

# Catheter-associated urinary tract infection in medical patients of a Portuguese hospital: incidence and risk factors

Maria João Lobão<sup>1,2</sup>, Ana Lúcia Taborda<sup>1</sup>, Ana Grilo<sup>1</sup>, Carolina Sepúlveda<sup>1</sup>, Filipa Taborda<sup>1</sup>, Jorge Castro<sup>1</sup>, Ana Gorgulho<sup>1</sup>, Paulo Sousa<sup>2</sup>

<sup>1</sup> Internal Medicine Department, Hospital de Cascais, <sup>2</sup> National School of Public Health, NOVA University of Lisbon

## Background

Catheter-associated urinary tract infections (CAUTI) are frequent and preventable hospital-acquired infections, which often result in patient morbidity and mortality as well as high costs for healthcare systems.<sup>1-4</sup> Portugal is one of the EU countries with higher prevalence of Hospital-Acquired infections (HAI).<sup>5-6</sup> Although CAUTI represents one of the most frequent HAI in general wards, the epidemiological data available in our country about it is scarce which turns difficult to better understand and characterize these infectious events and develop targeted measures to prevent it.

With this study we aimed to estimate incidence, to identify risk factors and to evaluate the impact of CAUTI in intra-hospital mortality and length of stay of medical patients admitted to an internal medicine department of a Portuguese hospital.

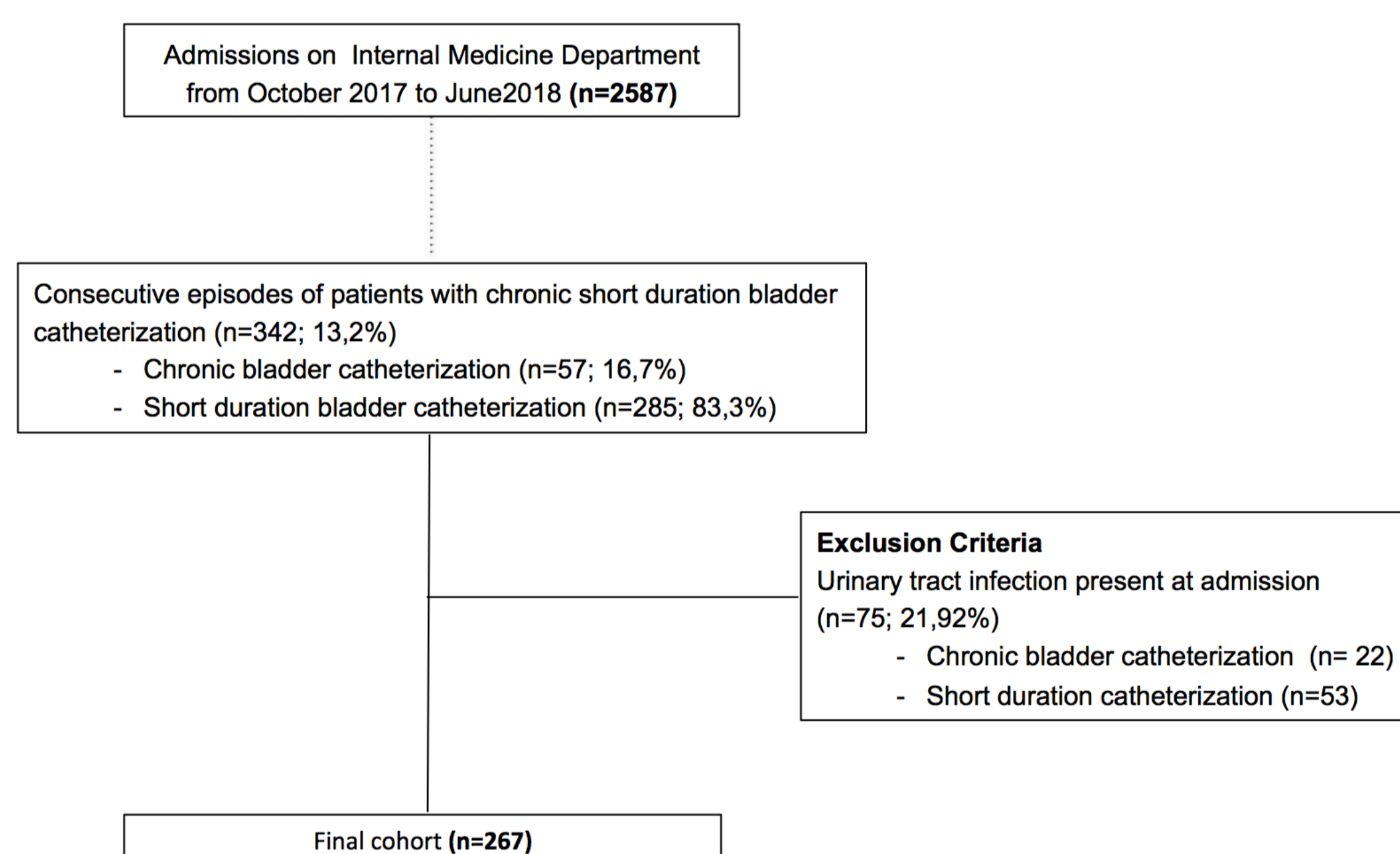
## Methods

A prospective cohort study was conducted in an Internal Medicine department of a Portuguese Hospital (93-beds) from October 2017 to June 2018. This hospital has an accreditation in Quality and Patient Safety since 2012. All patients with chronic bladder catheters or submitted to the procedure during the admission episode were considered eligible. We excluded all patients with UTI at admission.

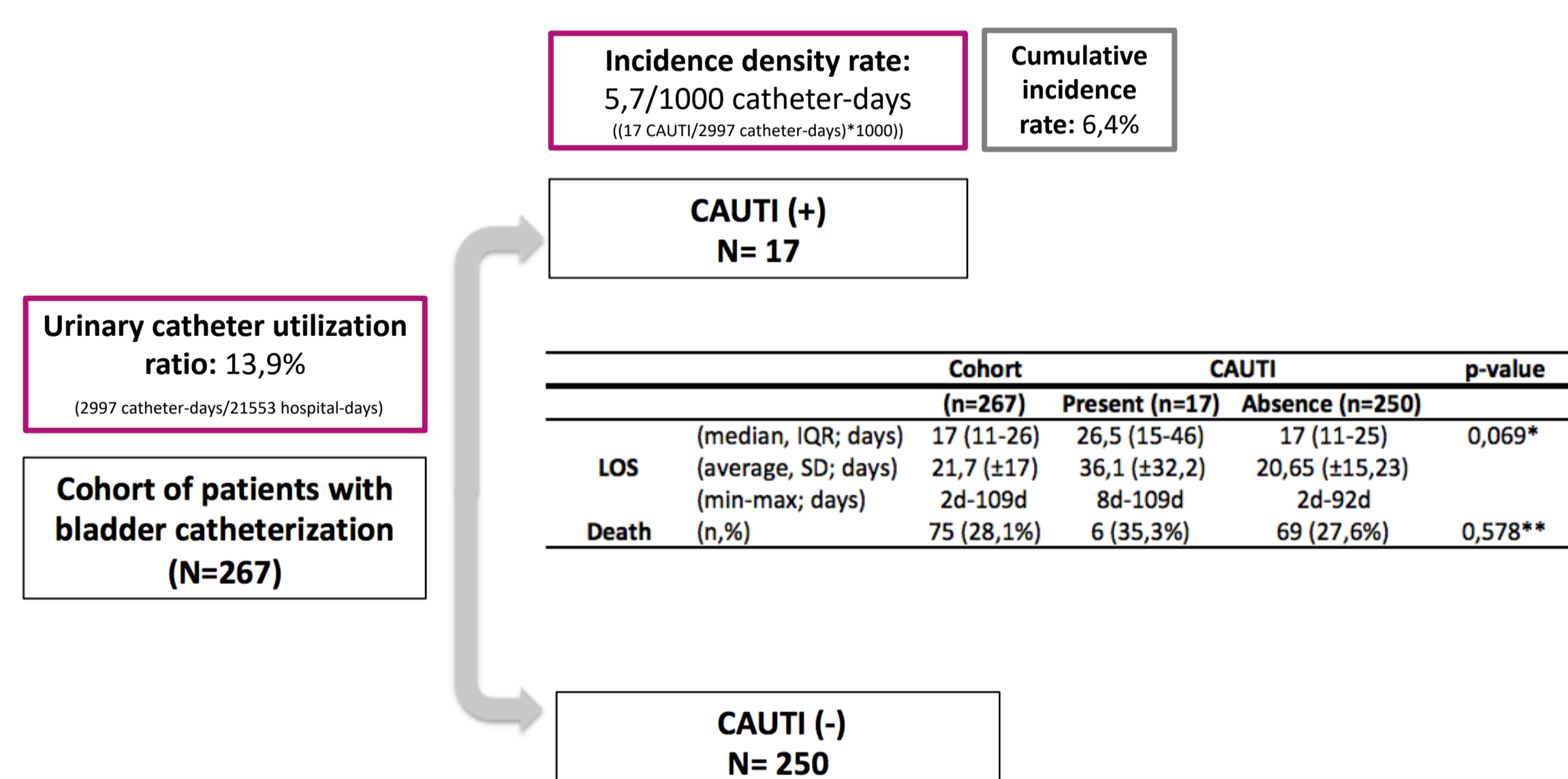
We analysed variables related to the patient (age, sex, age adjusted Charlson comorbidity Index<sup>7</sup>), admission episode (type, local, principal diagnosis according to ICD-10), bladder catheter (type, local, the procedure was done, indications, catheters-days) and outcome (CAUTI, in-hospital mortality and length of stay). For infection definition we used CAUTI CDC definitions and metrics.<sup>8,9</sup> Risk factors identification was performed using Binary Logistic Regression. To analyse CAUTI association with Length of Stay (LOS) and mortality, we used Mann-Whitney U and Qui-Square test, respectively.<sup>10</sup> A p-value < 0.05 was considered statistically significant. Statistical analysis was performed with SPSS IBM® Statistics Software (24<sup>th</sup> version). The study was approved by the Institutional Review Board.

## Results

### 1 Figure 1 Diagram of inclusion of patients in the study



### 2 Figure 2 Diagram of CAUTI, LOS and in-hospital death distribution



### 3 Bivariate Analysis

Variables	Bivariate Analysis			Adjustment for Sex and age		
	OR	95% CI OR	p-value	OR	95% CI	p-value
<b>RELATED TO THE PATIENT</b>						
<b>Sex</b>						
Female	1,57	(0,58-4,26)	0,374	1,58 (a)	(0,57-4,23,34)	0,384
Male	1,00			1,00		
<b>Age</b>						
aCCI	1,01	(0,96-1,06)	0,710	1,01 (b)	(0,96-1,06)	0,748
	1,01	(0,80-1,52)	0,560	1,01 (b)	(0,79-1,51)	0,576
<b>RELATED TO ADMISSION EPISODE</b>						
<b>Admission type</b>						
Programmed	4,25	(1,01-16,81)	0,039	4,78	(1,18-19,42)	0,029
Not programmed	1,00			1,00		
<b>ICD10 - Principal Diagnosis</b>						
Diseases of the cardiocirculatory system	1,28	(0,40-4,21)	0,665	1,34	(0,41-4,37)	0,631
Diseases of the respiratory system	0,59	(0,14-2,42)	0,459	0,63	(0,15-2,66)	0,531
Diseases of the genitourinary system	0,86	(0,17-4,50)	0,863	0,86	(0,17-4,63)	0,876
Others	1,00			1,00		
<b>LOS</b>						
Admission department	1,03	(1,03-1,05)	0,001	1,03	(1,01-1,06)	0,001
Urgency	0,55	(0,20-1,56)	0,264	0,49	(0,17-1,44)	0,195
Others	1,00			1,00		
<b>RELATED TO BLADDER CATHETER</b>						
<b>Type</b>						
Short duration	0,39	(0,19-0,97)	0,044	0,30	(0,05-0,90)	0,034
Chronic	1,00			1,00		
<b>Catheterization place</b>						
Urgency	1,81	(0,67-4,93)	0,240	1,81	(0,67-4,95)	0,243
Other	1,00			1,00		
<b>Indications</b>						
Urinary retention	1,28	(0,32-5,10)	0,718	1,29	(0,32-5,18)	0,713
Output monitoring	0,72	(0,17-3,04)	0,664	0,73	(0,18-3,10)	0,679
Other	1,00			1,00		
<b>Bladder catheterization days</b>						
	1,05	(1,02-1,09)	<0,001	1,06	(1,03-1,09)	<0,001

Legend: OR: Odds ratio; CI: Confidence interval; a) adjustment for age only; b) adjustment for sex only

### 4 Multivariate Analysis

	OR	95% IC OR	p
Admission Type	4,3	0,99-19,6	0,052
Bladder catheterization days	1,06	1,03-1,09	<0,001

Legend: OR – Odds Ratio; 95% IC OR - Confidence Interval for Odds Ratio; p - value, Wald Test  
The variables with significant p-value on the bivariate analysis were all initially introduced in the model (admission type, LOS, Type of bladder catheter, bladder catheterization days).

In this cohort the only independent risk factor for CAUTI is the number of catheter-days. **The risk to develop a CAUTI is 6% for each day of bladder catheterization.**

## Discussion and Conclusions

In this study we have found a high<sup>11,12</sup> CAUTI rate per 1000 catheters-day which underscores the importance of directed multidisciplinary programs to improve compliance to good practices in order to reduce this avoidable nosocomial infection. Taking into account the urinary catheter utilization rate we found it seems clear that there is a need to improve bladder catheterization bundles in this department. As the only independent risk factor identified in this cohort was the number of catheter-days, it is very important to consider the early remove of the device as fundamental part of CAUTI prevention strategy in this case. We didn't find any association between CAUTI end LOS and in-hospital death, but further studies are needed to better address this issue.

## References

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