



Bacteremia in patients with cancer and stem-cell transplant: characteristics of health-care associated infections

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BACKGROUND

The clinical and microbiological characteristics of bacteremia in cancer and Stem Cell Transplant (SCT) patients can be different depending on the site of onset and acquisition of the infection

OBJECTIVES

To describe and compare the characteristics of episodes of bacteremia in these patients, depending if the episode was community-acquired, healthcare associated or hospital-acquired, according to the CDC definitions

METHODS

Prospective, multicenter study. Episodes of bacteremia in adult patients with cancer and SCT were included in 10 centers of Argentina, from May 2014 to July 2016. We compare the patients with community-acquired infections (G1) vs healthcare associated infections (G2) vs hospital-acquired infections (G3). Categorical variables were analyzed by the Fisher exact test or the Chi-square test as appropriate, and continuous variables were analyzed by the Kruskal-Wallis test

RESULTS

- 585 episodes of bacteremia were included

- Inclusion criteria:

Hematological tumor: 357 (61%) (Acute leukemia most common)

Stem Cell Transplant (SCT): 124 (21.2%) (43.5% allogeneic)

Solid Tumor: 104 (17.8%)

- Microbiology:

- Gram Negative rods (GNR): 387 (66.2%)

- *Escherichia coli* (21.7%)

- *Klebsiella spp.* (20.9%)

- *Pseudomonas aeruginosa* (8.4%)

- Gram Positive cocci (GPC): 211 (36.1%)

- Coagulase-negative staphylococci (CoNS) (13%)

- *Staphylococcus aureus* (SA) (10.4%)

Multidrug Resistant Bacteria (MDRB): 261 (44.6%)

- *ESBL-producing Enterobacteriaceae* : 31.4%

- Multidrug-resistant CoNS: 20.3%

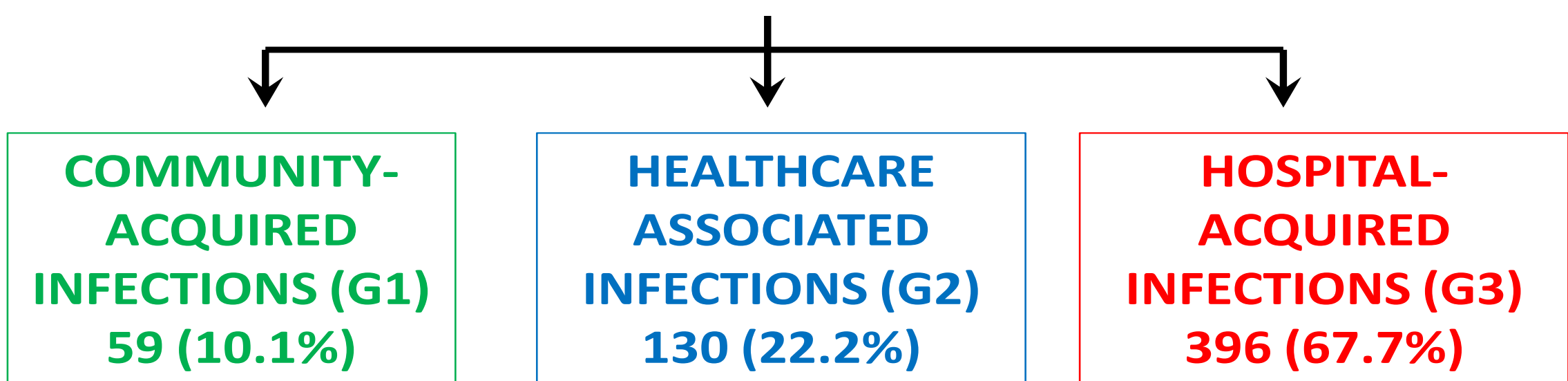
- KPC-producing Enterobacteriaceae: 12.6%

- Methicillin-resistant SA (MRSA) : 8.8%

- MDR *Pseudomonas aeruginosa*: 8%

- MDR *Acinetobacter spp.*: 7%

Site of onset and acquisition of the infection



MICROBIOLOGICAL CHARACTERISTICS

Variable	G1	G2	G3	p
GPC bacteremia	22 (37.3%)	55 (42.3%)	134 (33.8%)	0.214
<i>Staphylococcus aureus</i>	6 (10.2%)	16 (12.3%)	39 (9.8%)	0.727
CoNS	2 (3.4%)	22 (16.9%)	52 (13.1%)	0.037
<i>Streptococcus viridans</i>	3 (5.1%)	3 (2.3%)	16 (4%)	0.57
<i>Streptococcus pneumoniae</i>	9 (15.3%)	4 (3.1%)	4 (1%)	0.001
GNR bacteremia	38 (64.4%)	76 (58.5%)	273 (68.9%)	0.08
<i>Escherichia coli</i>	20 (58.8%)	35 (58.3%)	72 (36.5%)	0.002
<i>Klebsiella spp.</i>	11 (32.4%)	15 (25%)	96 (48.7%)	0.002
<i>Pseudomonas aeruginosa</i>	2 (3.4%)	10 (7.7%)	37 (9.3%)	0.29
<i>Enterobacter spp.</i>	4 (11.8%)	4 (6.7%)	20 (10.2%)	0.655
<i>Acinetobacter spp.</i>	0	1 (0.8%)	25 (6.3%)	0.006
Polimicrobial bacteremia	3 (5.1%)	7 (5.4%)	24 (6.1%)	0.93

ANTIMICROBIAL SUSCEPTIBILITY OF GNR

Variable	G1	G2	G3	p
GNR resistant to ciprofloxacin	7 (11.9%)	29 (22.3%)	172 (43.4%)	0,0001
GNR resistant to ceftazidime	4 (6.8%)	15 (11.5%)	160 (40.4%)	0,0001
GNR resistant to cefepime	3 (5.1%)	16 (12.3%)	147 (37.1%)	0,0001
GNR resistant to piperacilin/tazobactam	2 (3.4%)	11 (8.5%)	142 (35.9%)	0,0001
GNR resistant to imipenem	0	5 (3.8%)	78 (19.7%)	0,0001
GNR resistant to meropenem	0	3 (2.3%)	78 (19.7%)	0,0001
GNR resistant to amikacin	1 (1.7%)	3 (2.3%)	53 (13.4%)	0,0001
GNR resistant to colistin	0	2 (1.5%)	20 (5.1%)	0,064
GNR resistant to tygeciline	1 (1.7%)	12 (9.2%)	59 (14.9%)	0,008
GNR resistant to fosfomycin (n=332)	0	0	18 (8.1%)	0,005

BASELINE CLINICAL CHARACTERISTICS

Variable	G1	G2	G3	p
Age (years) (median, P25-P75)	61 (47-68)	55 (40-66)	49 (35-60)	0,0001
Male sex	30 (50,8%)	70 (53,8%)	241 (60,9%)	0,176
Hematological tumor	24 (40,7%)	83 (63,8%)	250 (63,1%)	0,003
Acute leukemia (n=481)	7 (11,9%)	37 (28,5%)	201 (50,8%)	0,0001
Lymphoma (n=481)	9 (15,3%)	37 (28,5%)	90 (22,7%)	0,125
Stem Cell Transplant (SCT)	5 (8,5%)	16 (12,3%)	103 (26%)	0,0001
Allogeneic SCT (n=124)	1 (1,7%)	8 (6,2%)	45 (11,4%)	0,022
Solid Tumor	30 (50,8%)	31 (23,8%)	43 (10,9%)	0,0001
Charlson score (median, p25-p75)	4 (2-6)	2 (2-4)	2 (2-2)	0,0001
Recent hospitalization	0	66 (50,8%)	208 (52,5%)	0,0001
Recent antibiotic treatment	9 (15,3%)	40 (30,8%)	215 (54,3%)	0,001
Fluorquinolone prophylaxis	1 (1,7%)	15 (11,5%)	101 (25,5%)	0,0001

BACTEREMIA CLINICAL CHARACTERISTICS

Variable	G1	G2	G3	p
APACHE II Score (median, P25-75)	13 (10-18)	12 (9-16)	13 (10-16)	0,168
PITT score (median, P25-75)	0 (0-2)	0 (0-2)	0 (0-2)	0,249
Neutropenia	23 (39%)	55 (42,3%)	306 (77,3%)	0,0001
Presence of a central venous catheter	11 (18,6%)	74 (56,9%)	294 (74,2%)	0,0001
Bacteriemia with clinical source	48 (81,4%)	89 (68,5%)	298 (75,3%)	0,132
Catheter source (n=435)	2 (4,2%)	31 (34,8%)	99 (33,2%)	0,0001
Respiratory source (n=435)	12 (25%)	13 (14,6%)	29 (9,7%)	0,009
Urinary source (n=435)	14 (29,2%)	7 (7,9%)	15 (5%)	0,0001
Skin/soft tissue source (n=435)	2 (4,2%)	5 (5,6%)	30 (10,1%)	0,278
Abdominal source (n=435)	12 (25%)	29 (32,6%)	83 (27,9%)	0,58
Fever	52 (88,1%)	118 (90,8%)	373 (94,2%)	0,144
Hypotension	10 (16,9%)	37 (28,5%)	94 (23,7%)	0,22

MDRB BACTEREMIA

Variable	G1	G2	G3	p
MDR bacteremia	4 (6,8%)	41 (31,5%)	216 (54,5%)	0,0001
MRSA	0	6 (4,6%)	17 (4,3%)	0,258
Vancomicin resistant <i>Enterococcus</i> (VRE)	0	1 (0,8%)	8 (2%)	0,567
Multidrug-resistant CoNS	1 (1,7%)	18 (13,8%)	34 (8,6%)	0,022
Multidrug-resistant GNR	3 (5,1%)	16(12,3%)	157 (39,6%)	0,0001
ESBL-producing Enterobacteriaceae	3 (5,1%)	9 (6,9%)	70 (17,7%)	0,001
KPC-producing Enterobacteriaceae	0	2 (1,5%)	31 (7,8%)	0,004
MDR <i>Pseudomonas aeruginosa</i>	0	2 (1,5%)	19 (4,8%)	0,07
MDR <i>Acinetobacter spp.</i>	0	1 (0,8%)	19 (4,8%)	0,031
Previous rectal colonization with a MDRB	0	12 (9,2%)	55 (13,9%)	0,005
Previous infection with a MDRB	1 (1,7%)	9 (6,9%)	54 (13,6%)	0,006
Recent rectal colonization with a MDRB	2 (3,4%)	6 (4,6%)	54 (13,6%)	0,002

TREATMENT AND OUTCOMES

Variable	G1	G2	G3	p
Adequate empirical antibiotic treatment	54 (91,5%)	106 (81,5%)	278 (70,2%)	0,0001
Empirical carbapenem use	6 (10,2%)	33 (25,4%)	192 (48,5%)	0,0001
Empirical colistin use	0	9 (6,9%)	91 (23%)	0,0001
Empirical vancomycin use	10 (16,9%)	41 (31,5%)	153 (38,6%)	0,003
Combined antibiotic treatment	10 (16,9%)	24 (18,5%)	123 (31,1%)	0,0004
Breakthrough bacteremia	1 (1,7%)	3 (2,3%)	62 (15,7%)	0,0001
Intensive care unit requirement	10 (16,9%)	24 (18,5%)	82 (20,7%)	0,769
Shock	9 (15,3%)	23 (17,7%)	86 (21,7%)	0,412
7-day mortality	7 (11,9%)	17 (13,1%)	58 (14,6%)	0,849
30-day mortality	9 (15,3%)	23 (17,7%)	93 (23,5%)	0,181
Hospital length of stay (days) (median, P25-75) (n=538)	11 (7-22)	11 (7-15)	31 (21-46)	0,0001

CONCLUSION

Although health-care associated bacteremias had distinctive microbiological features, in the case of multidrug resistant GNR the profile was similar to community-acquired infections. These findings must be taken into account when choosing the empirical treatment.