



# Candidemie e PICC a Genova

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# Epidemiology, Species Distribution, Antifungal Susceptibility and Outcome of Nosocomial Candidemia in a Tertiary Care Hospital in Italy

Matteo Bassetti<sup>1\*</sup>, Lucia Taramasso<sup>2</sup>, Elena Nicco<sup>2</sup>, Maria Pia Molinari<sup>3</sup>, Michele Mussap<sup>2</sup>, Claudio Viscoli<sup>2</sup>

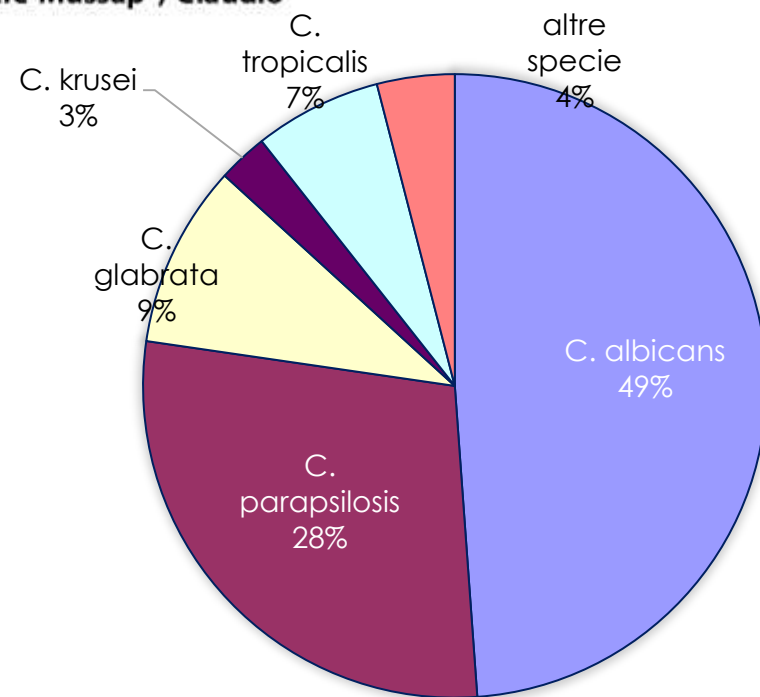
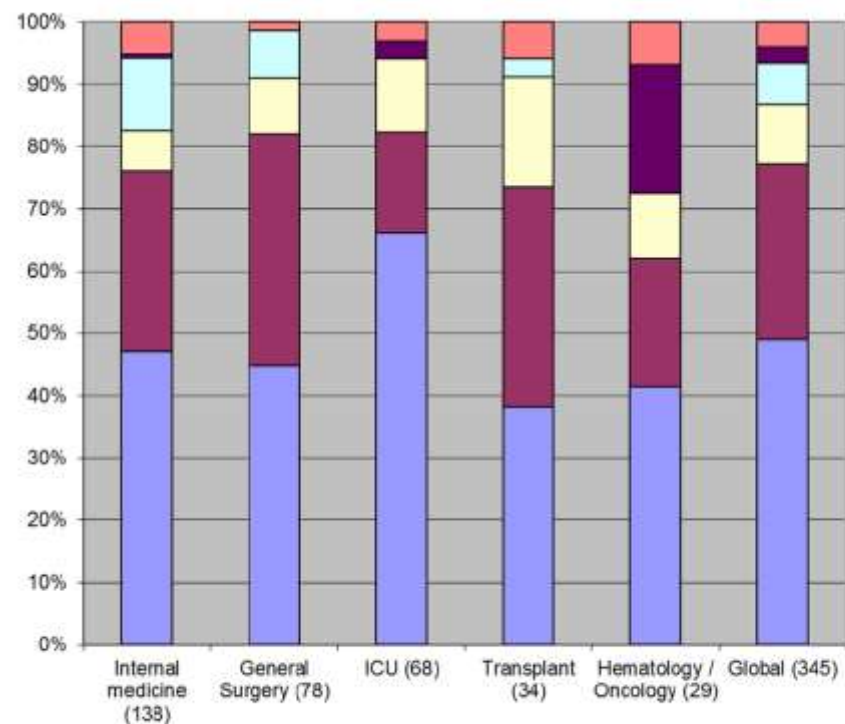
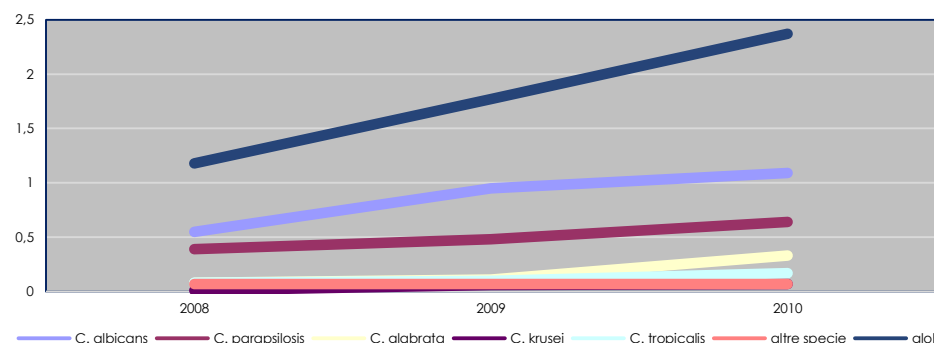
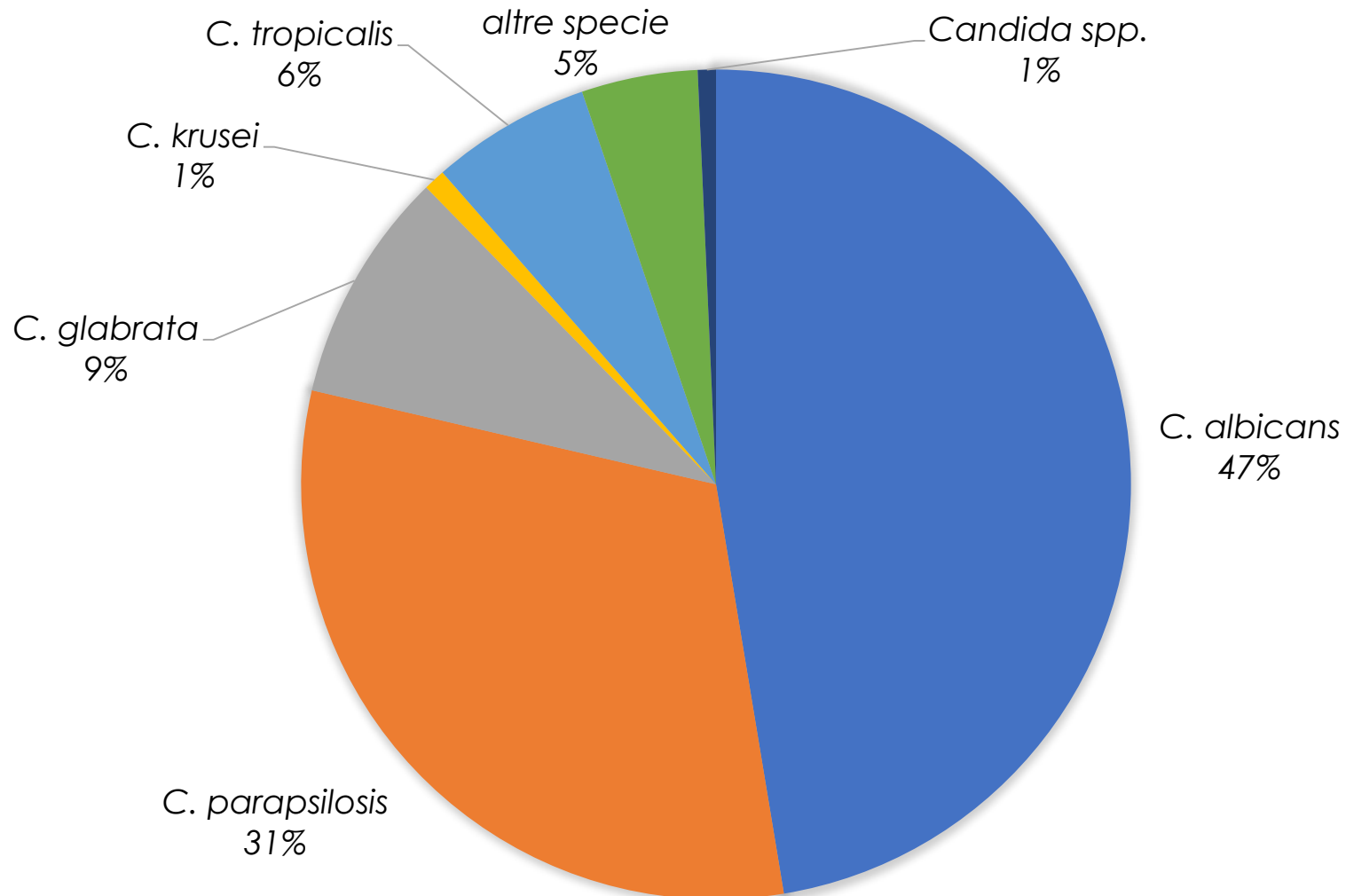


Figure 1. Distribution of the *Candida* species according to underlying pathology/medical care (n). doi:10.1371/journal.pone.0024198.g001

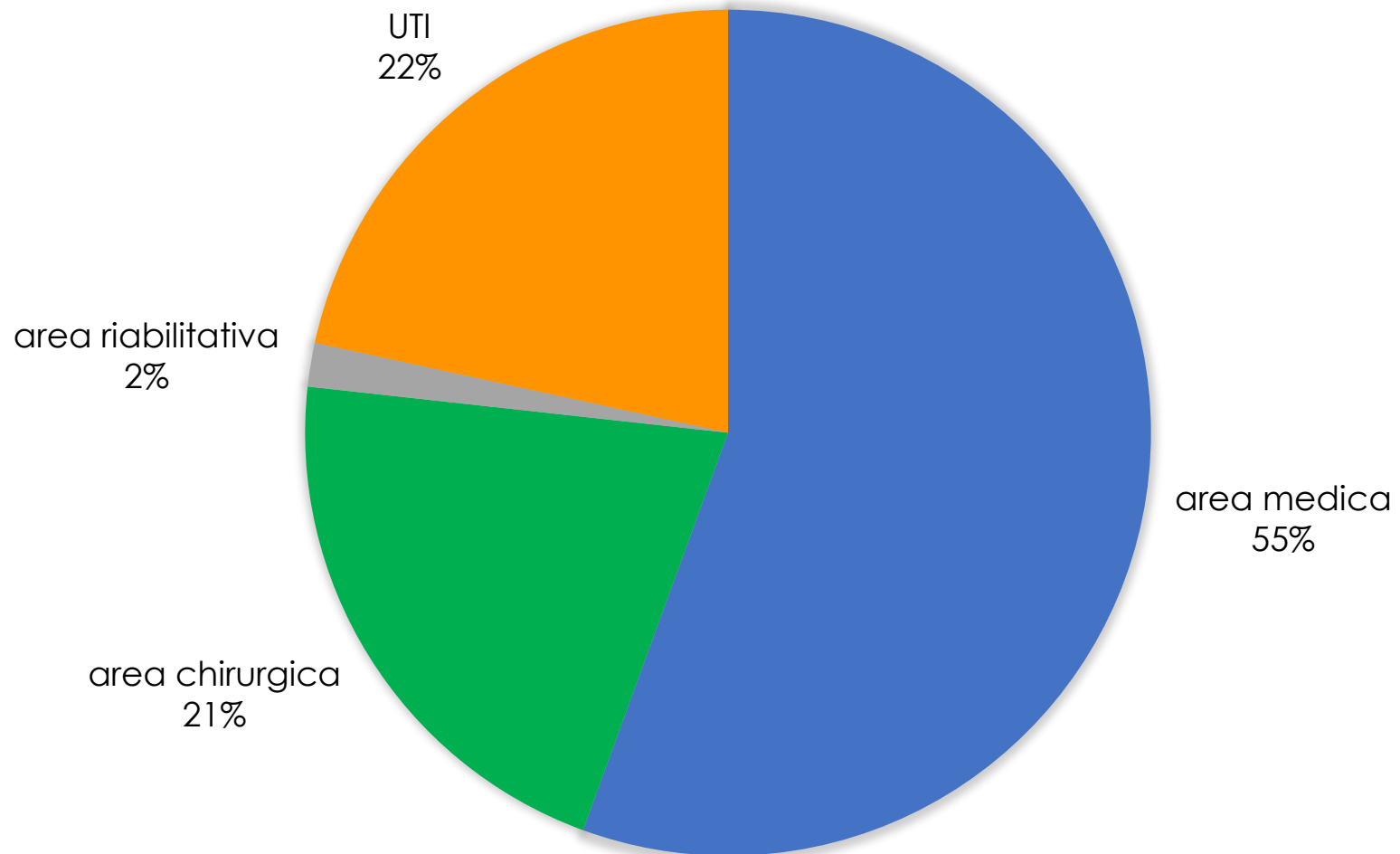
Area medica: 44%



# Specie isolate 2012 – 2016 (707 episodi)

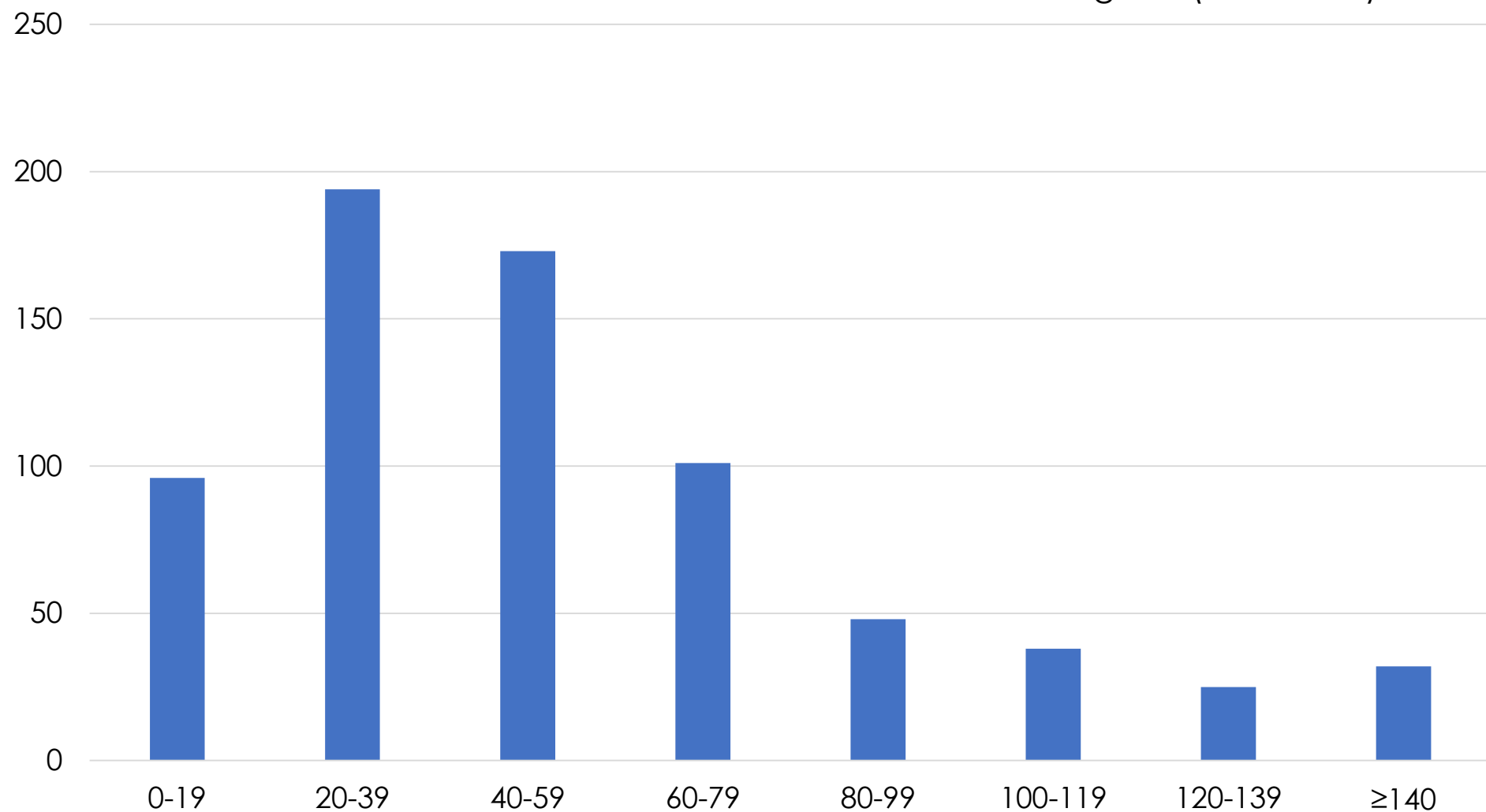


# Aree funzionali



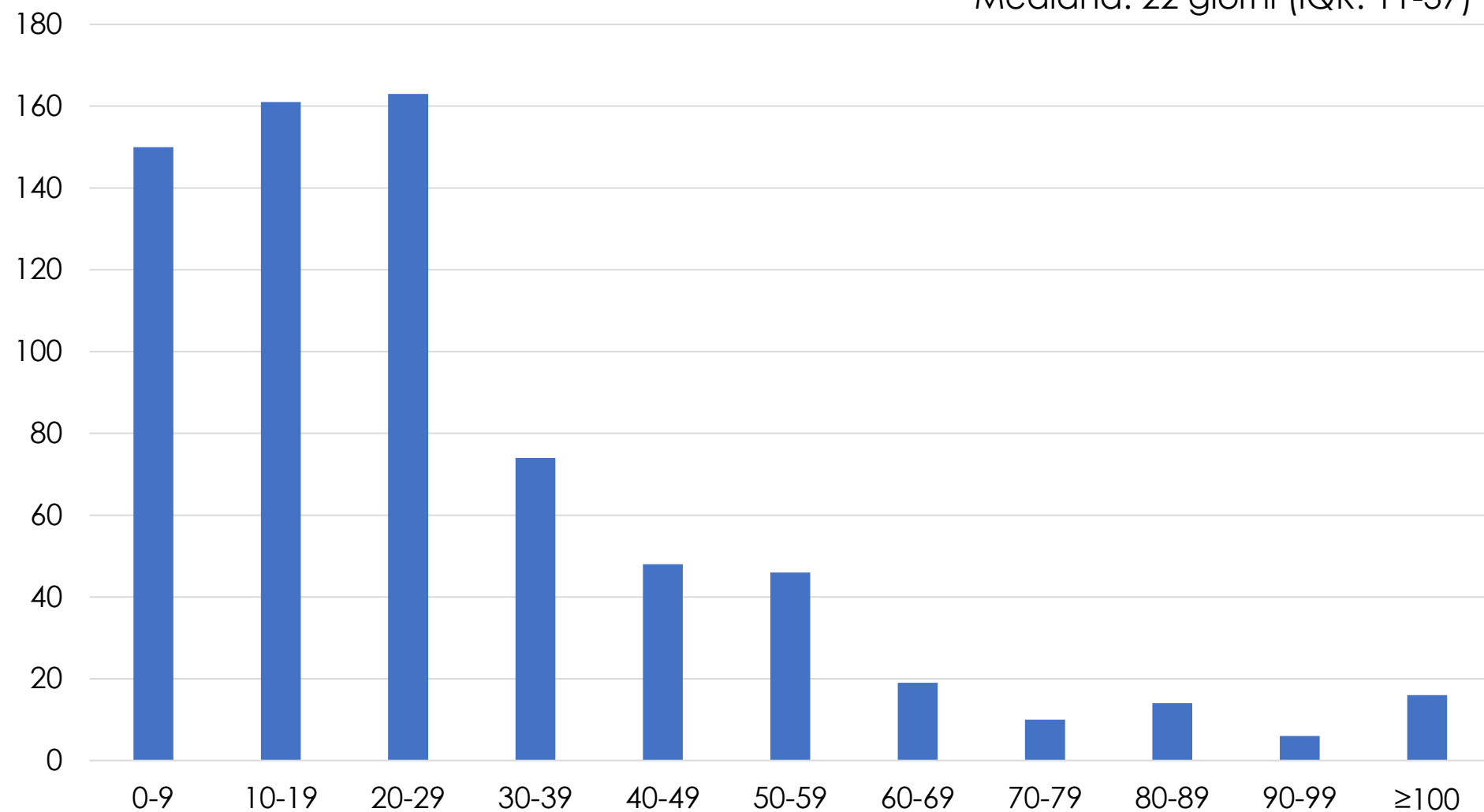
# Giorni di ricovero

Mediana: 45 giorni (IQR: 28-72)

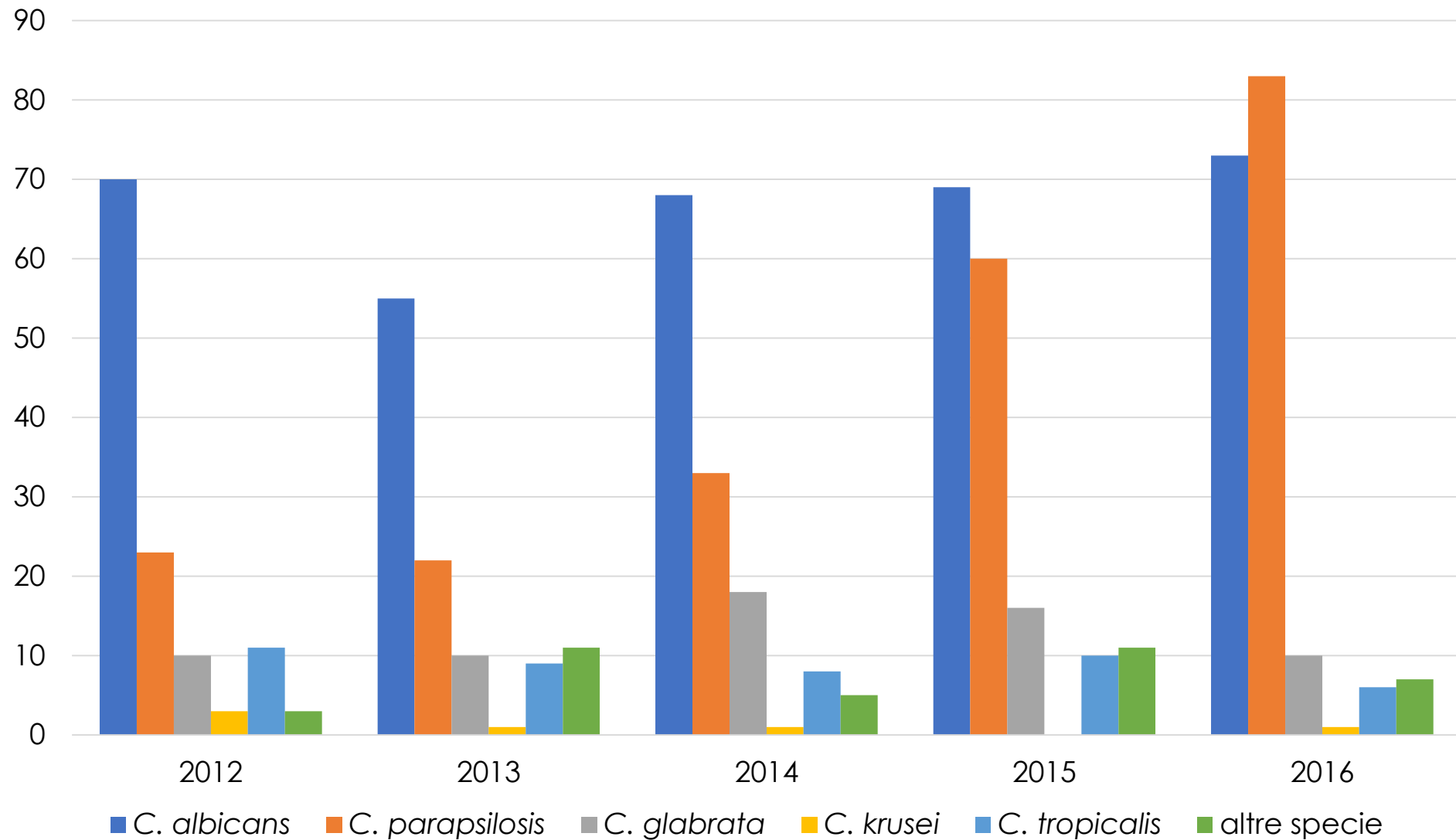


# Giorni alla candidemia

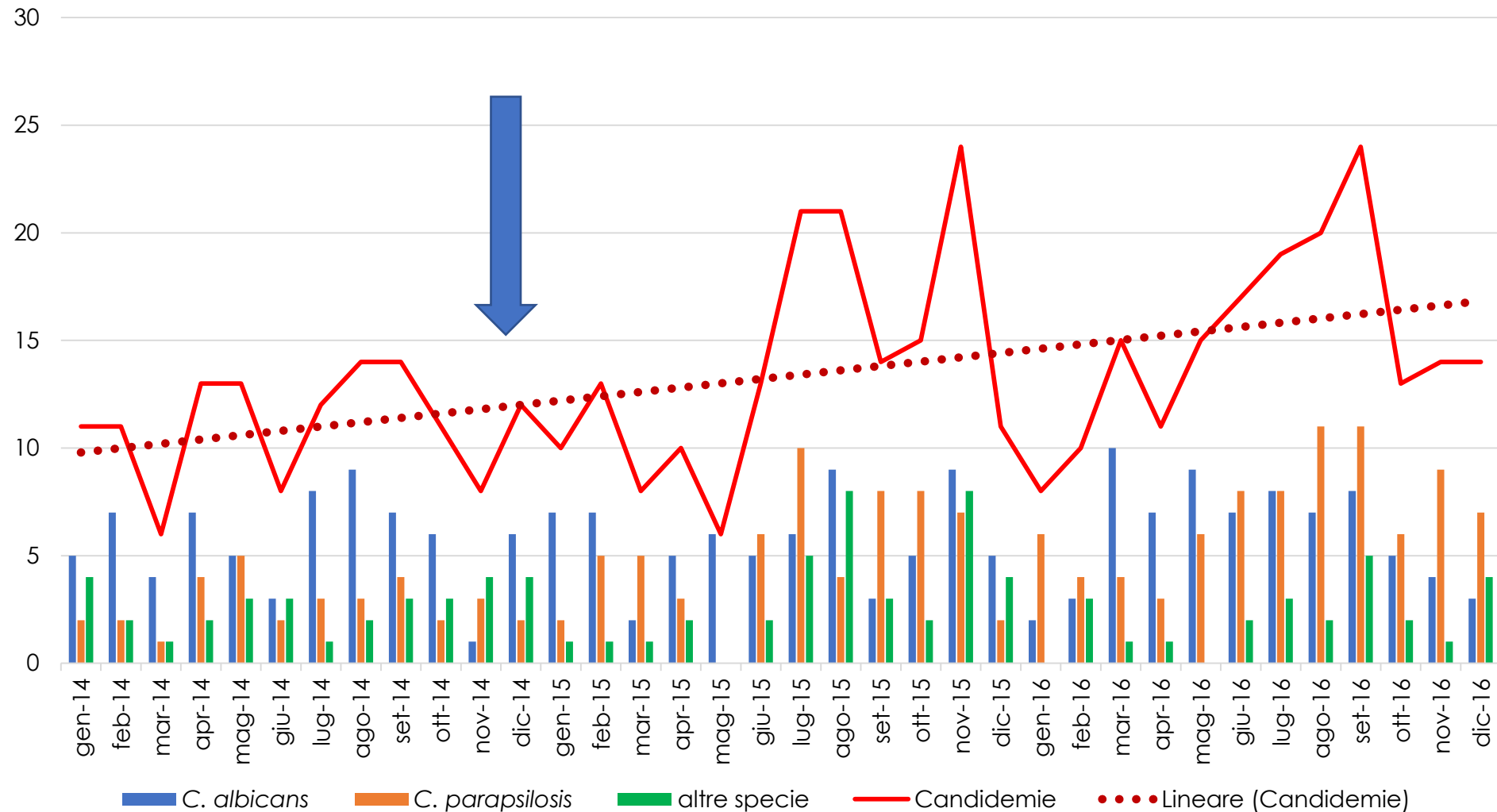
Mediana: 22 giorni (IQR: 11-37)



# Specie per anno

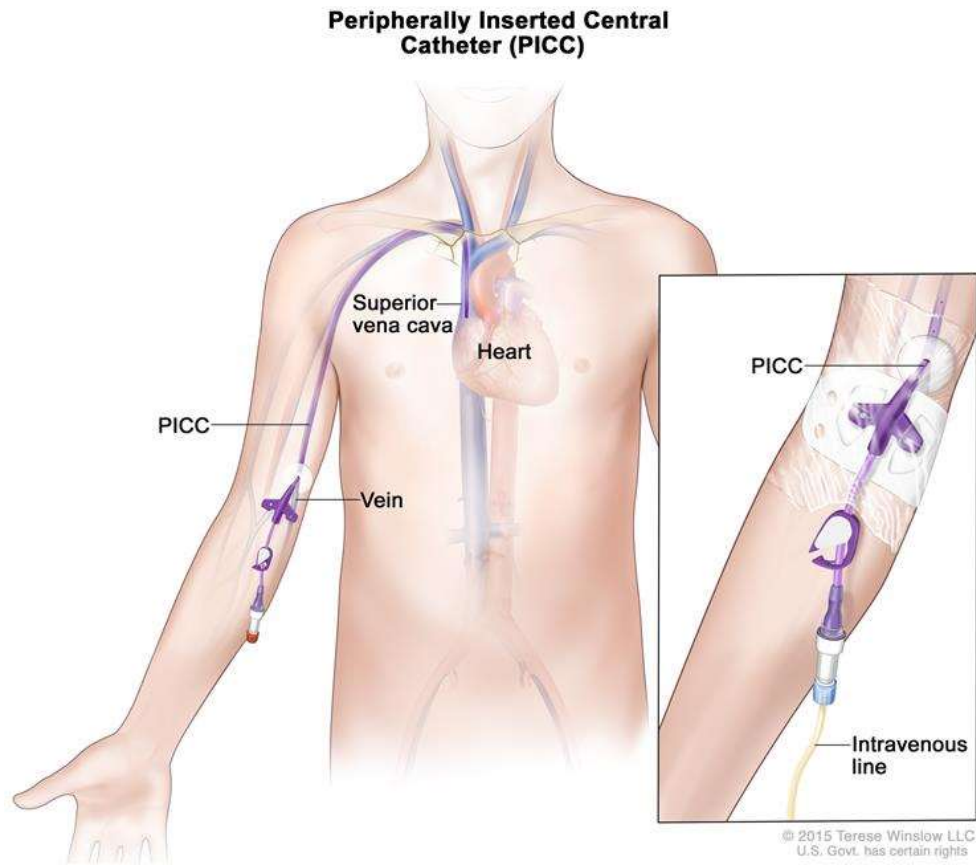


# Andamento 2014 – 2016





# PICC-team



- Personale dedicato all'impianto del device
- Posizionamento al letto del malato
- Guida ECG

# Central Line–Associated Bloodstream Infection in Hospitalized Children with Peripherally Inserted Central Venous Catheters: Extending Risk Analyses Outside the Intensive Care Unit

Sonali Advani,<sup>1</sup> Nicholas G. Reich,<sup>2</sup> Arnab Sengupta,<sup>1</sup> Leslie Gosey,<sup>3</sup> and Aaron M. Milstone<sup>1,2,4</sup>

**Table 2. Pathogens Causing Central Line–Associated Bloodstream Infection (CLABSI) in Hospitalized Children with Peripherally Inserted Central Catheters (PICCs)**

Organism	No. (%) of organisms (n = 132)
Gram-positive organism	49 (37)
Coagulase-negative <i>Staphylococcus</i> species	18 (13.6) <b>1°</b>
<i>Enterococcus faecalis</i>	13 (9.8) <b>3°</b>
<i>Staphylococcus aureus</i>	7 (5.3)
Methicillin-resistant <i>Staphylococcus aureus</i>	3 (2.3)
<i>Enterococcus faecium</i>	3 (2.3)
Vancomycin-resistant <i>Enterococcus</i> species	3 (2.3)
<i>Enterococcus raffinosus</i>	1 (.8)
<i>Enterococcus agglomerans</i>	1 (.8)
Gram-negative organism	50 (38)
<i>Klebsiella pneumoniae</i>	13 (9.8) <b>3°</b>
<i>Enterobacter cloacae</i>	13 (9.8) <b>3°</b>
<i>Pseudomonas aeruginosa</i>	4 (3.0)
<i>Escherichia coli</i>	3 (2.3)

Organism	No. (%) of organisms (n = 132)
<i>Klebsiella ozonae</i>	3 (2.3)
<i>Klebsiella oxytoca</i>	3 (2.3)
<i>Serratia marcescens</i>	4 (3.0)
<i>Acinetobacter baumannii</i>	5 (3.8)
<i>Sphingomonas paucimobilis</i>	1 (0.8)
<i>Stenotrophomonas maltophilia</i>	1 (0.8)
Fungus	33 (25)
<i>Candida parapsilosis</i>	17 (12.9) <b>2°</b>
<i>Candida albicans</i>	10 (7.6)
<i>Candida glabrata</i>	3 (2.3)
<i>Candida krusei</i>	1 (0.8)
<i>Candida lusitanae</i>	1 (0.8)
<i>Candida tropicalis</i>	1 (0.8)

Carlo Tascini  
 Emanuela Sozio  
 Giancarlo Tintori  
 Andrea Ripoli  
 Francesco Sbrana  
 Elena Rosselli Del Turco  
 Giacomo Bertolino  
 Simona Fortunato  
 Franco Carmassi  
 Gianluigi Cardinali  
 Francesco Menichetti

## Peripherally inserted central catheter as a predominant risk factor for candidemia in critically ill patients in Internal Medicine wards in Italy

**Table 1** Comparison of clinical characteristics and outcomes of patients in the general internal medicine wards versus those in the intensive care units

Clinical characteristics and outcomes of patients	All patients (n = 72)	Patients in General Internal Medicine wards (n = 50)	Patients in Intensive Care Units (n = 22)	p value
<b>Clinical characteristics</b>				
Age (years)	73 ± 14	78 ± 13	66 ± 12	<0.05
Charison score	6.82 ± 2.70	6.69 ± 2.52	7.16 ± 3.14	ns
Admission from home	36/72 (50 %)	34/50 (68 %)	2/22 (9 %)	≤0.001
Transfer from surgical ward	14/72 (19 %)	1/50 (2 %)	13/22 (59 %)	≤0.001
Hospital stay (days)	15 [8–35]	11 [6–20]	40 [30–72]	≤0.001
Time to onset of candidemia (days)	7 [2–17]	4 [1–11]	21 [9–36]	≤0.001
Very early onset candidemia (<48 h from admission)	24/72 (34 %)	23/50 (46 %)	1/22 (5 %)	≤0.001
Early onset candidemia (2–10 days from admission)	19/72 (26 %)	13/50 (26 %)	6/22 (27 %)	ns
Late onset candidemia (>10 days from admission)	29/72 (40 %)	14/50 (28 %)	15/22 (68 %)	<0.05
<b>Patient therapy and outcomes</b>				
Therapy with azole	39/72 (54 %)	33/50 (66 %)	6/22 (27 %)	<0.05
Therapy with echinocandins	17/72 (22 %)	2/50 (4 %)	14/22 (64 %)	≤0.001
No treatment	17/72 (24 %)	15/50 (30 %)	2/22 (9 %)	ns
Continuous infusions	48/72 (67 %)	29/50 (58 %)	19/22 (86 %)	<0.05
Nasogastric tube	33/72 (46 %)	16/50 (32 %)	17/22 (77 %)	≤0.001
Central venous catheter	26/72 (36 %)	9/50 (18 %)	17/22 (77 %)	≤0.001
Peripherally inserted central catheter	37/72 (52 %)	36/50 (72 %)	1/22 (5 %)	≤0.001
Overall mortality	31/72 (43 %)	17/50 (34 %)	14/22 (64 %)	≤0.001

Data are presented as the mean ± standard deviation, number with the percentage in parenthesis, or the median with the interquartile range in square brackets, as appropriate  
 ns Not significant

# Assessment of risk factors for candidemia in non-neutropenic patients hospitalized in Internal Medicine wards: A multicenter study

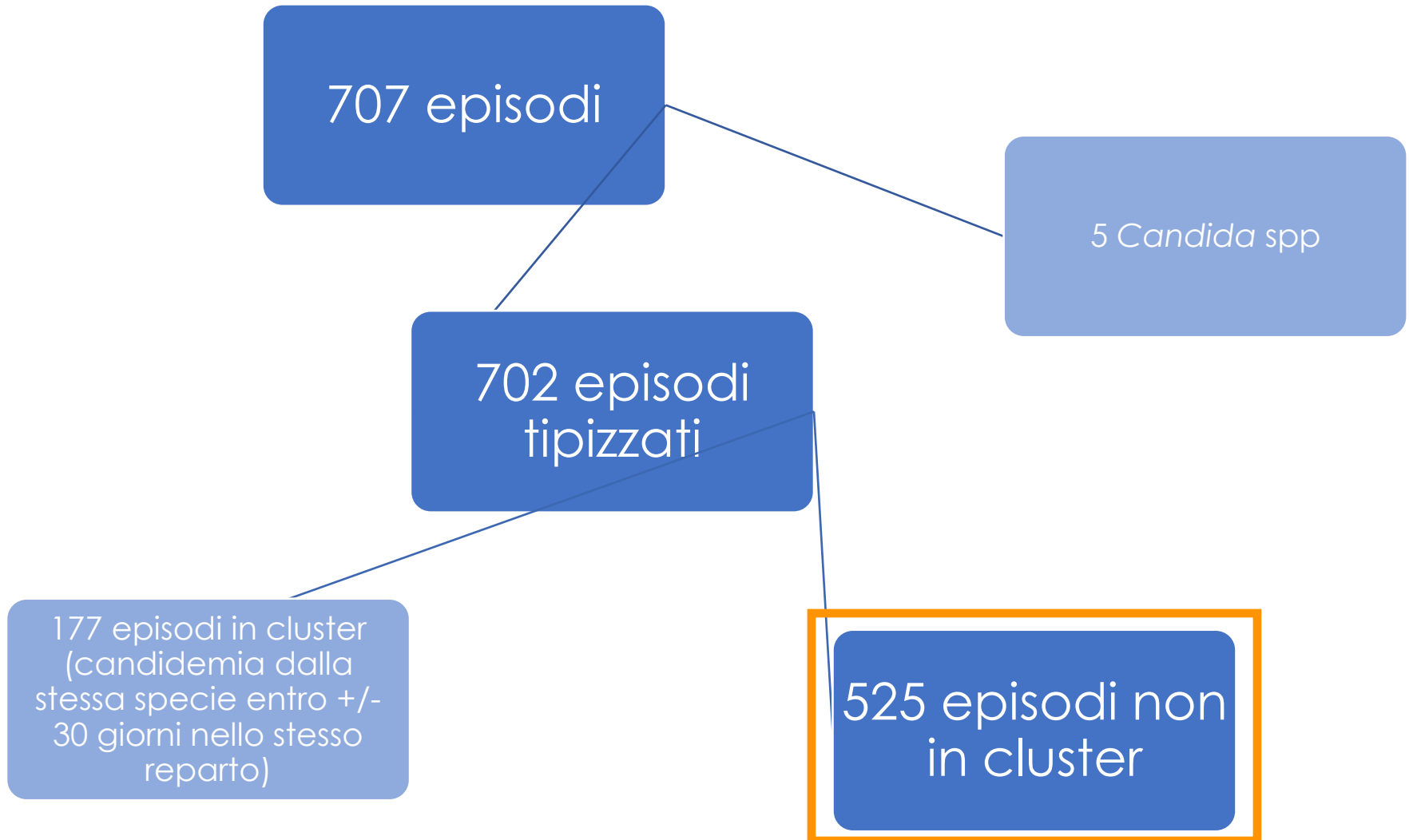
M Falcone <sup>a,\*</sup>, G Tiseo <sup>b</sup>, C Tascini <sup>c</sup>, A Russo <sup>a</sup>, E Sozio <sup>c</sup>, G Raponi <sup>a</sup>, C Rosin <sup>e</sup>, P Pignatelli <sup>b</sup>, P Carfagna <sup>d</sup>,  
 A Farcomeni <sup>a</sup>, R Luzzati <sup>e</sup>, F Violi <sup>b</sup>, F Menichetti <sup>c</sup>, M Venditti <sup>a</sup>

**Table 2**  
 Univariate and multivariate analysis of risk factors for candidemia in Internal Medicine wards (derivation cohort).

	Univariate analysis				Multivariate analysis			
	OR	95.0% CI		p-Value	OR	95.0% CI		p-Value
		Lower	Upper			Lower	Upper	
Male sex	0.675	0.515	0.885	0.004				
Diabetes mellitus	2.774	2.100	3.665	<0.001	7.306	3.905	13.666	<0.001
IBD	6.248	2.250	17.352	<0.001				
Chronic renal failure	1.487	1.096	2.019	0.011				
COPD	3.332	2.316	4.794	<0.001	6.029	2.982	12.188	<0.001
Recent CDI	7.957	4.542	13.939	<0.001	9.287	3.166	27.241	<0.001
Previous antibiotic therapy	4.232	3.169	5.651	<0.001	3.315	1.975	5.565	<0.001
Ongoing antibiotic therapy	1.688	1.252	2.275	0.001				
Multiple concomitant antibiotics	1.581	1.073	2.329	0.020				
Concomitant $\beta$ lactam/ $\beta$ LI	1.840	1.362	2.485	<0.001				
Concomitant cephalosporin	0.461	0.274	0.777	0.003				
Concomitant carbapenem	1.794	1.166	2.759	0.007				
Concomitant IV glycopeptide therapy	6.950	3.740	12.915	<0.001	5.863	2.138	16.078	<0.001
Immunosuppressive therapy	3.054	2.309	4.040	<0.001	2.131	1.316	3.451	0.002
Steroids	2.294	1.715	3.067	<0.001				
Non-steroidal immunosuppressive th.	2.574	1.670	3.967	<0.001				
Chemotherapy	1.772	1.177	2.667	0.006				
CVC	2.862	1.971	4.156	<0.001				
TPN	8.162	5.757	11.571	<0.001	6.266	3.240	12.119	<0.001
PICC	8.113	5.469	12.036	<0.001	5.125	2.595	10.118	<0.001
Severe sepsis/septic shock	16.542	10.018	27.317	<0.001	12.544	5.426	29.001	<0.001

IBD = inflammatory bowel disease; COPD = chronic obstructive pulmonary disease; CDI = *Clostridium difficile* infection;  $\beta$  LI =  $\beta$  lactamase inhibitors; IV = intravenous; CVC = central venous catheter; TPN = total parenteral nutrition; PICC = peripherally inserted central catheter.

# Selezione degli episodi



# Analisi dei fattori associati a *C. parapsilosis*



	<b>C. non-parapsilosis (384)</b>	<b>C. parapsilosis (141)</b>	<b>Total (525)</b>	<b>univariate</b>		<b>multivariate</b>	
	<b>n (%)</b>	<b>n (%)</b>	<b>n (%)</b>	<b>OR (95) CI</b>	<b>p</b>	<b>OR (95) CI</b>	<b>p</b>
<b>sex, male</b>	208 (54)	78 (55)	286 (54)				
<b>age, years (median)</b>	75 (IQR: 65-83)	72 (IQR: 62-80)	75 (IQR: 64-82)		0.064		
<b>Period</b>					0.014		0.028
<b>2012 - 2014</b>	228 (59)	70 (50)	298 (57)	rif.		rif.	
<b>2015 - 2016</b>	156 (41)	71 (50)	227 (43)	1.7 (1.1-2.6)		1.64 (1.06-2.55)	
<b>medicine ward</b>	229 (60)	78 (55)	307 (58)				
<b>surgery ward</b>	87 (23)	37 (26)	124 (24)				
<b>riab ward</b>	5 (1)	3 (2)	8 (2)				
<b>ICU</b>	63 (16)	23 (16)	86 (16)				
<b>days to episode (median)</b>	20 (IQR 10-31)	27 (IQR 12-44)	21 (IQR: 11-36)		0.006	1.01 (1.00-1.01)	0.017
<b>TPN</b>	254 (66)	92 (65)	346 (66)				
<b>Central line</b>					0.114		0.477
<b>No CVC</b>	158 (41)	48 (34)	206 (39)	rif.		rif.	
<b>CVC</b>	186 (48)	70 (50)	256 (49)	1.2 (0.8-1.9)		1.27 (0.82-1.97)	
<b>PICC</b>	40 (10)	23 (16)	63 (12)	1.9 (1.0-3.5)		1.38 (0.72-2.64)	
<b>Hemat. malign.</b>	30 (8)	13 (9)	43 (8)				
<b>Solid tumor</b>	113 (29)	32 (23)	145 (28)				
<b>SOT</b>	10 (3)	4 (3)	14 (3)				
<b>HSCT</b>	9 (2)	2 (1)	11 (2)				
<b>prior immunosupp.</b>	34 (9)	13 (9)	47 (9)				
<b>prior steroids</b>	64 (17)	18 (13)	82 (16)				
<b>prior surgery</b>	117 (30)	42 (30)	159 (30)				
<b>HIV</b>	8 (2)	1 (1)	9 (2)				
<b>neutropenia</b>	19 (5)	11 (8)	30 (6)				
<b>Charlson (median)</b>	3 (IQR: 2-4)	3 (IQR: 1-4)	3 (IQR: 2-4)				
<b>prior antibiotics</b>	361 (94)	129 (91)	490 (93)				
<b>Prior antifungal</b>					0.006		0.034
<b>no antifung.</b>	335 (87)	109 (77)	444 (85)	rif		rif.	
<b>azoles</b>	37 (10)	17 (12)	54 (10)	1.4 (0.8-2.6)		1.49 (0.80-2.79)	
<b>echin.</b>	9 (2)	14 (10)	23 (4)	4.8(2.0-11.4)		4.30 (1.79-10.29)	
<b>az. + echin.</b>	2 (1)	1 (1)	3 (1)	1.5 (0.1-17.2)		1.10 (0.10-12.42)	
<b>echin.+ampho</b>	1 (0)	0 (0)	1 (0)	3.1 (0.2-49.8)		2.74 (0.15-49-90)	

# Epidemiology and predictive factors for early and late mortality in *Candida* bloodstream infections: a population-based surveillance in Spain

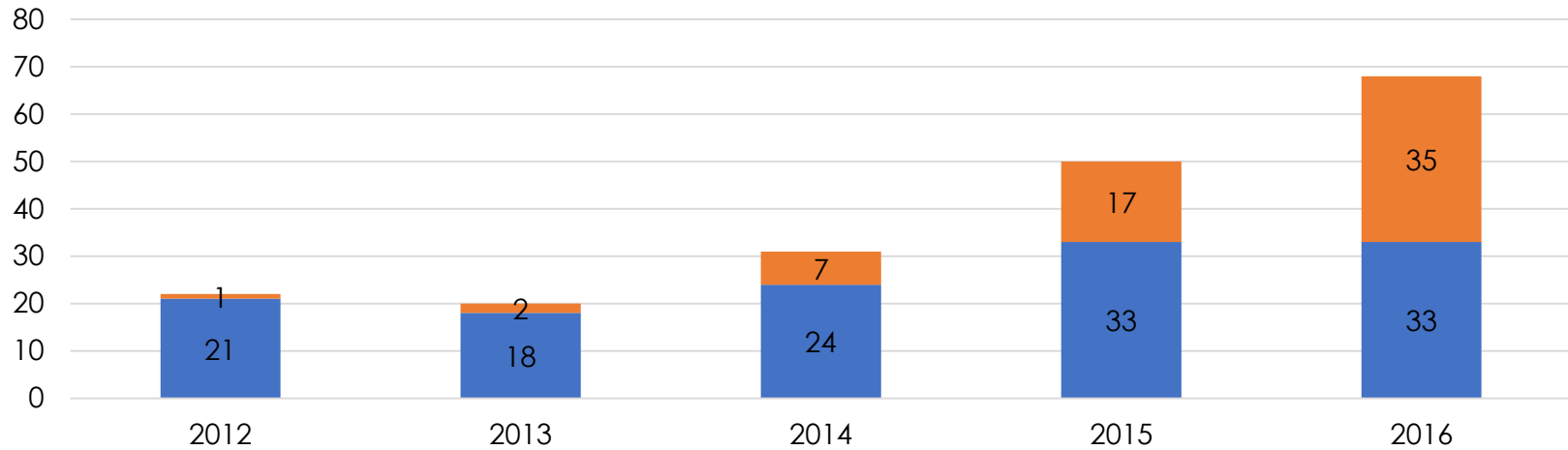
M. Puig-Asensio<sup>1</sup>, B. Padilla<sup>2,3</sup>, J. Garnacho-Montero<sup>4</sup>, O. Zaragoza<sup>5</sup>, J. M. Aguado<sup>6</sup>, R. Zaragoza<sup>7</sup>, M. Montejo<sup>8</sup>, P. Muñoz<sup>2,3</sup>, I. Ruiz-Camps<sup>1</sup>, M. Cuenca-Estrella<sup>5</sup> and B. Almirante<sup>1</sup> on behalf of the CANDIPOP Project\* and GEIH-GEMICOMED (SEIMC) and REIPI

**TABLE I.** Baseline characteristics of study population and clinical data of candidaemia episodes according to *Candida* species, Spain (2010–2011)

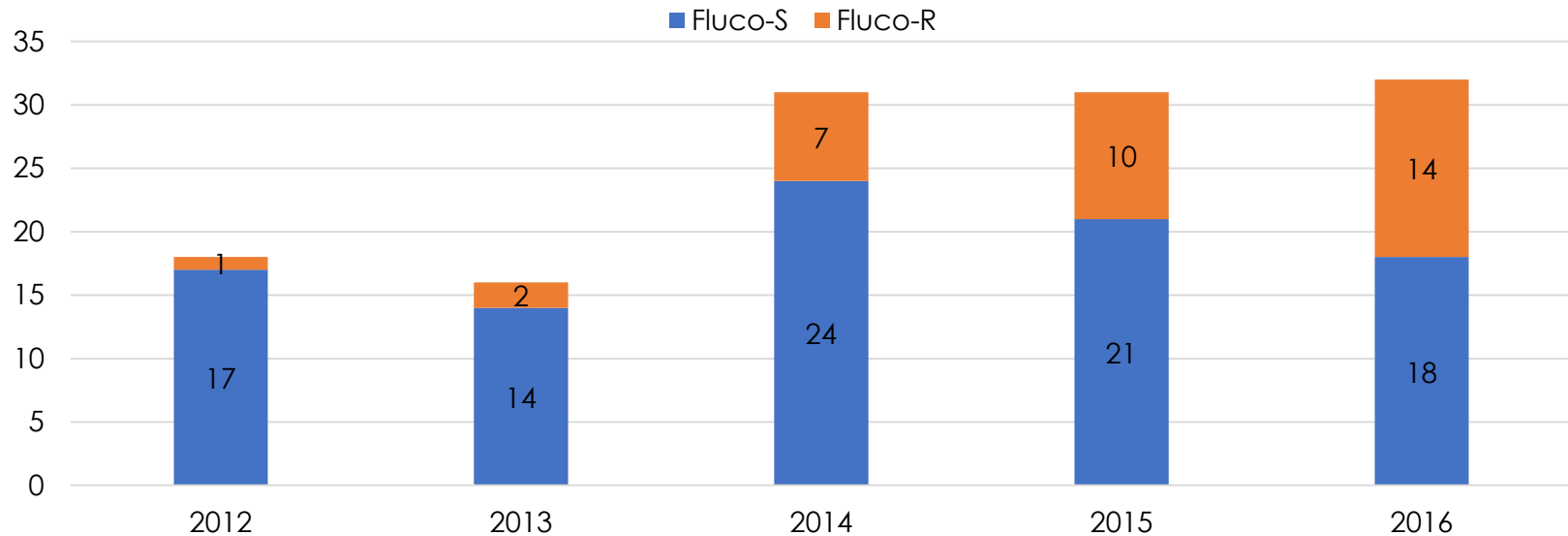
Characteristic	All cases (N = 752)	<i>Candida</i> species <sup>a</sup>				
		<i>C. albicans</i> (n = 337)	<i>C. parapsilosis</i> (n = 185)	<i>C. glabrata</i> (n = 97)	<i>C. tropicalis</i> (n = 57)	<i>C. krusei</i> (n = 14)
Risk factors for candidaemia						
Central venous catheter	581/750 (77.5)	258 (76.6)	156/183 (85.2)	66 (68)	38 (66.7)	13 (92.9)
Total parenteral nutrition	365 (48.5)	176 (52.2)	95 (51.4)	41 (42.3)	20 (35.1)	8 (57.1)
Immunosuppressive therapy <sup>c</sup>	168 (22.3)	68 (20.2)	40 (21.6)	18 (18.6)	14 (24.6)	6 (42.9)
Neutropenia (<500 cell/mm <sup>3</sup> )	35 (4.7)	10 (3)	6 (3.2)	3 (3.1)	5 (8.8)	2 (14.3)
Intubation	188/751 (25)	98/336 (29.1)	51 (27.6)	16 (16.5)	7 (12.3)	4 (28.6)
Prior surgery (3 months)	382 (50.8)	181 (53.7)	98 (53)	47 (48.5)	27 (47.4)	5 (35.7)
Abdominal surgery	211 (28.1)	95 (28.2)	54 (29.2)	34 (35.1)	15 (26.3)	4 (28.6)
Prior antibiotic therapy <sup>c</sup>	699/748 (93.5)	324/334 (97)	165/184 (89.7)	87 (89.7)	54 (94.7)	11 (78.6)
Prior fungal therapy <sup>c</sup>	160/751 (21.3)	46 (13.6)	57 (30.8)	23/96 (24)	12 (21.1)	8 (57.1)
Azole exposure	117/750 (15.6)	37 (11)	34 (18.4)	20/96 (20.8)	7/56 (12.5)	7 (50)
Echinocandin exposure	45/751 (6)	9 (2.7)	23 (12.4)	5/96 (5.2)	4 (7)	2 (14.3)
Prior <i>Candida</i> colonization	284/750 (37.9)	157/336 (46.7)	50 (27)	42 (43.3)	18 (31.6)	4/13 (30.8)
Source of infection						
Primary	423 (56.3)	202 (59.9)	89 (48.1)	54 (55.7)	33 (57.9)	8 (57.1)
Catheter-related	258 (34.3)	101 (30)	89 (48.1)	24 (24.7)	16 (28.1)	5 (35.7)
Urological	40 (5.3)	22 (6.5)	2 (1.1)	9 (9.3)	5 (8.8)	–
Abdominal	25 (3.3)	9 (2.7)	5 (2.7)	8 (8.2)	3 (5.3)	–
Others	6 (0.8)	3 (0.9)	–	2 (2.1)	–	1 (7.1)
Severity of infection						
Bacteria in incident culture	145 (19.3)	63 (18.7)	38 (20.5)	20 (20.6)	10 (17.5)	5 (35.7)
Septic shock or severe sepsis	240 (31.9)	120 (35.6)	46 (24.9)	30 (30.9)	21 (36.8)	7 (50.7)



# C. parapsilosis e resistenza a fluconazolo a Genova

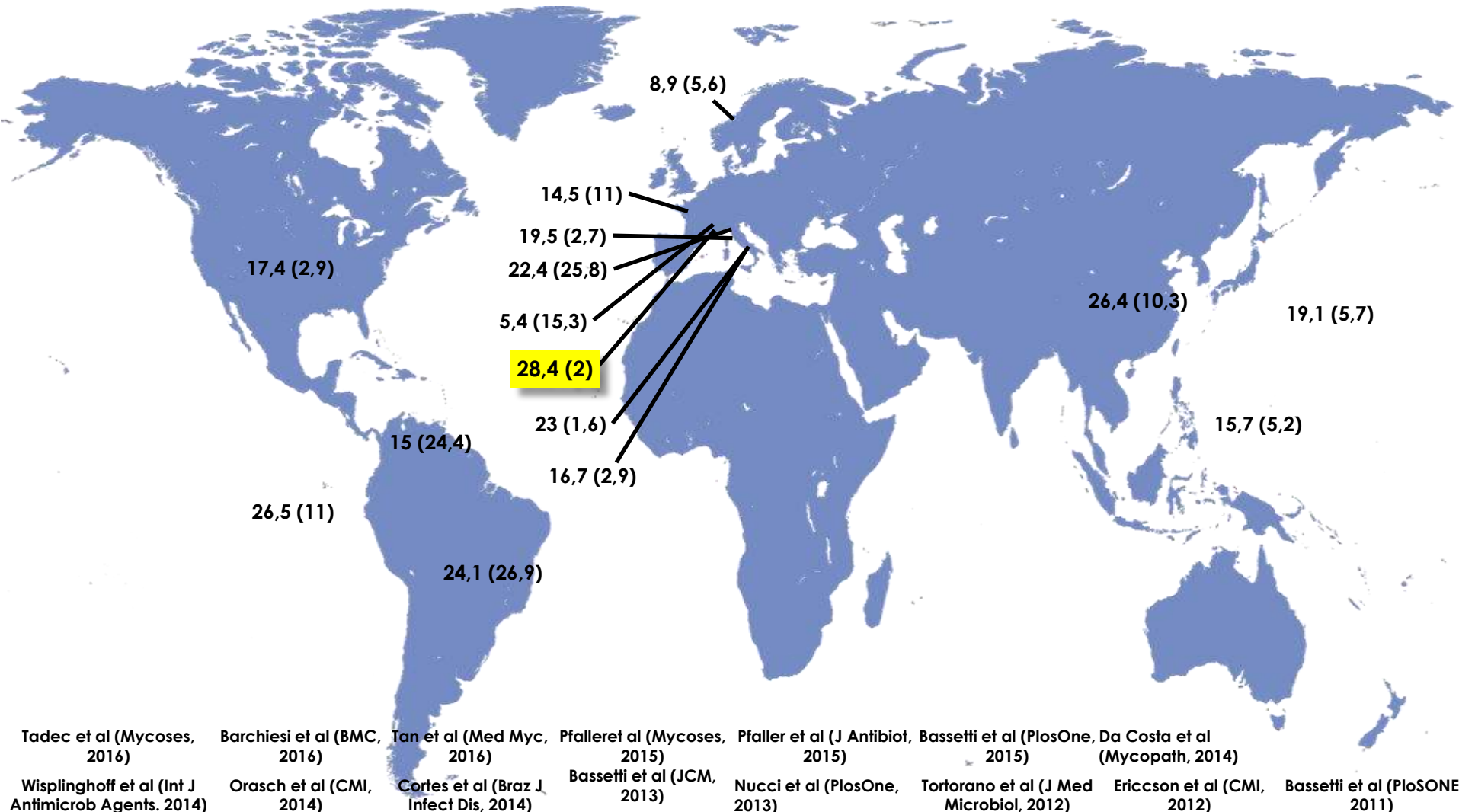


32%



27%

# C. parapsilosis e resistenza a fluconazolo



# Conclusioni

- *C. parapsilosis* rappresenta un problema di primaria importanza nel nostro Istituto, anche per l'elevato numero di resistenze
- L'associazione tra PICC e *C. parapsilosis* e il ruolo di un precedente trattamento con echinocandine necessitano di ulteriori studi



*Grazie per  
l'attenzione!*

Grazie a

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Giacobbe  
Dott. Nemo Gandolfo  
Prof.ssa Małgorzata Mikulska

Prof.ssa Anna Marchese  
Dott. Valerio Del Bono  
Prof. Claudio Viscoli