10° CONGRESSO NAZIONALE SIMPIOS

26-28 SETTEMBRE 2022

Infezioni catetere correlate: a che punto siamo e il ruolo dei bundle

Epidemiologia e prevenzione delle infezioni catetere correlate nelle terapie intensive: «the Italian Job»

27 Settembre 2022

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Dichiarazione conflitto di interessi

In qualità di relatore

dichiaro

che negli ultimi due anni ho avuto i seguenti rapporti anche di finanziamento con soggetti portatori di interessi commerciali in campo sanitario:

- Pfizer
- Orion
- Menarini

Bloodstream infection (BSI) is defined by POSITIVE BLOOD CULTURE in a patient with systemic signs of infection and may be either secondary to a documented source or primary- that is without identified origin

www.cdc.gov/nhsn/pdfs

Timsit JF. et al. Intensive Care Medicine 2020, 46: 266-284

BLOODSTREAM INFECTIONS AND SEPSIS

Bloodstream infections (BSI) represent 40% of cases of community-acquired (CA) and hospital-acquired (HA) sepsis and septic shock and approximately 20% of the ICU-acquired cases

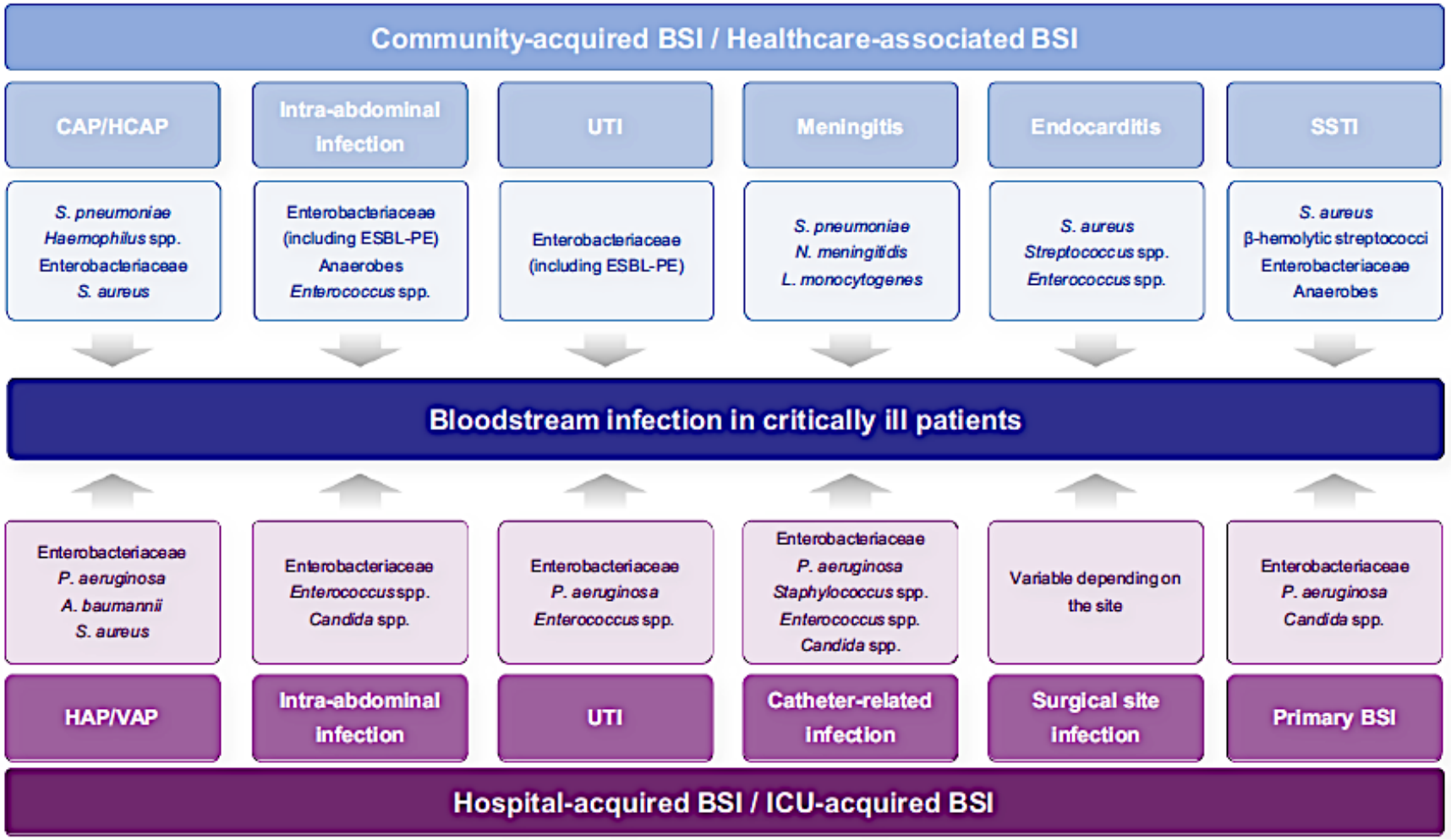
Table 1 Prevalence of bloodstream infections in selected recent randomized trials including adult patients with sepsis or septic shock

RCT	Patient population, *N*	Patients with BSI, *n* (%)	Registration no./reference
SMART (saline versus balanced crystalloids in ICU patients—secondary analysis focused on patients with sepsis)	1641	653 (39.8)	NCT02444988 Brown et al. [124]
EUPHRATES (targeted polymyxin B hemoperfusion for patients with septic shock and elevated endotoxin level)	450	134 (29.8)	NCT01046669 Dellinger et al. [125]
APROCCHSS (hydrocortisone plus fludrocortisone versus placebo for patients with septic shock)	1240	454 (36.6)	NCT00625209 Annane et al. [126]
ARISE (EGDT vs usual care for patients with septic shock)	1591	601 (37.8)	NCT00975793 ANZICS. [127]
ProCESS (protocol-based vs usual care for patients with septic shock)	1341	396 (29.5)	NCT00510835 ProCESS investigators. [128]

RCT randomized controlled trial, *BSI* bloodstream infection, *ICU* intensive care unit, *EGDT* early goal-directed therapy

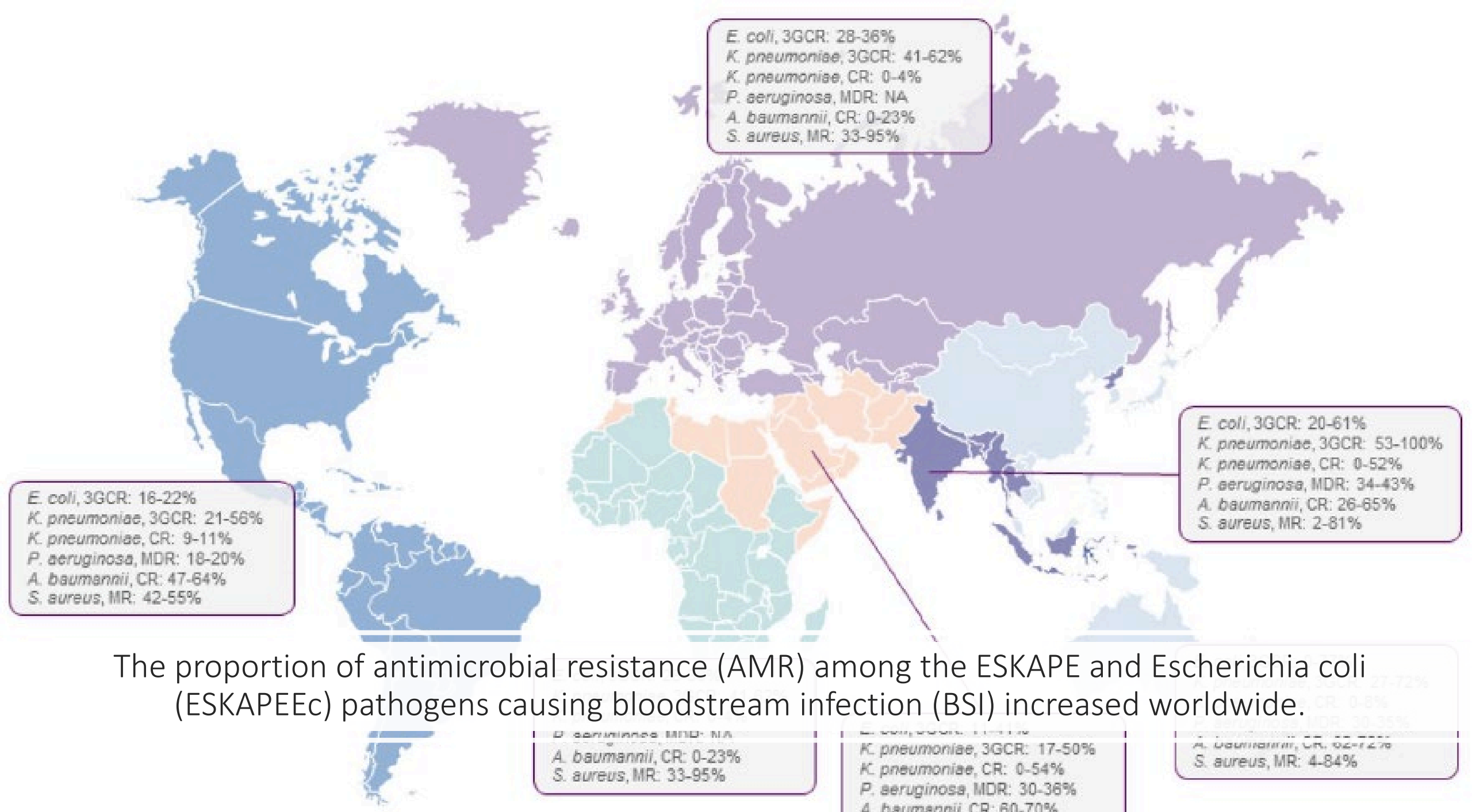
Timsit JF. et al. Intensive Care Medicine 2020, 46: 266-284

THE ORIGIN of BLOODSTREAM INFECTIONS in ICU



Bloodstream infections in critically ill patients: main souces and leading pathogens

Timsit JF. et al. Intensive Care Medicine 2020, 46: 266-284



The proportion of antimicrobial resistance (AMR) among the ESKAPE and Escherichia coli (ESKAPEEc) pathogens causing bloodstream infection (BSI) increased worldwide.

Incidence and antimicrobial resistance trends in bloodstream infections caused by ESKAPE and *Escherichia coli* at a large teaching hospital in Rome, a 9-year analysis (2007–2015)

Giulia De Angelis[1] · Barbara Fiori[1] · Giulia Menchinelli[1] · Tiziana D'Inzeo[1] · Flora Marzia Liotti[1] · Grazia Angela Morandotti[1] · Maurizio Sanguinetti[1] · Brunella Posteraro[2] · Teresa Spanu[1]

N= 4374 (72.9%)

N=1628 (27.1%)

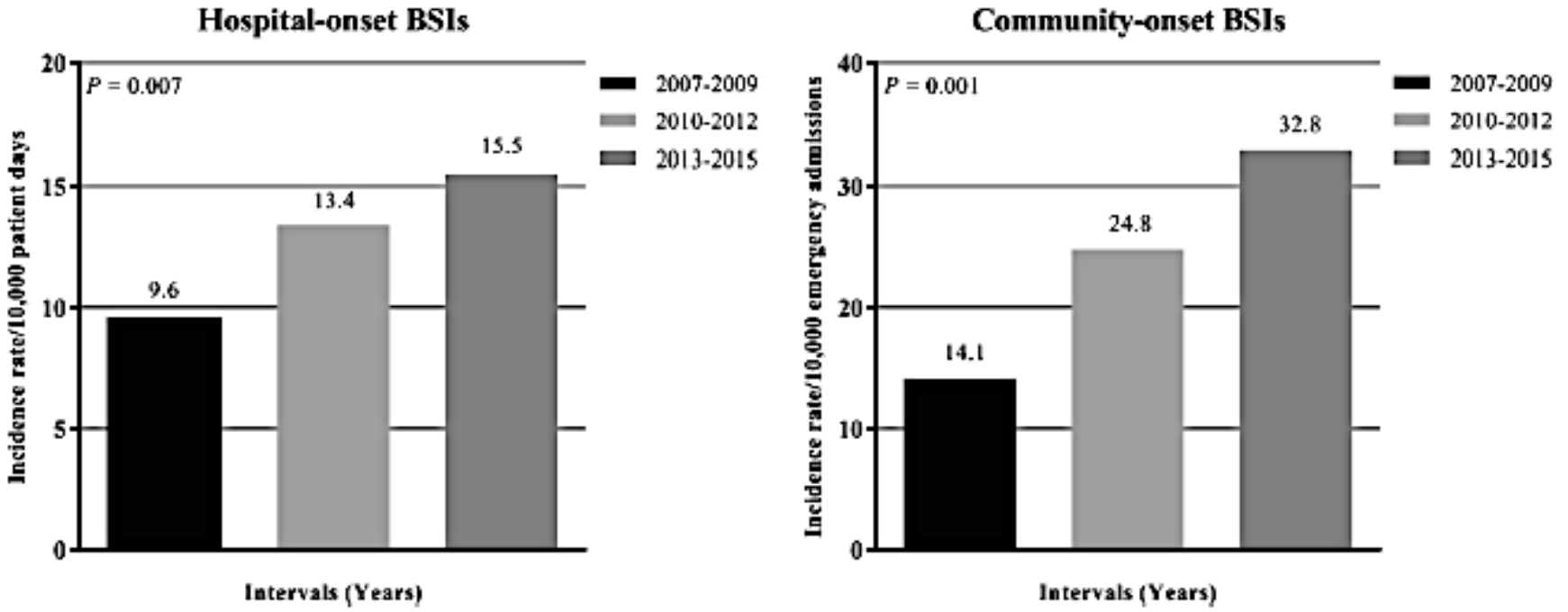


Fig. 1 Incidence rates of bloodstream infections (BSIs) in three 3-year intervals (2007 to 2015), according to the onset (hospital or community) of BSI

European Journal of Clinical Microbiology & Infectious Diseases (2018) 37:1627–1636

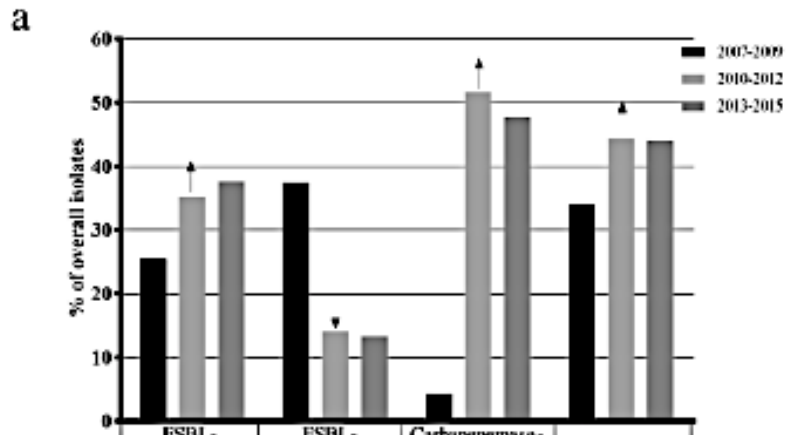
Organism	Isolates (percent of phenotypes per species) from			
	Total BSIs		HO BSIs	CO BSIs
	No.	%	No.	No.
Gram-negative bacteria	4371	72.8	3185	1186
Enterobacteriaceae	3243	54.0	2126	1117
Escherichia coli	1969	32.8	1029	940
ESBL-producing	690 (35.0)		342 (33.2)	348 (37.0)
pAmpC β-lactamase-producing	6 (0.3)		2 (0.2)	4 (0.4)
Carbapenemase-producing	6 (0.3)		6 (0.6)	0 (0.0)
None	1267 (64.3)		679 (66.0)	588 (62.6)
Klebsiella pneumoniae	965	16.1	807	158
ESBL-producing	178 (18.4)		145 (18.0)	33 (20.9)
pAmpC β-lactamase-producing	1 (0.1)		1 (0.1)	0 (0.0)
Carbapenemase-producing	360 (37.3)		336 (41.6)	24 (15.2)
None	426 (44.1)		325 (40.3)	101 (63.9)
Enterobacter species	309	5.1	290	19.0
Non-*Enterobacteriaceae*	1128	17.1	1059	69.0
Pseudomonas aeruginosa	694	11.6	625	69.0
Acinetobacter baumannii	434	7.2	434	0.0
Gram-positive cocci	1631	27.2	1189	442
Staphylococcus aureus	1239	20.6	816	423
MRSA	489 (39.5)		336 (41.2)	151 (35.7)
MSSA	750 (60.5)		480 (58.8)	272 (64.3)
Enterococcus faecium	392	6.5	373	19.0
VRE	40 (10.2)		39 (10.4)	1 (5.3)
VSE	352 (89.8)		334 (89.5)	18 (94.7)
Total organisms	6002		4374	1628

the ESKAPEEc BSI and AMR frequencies during 9 years (2007–2015) of microbiology laboratory activity at a large Italian university hospital.

During the study period, 9720 unique BSI episodes were identified, of which 6002 (61.7%) were caused by ESKAPEEc pathogens.

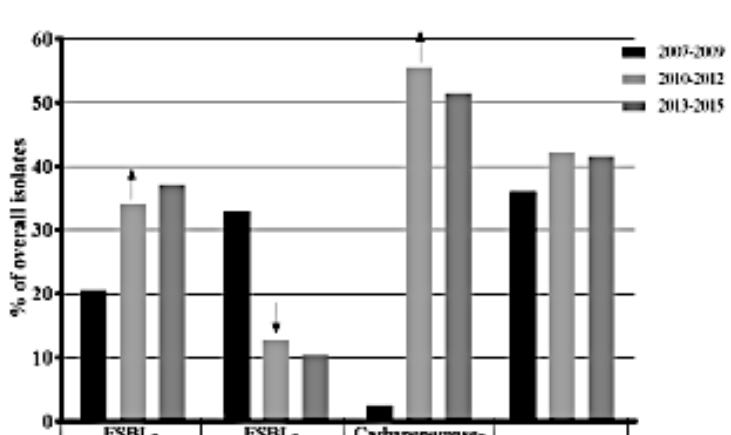
European Journal of Clinical Microbiology & Infectious Diseases (2018) 37:1627–1636

Overall



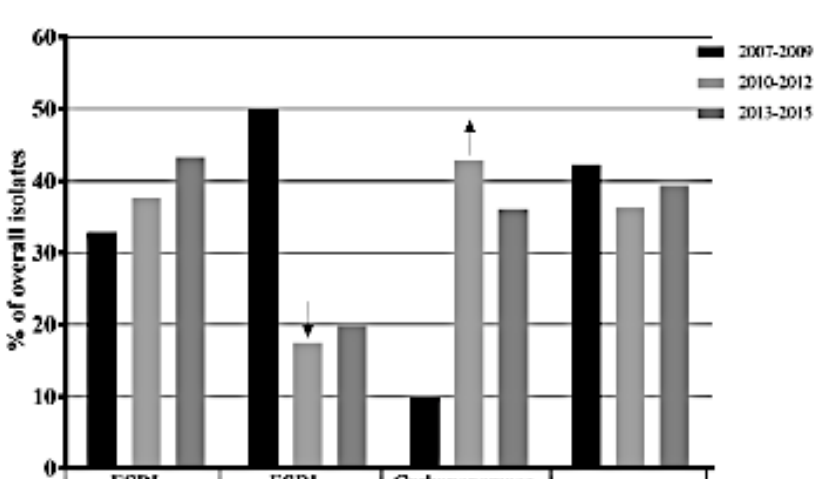
	ESBL-producing *E. coli*	ESBL-producing *K. pneumoniae*	Carbapenemase-producing *K. pneumoniae*	MRSA
2007-2009	25.4	37.5	4.2	33.9
2010-2012	35.2	14.1	51.6	44.4
2013-2015	37.6	13.3	47.8	44.1

Medical ward



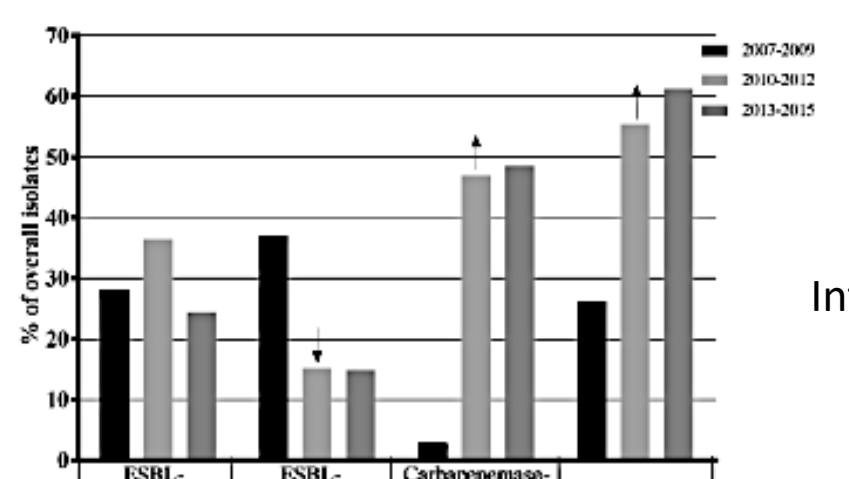
	ESBL-producing *E. coli*	ESBL-producing *K. pneumoniae*	Carbapenemase-producing *K. pneumoniae*	MRSA
2007-2009	20.5	32.9	2.5	36.1
2010-2012	34.1	12.8	55.5	42.2
2013-2015	37.1	10.5	51.4	41.6

Surgical ward



	ESBL-producing *E. coli*	ESBL-producing *K. pneumoniae*	Carbapenemase-producing *K. pneumoniae*	MRSA
2007-2009	32.9	50.0	10.0	42.3
2010-2012	37.6	17.5	42.9	36.4
2013-2015	43.4	19.7	36.1	39.4

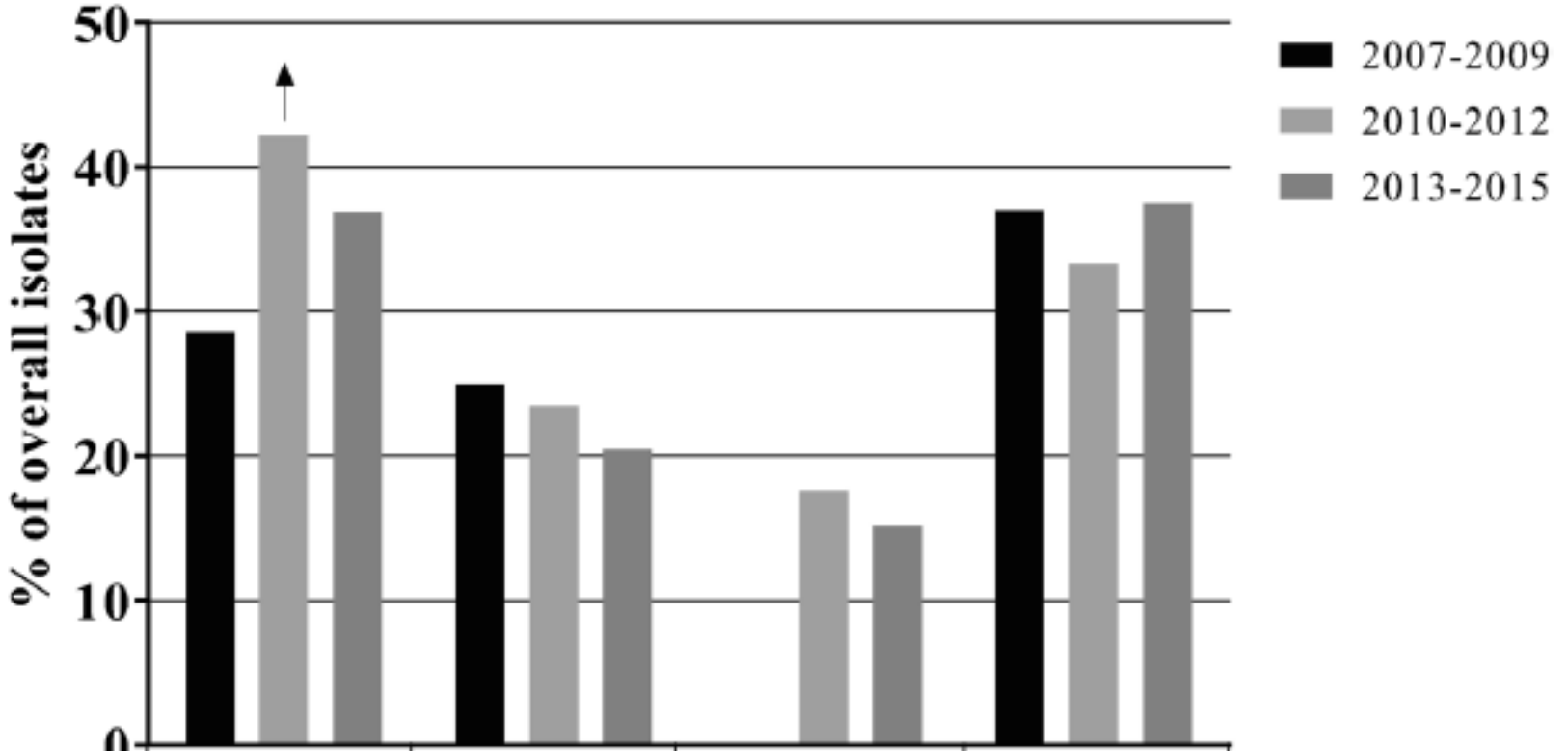
Intensive Care Unit



	ESBL-producing *E. coli*	ESBL-producing *K. pneumoniae*	Carbapenemase-producing *K. pneumoniae*	MRSA
2007-2009	28.1	37.1	2.9	26.1
2010-2012	36.4	15.2	47.0	55.4
2013-2015	24.4	14.9	48.6	61.2

European Journal of Clinical Microbiology & Infectious Diseases (2018) 37:1627–1636

Community acquired BSI



	ESBL-producing *E. coli*	ESBL-producing *K. pneumoniae*	Carbapenemase-producing *K. pneumoniae*	MRSA
2007-2009	28.6	25.0	0.0	37.0
2010-2012	42.2	23.5	17.6	33.3
2013-2015	36.9	20.5	15.2	37.5

European Journal of Clinical Microbiology & Infectious Diseases (2018) 37:1627–1636

Central venous catheter-related bloodstream infections (CR-BSI) are a frequent event in the intensive care unit (ICU) setting.

Central venous catheters (CVCs) are essential in the care of critically ill patients to allow safe intravenous administration of medications, help in the monitoring of hemodynamic parameters, and aid the intravenous administration of fluid resuscitation. In European intensive care units (ICUs), the CVC utilization rate was on average 71 CVC days per 100 patient days.

Moreover, bloodstream infections (BSIs) were catheter related in 42.6% of cases and rates of CVC-related BSIs (CR-BSI) ranged to levels still as high as 1 to 6.2 per 1,000 catheter-days.

https://www.ecdc.europa.eu/sites/default/files/documents/AER_for_2015-healthcare-associated-infections

Two major definitions are utilized to define BSIs due to vascular catheters:

- central-line–associated BSI (CLA-BSI)
- catheter-related BSI (CR-BSI).

The **CLA-BSI** definitions require a single positive blood culture for a typical pathogen (or two positive blood cultures for a skin commensal) without positive tip culture or positive peripheral blood cultures.

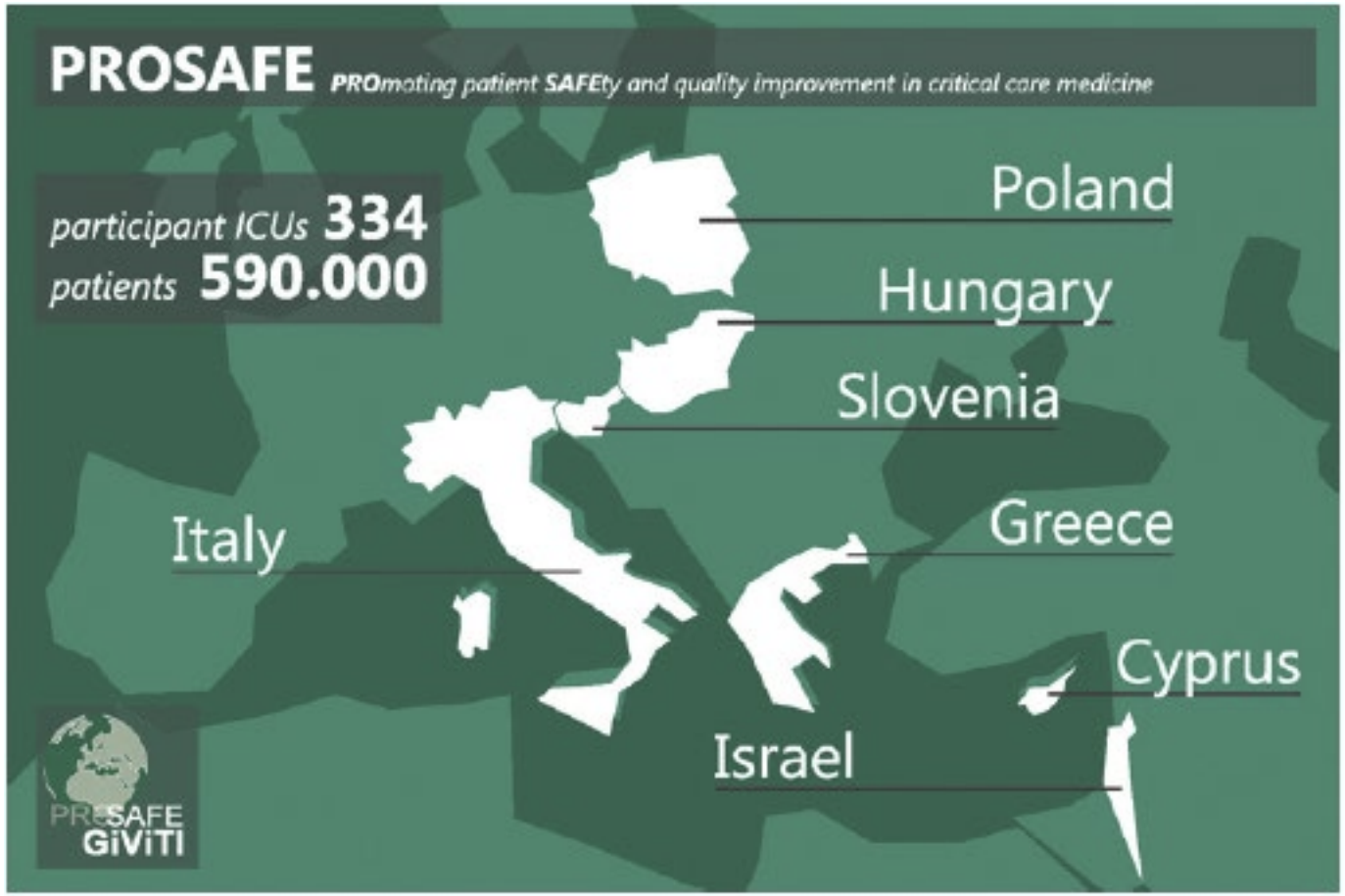
The **CR-BSI** definition is a more specific clinical definition that requires specialized microbiologic data (e.g., differential time to positivity [DTP], catheter tip culture) and positive peripheral blood cultures

Rupp ME, Karnatak R. Intravascular catheter-related bloodstream infections. Infect Dis Clin North Am 2018;32(04):765–787

Mermel LA, Allon M, Bouza E, et al. Clinical practice guidelines for the diagnosis and management of intravascular catheter-related infection: 2009 update by the Infectious Diseases Society of America. Clin Infect Dis 2009;49(01):1–45

PROSAFE: a European endeavor to improve quality of critical care medicine in seven countries

Stefano FINAZZI [1], Giulia PACI [1], Luca ANTIGA [2], Obou BRISSY [1], Greta CARRARA [1], Daniele CRESPI [1], Gabor CSATO [3], Akos CSOMOS [4], Or DUEK [5], Sara FACCHINETTI [6], Joanne FLEMING [1], Elena GARBERO [1] *, Massimo GIANNI [7], Primoz GRADISEK [8], Rafael KAPS [9], Theodoros KYPRIANOU [10], Isaac LAZAR [5], Malgorzata MIKASZEWSKA-SOKOLEWICZ [11], Matteo MONDINI [1], Giovanni NATTINO [1, 12], Carlo OLIVIERI [13], Daniele POOLE [14], Claudio PREVITALI [1], Danilo RADRIZZANI [15], Carlotta ROSSI[1], Stefano SKURZAK [16], Mario TAVOLA [17], Nektaria XIROUCHAKI [18], Guido BERTOLINI [1], GiViTI-PROSAFE collaboration ‡



In 2008, the European Commission funded the PROSAFE study (Promoting Patient Safety and Quality Improvement in Critical Care DGSANCO contract No. 2007331).
The data collection started in 2011 in five European countries (Cyprus, Hungary, Italy, Poland and Slovenia) with a common electronic case report form (eCRF) and subsequently extended to Israel and Greece.

Minerva Anestesiologica 2020 December;86(12):1305-20

PROSAFE: a European endeavor to improve quality of critical care medicine in seven countries

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TABLE III.—*Characteristics of the patients at admission (continues).*

	Italy
Organ failure at admission - N. (%)	
Respiratory	201,357 (49.9)
Cardiovascular	100,587 (24.9)
Neurologic	50,342 (12.5)
Renal	130,175 (32.2)
Metabolic	84,237 (20.9)
Acute clinical conditions at admission - N. (%)	
Respiratory	78,209 (19.4)
Cardiovascular	85,907 (21.3)
Neurologic	53,787 (13.3)
Gastrointestinal and hepatic	88,426 (21.9)
Other	220,693 (69.5)
Infections at admission - N. (%)	
None	314,039 (78.1)
Infection without sepsis/Sepsis	58,711 (14.6)
Septic shock	29,127 (7.2)

Minerva Anestesiologica 2020 December;86(12):1305-20

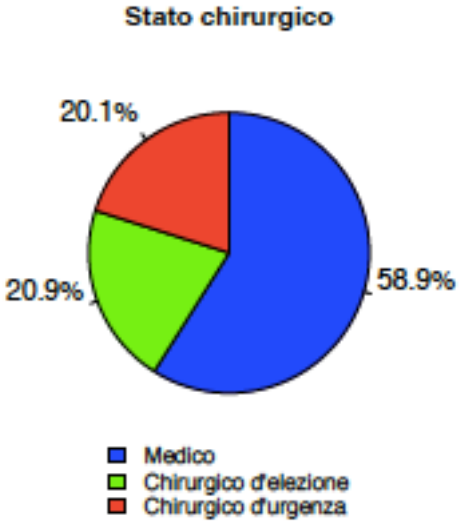
TABLE IV.—*Procedures and interventions during the stay.*

	Italy
ICUs-N.	233
Patients - N.	403,901
Missing data on procedures	771
Invasive ventilation - N (%)	274,559 (68.1)
Present at admission	202,600 (50.3)
During the stay	71,959 (17.8)
Reintubation within 48 hours	4,422 (1.6*)
Non-invasive ventilation - N (%)	58,717 (14.6)
Present at admission	12,005 (3)
During the stay	46,712 (11.6)
Non-invasive ventilation only	29,911 (7.4)
For weaning	17,096 (4.2)
Non-invasive ventilation failed	9,316 (15.9**)
Tracheostomy - N. (%)	41,883 (10.4)
Present at admission	10,902 (2.7)
During the stay	30,981 (7.7)
Surgical	10,475 (2.6)
Non-surgical	29,595 (7.3)
Tracheostomy - Days after the beginning of invasive ventilation	
Mean (SD)	7 (7.9)
Median (IQR)	6 (1-10)
Central venous catheter – N (%)	265,028 (65.7)
Vasoactive drugs – N (%)	127,319 (31.6)
Invasive hemodynamic monitoring in septic shock - n/N (%)	6,466/37,173 (17.4)
Hemofiltration or hemodialysis in moderate-severe AKIN - n/N (%)	19,416/67,606 (28.7)

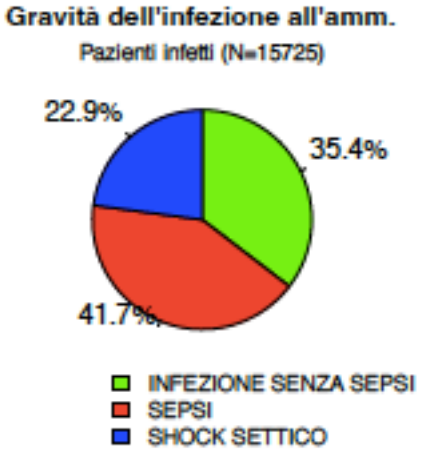
TABLE V.—*Complications and outcome.*

	Italy
ICUs - N	233
Patients - N	403,901
Complications during stay - N. (%)	111,290 (27.6)
Failures during stay - N. (%)	
Any	47,167 (11.7)
Respiratory failure	17,946 (4.4)
Cardiovascular failure	23,055 (5.7)
Renal failure (AKIN)	14,998 (3.7)
VAP - N (%)	
Pts with VAP/1000 days of MV pre-VAP	10,041 (2.5)
Estimate (95%-CI)	8.5 (8.3-8.7)
CR-BSI - N (%)	
Pts with CR-BSI/1000 days of catheter pre-BSI	3,087 (0.8)
Estimate (95%-CI)	1.6 (1.6-1.7)
ICU stay - days	
All pts - median (IQR)	2 (1-6)
Survivors - median (IQR)	2 (1-5)
Dead - median (IQR)	3 (1-10)
ICU mortality - N. (%)	66,949 (16.6)
Missing	1429
Hospital mortality - N. (%)	85,459 (23.6)
Missing	2,604

Stato chirurgico	N	%
Medico	23152	58.9
Chirurgico d'elezione	8221	20.9
Chirurgico d'urgenza	7904	20.1
Missing	148	



Gravità dell'infezione all'amm.	N	%
Nessuna	23522	59.9
INFEZIONE SENZA SEPSI	5565	14.2
SEPSI	6559	16.7
SHOCK SETTICO	3601	9.2
Missing	178	



Batteriemia primaria da catetere (CR-BSI)	N	%
No	38505	98.4
Si	625	1.6
Missing	295	

Incidenza di CR-BSI *(Paz. con CR-BSI/1000 gg. di CVC pre-CR-BSI)*	
Stima	2.6
CI (95%)	2.4–2.8

Incidenza di CR-BSI *(Paz. con CR-BSI/paz. con catetere per 12 gg.)*	
Stima	3.1%
CI (95%)	2.8–3.3

Infezioni	N	%
Nessuna	21542	55.1
Solo all'ammissione	12621	32.3
All'ammissione e in degenza	3054	7.8
Solo in degenza	1909	4.9
Missing	299	

Gravità massima dell'infezione	N	%
Nessuna	21542	55.1
INFEZIONE SENZA SEPSI	5403	13.8
SEPSI	7363	18.8
SHOCK SETTICO	4813	12.3
Missing	304	

Evoluzione della gravità

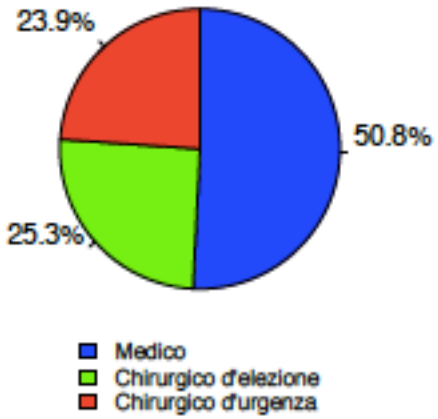
	N (R %)	Degenza: Nessuna	Degenza: INFEZIONE SENZA SEPSI	Degenza: SEPSI	Degenza: SHOCK SETTICO	Degenza: TOT
Ammissione	Nessuna	21542 (91.9%)	1023 (4.4%)	698 (3.0%)	187 (0.8%)	23450
	INFEZIONE SENZA SEPSI	-	4379 (79.0%)	858 (15.5%)	306 (5.5%)	5543
	SEPSI	-	-	5806 (88.8%)	732 (11.2%)	6539
	SHOCK SETTICO	-	-	-	3587 (100.0%)	3588
	TOT	21542	5403	7363	4812	39120

PROSAFE GiViTI

REPORT 2020

Stato chirurgico	N	%
Medico	16473	50.8
Chirurgico d'elezione	8196	25.3
Chirurgico d'urgenza	7765	23.9
Missing	0	

Stato chirurgico



Gravità dell'infezione all'amm.	N	%
Nessuna	23522	72.5
INFEZIONE SENZA SEPSI	2560	7.9
SEPSI	3212	9.9
SHOCK SETTICO	3137	9.7
Missing	3	

Gravità dell'infezione all'amm.

Pazienti infetti (N=8909)

Batteriemia primaria da catetere (CR-BSI)	N	%
No	32014	99.0
Si	312	1.0
Missing	108	

Incidenza di CR-BSI *(Paz. con CR-BSI/1000 gg. di CVC pre-CR-BSI)*	
Stima	2.0
CI (95%)	1.8–2.2

Incidenza di CR-BSI *(Paz. con CR-BSI/paz. con catetere per 12 gg.)*	
Stima	2.4%
CI (95%)	2.2–2.7

Infezioni	N	%
Nessuna	21542	66.6
Solo all'ammissione	7906	24.5
All'ammissione e in degenza	969	3.0
Solo in degenza	1909	5.9
Missing	108	

Gravità massima dell'infezione	N	%
Nessuna	21542	66.7
INFEZIONE SENZA SEPSI	3220	10.0
SEPSI	3967	12.3
SHOCK SETTICO	3588	11.1
Missing	117	

Evoluzione della gravità

	N (R %)	Degenza: Nessuna	Degenza: INFEZIONE SENZA SEPSI	Degenza: SEPSI	Degenza: SHOCK SETTICO	TOT
Ammissione	Nessuna	21542 (91.9%)	1023 (4.4%)	698 (3.0%)	187 (0.8%)	23450
	INFEZIONE SENZA SEPSI	-	2196 (86.3%)	297 (11.7%)	52 (2.0%)	2545
	SEPSI	-	-	2971 (93.0%)	224 (7.0%)	3196
	SHOCK SETTICO	-	-	-	3124 (100.0%)	3125
	TOT	21542	3220	3967	3587	32316

REPORT 2020- No COVID

ICA

Polmonite associata a ventilazione (VAP)	N	%
No	3859	85.1
Si	678	14.9
Missing	6	

Incidenza di VAP *(Paz. con VAP/1000 gg. di VM pre-VAP)*	
Stima	15.5
CI (95%)	14.4–16.7

Batteriemia primaria da catetere (CR-BSI)	N	%
No	4323	95.3
Si	212	4.7
Missing	8	

Incidenza di CR-BSI *(Paz. con CR-BSI/1000 gg. di CVC pre-CR-BSI)*	
Stima	3.5
CI (95%)	3.1–4.0

Quanto siamo stati invasivi

Ventilazione invasiva	N	%
No	961	21.2
Si	3580	78.8
Missing	2	

Durata (gg) ventilazione invasiva	
N	3576
Mediana	11
Q1–Q3	5–20

ECMO	N	%
No	4471	98.5
Si	70	1.5
Missing	2	

Durata (gg) ECMO	
N	70
Mediana	12
Q1–Q3	4.2–31.8

Tracheostomia	N	%
No	3348	73.7
Si	1193	26.3
Missing	2	

Giorni dall'ingresso trachestomia	
N	1072
Mediana	11
Q1–Q3	7–16

Terapia antibiotica	N	%
No	1146	25.2
Si	3395	74.8
Profilassi	579	12.8
Terapia empirica	2378	52.4
Terapia mirata	1566	34.5
Terapia antifungina	678	14.9
Missing	2	

Terapia con farmaci antivirali	N	%
No	2493	55.2
Si	2024	44.8
Iopinavir/Ritonavir	966	21.3
Darunavir/Cubicistat	317	7.0
Darunavir/Ritonavir	368	8.1
Remdesivir	571	12.6
Altro antivirale	38	0.8
Missing	26	

REPORT 2020- solo COVID

Progetto PROSAFE - Petalo COVID

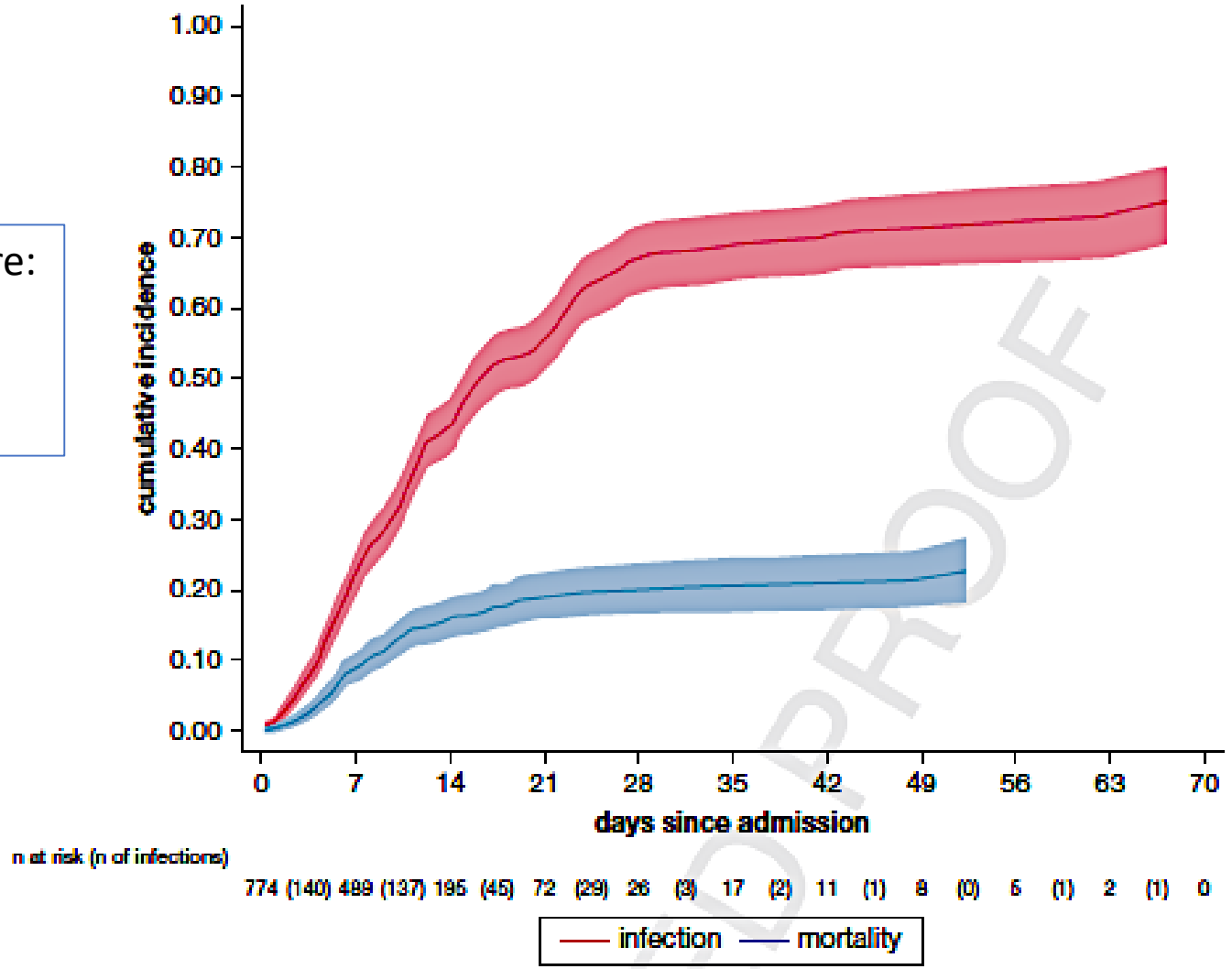
CHEST

Hospital-Acquired Infections in Critically Ill Patients With COVID-19

Variable independently associated with infections were:

- Age
- PEEP
- Broad-spectrum antibiotics

Critically ill patients with COVID-19 are at high risk of HAIs, especially **VAP (50%)** and **BSIs (34%**), frequently caused by MDR bacteria. Patients with HAIs complicated by shock showed almost double mortality (**52%** vs 29%) and infected patients experienced prolonged IMV and hospitalization.



Grasselli G. et al., **Chest 2021; 160(2): 454-465**

PAZIENTI COVID-19 – PERIODO FEBBRAIO 2020-MAGGIO2020

TABLE 3] Microorganisms of the Nosocomial Infections Resulting From a Bacterial Agent (N = 723)[a]

Variable	VAP	BSI	CRBSI	UTI	HAP	Overall	MDR
Included patients	389 (50)	183 (24)	74 (10)	60 (8)	17 (2)	723 (44)	272 (35)
Incidence, No. infections/ 1,000 ICU patient-days	26.03 (23.57-28.76)[b]	11.71 (10.13-13.54)	4.74 (3.78-5.95)	3.84 (2.98-4.95)	1.09 (0.68-1.75)	42.78 (39.78-46.01)	16.05 (14.25-18.07)
Gram-staining microorganisms							
Gram-positive microorganisms	140 (36)	97 (54)	40 (54)	33 (55)	7 (40)	317 (44)	138 (51)
S. aureus	110 (28)	26 (14)	11 (16)		4 (24)	151 (21)	83 (31)
Enterococcus species	21 (5)	45 (25)	18 (24)	33 (55)	...	117 (16)	29 (11)
Coagulase-negative staphylococci	...	21 (12)	9 (12)	...	...	30 (4)	24 (9)
Streptococcus pneumoniae	3 (1)		1 (1)	...	1 (5)	5 (1)	1 (1)
Other	6 (2)	5 (3)	1 (1)	...	2 (11)	14 (2)	2 (1)
Gram-negative microorganisms	249 (64)	86 (46)	34 (46)	27 (45)	10 (60)	406 (56)	133 (49)
Pseudomonas aeruginosa	85 (21)	17 (9)	6 (8)	8 (13)	3 (18)	119 (16)	34 (12)
Enterobacterales (other)	53 (14)	30 (17)	13 (18)	4 (7)	1 (6)	101 (14)	29 (11)
Klebsiella species	43 (11)	11 (5)	5 (7)	3 (5)	1 (6)	63 (9)	25 (9)
Escherichia coli	31 (8)	9 (5)	1 (1)	12 (20)	1 (6)	54 (8)	18 (7)
Acinetobacter baumannii	6 (2)	10 (6)	5 (7)	...		21 (3)	19 (7)
Other	31 (8)	9 (4)	4 (5)	...	4 (24)	48 (7)	8 (3)

Grasselli G. et al., **Chest 2021; 160(2): 454-465**

Bloodstream infections in critically ill patients with COVID-19

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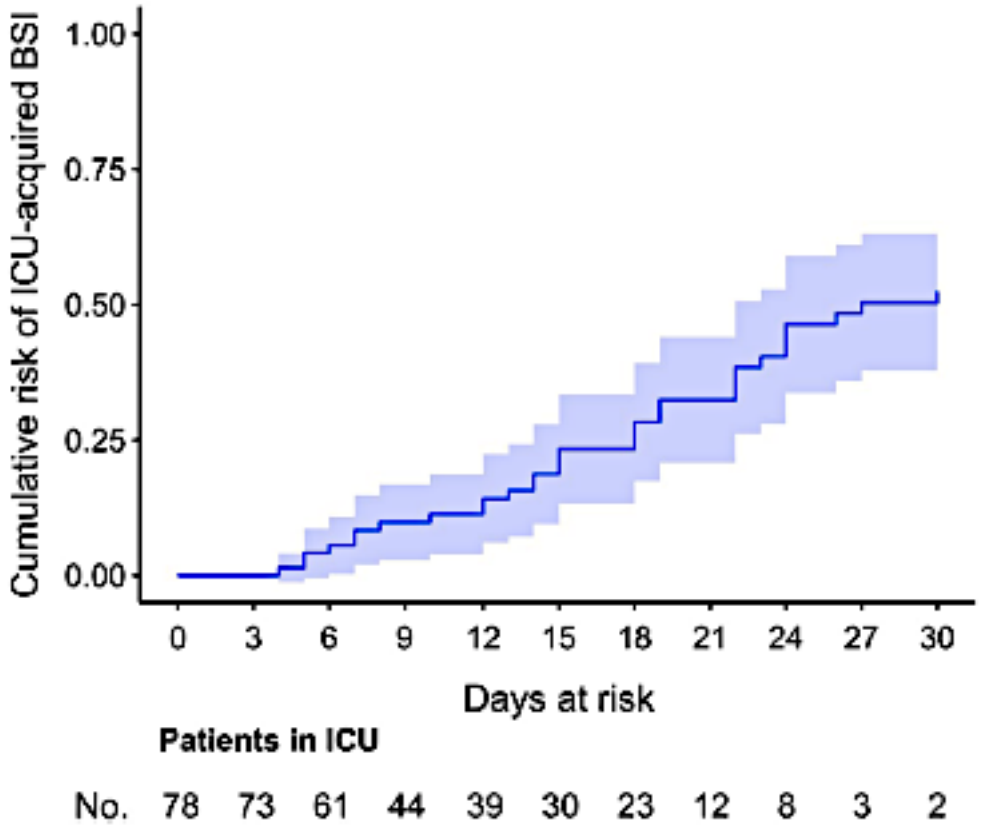

Variable	Unadjusted cause-specific HR (95% CI)	*P*	Adjusted cause-specific HR (95% CI)	*P*
Age in years	1.00 (0.96-1.04)	.970		
Male gender	1.60 (0.65-3.94)	.304		
Diabetes mellitus	2.76 (1.09-6.98)	.032	2.22 (0.80-6.20)	.127
Hypertension	0.89 (0.43-1.85)	.755		
Respiratory disease	1.87 (0.54-6.43)	.323		
Moderate/severe liver failure	6.71 (0.77-58.29)	.084	6.36 (0.59-68.39)	.127
Solid cancer	2.71 (0.35-20.99)	.340		
Haematological malignancy	[b]	-		
Hospital stay before ICU admission in days	1.02 (0.98-1.08)	.339		
SOFA score	1.00 (0.80-1.25)	.996		
Antibiotic therapy	[b]	-		
Anti-inflammatory treatment				
Methylprednisolone	4.48 (1.38-14.56)	.002	3.95 (1.20-13.03)	.003
Tocilizumab	1.21 (0.44-3.30)		1.07 (0.38-3.04)	
Both of them	10.84 (2.79-42.08)		10.69 (2.71-42.17)	
None of them	(ref)		(ref)	

*Table 3. Univariable and multivariable analyses of risk factors for the development of ICU-acquired BSI in critically ill patients with COVID-19**

Eur J Clin Invest 2020; 50: e13319

CR-BSIs are associated with a significantly increased mortality; however, recent studies describe a non increased risk of mortality in a cohort of patients where catheters were systematically removed.

Early adequate antimicrobial therapy and catheter removal are key components of therapy in case of CR-BSI with severe sepsis or shock.

In contrast to other nosocomial infections, the majority of the risk factors for intravascular catheter infection are linked to the device itself and can be prevented efficiently

Ziegler MJ, et al. Infection 2015;43(01):29–36
Adrie C, et al. J Infect 2017; 74(02):131–141
Marschall J, et al. Infect Control Hosp Epidemiol 2014;35(07):753–771
Bell T, et al. Infect Dis Clin North Am 2017;31(03): 551–559

Expert consensus-based clinical practice guidelines management of intravascular catheters in the intensive care unit

Table 2 Strategies proposed by experts to allow a reduction of catheter-related infection

For the catheter insertion	During catheter care
Hand hygiene	Hand hygiene
Maximum hygiene and asepsis measures (cap, mask, sterile gown, sterile gloves, large sterile fields)	Regular inspection of dressings Change semipermeable transparent dressings every 7 days (except in the case of detachment, soiling or bleeding)
2% Chlorhexidine-alcohol for skin antisepsis	Change of tubing after 96 h (or after 24 h in the case of lipids or blood products). Disinfect valves before accessing or manipulating open systems on a sterile compress or an alcohol compress Remove the catheter as soon as it is no longer necessary

Timsit et al. Ann. Intensive Care (2020) 10:118

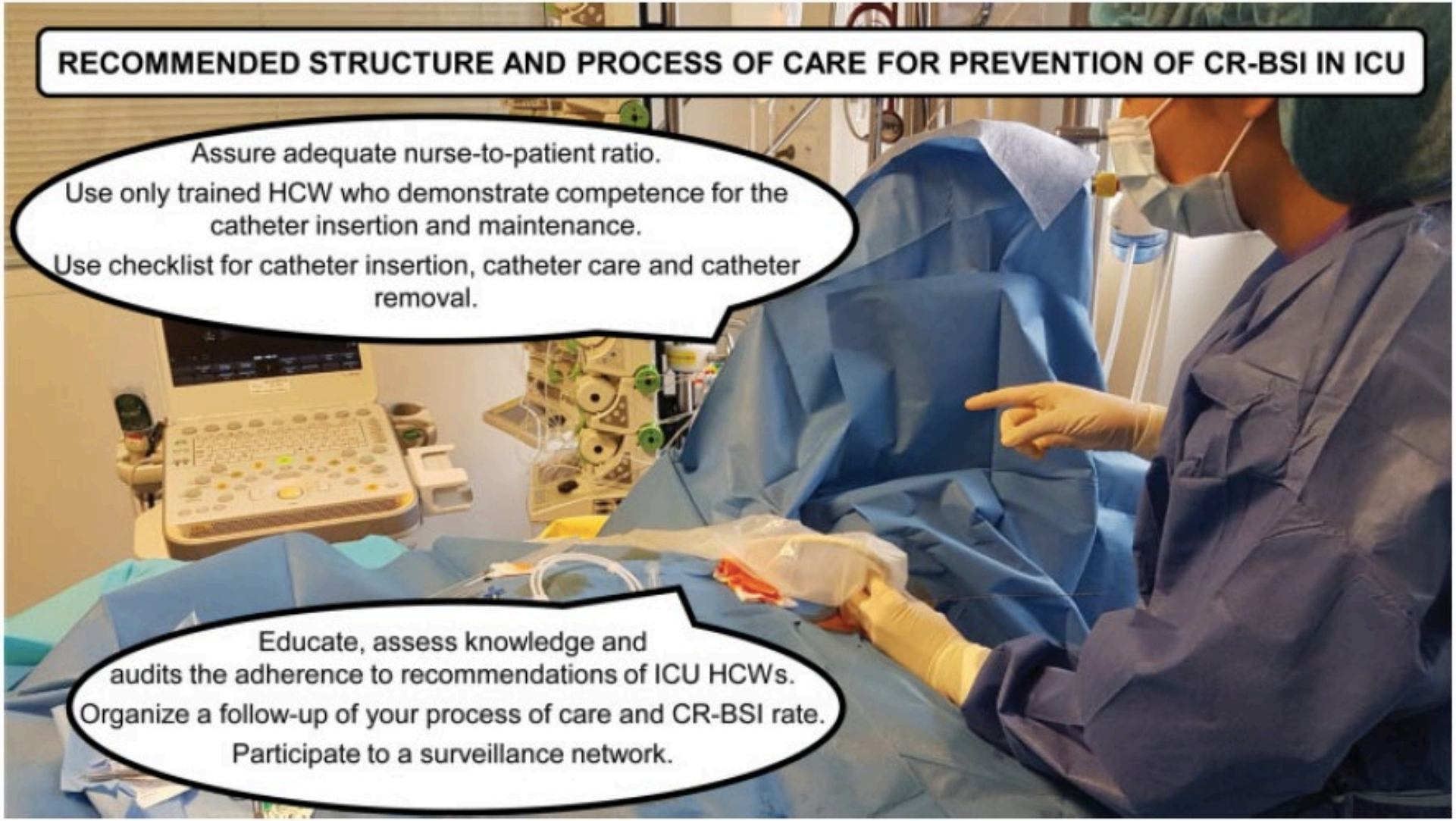

Fig. 1 Recommended structure and process of care for prevention of CR-BSI in ICU. CR-BSI, catheter-related bloodstream infection; ICU, intensive care unit; HCW, health care worker.

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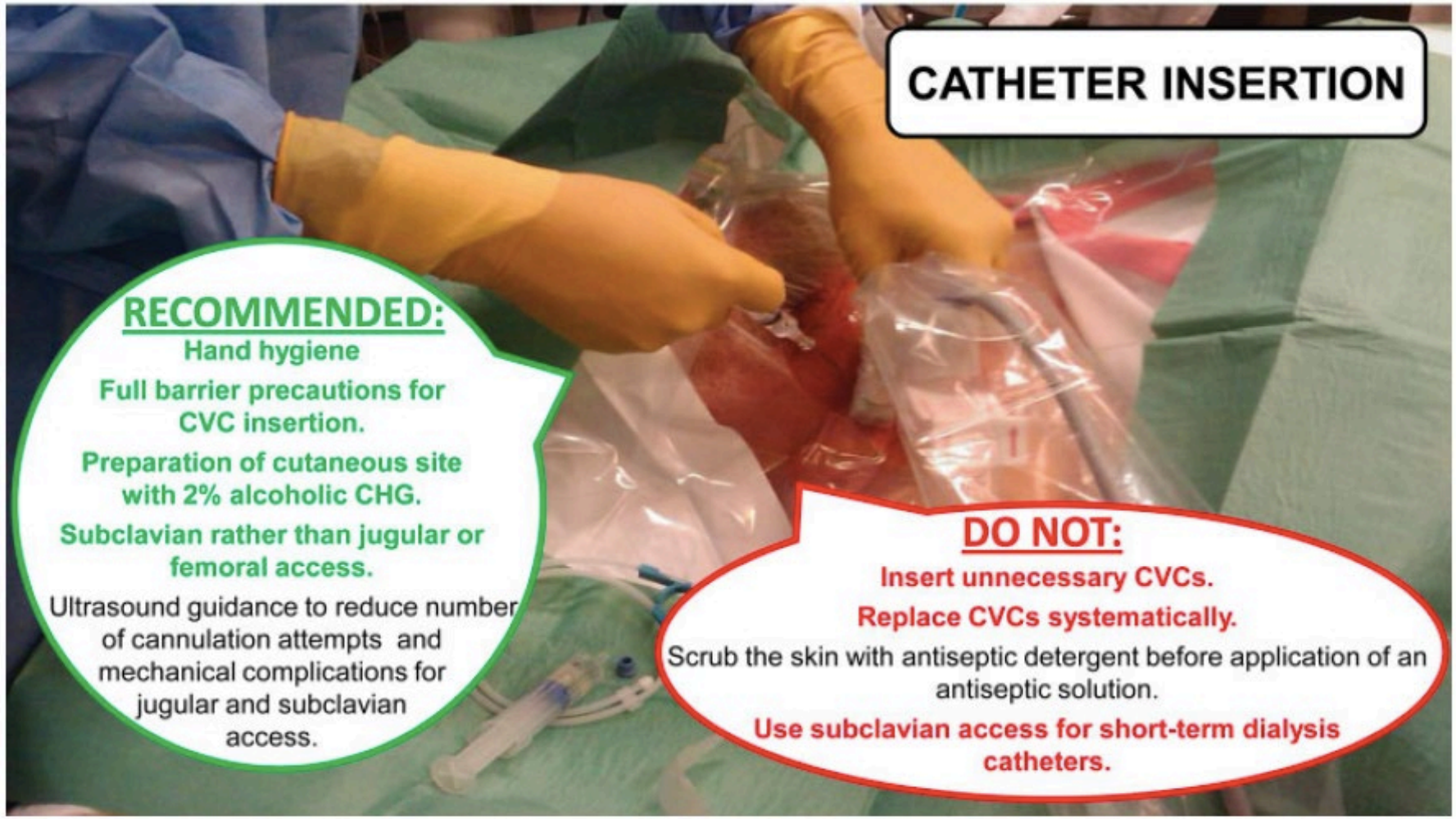

Fig. 2 Strongly recommended preventive measures are written in bold. CHG, chlorhexidine gluconate; CR-BSI, catheter-related bloodstream infection; CVC, central venous catheter.

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Fig. 3 Strongly recommended preventive measures are written in bold. CVC, central venous catheter; CHG, chlorhexidine gluconate.

Prevention of hospital infections by intervention and training (PROHIBIT): results of a pan-European cluster-randomized multicentre study to reduce central venous catheter-related bloodstream infections

Tjallie van der Kooi[1], Hugo Sax[2,3], Didier Pittet[3], Jaap van Dissel[1], Birgit van Benthem[1], Bernhard Walder[4], Vanessa Cartier[4], Lauren Clack[2], Sabine de Greeff[1], Martin Wolkewitz[5], Stefanie Hieke[5], Hendriek Boshuizen[1], Jan van de Kassteele[1], Annemie Van den Abeele[6], Teck Wee Boo[7], Magda Diab-Elschahawi[8], Uga Dumpis[9], Camelia Ghita[10], Susan FitzGerald[11], Tatjana Lejko[12], Kris Leleu[6], Mercedes Palomar Martinez[13], Olga Paniara[14], Márta Patyi[15], Paweł Schab[16], Annibale Raglio[17], Emese Szilágyi[18], Mirosław Ziętkiewicz[19], Albert W. Wu[20], Hajo Grundmann[4,21], Walter Zingg[3,22*] and On behalf of the PROHIBIT consortium

To test the effectiveness of a central venous catheter (CVC) insertion strategy and a hand hygiene (HH) improvement strategy to prevent central venous catheter-related bloodstream infections (CRBSI) in European intensive care units (ICUs), measuring both process and outcome indicators

Adult ICUs from 14 hospitals in 11 European countries participated in this stepped-wedge cluster randomised controlled multicentre intervention study.

Hospital	Hospital type	CVC-days in baseline	CVC-days in intervention	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
1	Tertiary	3066	14171		R								
2	Tertiary	4026	11349		R								
3	Secondary	2063	7782		R								
4	Tertiary	5453	13196			R							
5	Tertiary	6594	16447			R							
6	Tertiary	9915	19403			R							
7	Secondary	2653	3696				R						
8	Tertiary	13253	19553				R						
9	Secondary	4287	5817				R						
10	Tertiary	6575	5724					R					
11	Secondary	25121	26338					R					
12	Tertiary	5589	5728					R					
13	Tertiary	3352	2214						R				
14	Tertiary	6336	12676						R				

01/11-03/11 | 04/11-06/11 | 07/11-09/11 | 10/11-12/11 | 01/12-03/12 | 04/12-06/12 | 07/12-09/12 | 10/12-12/12 | 01/13-03/13 | 04/13-06/13

Baseline | COMBi Intervention | CVCi Intervention | HHi Intervention

Intensive Care Med (2018) 44:48–60

MAIN RESULTS

Overall 25,348 patients with 35,831 CVCs were included. CRBSI incidence density decreased **from 2.4/1000** CVC-days at baseline **to 0.9/1000** (p < 0.0001).

	Univariable regression analysis	Multivariable regression analysis with time-dependent trend	Multivariable regression analysis without time-dependent trend
HH intervention	0.46 (0.27–0.79)	0.37 (0.16–0.87)	0.59 (0.43–0.81)
CVC intervention	0.61 (0.44–0.86)	1.16 (0.63–2.16)	0.46 (0.28–0.74)
Both interventions	0.39 (0.28–0.56)	0.47 (0.27–0.83)	0.33 (0.24–0.47)

Intensive Care Med (2018) 44:48–60

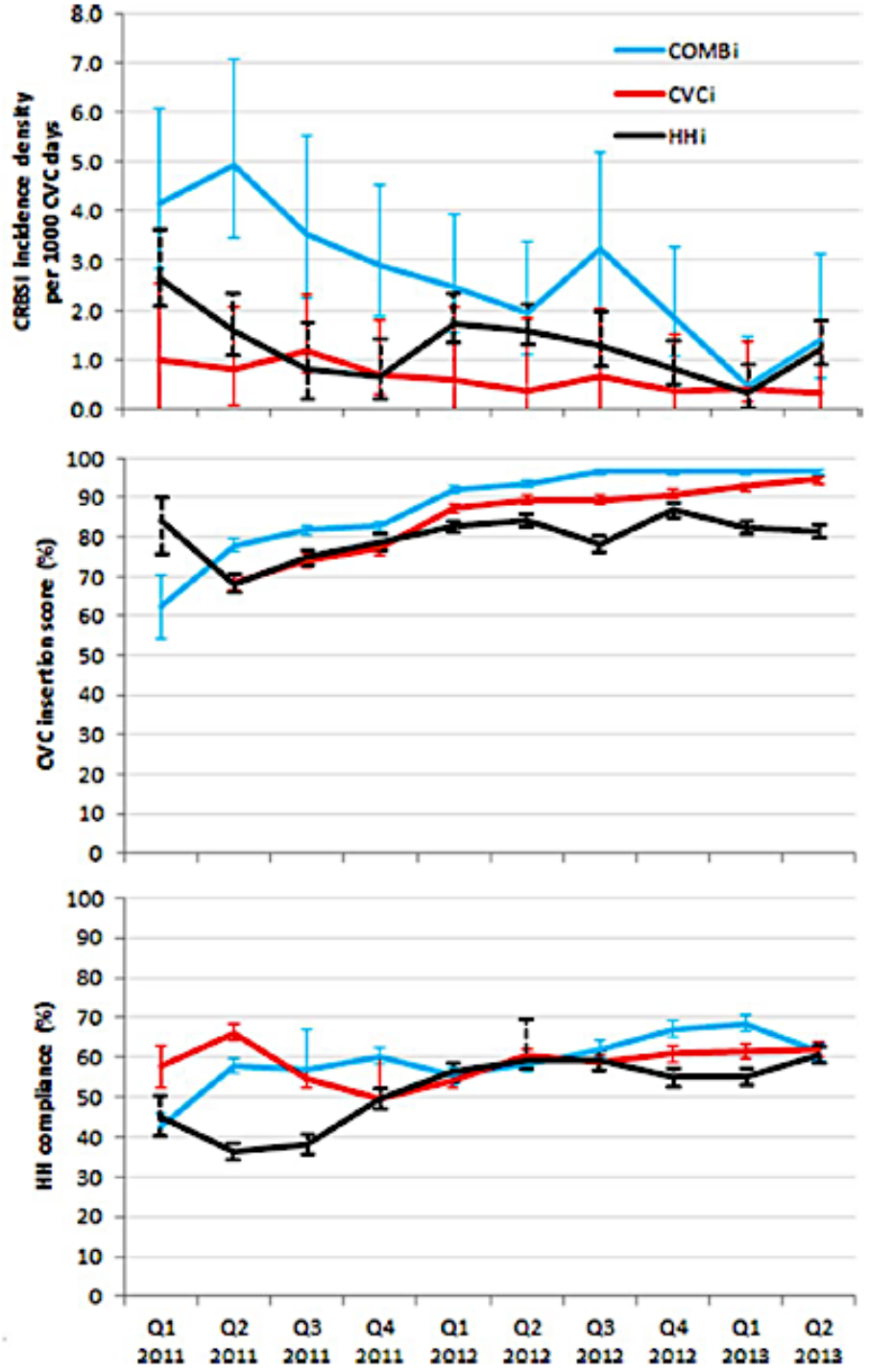
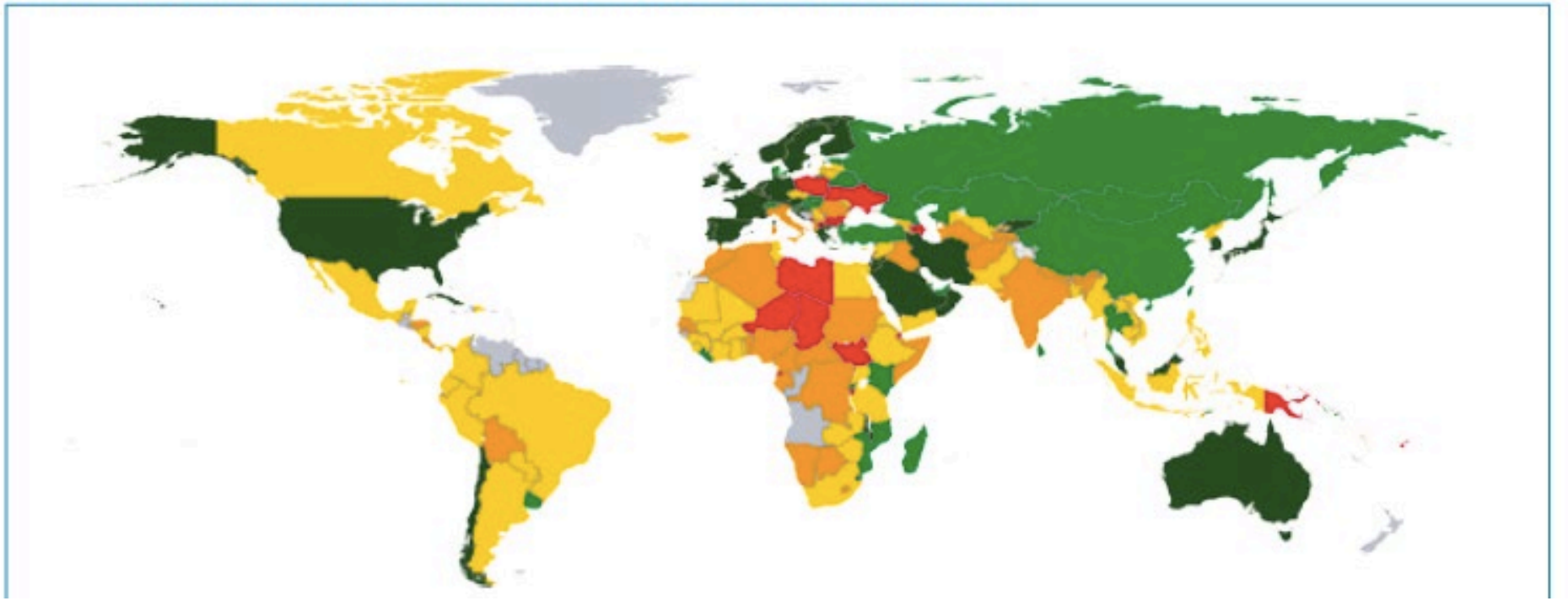


Fig. 1. Country map according to 2020–2021 TrACSS results (indicator 8.1)



- A. No national infection prevention and control (IPC) programme or operational plan is available.
- B. A national IPC programme or operational plan is available. National IPC and water, sanitation and hygiene (WASH) and environmental health standards exist but are not fully implemented.
- C. A national IPC programme and operational plan are available and national guidelines for health care IPC are available and disseminated. Selected health facilities are implementing the guidelines, with monitoring and feedback in place.
- D. A national IPC programme available, according to the WHO IPC core components guidelines and IPC plans and guidelines implemented nationwide. All health care facilities have a functional built environment (including water and sanitation), and necessary materials and equipment to perform IPC, per national standards.
- E. IPC programmes are in place and functioning at national and health facility levels, according to the WHO IPC core components guidelines. Compliance and effectiveness are regularly evaluated and published. Plans and guidance are updated in response to monitoring.
- No response.
- Not applicable.

Global report on infection prevention and control. Geneva: World Health Organization; 2022

CONCLUSIONS

- Catheter related bloodstream infections (CR-BSI) remain one of the main challenge for Infection prevention and Control (IPC) in Intensive Care Unit;
- There is evidence that CR-BSI is one of the most easily preventable HAI, with the application of bundles (catheter insertion and care) as multimodal strategy;
- We need to improve surveillance of the event;
- We need to implement bundles and strategies to improve the control of CR-BSI.
- We need to measure the implementation of bundles and their effects.

GRAZIE PER L'ATTENZIONE

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