IPC in Hematology

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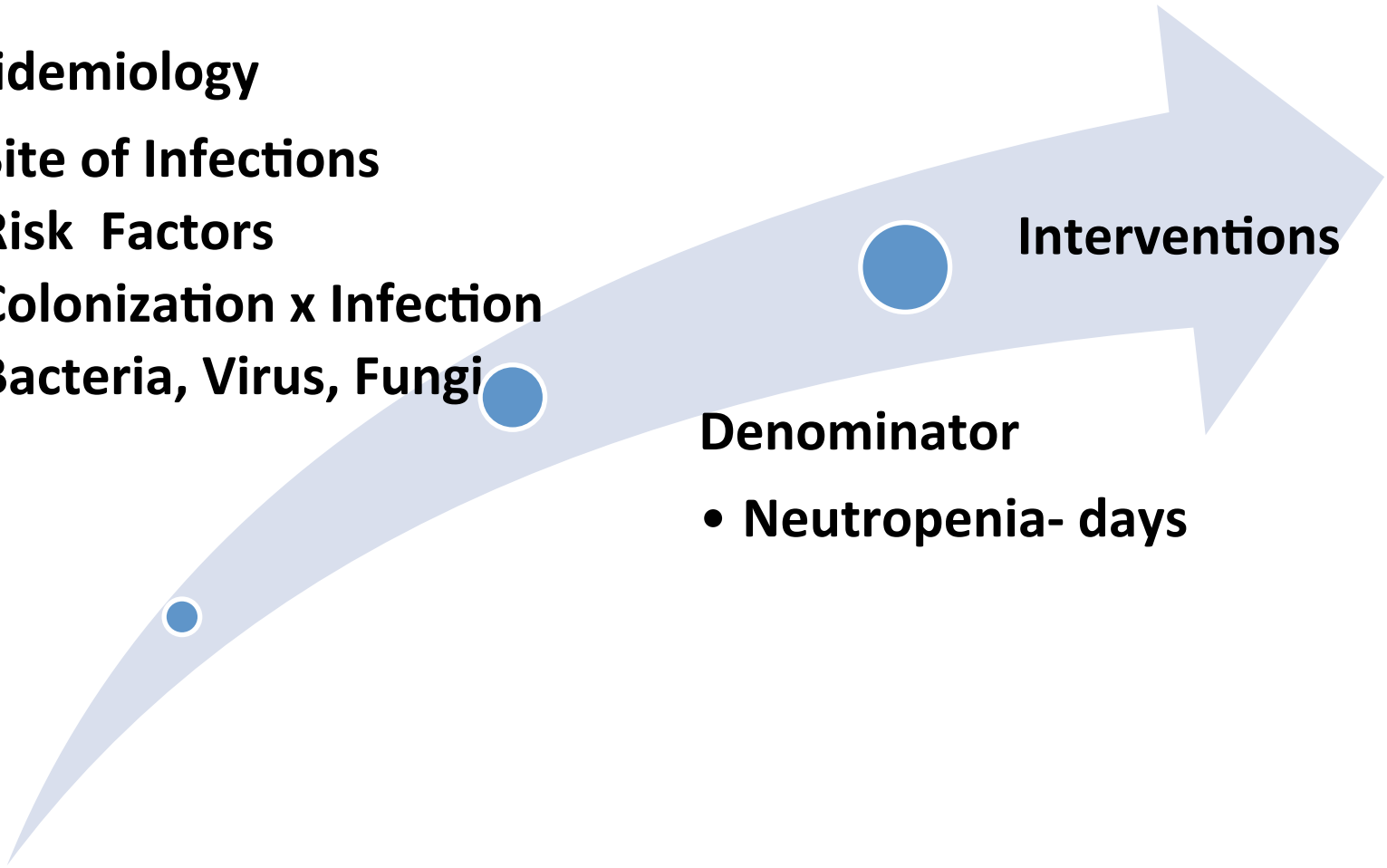
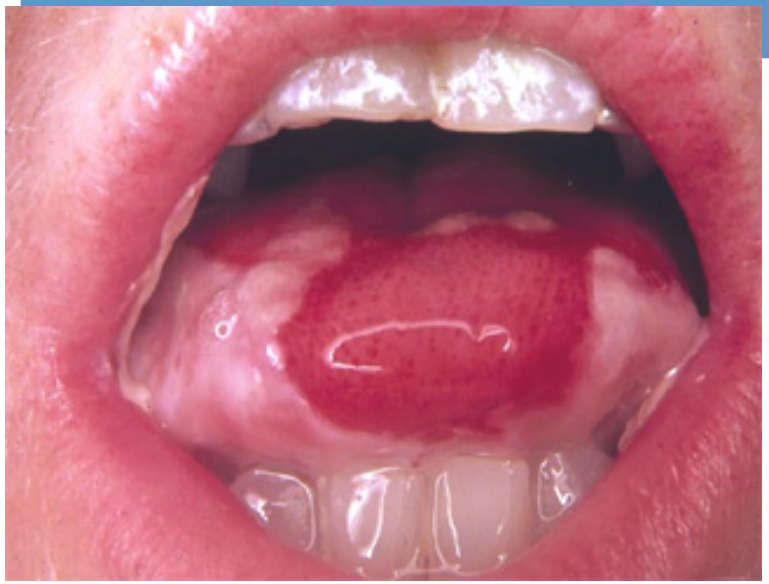
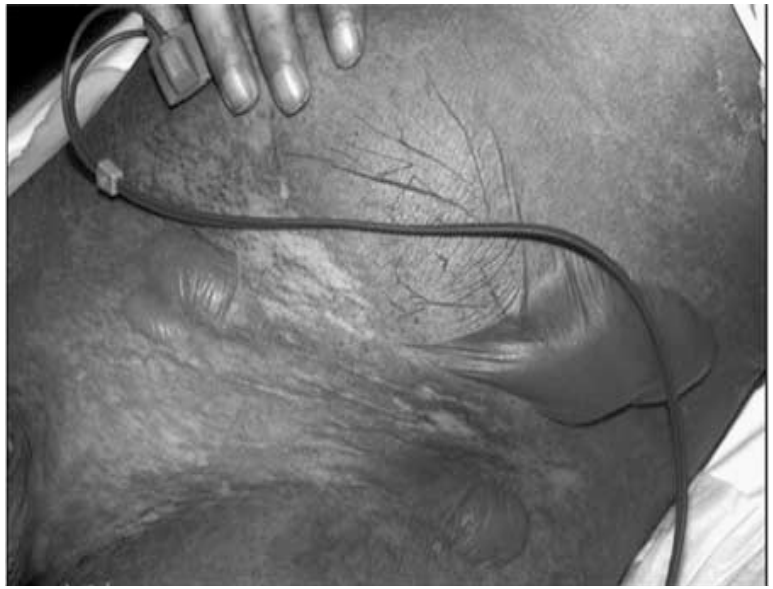
IPC in Hematology



Risk factors HCAI in Hematology





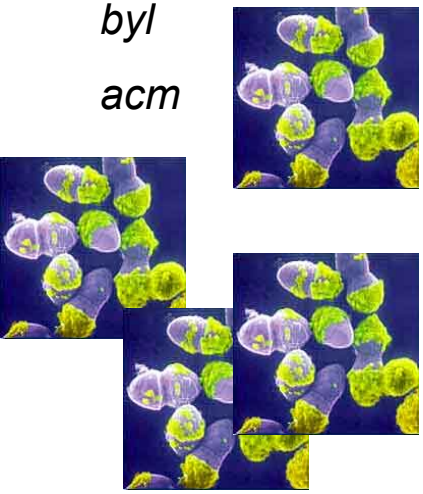
- CVC
- Chemotherapy
- Mucosite
- Neutropenia
- Cross Transmission
- ATB
- BMT pts
- GVHD

Virulance factors

esp

byl

acm



VRE

ATB

Gastric protector

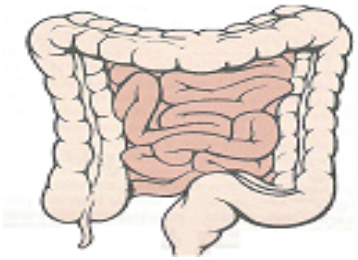
Dialysis

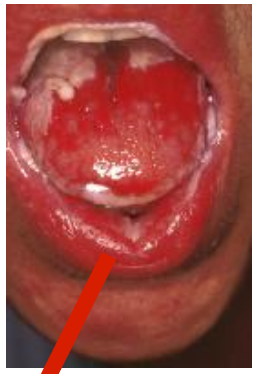
Host Factors

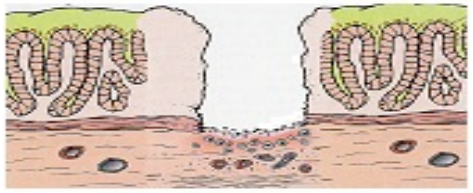
Mucositis

Neutropenia

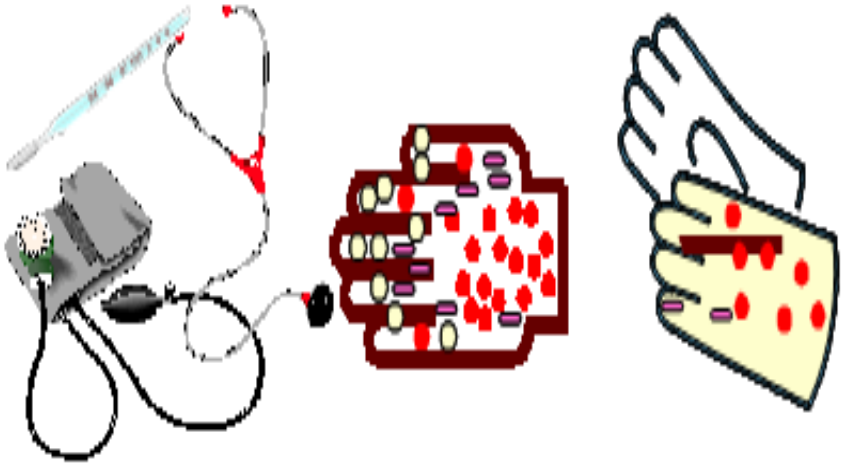
GI Tract colonization





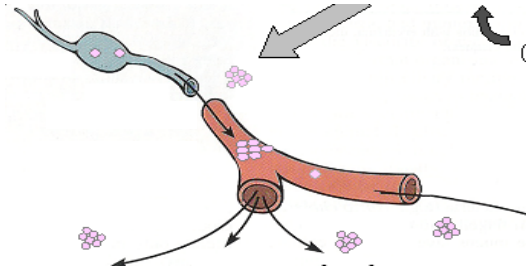


Cross Infection



Translocation

VRE BSI



Bone Marrow Transplantation (2003) 31, 795–801

www.nature.com/bmt

Infections Post Transplant

Surveillance of nosocomial infections in adult recipients of allogeneic and autologous bone marrow and peripheral blood stem-cell transplantation

M Dettenkofer[1,4], W Ebner[1,4], H Bertz[2], R Babikir[1,4], J Finke[2], U Frank[1,4], H Rüden[3,4] and FD Daschner[1,4]

Type of NI	*No.*	*NI/100 Patients*	*NI/1000 patient-days*	*NI during neutropenia*	*NI during neutrop./1000 neutrop.-days*	*NI during non-neutrop./1000 non-neutrop.-days*
Blood stream infections (BSI)[a]	85	24	6.0	70	13.9	1.6
With CVC[b]	66	19	6.3 (4.8–7.9)[d]			
With Hickman catheter[c]	19	5	7.1 (5.5–8.7)[d]			
Pneumonia	77	22	5.4	60	11.9	1.8
Gastroenteritis[e]	42	12	2.9	15	3.0	2.9
Catheter-ass. local infection (CAI)	20	6	1.4	16	3.2	0.4
Urinary tract infection (UTI)	11	3	0.8	8	1.6	0.3
Others[f]	4	1	0.3	2	0.4	0.2
Total	*239*	*68*	*16.8*	*171*	*34.0*	*7.4*

Surveillance of Infectious Complications in Hemato-Oncological Patients

Ron Ram MD[1,4], Anat Gafter-Gvili MD[1,4*], Pia Raanani MD[1,4], Moshe Yeshurun MD[1,4], Ofer Shpilberg MD[1,4], Juliet Dreyer RNMA[1], Anat Peck RNMA[1], Leonard Leibovici MD[3,4] and Mical Paul MD[2,3]

[1]Institute of Hematology, [2]Department of Medicine E and [3]Infectious Disease Unit, Rabin Medical Center (Beilinson Campus), Petah Tikva, Israel
[4]Sackler Faculty of Medicine, Tel Aviv University, Ramat Aviv, Israel

Reference	Type of study	Population	Infection category	Nominator	Denominator	Rate	Inpatient/ outpatient
Paul 2007 [19]	Retrospective	All admitted patients with febrile neutropenia	Bacteremia	Episodes of bacteremia	None	NA	Inpatient
Oren 2006 [17]	Prospective	AL+HSCT patients who received anti-fungal prophylaxis	IFI	Patients with IFI	All patients admitted	11%	NA
Adler 2006 [12]	Prospective	Patients in hemato-oncology ward	Catheter infections	Episodes of catheter infections	1000 catheter Days	2.264	Inpatient
Greenberg 2005 [20]	Prospective	All admitted patients with febrile neutropenia	Bacteremia	Patients with bacteremia	Admitted patients with febrile neutropenia	37%	Inpatient
Oren 2001 [16]	Retrospective	AL patients in a general ward without air filtration	IFI	Patients with IFI	All patients admitted	43%	Inpatient
Elishoov 1998 [13]	Prospective	HSCT patients	Catheter-related infections	Patients with catheter-related infections	All patients admitted	33%	Inpatient
Roguin 1996 [18]	Retrospective	AL patients	Infection rate	Episodes of certain and probable infection	All febrile neutropenia episodes	31%	Inpatient
Engelhard 1996 [14]	Prospective	HSCT patients	CONS-related CVC infection	Patients with CONS infection or colonization	All patients admitted	15%	Inpatient
Lossos 1995 [15]	Prospective	HSCT	CDI+MDI-Pneumonia	Patients with pneumonia	All patients admitted and follow-up available after discharge	15%	Inpatient and outpatient
Shpilberg 1991 [21]	Retrospective	All admitted patients with AL	IFI	Patients with IFI	All admitted patients with AL	14%	Inpatient

National Healthcare Safety Network (NHSN) Report, Data Summary for 2011, Device-associated Module

Margaret A. Dudeck, MPH, CPH, Teresa C. Horan, MPH,
Kelly D. Peterson, BBA, Katherine Allen-Bridson, RN, BSN, MScPH, CIC,
Gloria Morrell, RN, MS, MSN, CIC, Angela Anttila, RN, MSN, NPC, CIC,
Daniel A. Pollock, MD, and Jonathan R. Edwards, MStat

Permanent Central line-associated BSI rate*					Percentile				
Type of Location	No. of locations+	No. of PCLABSIs	Permanent Central line-days	Pooled mean	10%	25%	50% (median)	75%	90%
Specialty Care Area/Oncology									
Hematopoietic stem cell transplant	49 (48)	285	117,264	**2.4**	0.0	0.9	1.9	3.8	5.3
General hematology/oncology	163 (162)	400	295,200	**1.4**	0.0	0.0	1.0	1.9	3.1
Pediatric hematopoietic stem cell transplant	13	67	30,530	**2.2**					
Pediatric general hematology/oncology	40	212	127,444	**1.7**	0.0	0.6	1.6	2.2	3.3

Temporary Central line-associated BSI rate**					Percentile				
Type of Location	No. of locations+	No. of TCLABSI	Temporary Central line-days	Pooled mean	10%	25%	50% (median)	75%	90%
Specialty Care Area/Oncology									
Hematopoietic stem cell transplant	48 (47)	204	87,507	**2.3**	0.0	0.9	1.8	3.2	4.
General hematology/oncology	170 (169)	475	243,144	**2.0**	0.0	0.0	1.4	2.8	4.
Pediatric hematopoietic stem cell transplant	11 (8)	11	5,193	**2.1**					
Pediatric general hematology/oncology	41 (39)	84	37,815	**2.2**	0.0	0.0	1.0	3.3	4.
Solid organ transplant	19	58	34,735	**1.7**					

Criterion	Mucosal Barrier Injury Laboratory-Confirmed Bloodstream Infection (MBI-LCBI)
MBI-LCBI 1	Patient of any age meets criterion 1 for LCBI with at least one blood specimen identified by a culture or non-culture based microbiologic testing method, with ONLY intestinal organisms from the MBI-LCBI organisms list. A partial list of MBI-LCBI organisms is provided in Appendix A See MBI organism tab on the NHSN organisms list for the full list of MBI-LCBI organisms

NOTE: If a patient meets MBI-LCBI 1 and MBI LCBI 2 criteria, report organisms as MBI-LCBI 1.

And patient meets at least *one* of the following:

1. Is an allogeneic hematopoietic stem cell transplant recipient within the past year with one of the following documented during same hospitalization as positive blood specimen:
   a. Grade III or IV gastrointestinal graft versus host disease [GI GVHD]
   b. ≥1 liter diarrhea in a 24-hour period (or ≥20 mL/kg in a 24-hour period for patients <18 years of age) with onset on or within 7 calendar days before the date the positive blood specimen was collected.
2. Is neutropenic, defined as at least two separate days with values of absolute neutrophil count (ANC) or total white blood cell count (WBC) <500 cells/mm^3 within a 7-day time period which includes the date the positive blood specimen was collected (Day 1), the 3 calendar days before *and* the 3 calendar days after (See Table 5 for example).

Brief Report

Impact of removing mucosal barrier injury laboratory-confirmed bloodstream infections from central line–associated bloodstream infection rates in the National Healthcare Safety Network, 2014

Isaac See MD *, Minn M. Soe MD, MPH, Lauren Epstein MD, MS, Jonathan R. Edwards MStat, Shelley S. Magill MD, PhD, Nicola D. Thompson PhD

Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, Atlanta, GA

CDC

- 3,253 Hospitais

CLABSI reported 2014

- 10% MBI-CLABSI

American Journal of Infection Control 45 (2017) 321-3

Brief Report

Impact of removing mucosal barrier injury laboratory-confirmed bloodstream infections from central line–associated bloodstream infection rates in the National Healthcare Safety Network, 2014

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Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, Atlanta, GA

Location type	No. of locations	No. of CLABSIs	No. of MBI-LCBIs	Central line days	CLABSI rate* (including MBI-LCBI events)	CLABSI rate* (excluding MBI-LCBI events)	Change in CLABSI rate when MBI-LCBI excluded, % (95% confidence interval)
Adult							
Adult critical care	5,117	7,585	141	8,595,842	0.88	0.87	1.9 (−0.4% to 4.0%)
Adult specialty care area	34	86	5	84,947	1.01	0.95	5.8 (−19.4% to 22.3%)
Adult step down	961	764	16	1,034,532	0.74	0.72	2.1 (−5.4% to 8.6%)
Adult ward	7,932	4,604	236	6,536,683	0.70	0.67	5.1 (2.3% to 7.8%)
Other adult location†	215	144	15	202,575	0.71	0.64	10.4 (−7.1% to 23.0%)
Oncology							
Adult oncology critical care	19	57	17	53,337	1.07	0.75	29.8 (5.2% to 44.3%)
Adult oncology ward	413	2,559	1,172	1,392,652	1.84	1.00	45.8 (43.6% to 47.8%)
Oncology step down	9	11	1	23,004	0.48	0.43	9.1 (−122.3% to 42.9%)
Pediatric oncology critical care	3	8	2	2,724	2.94	2.20	25.0 (−144.3% to 55.7%)
Pediatric oncology ward	88	679	327	330,884	2.05	1.06	48.2 (43.9% to 51.8%)

Biol Blood Marrow Transplant 22 (2016) 1671–1677

Biology of Blood and Marrow Transplantation

journal homepage: www.bbmt.org

Healthcare Burden, Risk Factors, and Outcomes of Mucosal Barrier Injury Laboratory-Confirmed Bloodstream Infections after Stem Cell Transplantation

Christopher E. Dandoy [1,*], David Haslam [2], Adam Lane [1], Sonata Jodele [1], Kathy Demmel [1], Javier El-Bietar [1], Laura Flesch [1], Kasiani C. Myers [1], Abigail Pate [1], Seth Rotz [1], Paulina Daniels [1], Gregory Wallace [1], Adam Nelson [1], Heather Waters [3], Beverly Connelly [2,3], Stella M. Davies [1]

Restrospective Study

374 HSCT

MBI-LCBSI definition:

- An allogeneic HSCT recipient with grades III to IV graft-versus-host disease (GVHD) diagnosed within the same hospitalization
- An allogeneic HSCT recipient with ≥1 L of diarrhea (20 mL/kg for those < 18 years of age) in a 24-hour period within 7 days of the positive blood culture
- Neutropenia, defined as an absolute neutrophil count or total WBC count < 500 cells/mm^3 within 3 days before or after the positive blood culture

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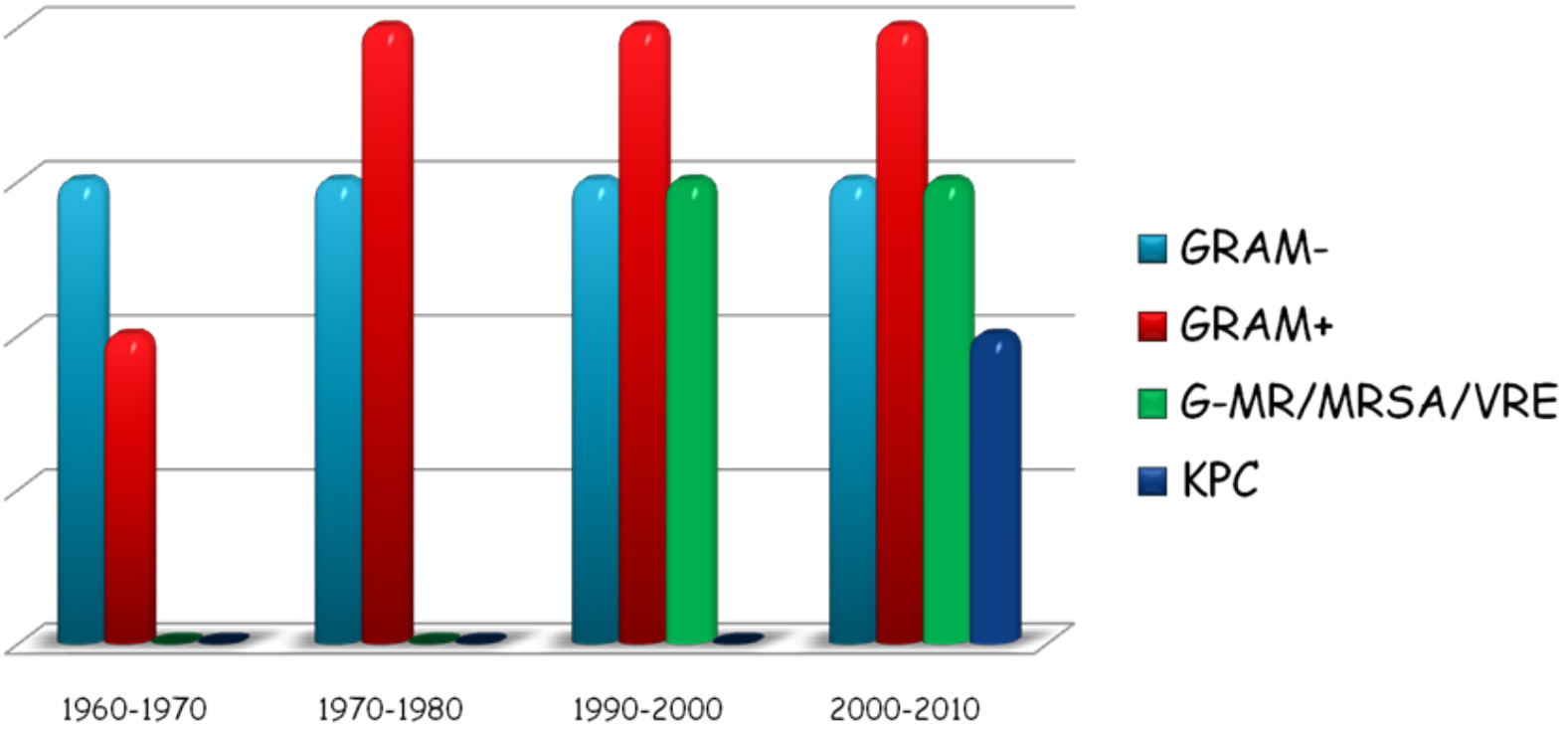
374 HSCT Pts			
BSI	**MBI-LCBSI**	**CLBSI**	**Secondary BSI**
170	**80 (47%)**	**68 (40%)**	**22 (13%)**

MBI-LCBSI more frequent Alogeinic HSCT 18% x 7% p=0.07

BSI agents Febrile Neutropenia



Klastersky J et al. Int J Antimicrob Agents 2007; 30 (suppl 1) S51-9
Freifeld et al. Clinical Practice Guideline. CID 2011; 52 (4) e56-93

BSI in Neutropenic pts

	2001-2006	2008-2010
BGN	23%	84%

200 Episodes Febrile Neutropenia

- **30% Microbiology Confirmed**
- **26% BSI**
- **30% HSCT**

Ghosh et al. Med Oncol 2012;29:1354-60

BGN Febrile Neutropenia

	N (%)
Gram-negativo	**44 (55.7%)**
P. aeruginosa	**12 (15%)**
E. coli	**11 (14%)**
Acinetobacter spp	**10 (13%)**
Klebsiella spp	**10 (13%)**
Gram-positivo	**35 (44.3%)**
S. aureus	**20 (25.4%)**
Enterococcus spp	**8 (10%)**
CONS	**6 (8%)**

R Carbapenem 80% *Acinetobacter* e 50% *P. aeruginosa*

Ghosh et al. Med Oncol 2012;29:1354-60

International Journal of Infectious Diseases 16 (2012) e424–e428

Contents lists available at SciVerse ScienceDirect

International Journal of Infectious Diseases

journal homepage: www.elsevier.com/locate/ijid

Healthcare-associated infection in hematopoietic stem cell transplantation patients: risk factors and impact on outcome

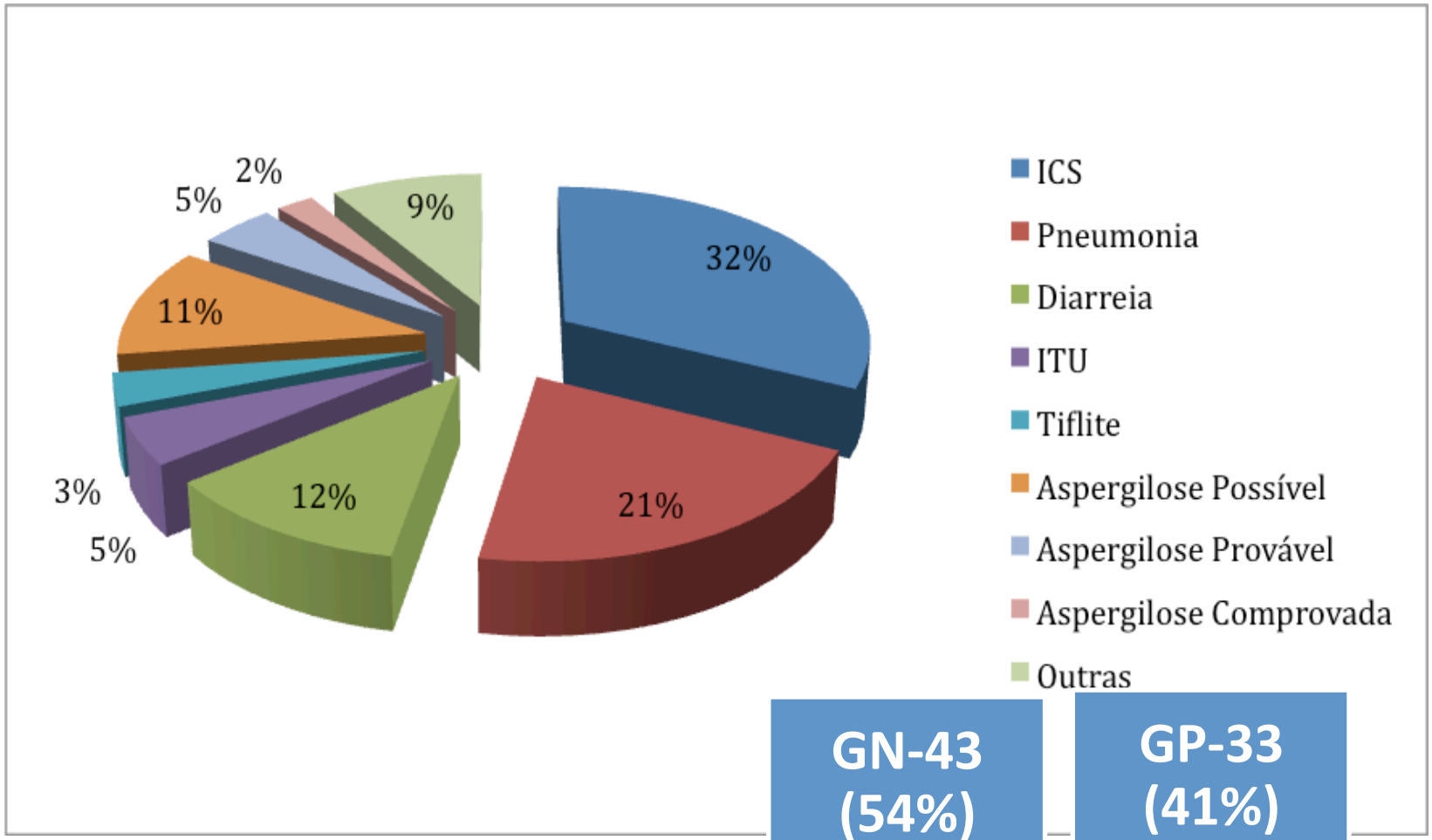
Elisa Teixeira Mendes [a,*], Frederico Dulley [b], Mariusa Basso [a], Marjorie Vieira Batista [a], Fabio Coracin [b], Thais Guimarães [a], Maria Aparecida Shikanai-Yasuda [a], Anna Sara Levin [a], Silvia Figueiredo Costa [a]

[a] Departamento de Molestias Infecciosas, Hospital das Clínicas, Faculdade de Medicina, Universidade de São Paulo, São Paulo, Brazil
[b] Serviço de Transplante de Medula Óssea da Disciplina de Hematologia e Hemoterapia, Faculdade de Medicina, Universidade de São Paulo, São Paulo, Brazil

Variable	HAI (n=277), n (%)	Not HAI (n=152), n (%)	Bivariate analysis		Multivariate analysis	
			OR (95% CI)	p-Value	OR (95% CI)	p-Value
Sex						
Male	164 (65.6)	86 (34.4)	1.33 (0.74–1.66)	0.67	-	-
Female	113 (63.1)	66 (39.2)	1			
Age, years, mean (range)	29.6 (1–69)	32.8 (2–70)	-	0.057	1.01 (0.99–1.02)	0.17
Acute leukemia	93 (70.5)	39 (29.5)	1.46 (0.94–2.29)	0.11	0.95 (0.53–1.58)	0.86
Aplastic anemia	21 (13.8)	54 (19.5)	0.87 (0.45–2.65)	0.50	-	-
Transplant						
Allogeneic	224 (70)	96 (30)	2.45 (1.57–3.85)	<0.00001	1.82 (0.84–2.76)	0.16
Autologous	53 (48.6)	56 (51.4)	1			
Days of fever, mean (range)	6.2 (0–42)	1.6 (0–17)	-	<0.00001	1.20 (1.12–1.30)	<0.0001
Days of neutropenia, mean (range)	17.29 (1–94)	9.14 (1–37)	-	<0.00001	1.07 (1.04–1.10)	<0.0001
Mucositis	102 (75.6)	33 (24.4)	2.1 (1.33–3.31)	0.001	1.28 (0.67–2.43)	0.75
Acute GVHD	74 (74.3)	23 (23.7)	2.04 (1.22–3.4)	0.008	1.27 (0.61–2.62)	0.51

HCAI in neutropenic pts HC-FMUSP

424 HSCT, 5.988 neutropenia days



GN-43 (54%)

GP-33 (41%)

Journal of Hospital Infection 88 (2014) 48–51

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevierhealth.com/journals/jhin

Short report

Ethanol versus heparin locks for the prevention of central venous catheter-associated bloodstream infections: a randomized trial in adult haematology patients with Hickman devices

L.J. Worth [a,*], M.A. Slavin [a,b], S. Heath [c], J. Szer [c], A.P. Grigg [d]

European Journal of Oncology Nursing 19 (2015) 694–700

Contents lists available at ScienceDirect

European Journal of Oncology Nursing

journal homepage: www.elsevier.com/locate/ejon

Sterile v aseptic non-touch technique for needle-less connector care on central venous access devices in a bone marrow transplant population: A comparative study

Julie M. Flynn [a,b,*], Samantha J. Keogh [a], Nicole C. Gavin [a,b]

[a] *Alliance for Vascular Access Teaching and Research (AVATAR Group), NHMRC Centre of Research Excellence in Nursing, Centre for Health Practice Innovation, Griffith University, Brisbane, Australia*

[b] *Cancer Care Services, Royal Brisbane & Women's Hospital, Brisbane, Australia*

American Journal of Infection Control 44 (2016) 1650-5

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

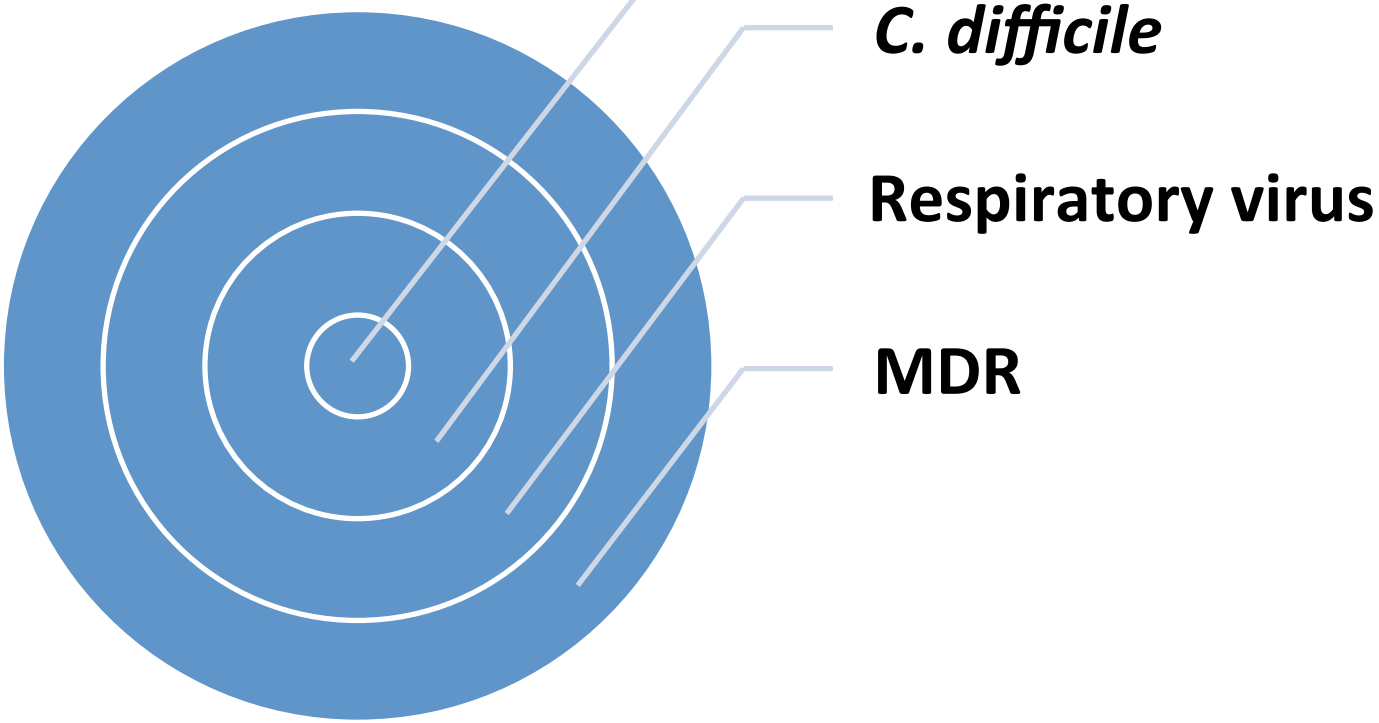
Major Article

Bacterial bloodstream infections in pediatric allogeneic hematopoietic stem cell recipients before and after implementation of a central line-associated bloodstream infection protocol: A single-center experience

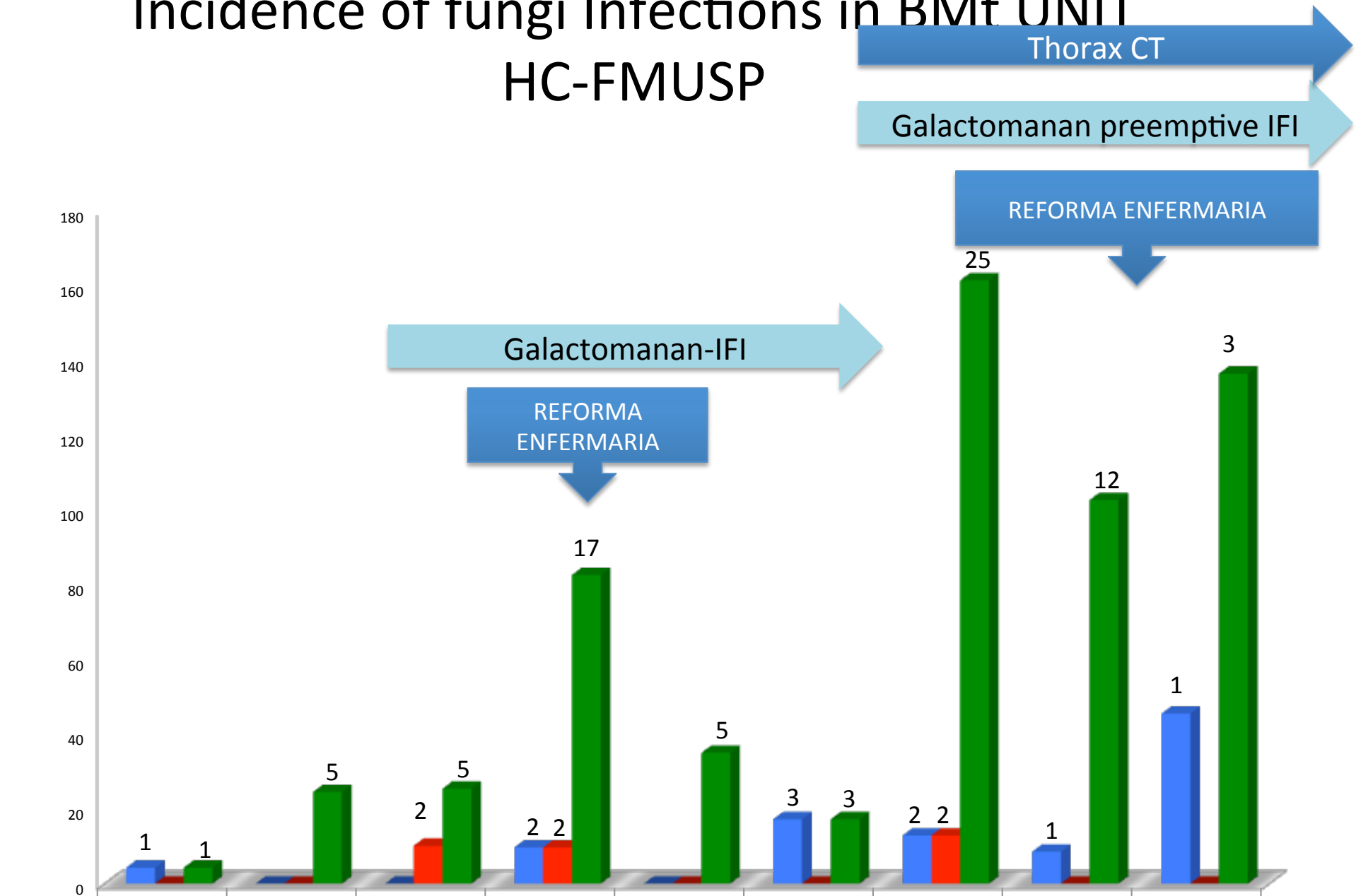
Alicia K. Chang MD [a], Marc D. Foca MD [a], Zhezhen Jin MD [b], Rahul Vasudev MD [a], Mary Laird RN, PNP [c], Sharon Schwartz RN, PNP [c], Mahvish Qureshi MD [a], Michelle Kolb RN, PNP [c], Anya Levinson MD [a], Monica Bhatia MD [a], Andrew Kung MD, PhD [a], James Garvin MD, PhD [a], Diane George MD [a], Phyllis Della-Latta PhD [d], Susan Whittier PhD [d], Lisa Saiman MD, MPH [a,e], Prakash Satwani MD [a,*]

	Total	Pre-CLABSI	Post-CLABSI	*P* value
S epidermidis infections	69	24	8	.001
Follow-up (mo)	3,246	759	861	
100-person month rate	2.13	3.16	0.93	
Gram-positive infections	150	40	30	.08
Follow-up (mo)	3,246	759	861	
100 person-month rate	4.62	5.27	3.48	
Gram-negative infections	152	48	19	.001
Follow-up (mo)	3,246	759	861	
100 person-month rate	4.62	6.32	2.21	
Total duration of CVL (mo)	974.6	183.8	306.3	< .001
Number of infections	230	72	38	
100 person-month rate	23.6	39.17	12.41	

Pathogen surveillance in Hematology/BMT pts



Incidence of fungi Infections in BMt UNIT HC-FMUSP



	2007	2008	2009	2010	2011	2012	2013	2014	2015
Candidíase	4,27	0,00	0,00	9,71	0,00	17,24	12,90	8,55	45,45
Fusariose	0,00	0,00	10,15	9,71	0,00	0,00	12,90	0,00	0,00
Aspergilose	4,27	24,51	25,38	82,52	34,97	17,24	161,29	102,56	136,36

EPIDEMIOLOGY AND RISK FACTORS FOR INFECTION

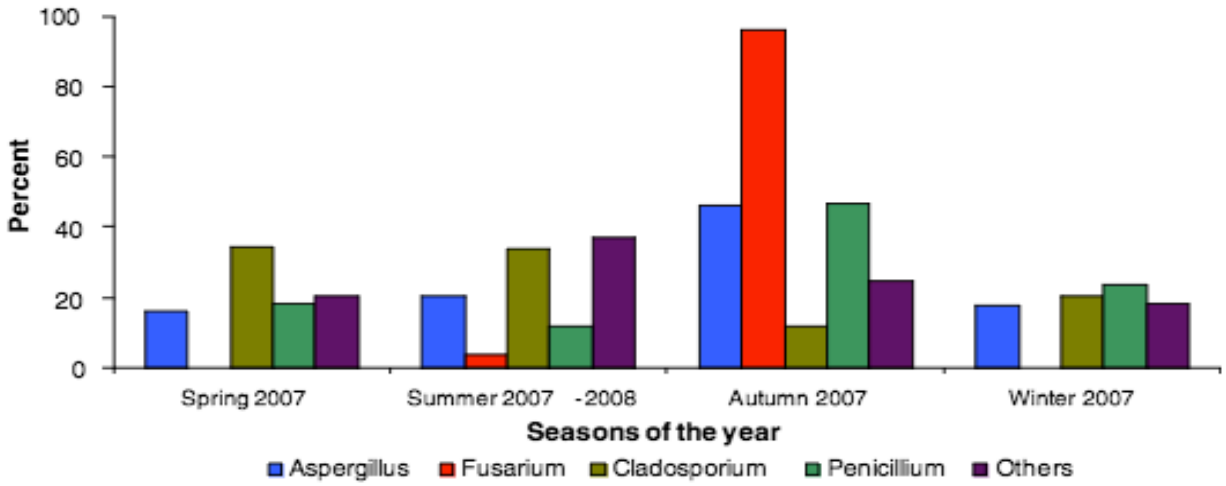


Figure 2 Distribution of fungal propagules in water samples collected from 4 different seasons of the year.

Allo HCT recipients, other highly immunocompromised patients at increased risk for IA should be placed in a protected environment

- **(strong recommendation; low-quality evidence).**

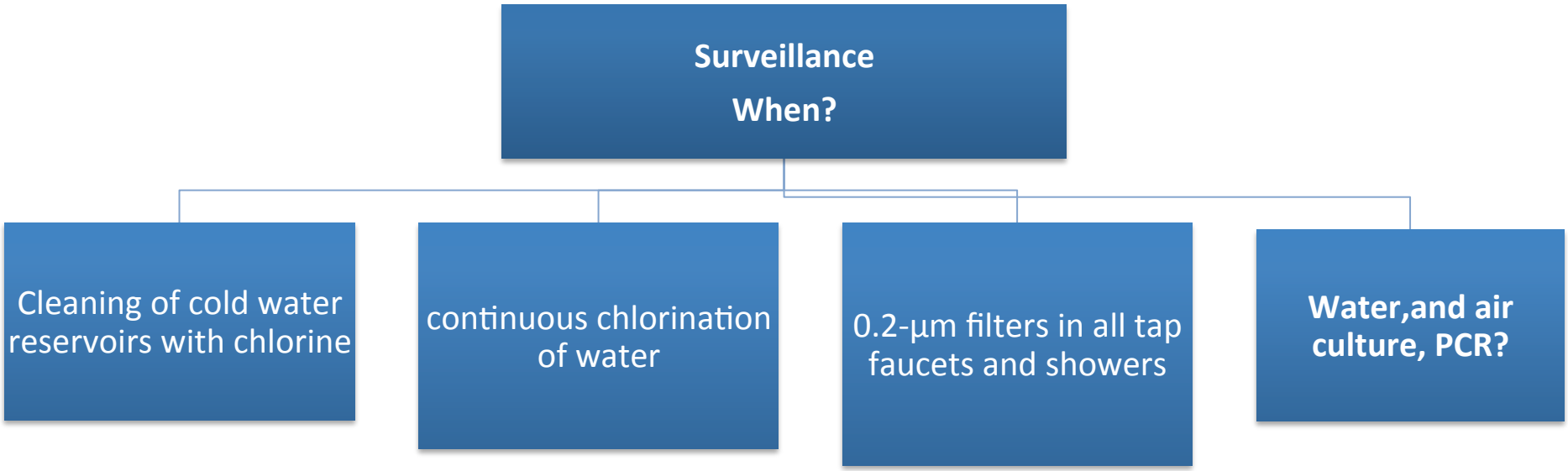
Leukemia and transplant centers should perform regular surveillance of cases of invasive mold infection.

- **(strong recommendation; low-quality evidence).**

Graça MG, van der Heijden IM, Perdigão L, Taira C, Costa SF, Levin AS. Evaluation of two methods for direct detection of Fusarium spp. in water. J Microbiol Methods. 2016 Apr; 123:39-43.

Litvinov N, da Silva MT, van der Heijden IM, Graça MG, Marques de Oliveira L, Fu L, Giudice M, Zilda de Aquino M, Odone-Filho V, Marques HH, Costa SF, Levin AS. An outbreak of invasive fusariosis in a children's cancer hospital. Clin

Moulds in Hematology Wards: interventions



MDR IN HEMATOLOGY SETTINGIMPORTANT QUESTIONS TO ASK:

PREVIOUS HOSPITALIZATION LAST YEAR?

PREVIOUS USE OF ANTIBIOTIC LAST YEAR?

TRAVEL- ENDEMIC COUNTRIES MRSA, NDM

COLONIZATION AND INFECTION DUE TO MDR

CULTURES RESULTS

CLASSIFY PATIENT RISK

- ***Hematological pts colonized by VRE over 2 years***
- ***Acinetobacter >42 months***
- ***MRSA over 6 months***

Marchaim et al. J Clin Microb 2007, 151-5

Feldman et al. J Clin Microb 2013,19:190-6

Risk Factor for MDR in Hematology and BMT patients

	CVC	Previous broad spectrum antibiotic	ICU	Mucositis/ GVHD	Previous colonization	Imunossupression
HSCT						

Gram-Negative

- Pseudomonas, Enterobacteria

Gram-positive

- VRE, SCN

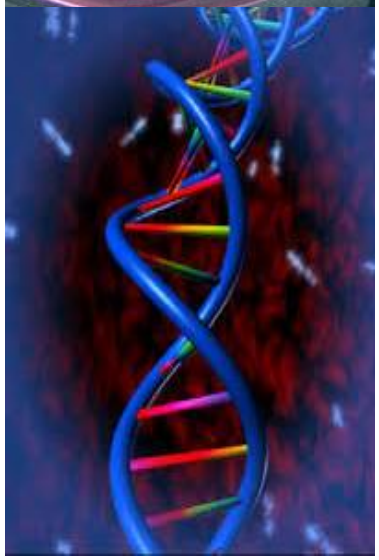
Mikulska et al. Curr opin Hematol 2014;21:451-8

Van Duin et al. J Tranplant 2013;13:31-41

Averbuch et al. Haematologica 2013;98:12

Which site should MDR screening be performed

	Rectal	Respiratory	Nares	Inguinal
• MRSA			X	
• VRE	X			
• CRE	X			X
• Acinetobacter		X		X
• Pseudomonas		X		X



- **Gram-negative: more than 1 site increases positivity**

Dalben et al. JHI 2010;74:395-411
Taconelli. Clin Microb Infect 2014;1:1-55

American Journal of Infection Control 45 (2017) 735-9

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Major Article

Is surveillance for colonization of carbapenem-resistant gram-negative bacteria important in adult bone marrow transplantation units?

Hayati Demiraslan MD [a,*], Fatma Cevahir MS [b], Elife Berk MD [c], Gokhan Metan MD [d], Mustafa Cetin MD [e], Emine Alp MD, PhD [a,b]

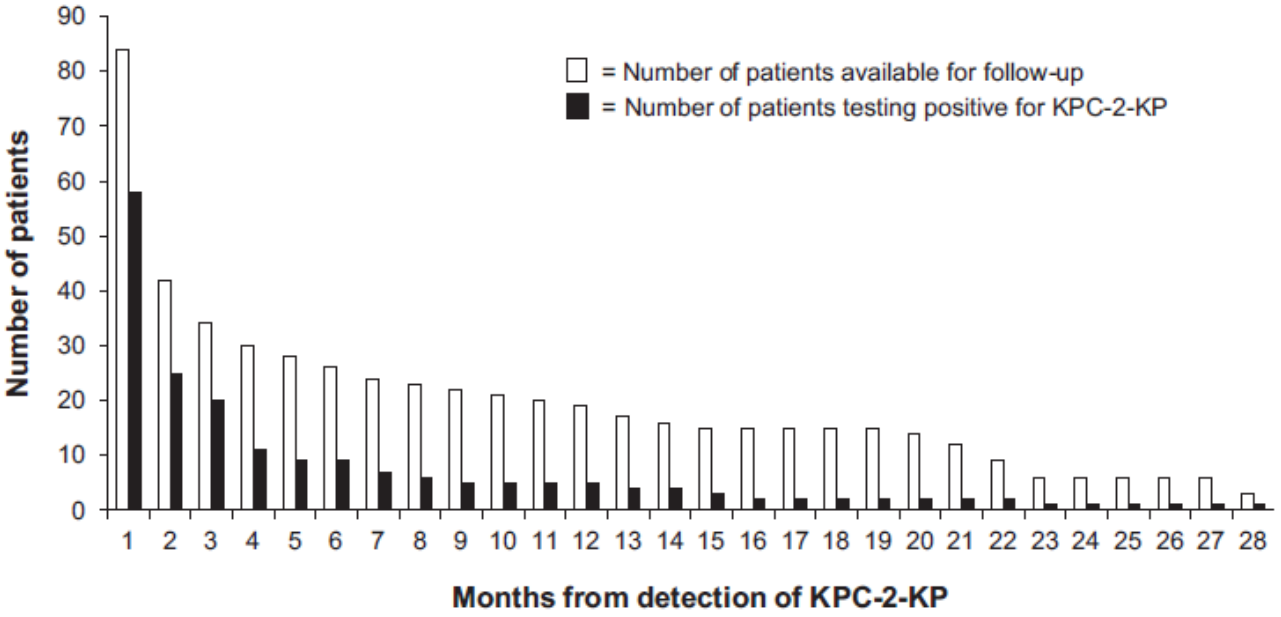
- Rectal Swab
- 3 rectal swabs
- 21/185 (11%) pts were colonized
  - *10 E.coli*
  - 5 Pseudomonas
  - *4 K. pneumoniae*
  - Enterobacter
  - 1 Stenotrophomonas
  - 1 A. baumannii

24 days hospitalization to colonization

Major article

Long-term carriage of *Klebsiella pneumoniae* carbapenemase–2-producing *K pneumoniae* after a large single-center outbreak in Germany

Christoph Lübbert MD, DTM&H [a,*], Norman Lippmann MD [b,c], Thilo Busch PhD [d], Udo X. Kaisers MD, PhD [d], Tanja Ducomble MD [e], Tim Eckmanns MD [e], Arne C. Rodloff MD, PhD [b,c]



Majority spontaneous decolonization 6 months after discharged

1 pt imunossupresion + antibiotic colonized >3 years

Am J Infect Control 2014;42:376-80

American Journal of Infection Control 45 (2017) 735-9

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Is surveillance for colonization of carbapenem-resistant gram-negative bacteria important in adult bone marrow transplantation units?

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Risk factors multivariate analysis	RR (95% IC)	P
Transfer from another Hospital	7.8 (2.0-31.2)	0.003
Transfer between units	9.3 (27-31.9)	<0.001
Busulfan	11.9 (2.5-56)	0.002
Fludarabine	6.4 (1.5-27)	0.011
Central venous catheter	5.1 (1.1-23.5)	0.037

Antimicrobial resistance in Gram-negative rods causing bacteremia in hematopoietic stem cell transplant patients: intercontinental prospective study of Infectious Diseases Working Party of the European Bone Marrow Transplantation group

65 centers 25 countries

- BSI post-THSCT up to 6 months

Rates and Risk factors

Resistance GNR

- Fluorquinolones
- Carbapenems
- MDR

Antimicrobial resistance in Gram-negative rods causing bacteremia in hematopoietic stem cell transplant patients: intercontinental prospective study of Infectious Diseases Working Party of the European Bone Marrow Transplantation group

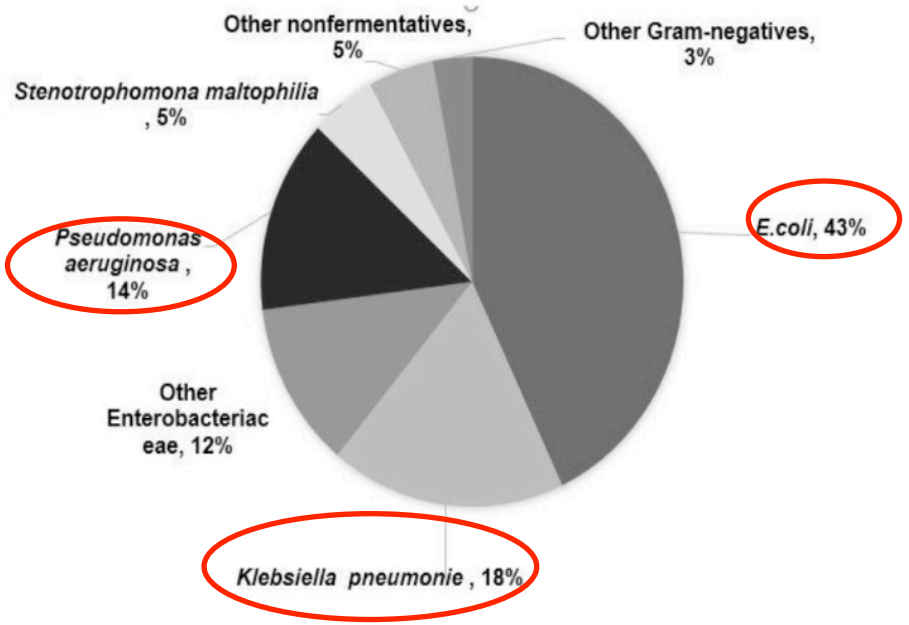
655 episodes BSI -591 pts

1.1 episodes/pt (1-4 episodes)

Resistance

- 50% fluorquinolones
- 18% Carbapenems
- 35% MDR

RF: Duration Hospitalization



Antimicrobial resistance in Gram-negative rods causing bacteremia in hematopoietic stem cell transplant patients: intercontinental prospective study of Infectious Diseases Working Party of the European Bone Marrow Transplantation group

Pathogens	Resistance to						
	Fluoro-quinolones n/N (%)	Non-carbapenem beta-lactams n/N (%)	Carbapenem n/N (%)	Multidrug resistant n/N (%)	Amino-glycoside n/N (%)	Colistin n/N (%)	Tigecyclin n/N (%)
E. coli	185/283 (65.4)	140/281 (49.8)	7/301 (2.3)	81/290 (27.9)	96/298 (32.2)	0/144	2/105 (1.9)
Klebsiella pneumoniae	71/111 (63.9)	79/118 (66.9)	31/124 (25.0)	63/121 (52.1)	53/124 (42.7)	5/77 (6.5)	6/37 (16.2)
Enterobacter spp	8/39 (20.5)	19/39 (48.7)	3/41 (7.3)	9/39 (23.1)	8/41 (19.5)	0/15	1/12 (8.3)
Other *Enterobacteriaceae*	7/41 (17.1)	9/43 (20.9)	2/45 (4.4)	5/44 (11.4)	8/45 (17.8)	9/28 (32.1)	1/14 (7.1)
Total *Enterobacteriacea*	**271/474 (57.2)[a]**	**247/481 (51.4)**	**43/511 (8.4)[a]**	**158/494 (31.9)[b]**	**165/508 (32.5)**	**14/264 (5.3)**	**10/168 (6.0)**
Pseudomonas aeruginosa	29/96 (30.2)	33/92 (35.9)	36/95 (37.9)	28/96 (29.2)	26/97 (26.8)	1/66 (1.5)	Not checked
Acinetobacter baumanii	7/10 (70.0)	8/10 (80.0)	7/11 (63.6)	7/11 (63.6)	5/11 (45.5)	1/9 (11.1)	2/3 (66.6)
Stenotrophomonas maltophilia	6/22 (27.3)	14/16 (87.5)	34/34 (100)	34/34 (100)	9/9 (100)	3/10 (30.0)	0/6
Other non-fermentative rods	4/22 (18.2)	13/20 (65.0)	5/21 (23.8)	7/22 (31.8)	5/23 (21.7)	0/1	2/2 (100)
Total non-fermentative rods	**46/150 (30.7)[a]**	**68/138 (49.3)**	**82/161 (50.9)[a]**	**76/163 (46.6)[b]**	**45/140 (32.1)**	**5/86 (5.8)**	**4/11 (36.4)**

VRE Hematology Ward

Colonization x Infection

Only severity marker?

Clinical Infectious Diseases Advance Access published July 17, 2012

MAJOR ARTICLE

Enterococcal Bacteremia Is Associated With Increased Risk of Mortality in Recipients of Allogeneic Hematopoietic Stem Cell Transplantation

Jan Vydra,[1] Ryan M. Shanley,[2] Ige George,[1] Celalettin Ustun,[1] Angela R. Smith,[4] Daniel J. Weisdorf,[1] and Jo-Anne H. Young[3]

[1]Division of Hematology-Oncology and Transplantation, Department of Medicine, [2]Biostatistics and Bioinformatics Core, Masonic Cancer Center, [3]Division of Infectious Disease, Department of Medicine, and [4]Division of Pediatric Blood and Marrow Transplantation, University of Minnesota, Minneapolis

752 pts TCTH

- **14% colonization** **7% Infection**

93 BSI 1 year post-THSCT 66% VRE

- RF: colonization and neutropenia

30 days Mortality s **38% VRE=VSE**

1 year survival

VRE **20%**

VSE **48%**

VRE Linezolid-resistant

- HSCT
- Susceptibility ↓ Linezolid
- 48 cases x 96 controls

RF MV	OR	95%IC	P
Previous use Linezolid	31.84	4,20-259	<0.001

- ***Santayana et al. Diag Microb Infec Dis July, 2012***

Journal of Global Antimicrobial Resistance 6 (2016) 27–31

Contents lists available at ScienceDirect

Journal of Global Antimicrobial Resistance

journal homepage: www.elsevier.com/locate/jgar

Short Communication

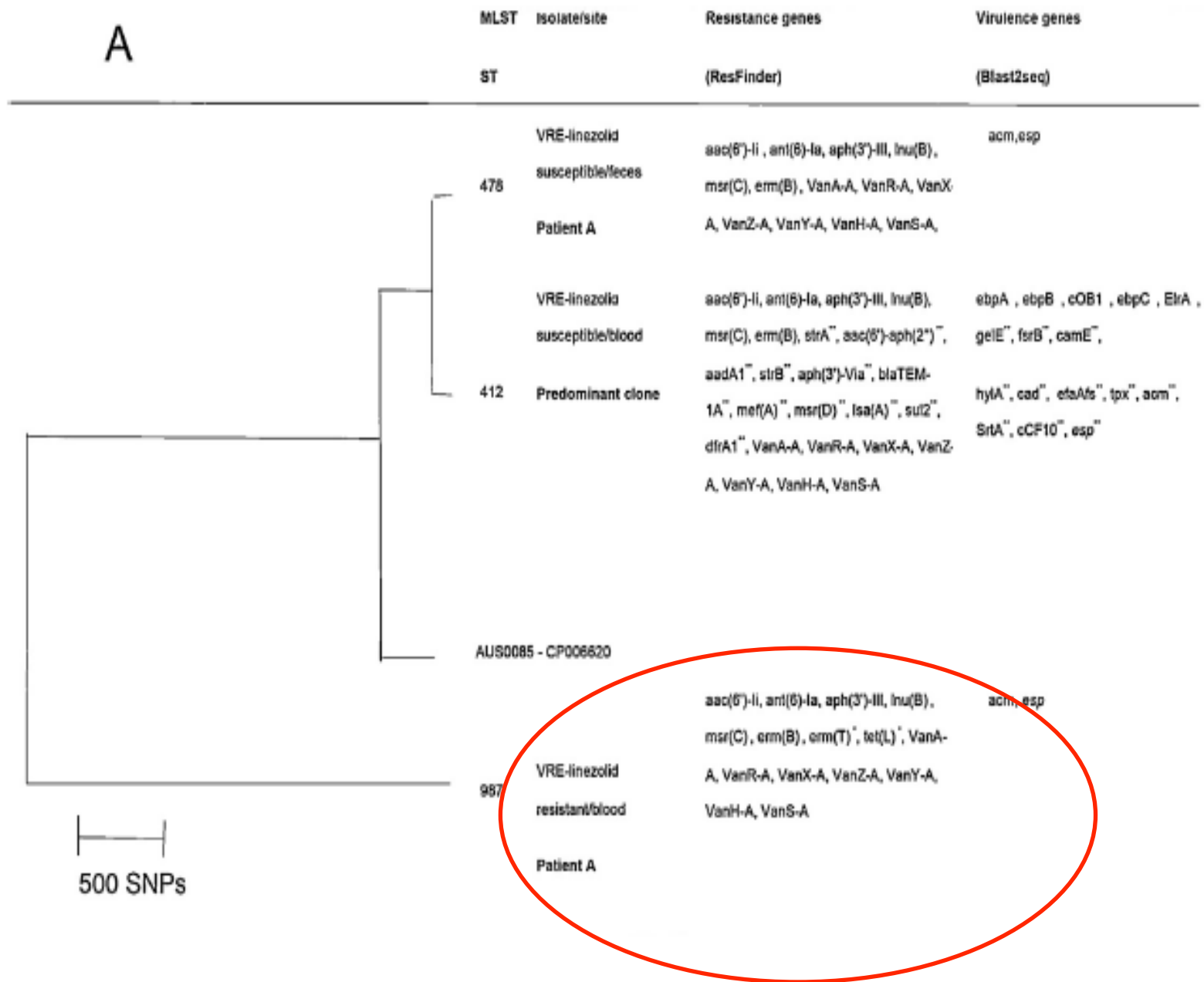
Virulence and resistance pattern of a novel sequence type of linezolid-resistant *Enterococcus faecium* identified by whole-genome sequencing

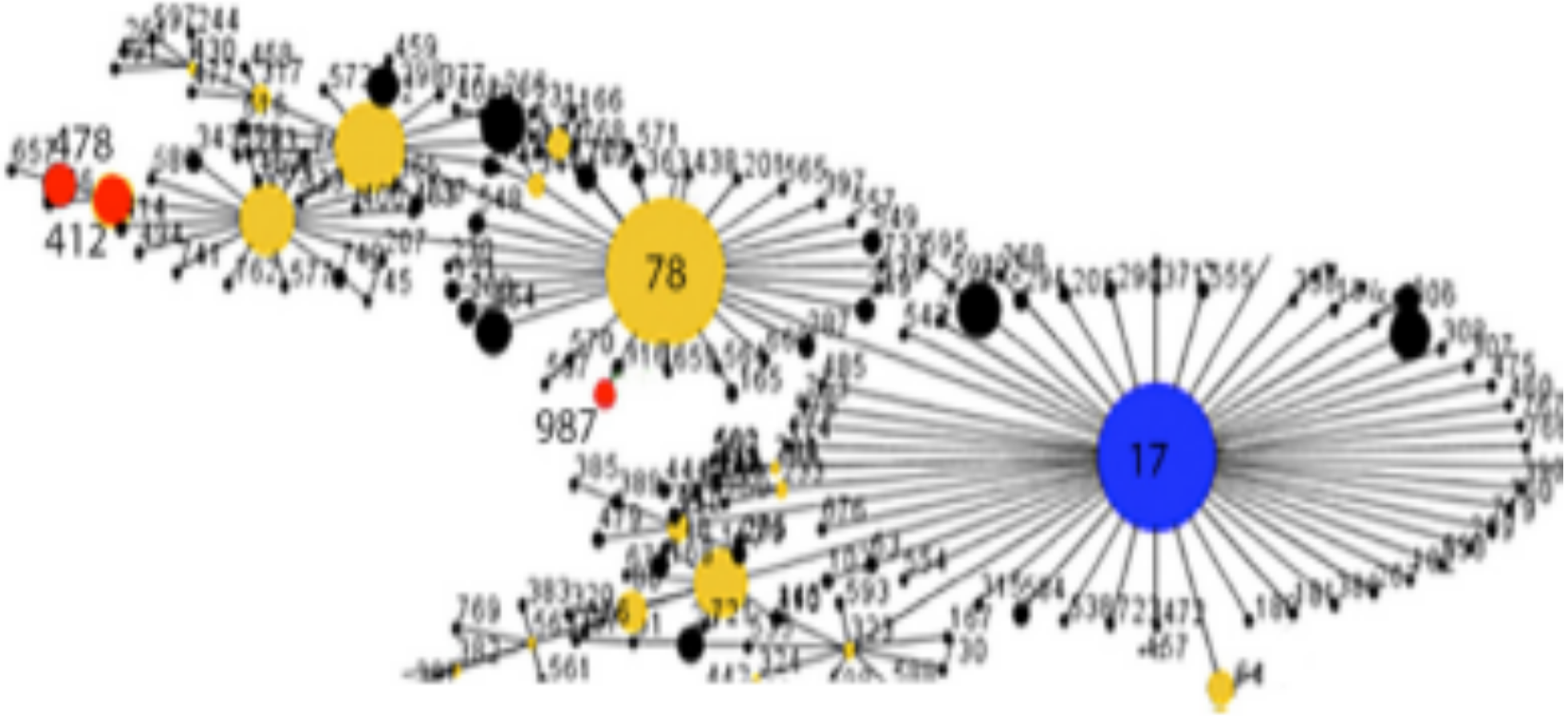
Gladys Villas Boas do Prado [a], Ana Paula Marchi [b], Luisa Zanolli Moreno [c], Camila Rizek [b], Ulisses Amigo [a], Andrea Micke Moreno [c], Flavia Rossi [a], Thais Guimaraes [a], Anna Sara Levin [a,b], Silvia F. Costa [a,b,*]

[a] Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo, São Paulo, Brazil
[b] Universidade de São Paulo, São Paulo, Brazil
[c] Faculdade de Medicina Veterinária e Zootecnia da Universidade de São Paulo, São Paulo, Brazil

- 89 VRE strains 2005-2014
- 78 pts
- 1 BSI isolate Linezolid-resistant

Isolates		Total
E. faecalis		
	Colonization	18
E. faecium		79
	Colonization	69
	Blood stream infection	7
	Pneumonia	2
	Skin and soft tissue	1


A
MLST
ST
Isolate/site
Resistance genes
(ResFinder)
Virulence genes
(Blast2seq)
478
VRE-linezolid susceptible/feces
Patient A
aac(6')-Ii , ant(6)-Ia, aph(3")-III, lnu(B), msr(C), erm(B), VanA-A, VanR-A, VanX-A, VanZ-A, VanY-A, VanH-A, VanS-A,
acm,esp
412
VRE-linezolid susceptible/blood
Predominant clone
aac(6')-Ii, ant(6)-Ia, aph(3")-III, lnu(B), msr(C), erm(B), strA**, aac(6')-aph(2")**, aadA1**, strB**, aph(3')-VIa**, blaTEM-1A**, mef(A)**, msr(D)**, lsa(A)**, sul2**, dfrA1**, VanA-A, VanR-A, VanX-A, VanZ-A, VanY-A, VanH-A, VanS-A
ebpA , ebpB , cOB1 , ebpC , ElrA , gelE**, fsrB**, camE**, hylA**, cad**, efaAfs**, tpx**, acm**, SrtA**, cCF10**, esp**
AUS0085 - CP006620
987
VRE-linezolid resistant/blood
Patient A
aac(6')-Ii, ant(6)-Ia, aph(3")-III, lnu(B), msr(C), erm(B), erm(T)*, tet(L)*, VanA-A, VanR-A, VanX-A, VanZ-A, VanY-A, VanH-A, VanS-A
acm, esp
500 SNPs


478
412
78
987
17

Rizek *et al. Annals of Clinical Microbiology and Antimicrobials* 2014, **13**:43
http://www.ann-clinmicrob.com/content/13/1/43

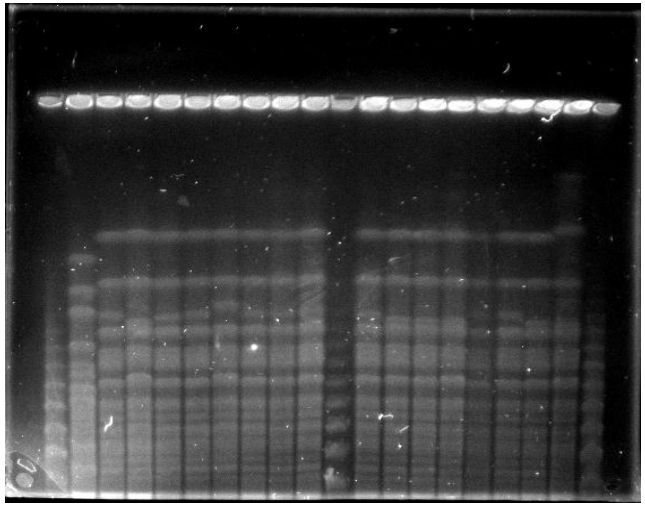
ANNALS OF CLINICAL MICROBIOLOGY AND ANTIMICROBIALS

RESEARCH **Open Access**

Characterization of carbapenem-resistant *Pseudomonas aeruginosa* clinical isolates, carrying multiple genes coding for this antibiotic resistance

Camila Rizek[1], Liang Fu[1], Leticia Cavalcanti dos Santos[1], Gleice Leite[1], Jessica Ramos[2], Flavia Rossi[3], Thais Guimaraes[2], Anna S Levin[1,2] and Silvia Figueiredo Costa[1,2*]

- 127 *P. aeruginosa* resistant to Carbapenem
- 12-year
  - Carbapenem MIC : 8-128
  - Susceptible only to colistin
  - New cluster BMT- 2012
- Isolates harboring KPC, VIM, SPM



- Outbreak-29 cases BSI
- Mortality over 70% (*in press*)

Isolation of NDM-1-producing *Pseudomonas aeruginosa* sequence type ST235 from a stem cell transplant patient in Italy, May 2013

A Carattoli[1], D Fortini[1], R Galetti[1], A Garcia-Fernandez[1], G Nardi[2], D Orazi[2], A Capone[3], I Majolino[2], A Proia[2], B Mariani[2], G Parisi[2], A Morrone[2], N Petrosillo (nicola.petrosillo@inmi.it)[3]

1. Istituto Superiore di Sanità, Rome Italy
2. Azienda Ospedaliera S.Camillo-Forlanini Hospital, Rome Italy
3. National Institute of Infectious Disease "L. Spallanzani", Rome Ita

- **Previous hospitalization in Serbia**
- **D+15 allogeneic HSCT BSI shock**
- **Colistin 12/ 12 hs- 9 milions**
- **D+17 death**

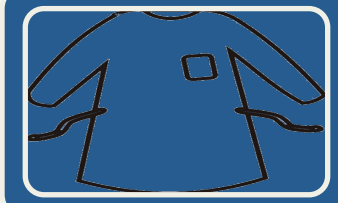
Antibiotics	MIC (µg/mL), interpretation result[a]
Amikacin	›16, R
Aztreonam	=16, R
Cefepime	›8, R
Ceftazidime	›8, R
Ciprofloxacin	›1, R
Colistin	≤1, S
Gentamicin	›4, R
Imipenem	›8, R
Levofloxacin	›2, R
Meropenem	›8, R
Piperacillin	›16, R
Piperacillin/tazobactam	›16/4, R
Tobramycin	›4, R

MIC: minimum inhibitory concentration R: resistant; S: susceptible
[a] Based on EUCAST interpretive criteria [1].

Euro Surveillance 2013;18:46


game over...

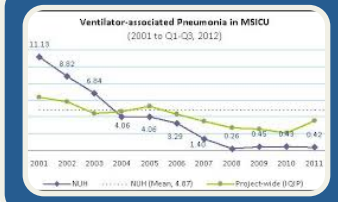
Prevention and Control MDR in transplantation



Contact precaution

Hand Hygiene

Bundles prevention BSI-CVC, VAP,UTI



Rates Feedback

others interventions

Boucher HW. Clinical Infectious Diseases. 2010
Taconelli et al. Clin Microb Infect 2014;1:1-55

Antibiotic stewardship transplantation setting

BMT

- Prophylaxis only for High Risk patients
  - Leukemia and Allogeneic HSCT

Febrile neutropenia

- Duration antibiotic
- Avoid vancomycin

- **Do not treat colonization**
- **De-escalation**

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

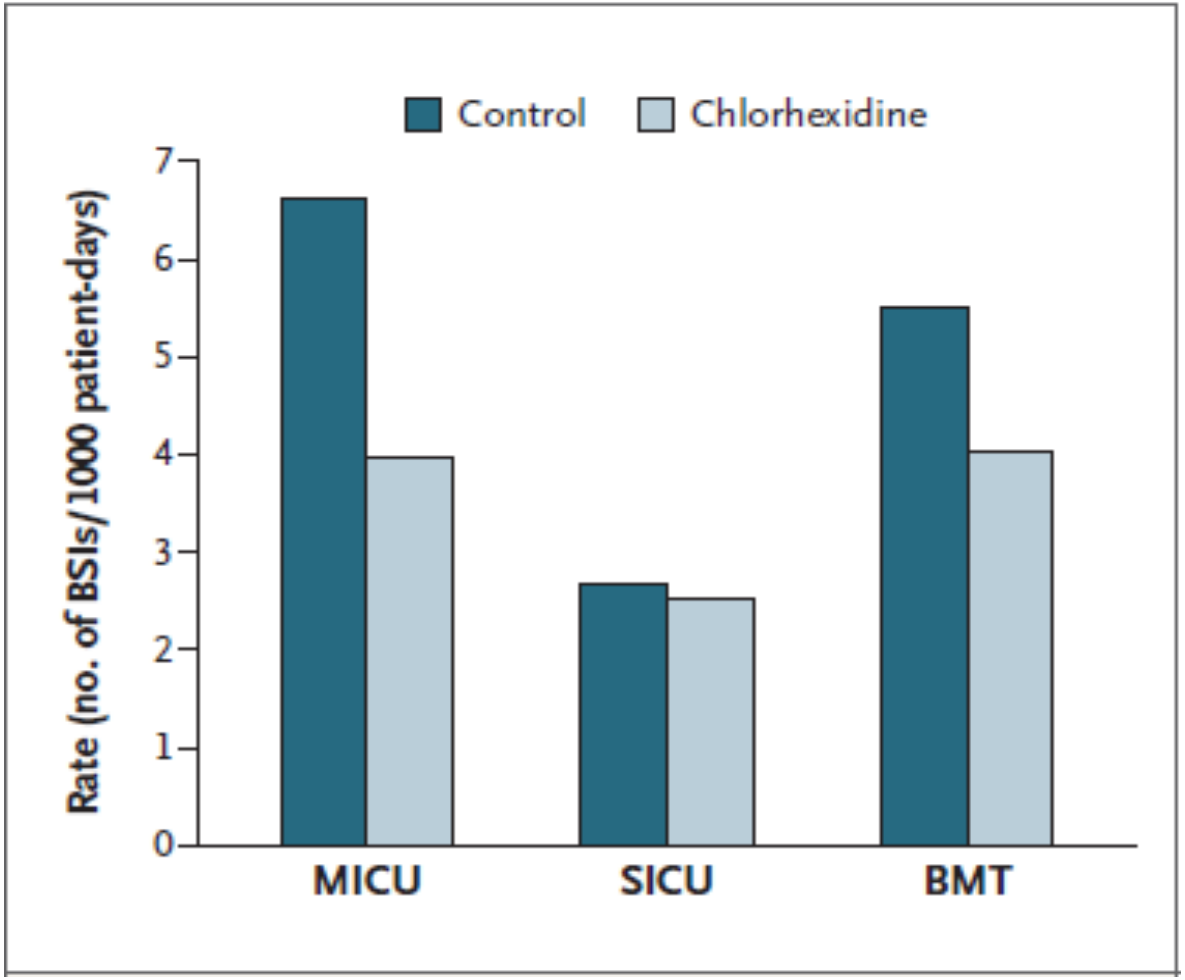
Effect of Daily Chlorhexidine Bathing on Hospital-Acquired Infection

Michael W. Climo, M.D., Deborah S. Yokoe, M.D., M.P.H., David K. Warren, M.D., Trish M. Perl, M.D., Maureen Bolon, M.D., Loreen A. Herwaldt, M.D., Robert A. Weinstein, M.D., Kent A. Sepkowitz, M.D., John A. Jernigan, M.D., Kakotan Sanogo, M.S., and Edward S. Wong, M.D.

- **6 months intervention x non-intervention**
- **7727 pts**
- **9 ICU**
- **1 BMT**

N Engl J Med 2013;368:533-42.

BSI rates pre and post Chlorexedine Bath



N Engl J Med 2013;368:533-42.

HCAI rates pre and post Chlorexedine Bath

Table 2. Incidence of Hospital-Acquired Bloodstream Infections and Acquisition of Multidrug Resistant Organisms (MDROs), MRSA, and VRE.*

Variable	Intervention Period	Control Period	P Value
No. of admissions	3970	3842	0.32
Total days of care	24,902	24,983	0.85
Central-catheter use (days)	13,425	13,049	0.14
Mean length of stay (days)	6.4	6.4	0.53
MRSA prevalence (%)	13.8	12.8	0.14
VRE prevalence (%)	16.3	15.1	0.24
MDRO acquisition			
No. of infections	127	165	0.03
Incidence rate (no./1000 patient-days)	5.10	6.60	
VRE acquisition			
No. of infections	80	107	0.05
Incidence rate (no./1000 patient-days)	3.21	4.28	
MRSA acquisition			
No. of infections	47	58	0.29
Incidence rate (no./1000 patient-days)	1.89	2.32	

N Engl J Med 2013;368:533-42.

Observational Study

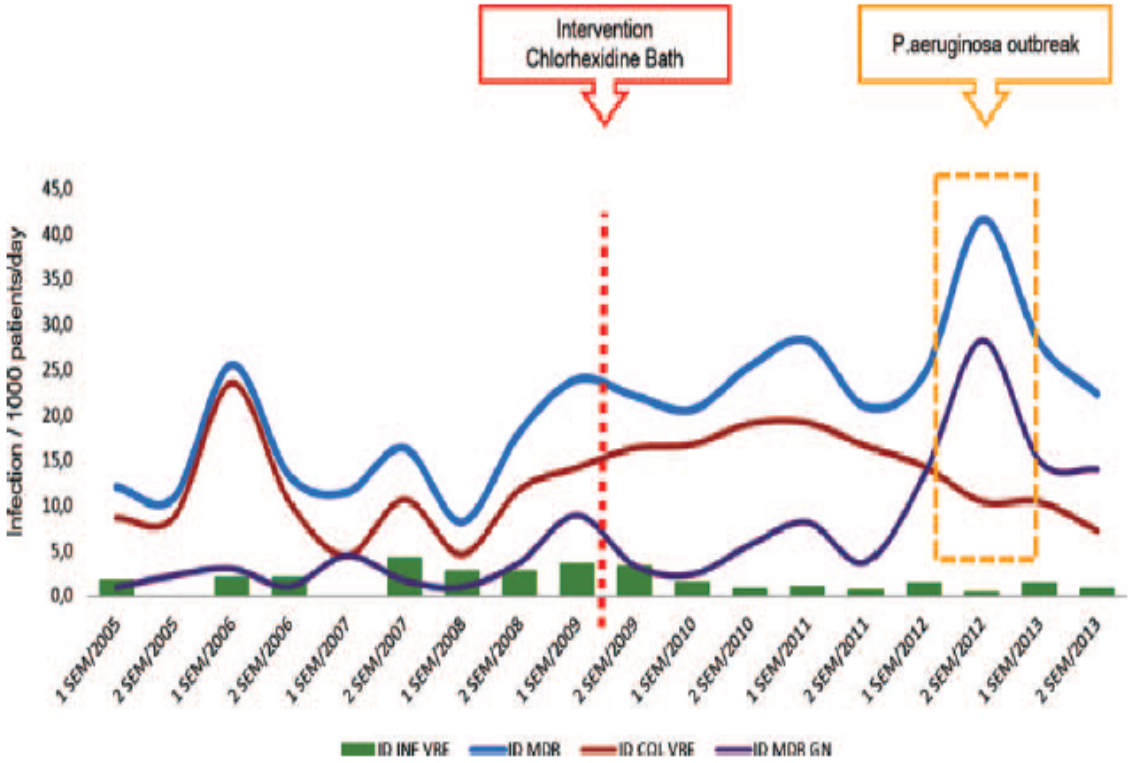
Medicine®

OPEN

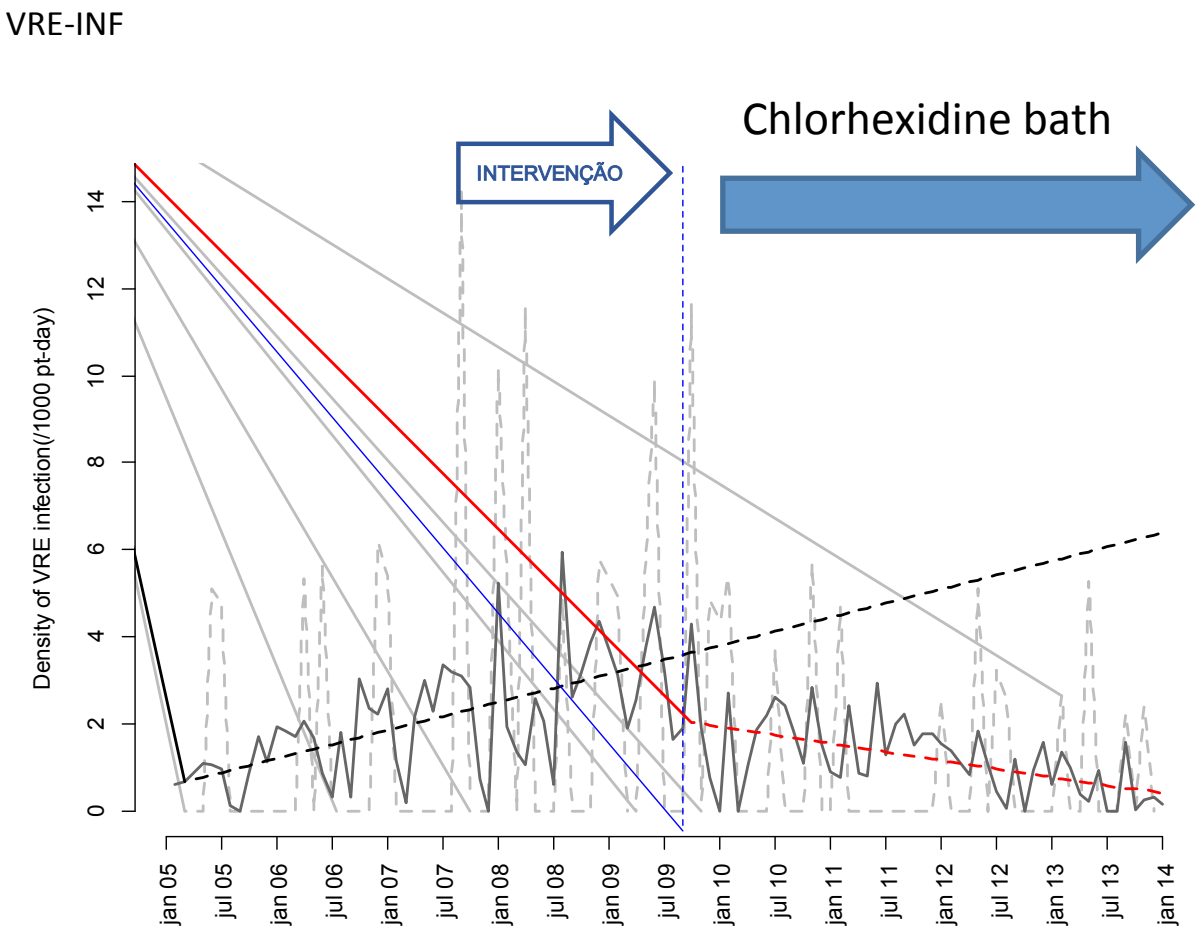
Chlorhexidine bathing for the prevention of colonization and infection with multidrug-resistant microorganisms in a hematopoietic stem cell transplantation unit over a 9-year period

Impact on chlorhexidine susceptibility

Elisa Teixeira Mendes, MD[a,*], Otavio T. Ranzani, MD[b], Ana Paula Marchi, BS[c], Mariama Tomaz da Silva, MS[c], José Ulysses Amigo Filho, MD[d], Tânia Alves, NSG[d], Thais Guimarães, PhD[e], Anna S. Levin, PhD[c], Silvia Figueiredo Costa, PhD[c]



VRE infection temporal series comparing pre and post intervention in BMT UNIT (2005-2009) x 2009-2013 HC-FMUSP, 1.323 pts



Model (0,0,4) (0,0,1)			
Variable	Betta	SE	P value
Constant	0.557	0.564	0.326
Secular	0.054	0.018	0.003
Intervention	-1.429	0.813	0.082
Post-intervention	-0.086	[illegible]	**0.001**

- Taxas observadas
- Modelo completo
- Previsão sem a intervenção
- Previsão com a intervenção
- Momento da intervenção

- **Gram-negative rates increased**
- **VRE Chlorhexidine MIC**

Observational Study

Medicine®

OPEN

Chlorhexidine bathing for the prevention of colonization and infection with multidrug-resistant microorganisms in a hematopoietic stem cell transplantation unit over a 9-year period

Impact on chlorhexidine susceptibility

Elisa Teixeira Mendes, MD[a,*], Otavio T. Ranzani, MD[b], Ana Paula Marchi, BS[c], Mariama Tomaz da Silva, MS[c], José Ulysses Amigo Filho, MD[d], Tânia Alves, NSG[d], Thais Guimarães, PhD[e], Anna S. Levin, PhD[c], Silvia Figueiredo Costa, PhD[c]

Minimal inhibitory concentrations (MIC) of chlorhexidine and effect of the efflux pump inhibitor CCCP on MIC of bacteria isolated in the pre-intervention and intervention periods in a Bone Marrow Transplant unit, Hospital das Clínicas, University of São Paulo, Brazil (2005–2013).

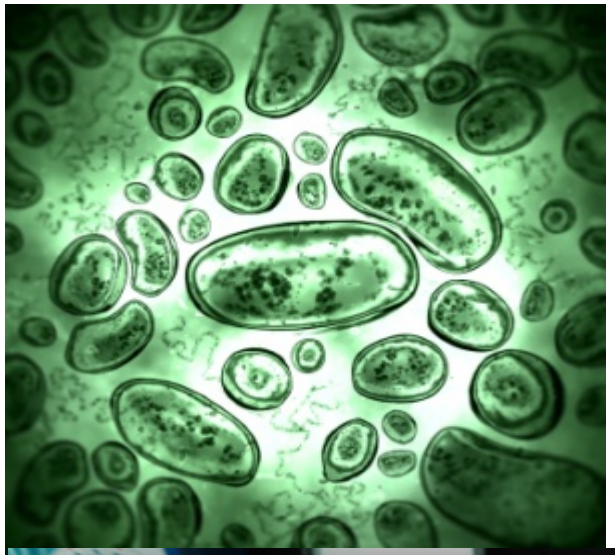
	Pre-intervention, μg/mL					Intervention, μg/mL				
Bacteria N = 127	N	MIC 50 (range)	MIC 90	MIC 50 CCCP (range)	CCCP response* (%)	N	CIM 50 (range)	CIM 90	CIM 50 CCCP (range)	CCCP response* (%)
P aeruginosa	18	32 (16–64)	64	4 (2–8)	1 (5)	28	32 (4–64)	64	4 (1–8)	9 (39.1)
A baumannii	NI	—	—	—	—	6	32 (8–64)	64	4 (0.5–8)	3 (42.8)
K pneumoniae	NI	—	—	—	—	27	64 (16–128)	128	2 (0.5–8)	24 (85.7)
E faecium	28	2 (1–32)	16	0.5 (0.25–4)	7 (25)	20	8 (4–32)	32	0.5 (0.125–4)	18 (90)

CCCP response = 4-fold MIC reduction compared with non-CCCP MIC, MIC50 = MIC that inhibited 50% of isolates, MIC90 = MIC that inhibited 90% of isolates, NI = not identified.

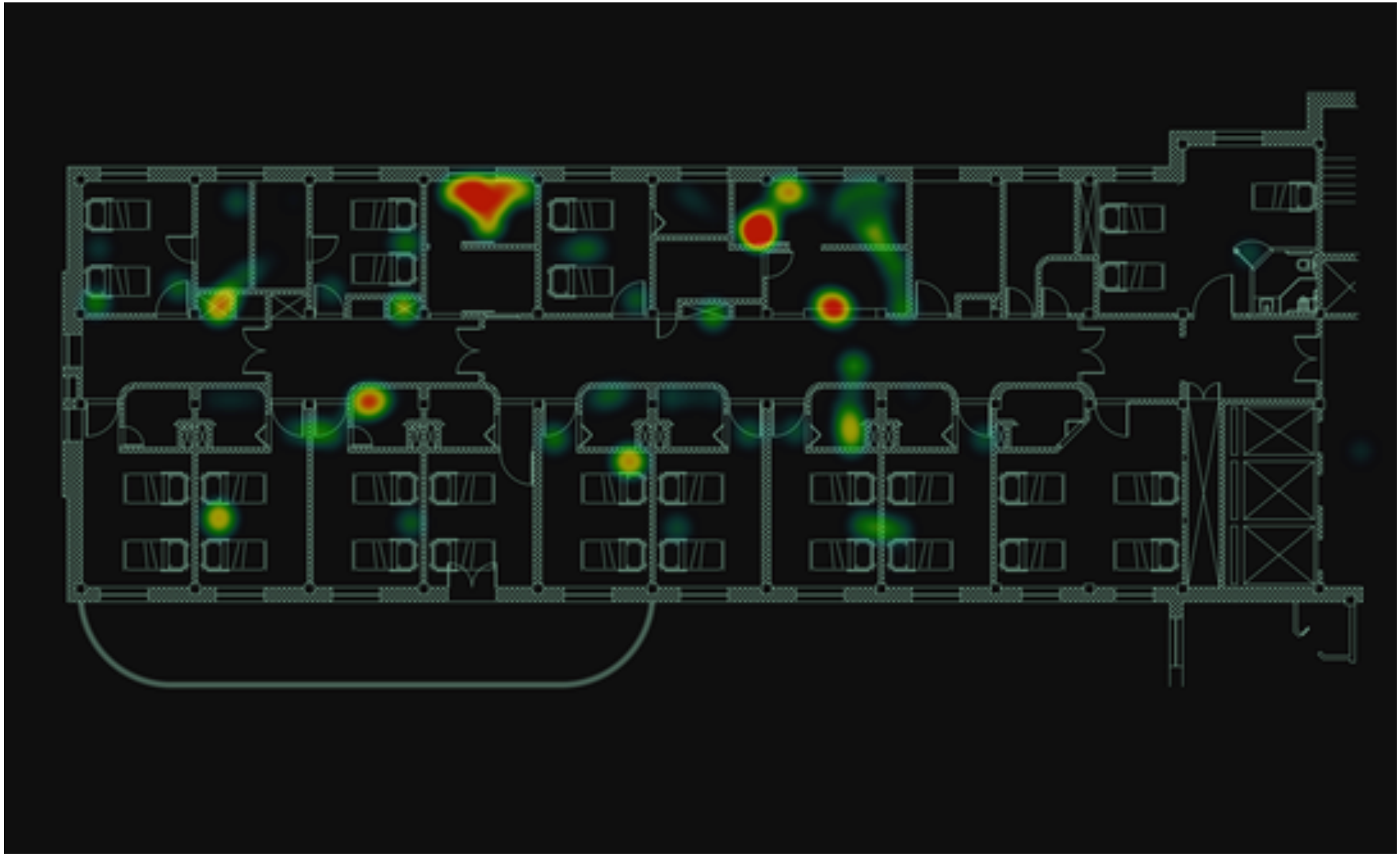
TMO HC-FMUSP
January- March 2015

Colunas1	Colunas2	Colunas3	Colunas4	Colunas5	Colunas6	Colunas7
Agente		Colonizado	NC	Neg	Pos	Total 3 meses
Pseudomonas		9	129	133	14	285
VRE		16	152	110	11	289
Enterobactérias		12	134	126	14	286

Colunas1	Colunas2	Colunas3	Colunas4	Colunas5	Colunas6	Colunas7
mês	colhidos fezes	colhidos swab	positivo fezes	positivo swab	Positividade fezes	Positividade swab
jan	39	0	10	4	9,4	9,8
fev	27	30				
mar	40	11				



PCR 16S Ribosomic



QUARTO	SUPERFICIE	VALOR ATP / RLU'S	QUARTO	SUPERFICIE	VALOR ATP / RLU'S PÓS
8043	GRADE DIREITA CAMA	19.684	8043	GRADE DIREITA CAMA	627
	GRADE DIREITA CAMA	1.029		GRADE DIREITA CAMA	23.510
	TAMPA VASO SANITÁ	28		TAMPA VASO SANITÁ	23
	ESTETOSCÓPIO L1	619		ESTETOSCÓPIO L1	206
	ESTETOSCÓPIO L2	919		ESTETOSCÓPIO L2	177
	ESTETOSCÓPIO L3	1.353		ESTETOSCÓPIO L3	99
	BOMBA INFUSÃO L2	3.651		BOMBA INFUSÃO L2	322
	BOMBA INFUSÃO L3	2.247		BOMBA INFUSÃO L3	110

QUARTO	SUPERFICIE	VALOR ATP / RLU'S	QUARTO	SUPERFICIE	VALOR ATP / RLU'S PÓS
8044	GRADE DIREITA CAMA	565	8044	GRADE DIREITA CAMA	360
L4 VAZIO	GRADE DIREITA CAMA	52.973	L4 VAZIO	GRADE DIREITA CAMA	350
L5 - ISOLAMEN	TAMPA VASO SANITÁ	35	L5 - ISOLAMEN	TAMPA VASO SANITÁ	25
	DUCHA HIGIÊNICA	1.569		DUCHA HIGIÊNICA	1.178
	BOMBA INFUSÃO L5	26.652		BOMBA INFUSÃO L5	335
	ESTETOSCÓPIO L5	1660		ESTETOSCÓPIO L5	1161

QUARTO	SUPERFICIE	VALOR ATP / RLU'S	QUARTO	SUPERFICIE	VALOR ATP / RLU'S PÓS
8045	GRADE DIREITA CAMA	250	8045	GRADE DIREITA CAMA	397
	GRADE INFERIOR CAN	433		GRADE INFERIOR CAN	224
	TAMPA VASO SANITÁ	55		TAMPA VASO SANITÁ	85
	GELADEIRA	478		GELADEIRA	245
	ESTETOSCÓPIO L6	477		ESTETOSCÓPIO L6	97
	ESTETOSCÓPIO L7	1.146		ESTETOSCÓPIO L7	86

QUARTO	SUPERFICIE	VALOR ATP / RLU'S	QUARTO	SUPERFICIE	VALOR ATP / RLU'S PÓS
8046	GRADE DIREITA CAMA	337	8046	GRADE DIREITA CAMA	597
	TAMPA VASO SANITÁ	194.995		TAMPA VASO SANITÁ	415
	GELADEIRA	405		GELADEIRA	302
	ESTETOSCÓPIO L8	108		ESTETOSCÓPIO L8	37
	ESTETOSCÓPIO L9	51		ESTETOSCÓPIO L9	43

QUARTO	SUPERFICIE	VALOR ATP / RLU'S	QUARTO	SUPERFICIE	VALOR ATP / RLU'S PÓS
8047	GRADE DIREITA CAMA	207	8047	GRADE DIREITA CAMA	566
L10 ISOLAMEN	TAMPA VASO SANITÁ	308	L10 ISOLAMEN	TAMPA VASO SANITÁ	216
	DUCHA HIGIÊNICA	14.131		DUCHA HIGIÊNICA	7.581
	BOMBA INFUSÃO L10	336		BOMBA INFUSÃO L10	99
	ESTETOSCÓPIO L10	170		ESTETOSCÓPIO L10	82

QUARTO	SUPERFICIE	VALOR ATP / RLU'S	QUARTO	SUPERFICIE	VALOR ATP / RLU'S PÓS
8049	GRADE DIREITA CAMA	655	8049	GRADE DIREITA CAMA	593
	MAÇANETA	1.233		MAÇANETA	331
	TAMPA VASO SANITÁ	4456		TAMPA VASO SANITÁ	110
	GELADEIRA	576		GELADEIRA	3.466
	ESTETOSCÓPIO L11	466		ESTETOSCÓPIO L11	129
	ESTETOSCÓPIO L12	335		ESTETOSCÓPIO L12	91

Clinical Infectious Diseases

MAJOR ARTICLE

Control of Multidrug-Resistant *Pseudomonas aeruginosa* in Allogeneic Hematopoietic Stem Cell Transplant Recipients by a Novel Bundle Including Remodeling of Sanitary and Water Supply Systems

Annelene Kossow,[1] Stefanie Kampmeier,[1] Stefanie Willems,[1] Wolfgang E. Berdel,[2] Andreas H. Groll,[3] Birgit Burckhardt,[3] Claudia Rossig,[3] Christoph Groth,[2] Evgeny A. Idelevich,[4] Frank Kipp,[1] Alexander Mellmann,[1,a] and Matthias Stelljes[2,a]

[1]Institute of Hygiene, [2]Department of Medicine A, Hematology and Oncology, [3]University Children's Hospital Muenster, Department of Pediatric Hematology and Oncology, and [4]Institute of Medical Microbiology, University of Muenster, Germany

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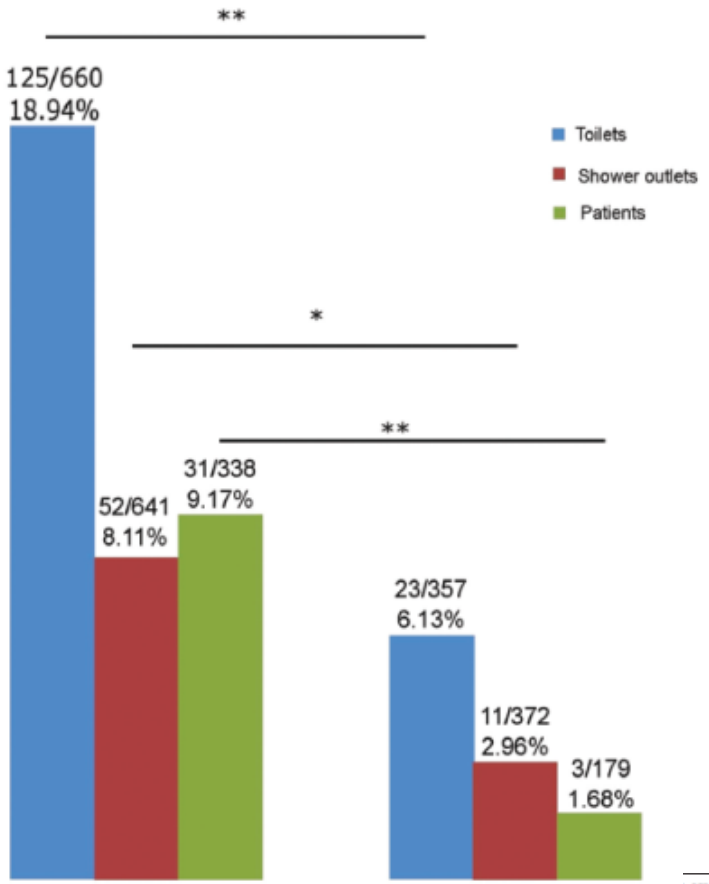

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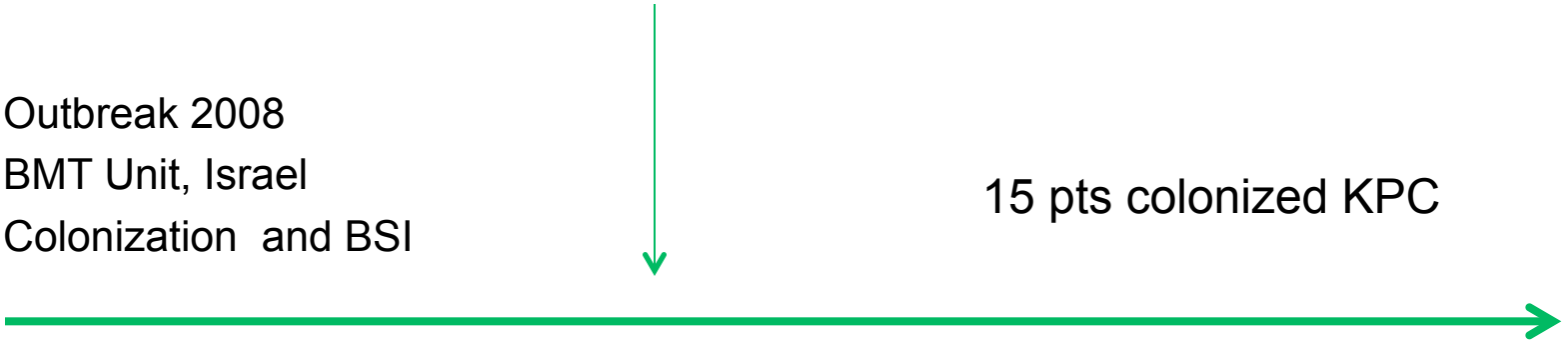
Table 2. Annual Distribution and Clinical Details of Patients Colonized or Infected With Multidrug-Resistant *Pseudomonas aeruginosa*

Year	No. of Patients Treated	No. of Patients With: BSI	Pneumonia	Colonization	Total No. of Affected Patients (%)[a]	Lethality, %[b]
2012	171	4	0	14	18 (10.5)	2.3 (n = 4)
2013	167	8	1	4	13 (7.8)	4.8 (n = 8)
2014	179	1	0	2	3 (1.7)	0 (n = 0)
2015	183	4	0	3	7 (3.8)	2.2 (n = 4)
2016	193	0	0	1	1 (0.5)	0 (n = 0)

KPC HSCT

- Outbreak 2008
- BMT Unit, Israel
- Colonization and BSI



- Erradication: 03 negatives rectal swabs weekly

Zuckerman et al. Bone Marrow Transplant 2011;46:1226-30

KPC HSCT

15 pts colonized KPC

10/15 decolonized

8/15 **BSI**

4/8 no decolonized

KCP susceptible to Colistina; Genta e Tige

6 Death

- **3 death related KPC Infection**

Zuckerman et al. Bone Marrow Transplant 2011;46:1226-30

Cycling antibiotic in BMT

- **Prospective cohort pts neutropenic fever**

	Pre-cycling	Period A	Period B	P
• Infection 1.000pts-day				
• Gram-negative	5.3	2.1	3.3	0.001 ↓
• Gram-positive	4.4	5.3	4.8	0.28
• VRE	0.1	1.1	1.6	0.005 ↑

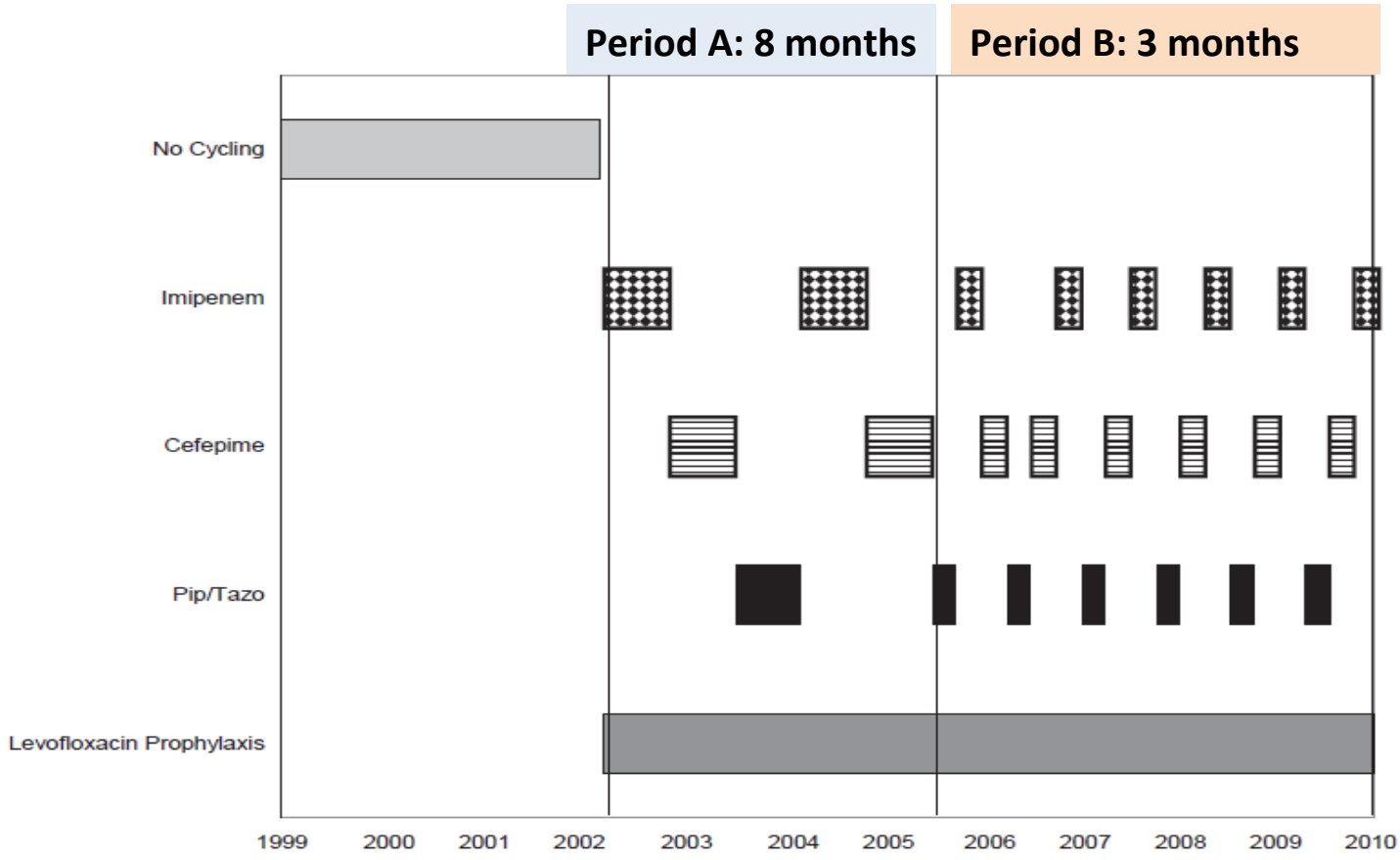
Period A: cycling 8 months

Period B: cycling 3 months

Cumpston et al. Transpl Infect Dis 2013;15:1425

Transplant Infectious Disease, ISSN 1398-2273

Extended follow-up of an antibiotic cycling program for the management of febrile neutropenia in a hematologic malignancy and hematopoietic cell transplantation unit



Transpl Infect Dis 2013: **15:** 142–149

Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Major article

Eradication of carbapenem-resistant *Enterobacteriaceae* gastrointestinal colonization with nonabsorbable oral antibiotic treatment: A prospective controlled trial

Ilana Oren MD[a,b,*], Hannah Sprecher PhD[c], Renato Finkelstein MD[a,b], Salim Hadad PhD[d], Ami Neuberger MD[a], Keatam Hussein MD[a], Ayelet Raz-Pasteur MD[a], Noa Lavi MD[e], Elias Saad MD[e], Israel Henig MD[e], Netanel Horowitz MD[e], Irit Avivi MD[b,e], Noam Benyamini MD[e], Riva Fineman MD[e], Yishai Ofran MD[b,e], Nuhad Haddad MD[e], Jacob M. Rowe MD[b,e], Tsila Zuckerman MD[b,e]

	Gentamicin treatment (n = 26)	Colistin treatment (n = 16)	Gentamicin + colistin treatment (n = 8)	All treatment regimens combined (N = 50)	Control group follow-up for spontaneous eradication (N = 102)
Eradication, n (%)	11 (42)	8 (50)	3 (37.5)	22 (44)	7 (7)
P value*	*P* < .001	*P* < .001	*P* = .004	*P* < .001	
Failure, n (%)	15 (58)	8 (50)	5 (62.5)	28 (56)	95 (93)
Reasons for failure	4, persisted 3, stopped 2, relapsed 6, resistant	3, stopped 4, relapsed 1, resistant	3, stopped 2, relapsed	4, persisted 9, stopped 8, relapsed 7, resistant	95, persisted

Am J Infect Control 2013;1167-77

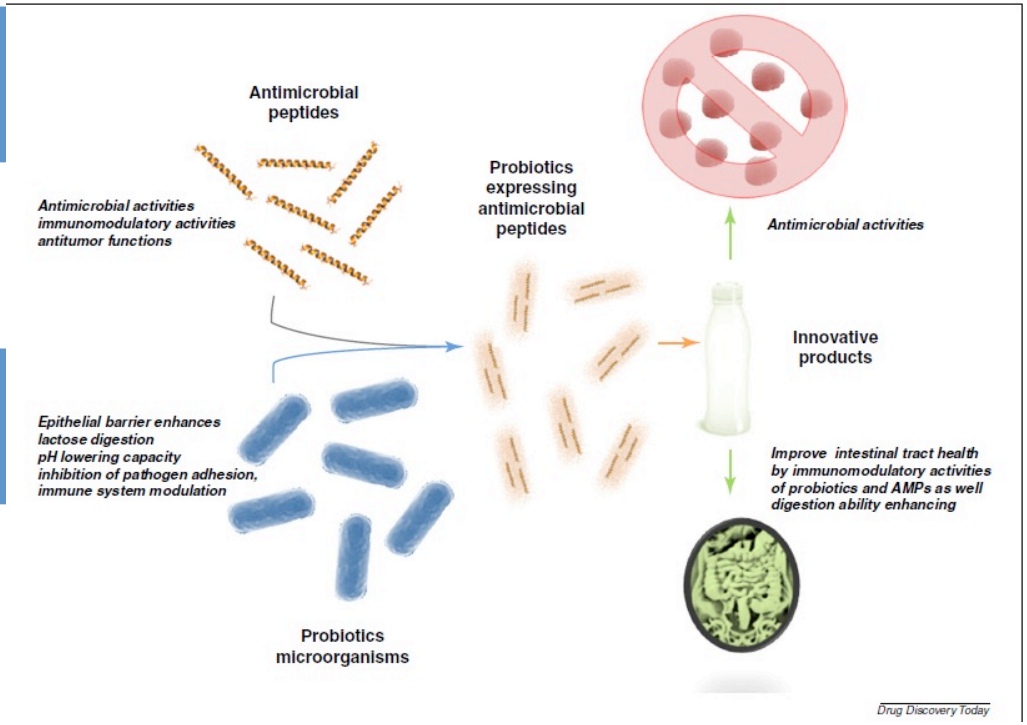
Others possibilities MDR decolonization

Fecal Transplant

- Save
- Cases Reports

Probiotics

- 1 trial in children



Where is the difference between an epidemic and a high endemic level with respect to nosocomial infection control measures? An analysis based on the example of vancomycin-resistant Enterococcus faecium in hematology and oncology departments

	Long outbreaks/ high endemic level (>6 months)	Short outbreaks (≤6 months)	P value	Long outbreaks/ high endemic level (>12 months)	Short outbreaks ≤12 months)	P value
Number of outbreaks with information about duration#	18	13		9	22	
Control measures						
Outbreaks with information about control measures	16	12		8	20	
Closure of department/unit	1 (6.2%)	3 (25.0%)	n.s.	1 (12.5%)	3 (15.0%)	n.s.
Enforcement of hand hygiene	6 (37.5%)	3 (25.0%)	n.s.	2 (25.0%)	7 (35.0%)	n.s.
Protective clothing	6 (37.5)	5 (41.7%)	n.s.	4 (50.0%)	7 (35.0%)	n.s.
Isolation/cohorting	10 (62.5%)	9 (75.0%)	n.s.	4 (50.0%)	15 (75.0%)	n.s.
Patient screening	13 (81.2%)	12 (100.0%)	n.s.	5 (62.5%)	20 (100.0%)	0,02
Environmental screening	4 (25.0%)	7 (58.3%)	n.s.	3 (37.5%)	8 (40.0%)	n.s.
Education/training	5 (31.2%)	4 (33.3%)	n.s.	2 (25.0%)	7 (35.0%)	n.s.
Environmental cleaning/disinfection	7 /43.8%)	4 (33.3%)	n.s.	4 (50.0%)	7 (35.0%)	n.s.
Antibiotic stewardship/restriction	6 (37.5%)	2 (17.6%)	n.s.	3 (37.5%)	5 (25.0%)	n.s.

GMS Hygiene and Infection Control 2017, Vol. 12, ISSN 2196-5226

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	Monoclonal#	Polyclonal	P value
Total number of outbreaks with typing information	**11**	**20**	
Among them outbreaks with duration of outbreak	**9**	**18**	
Short outbreaks ≤6 months	3 (33.3%)	9 (50.0%)	n.s.
Long outbreaks >6 months	6 (66.7%)	9 (50.0%)	n.s.
Short outbreaks ≤12 months	8 (88.9%)	12 (66.7%)	n.s.
Long outbreaks >12 months	1 (11.1%)	6 (33.3%)	n.s.
Outbreaks with no information about duration*	2 (22.2%)	2 (11.1%)	
Control measures			
Outbreaks with information about control measures	10	18	
Closure of department/unit	1 (10.0%)	4 (22.2%)	n.s.
Enforcement of hand hygiene	6 (60.0%)	4 (22.2%)	0.046
Protective clothing	4 (40.0%)	9 (50.0%)	n.s.
Isolation/cohorting	8 (80.0%)	10 (55.6%)	n.s.
Patient screening	10 (100.0%)	14 (77.8%)	n.s.
Environmental screening	4 (40.0%)	10 (55.6%)	n.s.
Education/training	3 (30.0%)	7 (38.9%)	n.s.
Environmental cleaning/disinfection	5 (50.0%)	5 (27.8%)	n.s.
Antibiotic stewardship/restriction	1 (10.0%)	5 (27.8%)	n.s.

GMS Hygiene and Infection Control 2017, Vol. 12, ISSN 2196-5226

Journal of Hospital Infection 96 (2017) 353–359

Available online at www.sciencedirect.com

Journal of Hospital Infection

journal homepage: www.elsevierhealth.com/journals/jhin

Consecutive yearly outbreaks of respiratory syncytial virus in a haemato-oncology ward and efficacy of infection control measures

T. Inkster [a,*], K. Ferguson [a], A. Edwardson [a], R. Gunson [b], R. Soutar [c]

[a] Department of Infection Control, Gartnavel General Hospital, Glasgow, UK
[b] Department of Virology, Glasgow Royal Infirmary, Glasgow, UK
[c] Department of Haematology, West of Scotland Beatson Oncology Centre, Gartnavel Hospital, Glasgow, UK

Nosocomial RSV
: Any patient with respiratory symptoms and a positive respiratory sample for RSV if patient was hospitalized two or more days before the onset of symptoms.

Confirmed case of RSV
: Any patient or staff member with respiratory symptoms and a positive respiratory sample for RSV

Probable case of RSV
: Any patient or staff member with respiratory symptoms

Asymptomatic carrier
: Any patient or staff member in whom RSV was detected on screening in the absence of respiratory symptoms or fever

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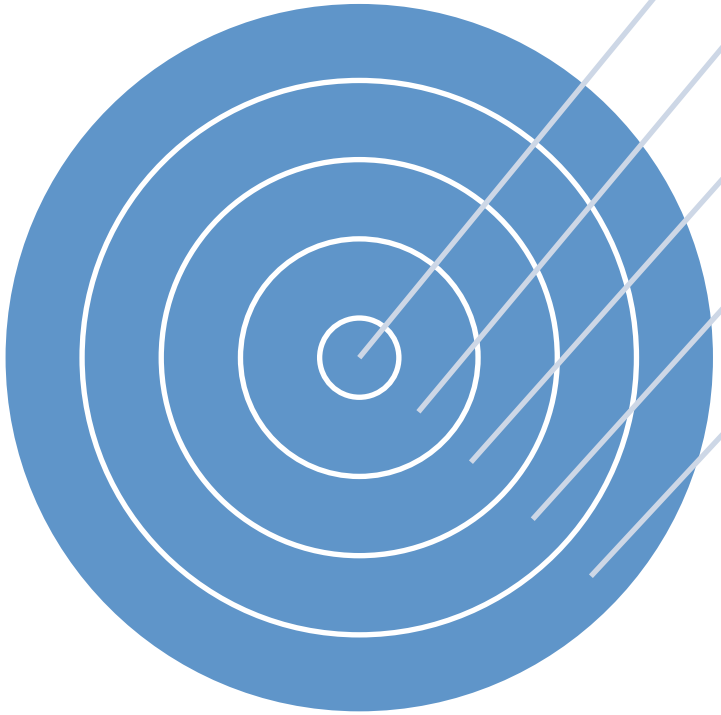
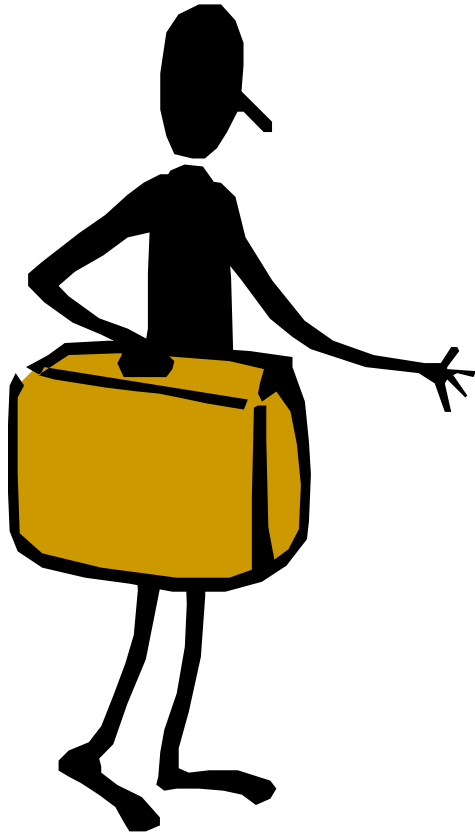
- Ward closed to admissions/transfers.
- Isolation of symptomatic cases in single side-room or cohorted with other respiratory syncytial virus-positive patients.
- Increased environmental cleaning: twice daily with chlorine-based detergent (Actichlor™ plus).
- Cough etiquette emphasized.
- Use of personal protective equipment (gloves, aprons, surgical masks, visors) emphasized and adequate supplies obtained.
- Hand hygiene emphasized.
- Screening of all patients.
- Screening of all staff (2015 outbreak only).
- Restriction of patient and staff movement.
- Access to adjoining ward (bone marrow transplant) restricted and entry via alternative route agreed.
- Reduced visiting hours and visitor numbers (no more than two per patient). If possible no child visitors aged <12 years. Media statements released which reinforced this.
- Symptomatic staff to refrain from duty until 48 h symptom-free.
- Enhanced observation of the ward by the infection prevention and control team and education.
- Frequent meetings with infection control, clinical and management staff.
- Written communication, so all staff were aware of situation.
- Psychological and practical support to ward staff dealing with patients and relatives from infection control staff.

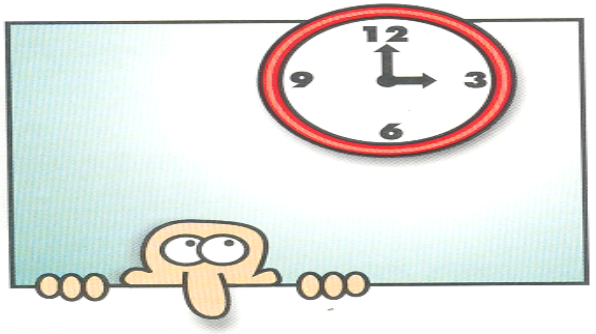
Take Home Message



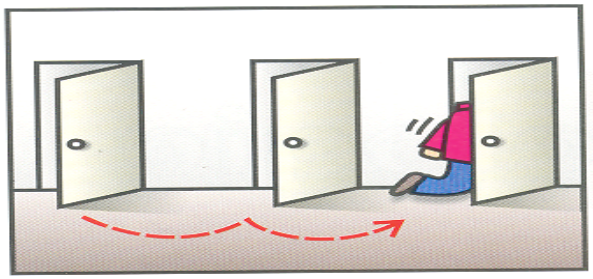
- Talk to your patient
- Screen
- Local/Country MDR Rates
- Classify patient
- Use the information wisely



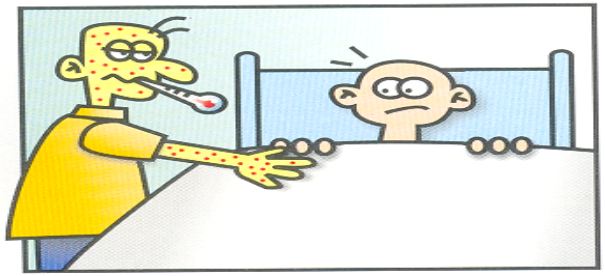
Lave as mãos antes
e após sair do quarto



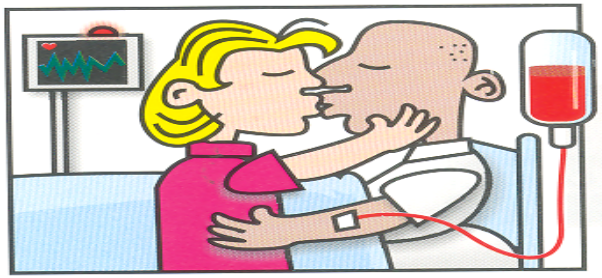
Respeite o horário de visita,
evite tumultos e aglomerações
no quarto



Visite somente
o seu amigo ou parente



Se estiver resfriado ou com
infecções, evite visitar seu
amigo ou parente



Evite contatos mais próximos.
Lembre-se: os pacientes
possuem baixa resistência

Elder Pimenta

Thank you