study.

Death was the major outcome of hospitalization. This fact may be justified due to the sample profile of this study, since all were using IBC and were interned in the CCU. According to the literature the use of IBC is related to a higher risk of UTI-IBC, which have been associated with worse patient outcomes¹⁴. Patients admitted to the CCU usually have a higher death risk than another hospitalized patients¹⁵⁻¹⁷.

The compliance of the CCU healthcare team to the prevention bundle was 100%. This allows us to infer that the assistance team understood the importance of adopting preventive measures to control UTI-IBC. It is already established that the implementation of protocols, training for professionals^{3,18,19} and auditing the care bundle adherence¹⁹ is the best strategy for UTI prevention^{3,18,19}, with significant

impact on clinical outcomes¹⁹⁻²⁰, including duration of hospital stay and cost of care²⁰.

For the items "Need to use the catheter" and "Collector bag below 2/3" agreement was very high and reliability was strong. So, the healthcare team understood these items by removing the urinary catheter early and the bag contents emptying was done at appropriate frequency, providing safe care as the protocol recommends¹⁹⁻²¹. Bundles encourage the healthcare team to define the patients who need catheterization or its removal, these kinds of intervention are associated with the decrease of catheter utilization days and rate²², such as the incidence of UTI-IBC^{19, 21}.

In the item "Catheter properly fixed" although the agreement between the two forms of data collection was high, reliability was slight. The same was reported by another study, even though being a relatively simple measure, catheter fixation was an indicator with a lower adequacy index⁸. These findings signal the importance of continued staff training²⁰. Implementing care bundles and auditing the adherence to each element should be included as a part of routine CCU practices^{18, 21}.

For the items "Collector bag below the bladder's level" and "Intimate hygiene" the agreement was very high, but it was not possible to verify reliability due to the limitation of Kappa's test. Oman et al. (2012)²³ developed a quality improvement process study where the aim was to develop and implement evidence-based, multifaceted, nurse-driven interventions and to measure the impact of these interventions on the duration of IBC and the UTI-IBC incidence among patients. The intervention consisted of three phases, in which in the last phase, nurses held 60 minutes educational

sessions about the risk factors and recommendations of using indwelling catheter. Fliers informing about catheter care like fixation, level and emptying the drainage bag, urine backflow and early removal were posted on the nursing units. The results of this quality improvement process ended up with up to 95%-100% of the nurses trained and reduced the number of UTI-IBC²³, showing the importance of CCU healthcare team permanent training.

The main limitation of this study was the lack of certainty about the trustworthiness of the responses recorded in the medical records. The heavy routine in the CCU, such as overload of activities and interferences during the shift period, may result in records that are not consistent with the bedside evaluation of the patient.

4 Conclusion

The care team understood the importance of adopting preventive measures to control the ICU-IBC by adhering to the implementation of the ICU-IBC prevention bundles. The agreement among the items was high, but not all items presented high reliability, showing the importance of the continuous formation of the staff. It is suggested that the study be continued, with verification of the reliability of the bundle responses, and correlation with infection rates, length of hospital stay, and even financial impact.

References

1. Nogueira LS, Sousa RMC, Padilha KG, Koike KM. Características clínicas e gravidade de pacientes internados em UTIs públicas e privadas. *Texto Contexto Enferm* 2012;21(1):59-67. doi: <https://doi.org/10.1590/S0104-07072012000100007>
2. Prates DB, Vieira MFM, Leite TS, Couto BRGM, Silva EU. Impacto de programa multidisciplinar para redução das densidades de incidência de infecção associada à assistência na UTI de hospital terciário em Belo Horizonte. *Rev Med Minas Gerais* 2014;24(Supl6):66-71. doi: <http://www.dx.doi.org/10.5935/2238-3182.20140088>
3. Moraes CLK, Chaves NMO. Controle de infecção em cateterismo vesical de demora em unidade de terapia intensiva. *RECOM* 2015;5(2):1650-7. doi: <https://doi.org/10.19175/recom.v0i0.773>
4. Silva BC, Martins GSM, Silva MRL, Chaves RGR, Silva ARA, Ferreira RKA. A importância da equipe multiprofissional na Unidade de Terapia Intensiva. *JNT* 2021;31(1):27-37.
5. Sena, NS, Costa CAG, Santos JMS, Lima UTS, Nascimento BEP, Lins DS, et al. Infecções hospitalares em Unidade de Terapia Intensiva: uma revisão integrativa. *Res, Soc Dev* 2022;11(10):e353111032591. doi: <http://dx.doi.org/10.33448/rsd-v11i10.32591>
6. Shimabukuro PMS, Paulon P, Feldman LB. Implantação de bundles em unidade de terapia intensiva: um relato de experiência. *Rev Enferm UFSM* 2014;4(1):227-36. doi: <https://doi.org/10.5902/2179769211097>
7. Brasil. Agência Nacional de Vigilância Sanitária Medidas de Prevenção de infecção Relacionada à Assistência à Saúde. Brasília: Anvisa; 2017.
8. Almeida RB, Santos VLB, Specht ML, Rosa LS, Fernandes IN, Souza PB, et al. Infecção urinária em pacientes utilizando cateter vesical de demora internados em uma Unidade de Terapia Intensiva. *REAS* 2021;13(7):e7724. doi: <https://doi.org/10.25248/reas.e7724.2021>
9. Brasil. Agência Nacional de Vigilância Sanitária Critérios diagnósticos de infecção do trato urinário. Brasília: Anvisa; 2017.
10. McHugh ML. Interrater reliability: the kappa statistic. *Biochem Med* 2012;22(3):276-82.
11. Vincent JL, Sakr Y, Singer M, Martin-Loeches I, Machado FR, Marshall JC, et al. Prevalence and outcomes of infection among patients in intensive care units. *JAMA* 2020;323(15):1478-87. doi: <https://doi.org/10.1001/jama.2020.2717>
12. Farias CH, Gama FO. Prevalência de infecção relacionada à assistência à saúde em pacientes internados em unidade de terapia intensiva. *Rev Epidemiol Controle Infecç* 2020;10(3). doi: <https://doi.org/10.17058/reci.v10i3.15406>.
13. Tolentino ACMS, Peregrino AAF, Marta CB, Silva RCL, Schutz V. The cost of the urinary catheterization in patients admitted to the intensive care unit. *Rev Fun Care Online* 2017;9(4):1170-6. doi: <http://dx.doi.org/10.9789/2175-5361.2017.v9i4.1170-1176>
14. Clarke K, Hall CL, Wiley Z, Tejedor SC, Kim JS, Reif L, Witt L, Jacob JT. Catheter-associated urinary tract infections in adults: diagnosis, Treatment and prevention. *J Hosp Med* 2020;15(9):552-6. doi: <http://dx.doi.org/10.12788/jhm.3292>
15. Yang S, Wang Z, Liu Z, Wang J, Ma L. Association between time of discharge from ICU and hospital mortality: a systematic review and meta-analysis. *Crit Care* 2016;20(1):390. doi: <http://dx.doi.org/10.1186/s13054-016-1569-x>
16. Azoulay E, Adrie C, De Lasseance A, Pochard F, Moreau D, Thiery G, et al. Determinants of postintensive care unit mortality: a prospective multicenter study. *Crit Care Med* 2003;31(2):428-32. doi: <http://dx.doi.org/10.1097/01.CCM.0000048622.01013.88>
17. Moreno R, Miranda DR, Matos R, Fevereiro T. Mortality after discharge from intensive care: the impact of organ system failure and nursing workload use at discharge. *Intensive Care Med* 2001;27(6):999-1004. doi: <http://dx.doi.org/10.1007/s001340100966>
18. Miranda AL, Oliveira L, Nacer TD, Mesojedovasaguair CA. Results after implementation of a protocol on the incidence of urinary tract infection in an intensive care unit. *RLAE* 2016;24:e2804. doi: <http://dx.doi.org/10.1590/1518-8345.0866.2804>.
19. Soundaram GVG, Sundaramurthy R, Jeyashree K, Ganesan V, Arunagiri R, Charles J. Impact of care bundle implementation on incidence of catheter-associated urinary tract infection: a comparative study in the intensive care units of a tertiary care teaching hospital in South India. *Indian J Crit Care Med* 2020;24(7):544-50. doi: <http://dx.doi.org/10.5005/jp-journals-10071-23473>
20. Shuman EK, Chenoweth CE. Urinary catheter-associated infections. *Infect Dis Clin N Am*

- 2018;32(4):885-97. doi: <https://doi.org/10.1016/j.idc.2018.07.002>
21. Meneguetti MG, Ciol MA, Bellissimo-Rodrigues F, Auxiliadora-Martins M, Gaspar GG, Canini SRMS, et al. Long-term prevention of catheter-associated urinary tract infections among critically ill patients through the implementation of an educational program and a daily checklist for maintenance of indwelling urinary catheters: a quasi-experimental study. *Medicine* 2019;98(8):e14417. doi: <https://doi.org/10.1097/MD.00000000000014417>
22. Tyson AF, Campbell EF, Spangler LR, Ross SW, Reinke CE, Passaretti CL, et al. Implementation of a nurse-driven protocol for catheter removal to decrease catheter-associated urinary tract infection rate in a surgical trauma ICU. *J Intens Care Med* 2020;35(8):738-44. doi: <https://doi.org/10.1177/0885066618781304>
23. Oman KO, Makic MBF, Fink R, Schraeder N, Hulett T, Keech T, et al. Nurse-directed interventions to reduce catheter-associated urinary tract infections. *Am J Infect Control* 2012;40(6):548-53. doi: <https://doi.org/10.1016/j.ajic.2011.07.018>.