

INCIDENCE, RISK FACTORS AND IMPACT ON CLINICAL OUTCOMES OF BLOODSTREAM INFECTIONS IN PATIENTS HOSPITALISED WITH COVID-19

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BACKGROUND

- **Bacterial co- and super-infections** may complicate disease course in COVID-19
- **Antibiotics** have been **extensively used** in the management of hospitalised COVID-19 patients, despite the incidence of bacterial infections appears to be relatively low as compared to other viral diseases
- **Incidence of BSI** and their **impact on outcome** has been adequately described in the ICU setting; less is known about BSI in non-critical wards

AIMS OF THE STUDY

- 1) To describe the burden and **epidemiology** of community-acquired/healthcare-associated and hospital-acquired **bloodstream infections** (CA/HCA and HA BSIs) in patients admitted with **COVID-19**
- 2) To evaluate **risk factors for HA-BSI** and their impact on mortality

MATERIALS & METHODS

Study design:

- Observational cohort study

Study population:

- Hospitalised patients with COVID-19
- San Paolo Hospital, Milan, Italy
- February 24th – November 30th 2020

1351 patients

MATERIALS & METHODS

Definitions:

- **CA/HCA-BSI**: acquired in the community or healthcare facilities; diagnosed within 48h from admission
- **HA-BSI**: acquired in hospital; diagnosed >48h after admission

Data collection:

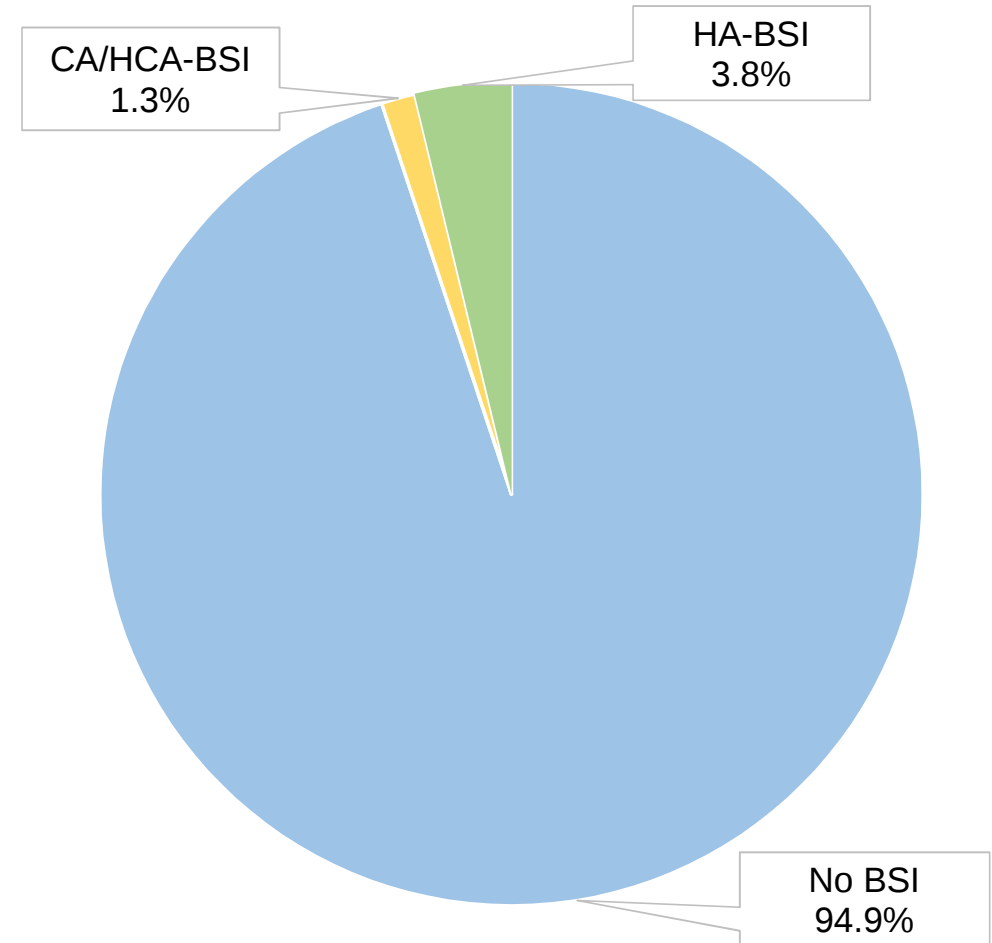
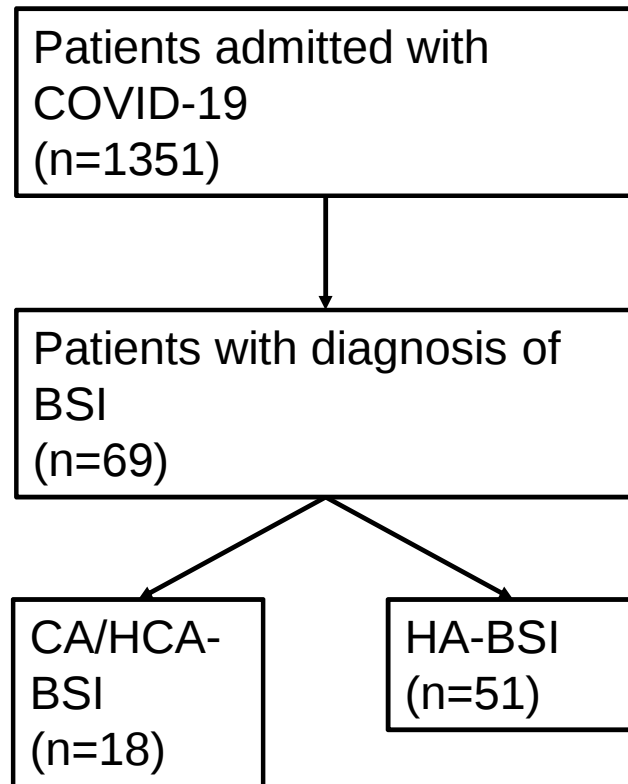
- Demographics, clinical features, microbiological findings collected from electronic medical records

MATERIALS & METHODS

Statistical analysis:

- To compare **characteristics of patients** who had CA/HCA-BSI or HA-BSI vs. those who did not → Chi-square and Kruskal-Wallis test
- To define **incidence of HA-BSI** → univariable Poisson regression with 95%CI; number of events per 1000 patients-days
- To elucidate **impact of BSI on mortality** → unadjusted and adjusted logistic regression model
- To identify **factors associated with onset of HA-BSI** → unadjusted and adjusted logistic regression model

RESULTS



Prevalence of BSI: 5.1%

Overall incidence of HA-BSI: 3.3/1000 patient-days

RESULTS

Demographics and disease characteristics

	Overall n=1351	No BSI n=1282	CA/HCA-BSI n=18	HA-BSI n=51	p-value
Gender, male, n (%)	842 (62%)	797 (62%)	10 (56%)	35 (69%)	0.541
Age, years, median (IQR)	68 (55-80)	68 (54-80)	75 (58-82)	63 (57-80)	0.444
Age-unadjusted Charlson Index, median (IQR)	1 (0-2)	1 (0-2)	2 (0-3)	1 (0-2)	0.077
COVID-19 severity at admission, n (%)					0.251
Mild	211 (16%)	203 (16%)	4 (22%)	4 (8%)	
Moderate	519 (38%)	498 (39%)	5 (28%)	13 (31%)	
Severe	581 (43%)	542 (42%)	9 (50%)	30 (59%)	
Critical	40 (3%)	39 (3%)	0 (0%)	1 (2%)	
Pneumonia at X-ray or CT scan, N (%)	1065 (79%)	1007 (79%)	11 (61%)	47 (92%)	0.012

RESULTS

Patient Management

	No BSI n=1282	CA/HCA-BSI n=18	HA-BSI n= 51	Overall n=1351	p-value
COVID-19 treatment, N (%)					
Lopinavir/r or Darunavir/c	130 (10%)	0 (0%)	7 (14%)	137 (10%)	0.253
Remdesivir	136 (11%)	2 (11%)	6 (12%)	144 (11%)	0.964
Hydroxychloroquine +/- azithromycin	414 (32%)	5 (28%)	20 (39%)	439 (33%)	0.534
Heparin prophylaxis	874 (68%)	10 (56%)	41 (80%)	925 (67%)	0.091
Corticosteroids	584 (46%)	6 (33%)	33 (65%)	623 (46%)	0.015
Immunomodulators	57 (5%)	0 (0%)	3 (6%)	60 (4%)	0.581
Highest grade of O2 support, N (%)					<0.001
Invasive Mechanical Ventilation (IMV)	83 (7%)	0 (0%)	11 (22%)	94 (7%)	
Non-invasive MV(NIMV)	73 (6%)	1 (6%)	10 (20%)	84 (6%)	
CPAP	360 (28%)	1 (6%)	14 (28%)	375 (28%)	
O2 low/high flow	541 (42%)	12 (67%)	14 (28%)	567 (42%)	
No O2 support	225 (18%)	4 (22%)	2 (4%)	231 (17%)	

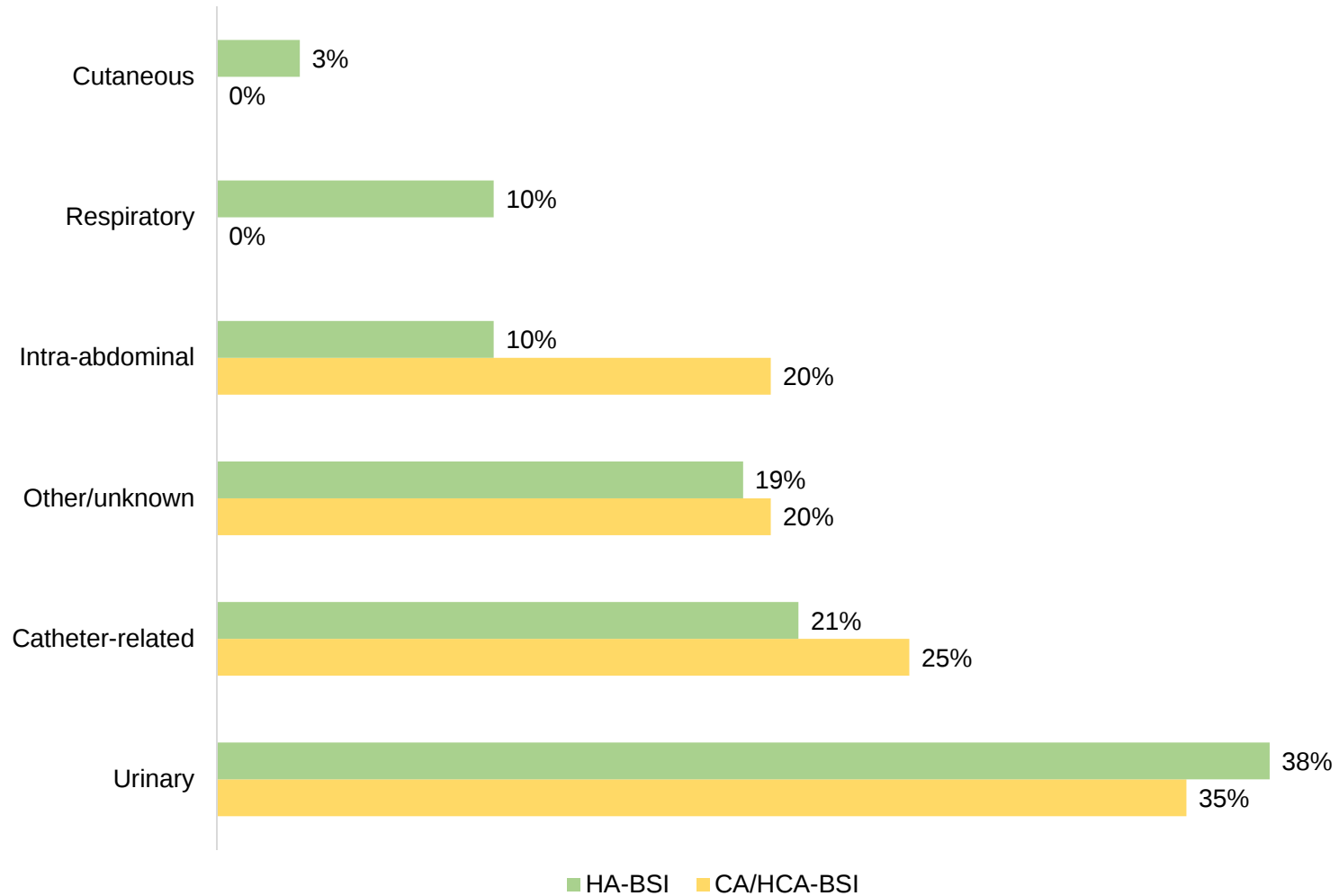
RESULTS

Patient Outcome

	Overall n=1351	No BSI n=1282	CA/HCA-BSI n=18	HA-BSI n= 51	p-value	
Length of hospital stay, Median days (IQR)	10 (5-18)	9 (5-17)	12.5 (7-29)	27 (21-35)	<0.001	
ICU admission, N (%)	101 (8%)	90 (7%)	0 (0%)	11 (22%)	<0.001	
Death, N (%)	341 (25%)	319 (25%)	6 (33%)	16 (31%)	0.421	

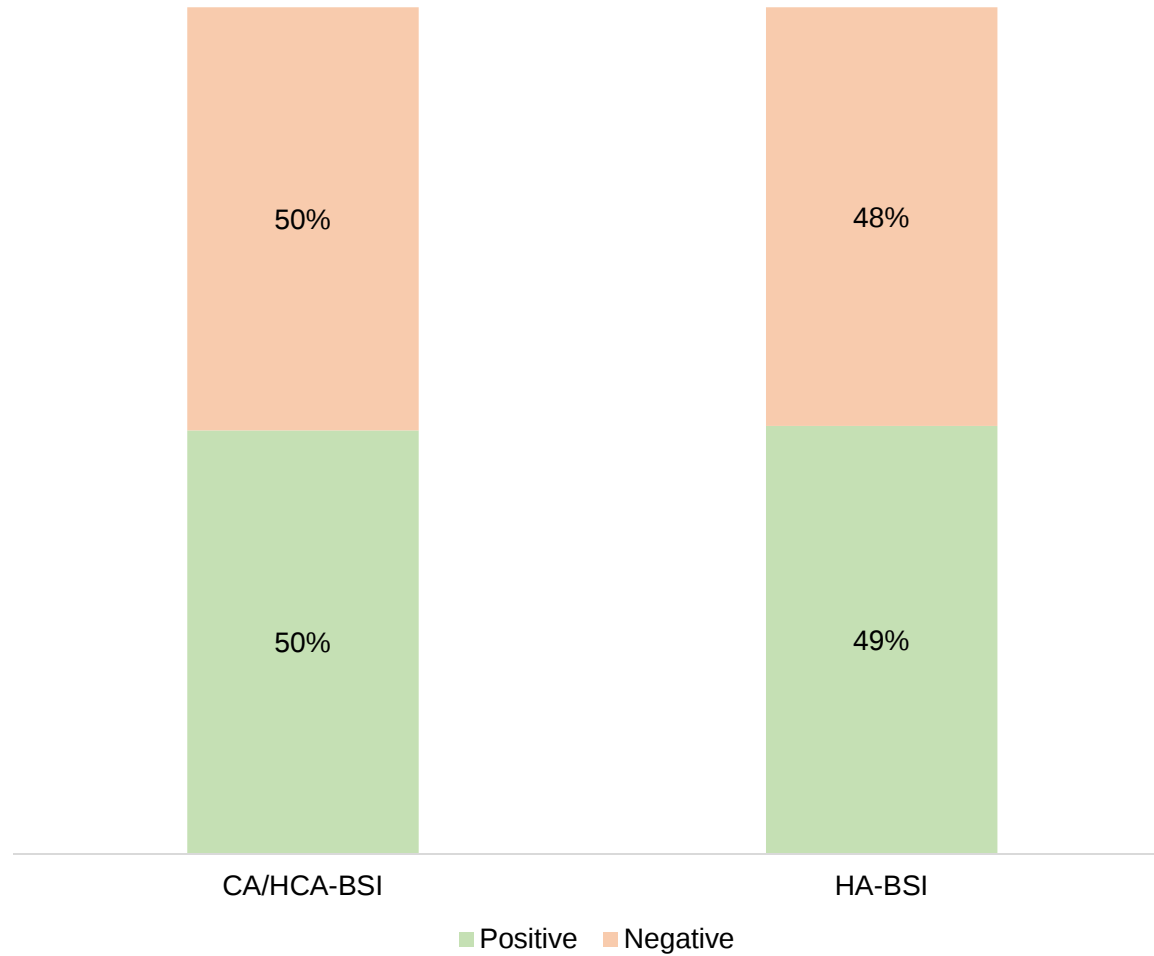
RESULTS

Microbiology – Source of BSI



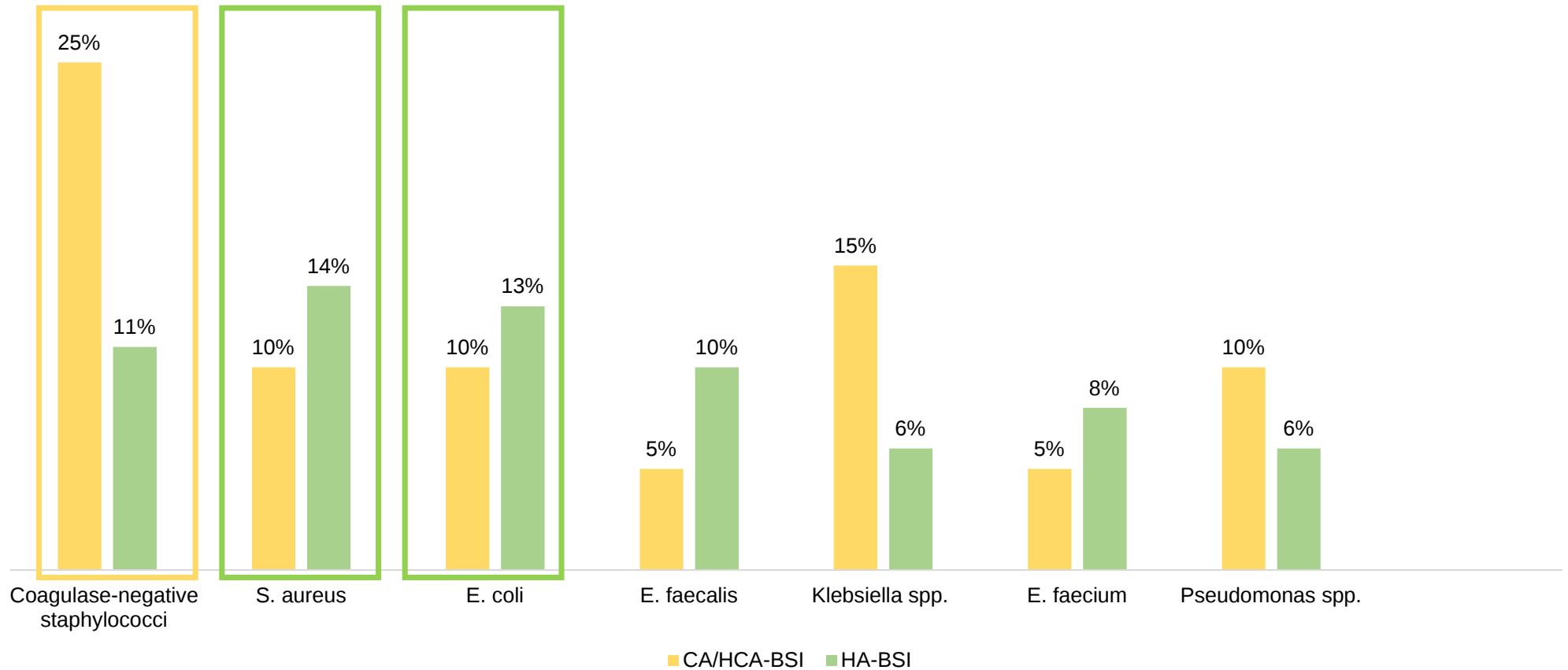
RESULTS

Microbiology – Gram



RESULTS

Microbiology – Causative agents



RESULTS

Factors associated with HA-BSI by uni- and multi-variable analysis

	OR	95% CI	p-value	aOR*	95% CI	p-value
Age, per 10 years older	1.03	0.87-1.22	0.713	1.03	0.83-1.29	0.764
Gender, male (vs. female)	1.33	0.73-2.43	0.415	1.04	0.55-1.94	0.908
Charlson age-unadjusted, per 1-point raise index	1.10	0.87-1.39	0.352	1.16	0.88-1.53	0.288
Max O2-tp (vs no O2 or high/low flow O2)						
NIMV/CPAP	2.65	1.39-5.05	0.003	2.09	1.06-4.12	0.034
IMV	6.34	2.84-14.13	<0.001	5.13	2.08-12.65	<0.001
Anti-inflammatory treatment						
Corticosteroids	2.19	1.22-3.93	0.009	2.11	1.06-4.19	0.032
Immunomodulators	1.34	0.41-4.44	0.629	0.96	0.28-3.29	0.946

**Adjusted for all the factors showed in table*

CONCLUSIONS

- Relatively **low incidence of HA-BSI** in hospitalised COVID-19 patients
- **No significant impact** of BSI on **mortality**
- HA-BSI associated with **longer hospital stays**
- **Corticosteroid therapy** independently **associated with HA-BSI** → a judicious use of steroids to avoid superinfections is warranted

THE TEAM

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