



Unravelling the Complexities of Vascular Access Devices: Insights from a Monocentric Study on Catheter-Related Bloodstream Infections Beyond Intensive Care Settings

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BACKGROUND

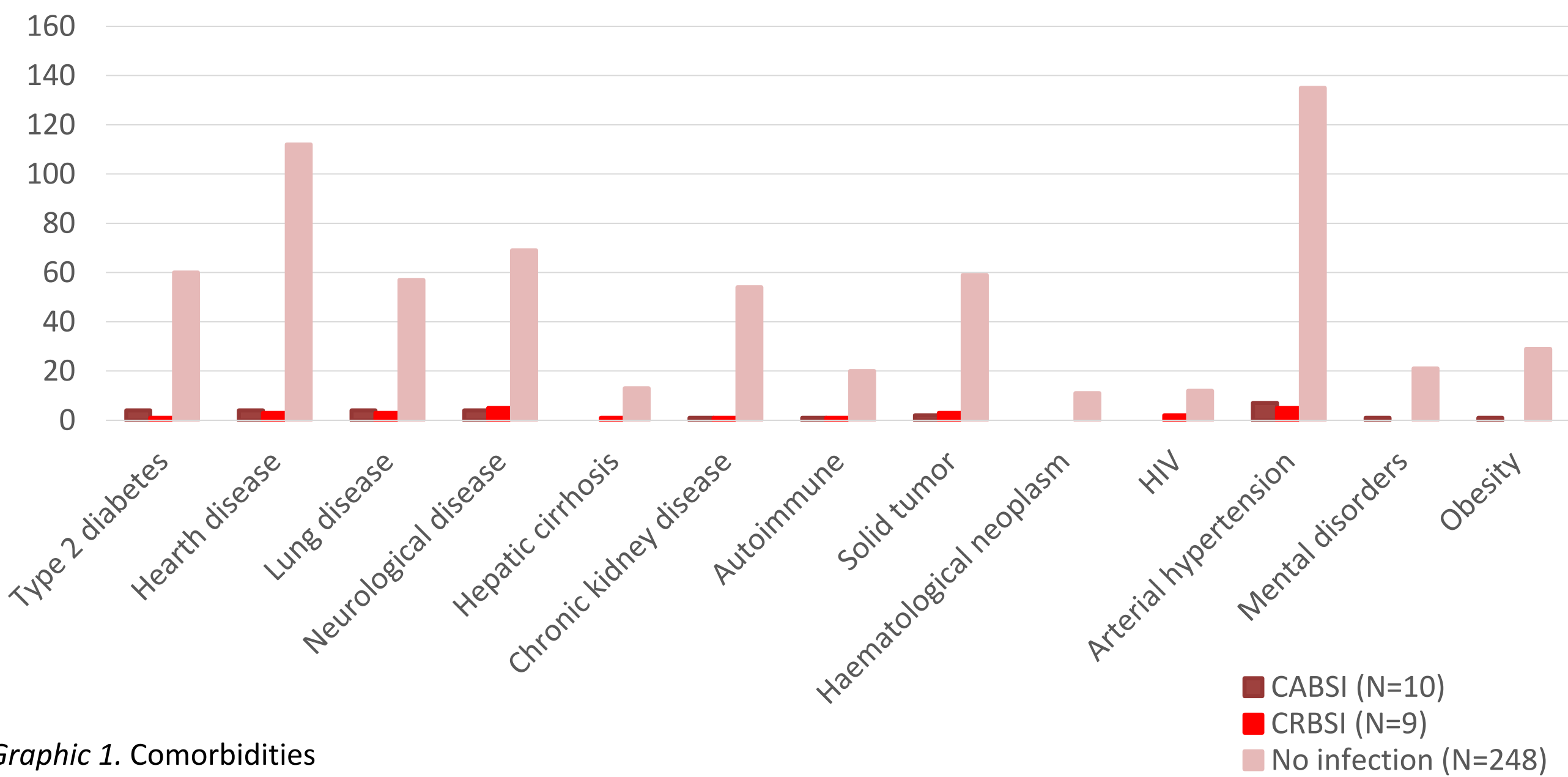
Vascular access devices (VADs) placement, an increasingly performed procedure, is linked to hospital-acquired bloodstream infections [1,2]. VADs comprise peripheral venous catheters (mid-tight, mini-midline and midline), and centrally (CICC, FICC) and peripherally (PICC) inserted central venous catheters. Distinguishing between catheter-related bloodstream infection (CRBSI) and catheter-associated bloodstream infection (CABSI) is challenging. Little data are available on their occurrence beyond intensive care unit (ICU) setting.

METHODS

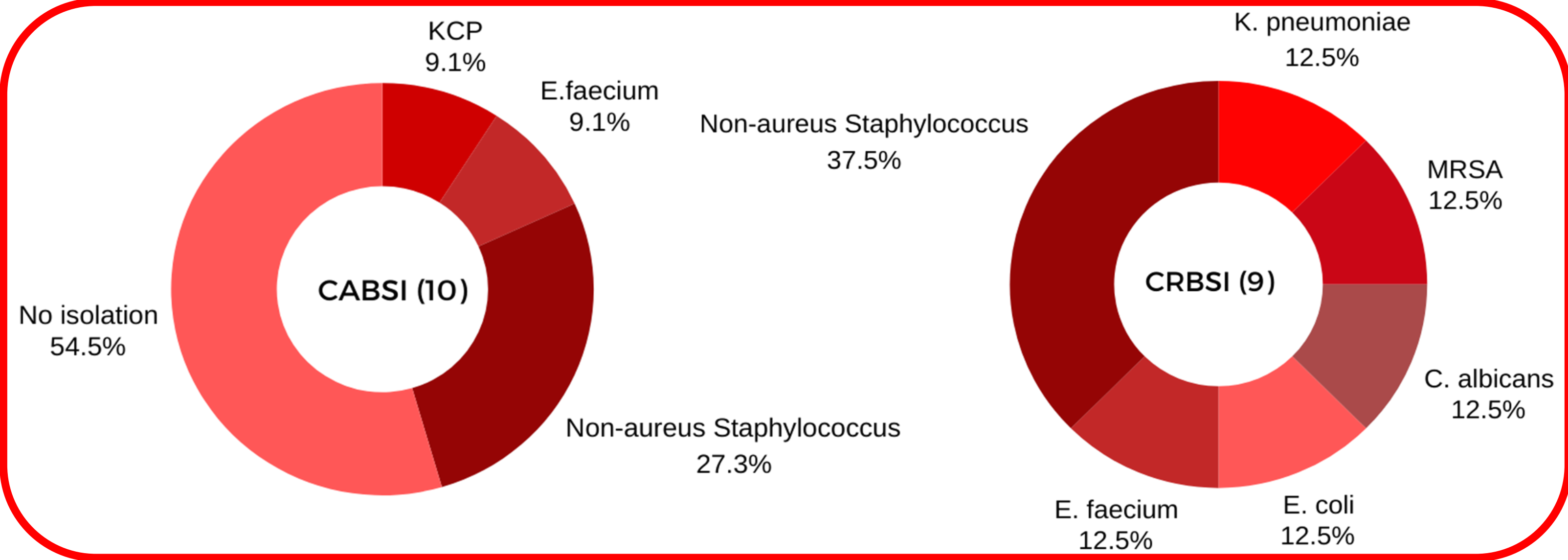
This is a retrospective, observational, monocentric study (January 2021- November 2021), conducted in Luigi Sacco hospital, Milan. Clinical and demographic data of hospitalized non-ICU patients undergone VADs placement were retrieved from medical records. Continuous variables were described with median and interquartile [IQR] while categorical variables were described with counts and percentiles and compared with Chi-square or Fisher's exact test. A multivariable logistic regression, accounting for age, gender, comorbidities, previous CABSI/CRBSI, transfer from ICU, insertion site and VAD LOS, to assess the risk factors associated with CABSI was performed.

	CABSI (N=10)	CRBSI (N=9)	No infection (N=248)	P- value
Type of vascular access				
Mid-thigh	7 (70.0%)	5 (55.6%)	71 (28.6%)	0.147
PICC	1 (10.0%)	3 (33.3%)	50 (20.2%)	
CICC	0 (0%)	0 (0%)	13 (5.2%)	
FICC	1 (10.0%)	0 (0%)	8 (3.2%)	
Mini midline	0 (0%)	0 (0%)	19 (7.7%)	
Midline	1 (10.0%)	1 (11.1%)	87 (35.1%)	
Number of lumens				
1	9 (90.0%)	8 (88.9%)	217 (87.5%)	>0.90
2	1 (10.0%)	1 (11.1%)	29 (11.7%)	
3	0 (0%)	0 (0%)	2 (0.8%)	
Tunnelled catheter	2 (20.0%)	0 (0%)	21 (8.5%)	0.352
Insertion site				
Lower limb	8 (80.0%)	5 (55.6%)	86 (34.7%)	0.059
Thoraco-cervical	2 (20.0%)	4 (44.4%)	146 (58.9%)	
Upper limb	0 (0%)	0 (0%)	16 (6.5%)	
Catheter fixation				
Subcutaneous anchor	2 (20.0%)	1 (11.1%)	54 (21.8%)	0.905
Adhesive	8 (80.0%)	8 (88.9%)	194 (78.2%)	
Removal for suspected CABSI	5 (50.0%)	8 (88.9%)	0 (0%)	<0.001
VAD LOS	9.00 [7.25, 23.5]	24.0 [15.8, 34.8]	12.0 [6.00, 23.0]	0.425

Table 2. Vascular access charaterstics [VAD, vascular access device; PICC, peripherally inserted central catheter; FICC, Femorally Inserted Central Catheter; CICC, centrally inserted central catheters LOS: length of stay].



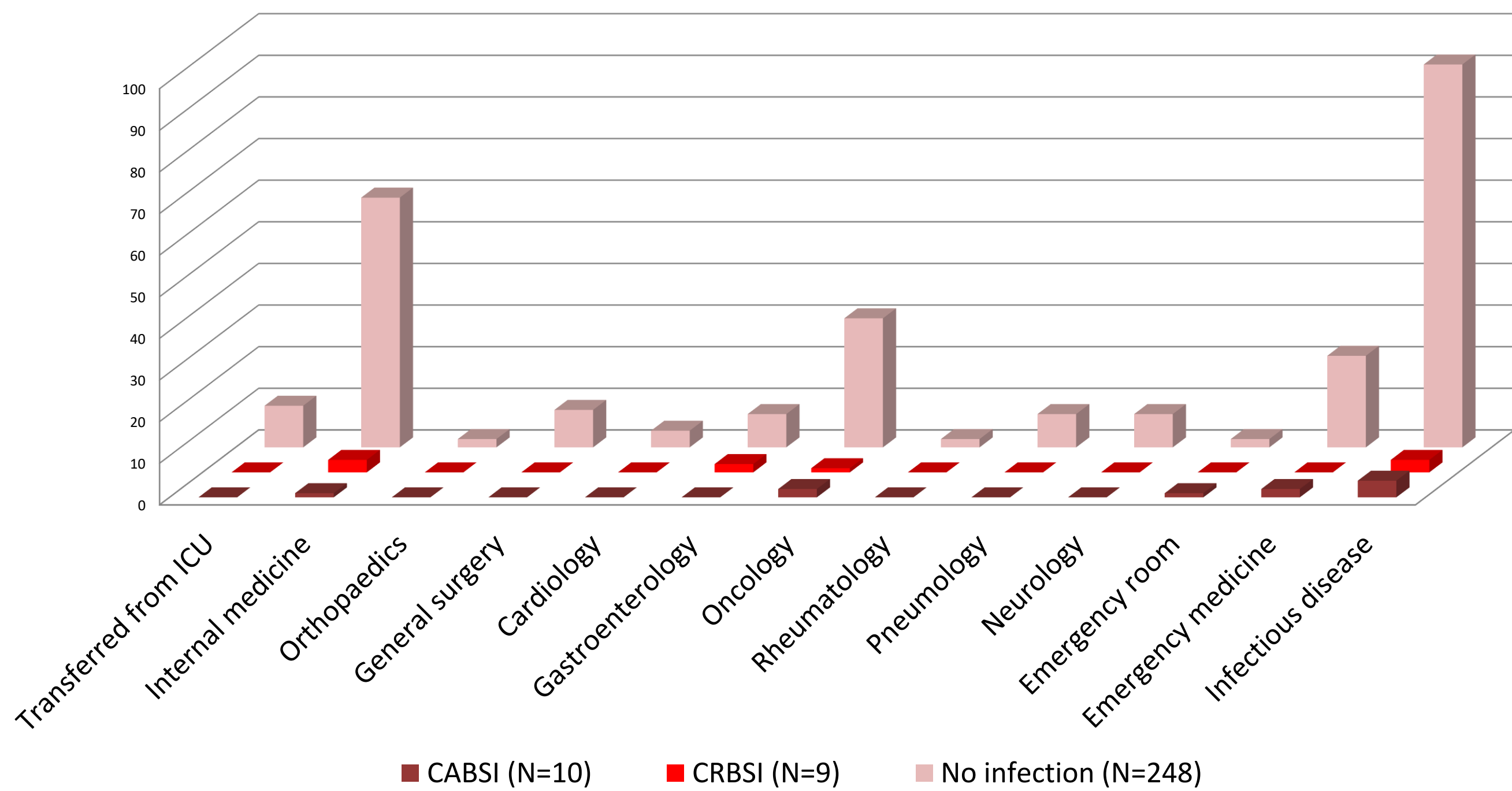
Graphic 1. Comorbidities



Graphic 2. Microbial isolation in CABSI and CRBSI [KPC, Klebsiella pneumoniae carbapenemase producing]

RESULTS

A total of 267 patients were found. Male were 122 (45.7%) and the median age was 77,5 (IQR 67.0-88.0) for CABSI group, 77 (41.0-88.0) for CRBSI group and 73 (23.0-96.0) for patients without infection. Arterial hypertension, cardiovascular and neurological diseases were the most frequent comorbidities. Peripheral devices were 191 (71.5%) while central venous catheters were 76 (28.5%). Nine CRBSI and ten CABSI events were identified. The overall prevalence of CRBSI was 0.033 (95% CI: 0.015-0.063), with an incidence of 1.508 per 1000 person-time (95% CI: 0.689-2.864). CABSI exhibited a prevalence of 0.037 (95% CI: 0.018-0.067) and an incidence of 1.66 per 1000 person-time (95% CI: 0.799-3.066). Gram-positive bacteria (GPB) were responsible for 40% of CABSI and 55.6% of CRBSI. We did not find any independent risk factor for CABSI.



Graphic 3. Department of hospitalisation

	CABSI (N=10)	CRBSI (N=9)	No infection (N=248)	P- value
Death	3 (30.0%)	3 (33.3%)	29 (11.7%)	0.038
ICU admission	0 (0%)	2 (22.2%)	21 (8.5%)	0.215
Death for CABSI	1 (10.0%)	1 (11.1%)	1 (0.4%)	0.014
Discharge	6 (60.0%)	5 (55.6%)	198 (79.8%)	0.062

Table 3. Outcomes

CONCLUSIONS

Our study reveals a low overall prevalence of CRBSI and CABSI with corresponding incidence rates. While GPB were commonly isolated, no independent risk factors for CABSI were found. Further research may be needed to better understand the occurrence and risk factors associated with these infections in non-ICU settings.

References:

- Rupp ME, Karnatak R. Intravascular Catheter-Related Bloodstream Infections. Infect Dis Clin N Am. 2018; 32: 765-787.
- Centers for Disease Control and Prevention (CDC). National and state health-care associated infections progress report. Available at: <http://www.cdc.gov/HAI/pdfs/progress-report/hai-progress-report.pdf>.