

The excessive use of urinary catheters in patients hospitalized in university hospital wards

USO EXCESSIVO DO CATETER VESICAL EM PACIENTES INTERNADOS EM ENFERMIARIAS DE HOSPITAL UNIVERSITÁRIO

USO EXCESIVO DEL CATÉTER VESICAL EN PACIENTES INTERNADOS EN ENFERMERÍAS DE HOSPITAL UNIVERSITARIO

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ABSTRACT

This cohort study included 254 adult patients who used a urinary catheter (UC) during their hospitalization in a university hospital ward. The following were evaluated: catheter use, indication, time of permanence, urinary infection density, mortality, and hospital stay. Throughout the studied period, 14% of the hospitalized patients received UC, totaling 1735 UC-day. In 23% of cases, the procedure had not been prescribed, and neither was its indication documented. The average time of UC use was 6.8 days. Among clinical patients, the indication for UC was inadequate in 29%; time of permanence was considered inadequate in 49% of clinical patients and in 66.9% of surgical patients. Patients with inadequate UC use had more urinary tract infections (RR 1.86 IC95% 1.4 to 3.04) and longer hospital stay (11.9 and 8.9 days, $p=0.002$). This study permitted to identify flaws in the care process that are potentially changeable and important to avoid urinary tract infection by urinary catheter use.

DESCRIPTORS

infection
Urinary catheterization
Urinary tract infections
Nursing

RESUMO

Este estudo de corte incluiu 254 pacientes adultos que usaram cateter vesical (CV) durante a hospitalização em enfermarias de um hospital universitário. Foram avaliados: utilização do cateter, indicação, tempo de permanência, densidade de infecção urinária, mortalidade e permanência hospitalar. Durante o período de estudo, 14% dos pacientes internados usaram CV, totalizando 1.735 CV-dia. Em 23% dos casos, o procedimento não foi prescrito, nem sua indicação foi documentada. O tempo médio de uso do CV foi de 6,8 dias. Entre os pacientes clínicos, a indicação do CV foi inadequada em 29%; o tempo de permanência foi considerado inadequado em 49% dos pacientes clínicos e em 66,9% dos pacientes cirúrgicos. Pacientes com uso inadequado do CV tiveram mais infecção do trato urinário (RR 1,86 IC95% 1,4 a 3,04) e maior tempo de permanência hospitalar (11,9 e 8,9 dias, $p=0,002$). O estudo permitiu identificar no processo assistencial falhas potencialmente modificáveis e importantes para a prevenção da infecção do trato urinário por cateter vesical.

DESCRIPTORIOS

Infecção hospitalar
Cateterismo urinário
Infecções urinárias
Enfermagem

RESUMEN

Estudio de coorte incluyendo 254 pacientes adultos que recibieron catéter vesical (CV) durante hospitalización en enfermerías de hospital universitario. Se evaluó: utilización del catéter, indicación, tiempo de permanencia, densidad de infección urinaria, mortalidad y permanencia hospitalaria. Durante el período de estudio, 14% de los internados usaron CV, totalizando 1753 CV-día. En 23% de los casos no fue prescrito, ni documentada su indicación. El tiempo medio de uso del CV fue 6,8 días. Entre pacientes clínicos, la indicación del CV fue inadecuada en 29%; el tiempo de permanencia se consideró inadecuado en 49% de pacientes clínicos y en 66,9% de pacientes quirúrgicos. Los pacientes con uso inadecuado del CV sufrieron más infecciones del tracto urinario (RR 1,86 IC95% 1,4 a 3,044) y mayor permanencia hospitalaria (11,9 y 8,9 días, $p=0,002$). El estudio identificó fallas del proceso asistencial, potencialmente modificables, importantes para prevención de infección del tracto urinario por catéter vesical.

DESCRIPTORIOS

Infeción hospitalaria
Cateterismo urinário
Infecciones urinarias
Enfermería

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INTRODUCTION

The urinary catheter (UC) is an important health care resource, however, overuse is common, and once it is placed, it often remains in place much longer than the necessary⁽¹⁾. The UC is uncomfortable and restrictive, and causes trauma, bleeding and pain. It is the most important risk factor for urinary tract infection (UTI). A single catheterization is associated with a 1% to 2% risk for developing UTI, and the cumulative risk is 5% per day⁽²⁾. UC-associated UTI (UC-UTI) may account for up to 40% of hospital infections, and prolongs the length of stay in about three days, which can become more complicated with bacteremia and death⁽³⁻⁴⁾.

It is estimated that about 20% to 50% of hospitalized patients are submitted to urinary catheterization, and some studies suggest that up to 38% of physicians are unaware their patient is using a UC, which contributes for the UC to remain in place longer than the necessary⁽⁵⁾. A study performed in an Intensive Care Unit (ICU) found that UC use was considered inappropriate for 13% of patients and for 41% of patients the UC remained in place longer than the necessary⁽⁶⁾.

Today, it is generally accepted that indications for UC should be limited to cases of acute urinary retention, diuresis control in critically ill patients, in the postoperative period of urological surgeries or surgeries involving sutures contiguous to the genitourinary tract, long surgeries or those requiring diuresis control, incontinent patients with sacral or perineal ulcers, terminally ill patients, or patients who are expected to be bedridden for a long period due to back or pelvic trauma^(3,7-9).

In cases of postoperative patients using UC, with rare exceptions, the device should not remain in place for more than 24-48 hours, as studies have shown that the risk of infection may surpass the benefit⁽¹⁰⁾.

Several measures specifically directed to the placement technique, collection system, type of catheter, and the daily UC management care have been recommended to reduce UC-UTI. Of all the recommended measures, avoiding catheter use and removing it as soon as possible have been considered the most important^(1-3,7). Furthermore, good practice principles emphasize the importance of registering every procedure involving urinary catheterization on the patient record, including the request for its placement and the justification^(1,11-12).

There is also some evidence suggesting that there is a greater chance of catheter use being appropriate when the physician registers the request for its placement on the patient record⁽¹³⁾. Therefore, it is expected that physicians request the UC placement and register that order

on the patient record, justifying its indication and also recording its removal. From the nursing team, it is expected they register who performed the procedure, any technical difficulties that occurred, the material that was used, the data of the procedure, the daily care that was provided, as well as the asking the physician every day about the need to maintain the UC in place.

Studies suggest that the systemized participation of nurses familiar with UC indications, and asking the physicians about the need for maintaining it in place, is essential to reduce UC-UTI^(8,13-14).

In order to plan educational activities and the correct direction of efforts to avoid UC-UTI, it is important that each hospital knows the profile of UC use and the possible inappropriateness of the indication or the time it is kept in place. However, studies performed in the United States have shown that only 25% of hospitals actually monitor which patients use UC, and only 20% monitor UC use duration and removal⁽¹⁵⁾.

It is estimated that about 20% to 50% of hospitalized patients are submitted to urinary catheterization, and some studies suggest that up to 38% of physicians are unaware their patient is using a urinary catheter, which contributes for the urinary catheter to remain in place longer than the necessary.

For a long time, the activities habitually developed to avoid hospital infections such as UC-UTI included epidemiologic surveillance and monitoring rates and incidences, which are considered outcome indicators. By working only with these indicators, there is limited understanding to why these outcomes occur, which is thus insufficient to improve management practices. Considering hospital infections as flaws, the evaluation of the health care process is being gradually adopted, because process indicators are useful for diagnosis, defining agreement rates, and educational activities goals and planning. Therefore, process evaluation can be an important tool to improve quality, because when the process being measured can be changed, it has a clear relationship with the outcome⁽¹²⁾.

Considering the frequency with which UC is performed and the potential of avoiding UC-UTI, the purpose of this study was to evaluate UC use in adult patients hospitalized in the Internal Medicine and Surgery wards at Marília Faculty of Medicine State University Hospital using the following process and outcome indicators: use rate; how often the placement request indication were recorded; use appropriateness in terms of the indication and time of use; UC-UTI incidence and its impact on length of stay and mortality.

Evaluate if there are any differences regarding these indicators between clinical and surgical patients.

Identify possible flaws related to these indicators to subsidize actions to improve health care quality at the referred hospital and the educational activities in Medicine and Nursing courses.

METHOD

This study was approved by the Ethics Committee for Research with Human Beings at Marília Faculty of Medicine, as per Resolution 196/96 of the National Health Council (review number 405/08).

Location: Clinics Hospital at Marília Faculty of Medicine. A general, tertiary, reference hospital that assists high complexity patients, with two medical surgical ICUs and an unreferenced emergency sector.

Population: all adult patients hospitalized in wards and submitted to urinary catheterization for over 24 hours, in a period of eight months – from November 2008 to June 2009. The study used a non-probabilistic convenience sample.

Study design: prospective cohort study, in which all adult patients using UC for over 24 hours and hospitalized in general units at the referred hospital were followed on a daily basis. Data was collected until patient discharge. Patients resubmitted to UC with an interval greater than seven days from the previous catheterization were considered new cases. Medical and nursing prescriptions were consulted every day to verify if UC had been prescribed or not, as well as its indication and any complications during the procedure. Bedside visits were performed to verify the patients' level of dependency, immobility and incontinence. A standardized form was used for data collection.

The appropriateness of UC use was evaluated as to the indication and time of use, according to the criteria on CDC's *Guideline for Prevention of Catheter-Associated Urinary Tract Infection*, with some adaptations by other authors^(3,9).

Patients evaluated as having an appropriate indication for urinary catheterization, at the moment of placement, were reevaluated to verify the need for the UC remaining in place or being removed, as per the following criteria. Because no data on complications during the surgical procedures were obtained, the authors decided to consider that patients submitted to prolonged surgery would be indicated for urinary catheterization for at least 24-48 hours. Patients hospitalized in Intensive Care Units were excluded from the study.

Criteria used in the urinary catheterization evaluation:

The following were considered *appropriate indications* for UC:

1. Patients with acute urinary retention or obstruction;
2. Critically ill (severe) patients with the need for rigorous diuresis control;

3. Patients submitted to urologic surgery or surgeries involving structures contiguous to the urogenital system; prolonged surgeries, orthopedic surgeries. Incontinent patients with sacral or perineal ulcers;
4. Patients bedridden for long periods due to spinal injuries or severe polytrauma;
5. Terminally ill patients, for comfort.

The following were considered *inappropriate* UC use:

1. Incontinent patients;
2. Urinary catheter as a substitute for nursing care;
3. As a means to obtain urine for exams in patients capable of spontaneous diuresis;
4. Prolonged postoperative period (>2days);
5. When the condom was not used as an alternative in men without urinary retention.

The time of UC use was considered inappropriate in clinical patients from the moment that the UC was maintained in place without having one of the previously defined indications. Among surgical patients, the tolerable time of UC use was up to two days in the postoperative period, except for cases with retention, urethral bleeding or other complications that contraindicated its removal, therefore, the time of UC use was considered inappropriate if longer than two days among surgical patients. The criteria used to diagnose UC-CTI were those proposed by the CDC⁽¹⁶⁾. Antimicrobial drugs were classified as appropriate or inappropriate considering if the use was prophylactic or therapeutic, the diagnosis of the infection, and confronting with the spectrum of the prescribed antimicrobial drug and/or culture results.

Statistical analysis: the demographic data and variables were submitted to descriptive analysis, obtaining the percentages, means, and standard deviations. In the comparative analyses between patients the chi-square test was used to compare proportions and t-student to compare means and the relative risk was calculated, with a confidence interval at 95%. Data analysis was performed using SPSS version 10.0, and the monthly discharge number was provided by the Hospital Statistics Technical Center.

RESULTS

The main data of patients hospitalized between November 2008 and June 2009 are listed in Table 1.

Table 1 – Data regarding urinary catheterization (UC) of patients hospitalized at Marília Clinics Hospital – Marília, SP – 2009

	Internal Medicine Number (%)	Surgery Number (%)	Total (%)	p
Number of patients	100 (39)	154 (61)	254(100)	
Prescribed Urinary Catheterization				
Yes	54 (54)	141 (91.6)	195 (76.7)	
No	46 (46)	13 (8.4)	59 (23.3)	0.00
UC indication				
Diuresis control	22 (22)	1 (6)	23 (9.1)	
Severe/unstable patient	38 (38)	0 (0)	38 (15)	
Bedridden patient	23 (23)	4 (2.6)	27 (10.6)	
Postoperative	0 (0)	139 (90.3)	139 (54.7)	
Urinary retention	17 (17)	8 (5.2)	25 (9.8)	
Other	(0)	2 (1.3)	2 (0.8)	
Days with UC				
Mean days (SD)	8.34 (8.54)	5.83 (4.39)	6.83 (6.64)	0.003
UC-day	834	901	1735	
Prescribed UC removal				
Yes	47 (47)	113 (73.4)	160 (63)	
No	53 (53)	41 (26.6)	94 (37)	0.00
Evaluation of UC indication				
Appropriate	71 (71)	-		
Inappropriate	29 (29)	6 (4.5)		
Perioperative		147 (95.5)		
UC use time evaluation				
Appropriate	53 (53)	51 (33.1)	104 (40.9)	
Inappropriate	47 (47)	103 (66.9)	150 (59.1)	0.002
Density UTI-1000 UC-day	20/1000	10/1000	29/1000	0.25
Antimicrobial use				
Yes	56 (56)	140 (91)	196 (77.2)	
No	44 (44)	14 (9)	58 (22.8)	-
Antimicrobial Indication				
Urinary infection	12 (21)	6 (4)	18 (9)	
Surgical prophylaxis	-	107 (76)	107 (55)	
Other infections	34 (61)	12 (9)	46 (23)	
No clear indication	10 (18)	15 (11)	25 (13)	-
Patient evolution				
Discharge without UC	50 (50)	126 (82)	176 (69)	
Discharge with UC	24 (24)	24 (16)	48 (19)	
Death	26 (26)	4 (3)	30 (12)	0.43

During eight months, from November 2008 to June 2009, 1837 patients were hospitalized for over 24 hours; 998 in the Internal Medicine Unit, and 839 in the Surgery Unit. Of all patients, 254 used UC; 100 in the Internal Medicine Unit, and 154 in the Surgical Unit, which corresponds to 1735 UC-day. The total UC use rate was 14%; 18% (154/836) in the Surgical Unit, and 10% in the Internal Medicine Unit (100/998) ($p < 0.0001$, OR: 1.33, CI95% 1.19 to 1.48).

Patients' mean age was 62.26 (± 17.64) years, with 40% (102/254) women and 60% (152/254) men. Most had at least one comorbidity: 49.6% (126/254). Functional dependence was a very common condition, and was statisti-

cally more frequent among clinical than surgical patients (61% e 16.9%, $p < 0.001$).

The main admission diagnoses were cardiovascular diseases 20.1% (42/254), gastrointestinal disorders 20.5% (52/254), neoplasm 16% (42/254), urogenital disorders 10.2% (26/254), and osteoarticular diseases 9.4% (24/254).

Clinical patients had the UC placed mainly at emergency units/rooms (62% and 32%), whereas for Surgical patients the UC was usually placed at the surgery department (81.8%), $p < 0.0001$. In 23.3% (59/254) of patients, the procedure had not been prescribed, neither was the indication registered on the medical record, and this was

most frequently observed among clinical patients compared to surgical (46% and 8.4%, $p < 0.0001$).

The indications for UC among clinical patients were: diuresis control 22% (22/100), severe/unstable patient 38% (38/100), bedridden patient 23% (23/100), and urinary retention 17% (17/100). The indications for UC among patients from the surgery department were: perioperative 90.3% (139/154), urinary retention 5.2% (8/154), others 0.8% (2/154). Only 7.5% (19/254) of male patients, at some moment, used the condom as an alternative method for urine drainage.

The mean overall time of UC use was 6.83 (± 6.46) days, and was longer among clinical compared to surgical patients (8.34 ± 8.54 and 5.83 ± 4.39 , respectively, $p = 0.003$).

Among the clinical patients, the UC was considered as having an inappropriate indication in 29% (29/100), and 47% (47/100) in relation to the time of UC use. Considering the tolerable time of up to two days in the postoperative period, excluding cases of retention, urethral bleeding, or other complication that would contraindicate its removal, the time of UC use was considered inappropriate in 66.9% (103/154) of surgical patients. A statistically significant difference was observed between clinical and surgical patients as to the inappropriateness of UC duration ($p = 0.002$).

Urine samples were collected from 33% (84/254) patients for urine tests, urine culture in 24.4% (62/254). The urine culture results were positive in 47% (29/62) of patients who provided the sample. Among patients with positive urine culture results and/or who took antimicrobial drugs to treat a urine infection, three were excluded because they were diagnosed with sepsis, or urinary infection at admission; therefore, these cases were considered community acquired. The UTI density was 29/1000 urinary catheter-day, with no statistical difference between clinical and surgical patients (20/1000 catheter-day and 10/1000 catheter-day, respectively ($p = 0.25$)). *E. coli* was the most frequently isolated bacteria, and 62% (18/29) of patients with positive urine culture results were treated. Among the patients with UTI, 66.7% (12/18) had symptomatic infection associated with fever.

UTI was more common among patients whose UC use evaluated as inappropriate in terms of indication/time compared to patients in which UC use was considered appropriate (72.4% and 27.6% respectively $p = 0.001$; OR: 1.86 CI95% 1.4 to 3.04). Inappropriate UC use was associated with a length of stay longer in about three days (11.9 ± 7.2 and 8.9 ± 7.2 , $p = 0.002$).

Of all patients with a UC, 77% (196/254) used antimicrobial drugs. In the Internal Medicine department, of the 56 who used antimicrobial drugs, the indications were: 21% to treat a urinary infection (12/56), 61% (34/56) for other infections, particularly respiratory, and 18% (10/56) of the indications were not well defined. In the surgery department, 91% of patients received antimicrobial drugs

(140/154), 76% (107/140) of which for surgical prophylaxis, 4% (6/140) to treat urinary infection, 9% (12/140) to treat other infections, and 11% without a clear indication.

Eighty-eight percent of patients were discharged, 19% (48) of which with a UC; and 12% (30/254) patients died. There was no statistical difference in the evolution between clinical and surgical patients.

DISCUSSION

UC-UTI can be considered a clinical indicator of quality of care, because there are known preventive measures to reduce the occurrence. Today, it has gained such relevance that the North American Center for Medicare & Medicaid Service decided to not include any addition payment for UC-UTI, as they understand it is due to health care errors⁽¹⁷⁾.

In this study, we observed that for 23.3% of patients who used UC, the procedure had not been prescribed on their record. Among clinical patients this rate was even higher, reaching 46%. This indicator is a very important marker of working process flaws, which continues to occur in a non-systematized manner in terms of documentation, implying a potential risk of the physician who will continue to assist these patients be unaware of the fact. It is common that a different professional provides the first aid at emergency, where 38% of urinary catheterizations are performed.

In a Canada study, it was also observed that only 62.5% of patients had a registered order on for UC placement on their records, and the reason for urinary catheterization was documented in only 16.7% of cases⁽¹⁸⁾. Nursing information about who performed the procedure and if there were any difficulties were virtually inexistent on the records.

In the present study, the UC use rate was 14%; 10% among clinical patients, and 18% among surgical patients. This use rate is similar to that observed in a study performed in a North American university hospital, before implementing a UC use guideline⁽¹¹⁾.

The Marília Clinics Hospital is a reference hospital that assists patients with numerous comorbidities, complex pathologies, and a high dependence level (present in 61% of clinical patients). This certainly results in a larger demand of bedridden patients and with more nursing needs. The UC use rate may be within acceptable and expected values, but we should evaluate if the indications were appropriate and if alternative methods for diuresis or incontinence control were used effectively. In this sense, it was observed that condom use was prescribed in only 7.5% of times, which suggests being much lower than the expected. Compared to UC use, condom use is clearly associated with better results in terms of infection and patient comfort⁽¹⁹⁾.

Studies suggest that a large number of patients, up to 40%, could be catheterized for unjustified reasons^(5-6,18). It is common that the request for urinary catheterization

is to control urinary incontinence, avoiding the need to change bed linen, diapers, and reduce bedside work and care. Incontinent patients who are hemodynamically stable and with diuresis possible to be controlled using an alternative way, the risks of the UC surpass its benefits.

In the present study, one of the most common reasons to consider UC indication or its use time inappropriate was monitoring diuresis volume in clinical bedridden patients. Many UC were placed for unjustified reasons, probably considering the initial unstable condition of some patients, as those diagnosed with heart failure or stroke. However, it was observed that these patients remained with the UC in place for many days, without any clinical justification. A study that evaluated the use of indwelling urinary catheters at an Emergency Hospital in Canada, found that 20.3% of the patients were catheterized, and that UC was considered inappropriate in 50%⁽¹⁸⁾.

Among the patients submitted to surgery, UC use in the postoperative period was very frequent, reaching 95% of patients, and in 66.9% the catheter use time was evaluated as inappropriate. Patients used the catheter for a mean of 5.8 ± 4.3 days.

A study performed in the United States, based on national data, showed that 86% of patients submitted to prolonged surgery used a UC in the postoperative period, and in 50% the use time was less than two days. UC use in the postoperative period for more than two days was associated with twice the risk of developing UC-UTI and a higher risk of readmission⁽¹⁰⁾.

The urine exam was collected in 33% (84/254) of patients with UC, which shows that there are difficulties to incorporate the knowledge about the low predictive value of this exam in this patient population. It is known that just the presence of UC causes pyuria, and is therefore of little value for the triage ICU patients with of UC, as pyuria may be present even without UTI⁽²⁰⁾.

The present study was not intended to collect surveillance urine cultures of patients with UC, because it is not recommended from a daily practice point of view, as urine cultures should only be collected within the context of a clinical suspicion of UTI, thus avoiding inappropriate treatments^(2-3,20). The UTI rate, calculating the positive cultures among patients with UC was 18.5%, which is higher than those of a Thailand study, which found 14% rates among patients with UC⁽¹⁴⁾.

When the UTI density was calculated per UC-day, the values found were 29/1000 UC-day, with higher values among clinical patients (20/1000 UC-day) than surgical patients (10/1000 UC-day). Considering that these UTI densities refer to patients in general units, the rates are much higher than those reported in the literature. In Germany, there were 6.8/1000 patients hospitalized in other units than the ICU⁽²¹⁾, which suggests that, certainly, specific prevention interventions should also be adopted in general units.

Inappropriate UC use was associated with higher UTI incidence, which can be explained by the UC overuse factor, for both clinical and surgical patients. Length of stay was increased by three days, as described in other studies, and is an indirect marker of the impact that the sub-optimal use of a procedure may have on the hospital and health system costs.

One limitation of the present study is that it was performed in one single center, a teaching hospital, which may difficult the generalization of the findings, considering that UC use density, its indications and use time, and recording information on patient records certainly range according to the characteristics of the hospital, the population being assisted, and the professionals involved. It should also be stressed that the process indicators evaluated in this study were only the recording and the appropriateness of UC indication and use time, not including others such as the placement technique and the maintenance conditions, which certainly has a strong impact on UC-UTI occurrence^(1,3,12).

The present study corroborates the literature findings that show that UC is overused in clinical and surgical patients, often without a clear indication and for too long. This reveals that the issue is present in most nursing units and not only in ICUs, as more commonly observed⁽²²⁾. Furthermore, it shows the importance of using process indicators to characterize and understand the modifiable variables associated with CU-UTI, identifying opportunities to improve.

Experiences in several hospitals suggest that it is possible to reduce UC-UTI through systematic strategies. These changes usually involve investments in infra-structure, leaderships becoming involved, implementing guidelines about appropriate UC indication and use, and especially the process routines in which nursing plays a central role, so that transformations can take place.

CONCLUSION

A great number of patients were submitted to urethral catheterization at the Marilia Clinics Hospital, without, however, any records by the physician regarding the reason and indication of UC placement. In addition, there were no systematic records by the nursing team about who performed the urethral catheterization and the possible difficulties experienced during the procedure. UC indication is often inappropriate, especially in situations involving incontinent clinical patients and/or in cases when diuresis control was wanted. Surgical patients used the UC for more than two days in the postoperative period. Inappropriate UC use was associated with higher UTI rates and longer length of stay.

Preceptors should include in their daily, ideally multi-professional, visits a systematic checking of procedures to which their patients are submitted, discuss and record the justification for keeping the UC in place, exhaustively seeking for feasible or less harmful alternatives in terms of infection, comfort, and costs.

It is essential that nursing professionals have the theoretical knowledge needed for them to have a confident proactive attitude towards patients with urethral catheterization, including in the daily care routine to ask the physician about the need to maintain the UC, as it is one of the proven effective measures to reduce UC use time.

The Hospital Infection Control Committee should define, disseminate and monitor what is considered appropriate regarding UC, and make a strong educational effort with medical-surgical teams and nursing professionals in order to implement UC-UTI prevention measures in Internal Medicine and Surgical Units.

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