



XIV

Congresso Brasileiro de
Controle de Infecção e
Epidemiologia Hospitalar

19 A 22 DE NOVEMBRO DE 2014 | EXPO UNIVED CURITIBA | CURITIBA | PR



Clorexidine para prevenção de IRAS

Riscos

Silvia F Costa

HC-FMUSP

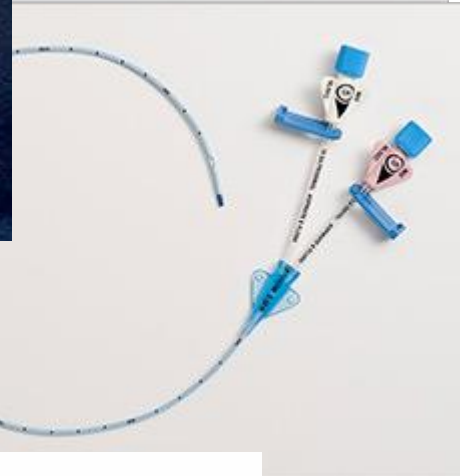
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Riscos uso clorexidina

- Efeitos adversos
- Adesão ao uso adequado?
- Indicador de processo?
- Resistência à clorexidina
- Resistência cruzada a outros antibióticos




**CLOREXIDINA PRODUTOS USO
ASSITÊNCIA A SAÚDE**



Clorexidina reação alérgica

1 relato Japão -1985

- Decorrente uso: Gel, swab, antisséptico
 - Prurido, urticaria
 - Dermatite contato e fotossensível
 - Broncoespasmo
 - Asma ocupacional
 - Choque anafilático
- Subnotificada
- Japão, UK,  associação procedimentos urológicos

Takeda et al, 1985

Jayathillake et al. Urology 2003;61:832

Allerg Immun 2014;42:44-7



ORIGINAL ARTICLE

Immediate hypersensitivity to chlorhexidine is increasingly recognised in the United Kingdom

A. Nakonechna^a, P. Dore^a, T. Dixon^b, S. Khan^c, S. Deacock^c, S. Holding^a,
M. Abuzakouk^{a,*}

Table 1 A summary of patients' reactions and investigations.

Patient	Onset of symptoms	Severity of reaction ^a	Tryptase level (mcg/L)	Chlorhexidine IgE (kUa/L)	Chlorhexidine skin prick test (wheal size)
Case 1	10 min following the procedure	Grade IV	1 h-17.3 2 h-20.2 12 h-7.1	30.0	Not done
Case 2	10 min following the procedure	Grade II-III	1 h-4.6	2.3	Not done
Case 3	10 min after procedure	Grade III	Not done	4.4	Chlorhexidine 0.5% = 9.5 mm Instillagel = 6.5 mm
Case 4	20 min after induction of anaesthesia	Grade III-IV	1 h-32.6 2 h-40.2 18 h-10.2	3.32	Chlorhexidine 0.05% = 7.2 mm Chlorhexidine 0.5% = 10.5 mm
Case 5	10 min in recovery room	Grade IV	4 h-35.8 12 h-6.95	11.8	Chlorhexidine 0.005% = 4 mm Chlorhexidine 0.05% = 4 mm Chlorhexidine 0.2% = 12 mm (in 30 min)
Case 6	10 min in recovery room	Grade I	Not done	0.69	Chlorhexidine 0.2% = 4 mm flare response, delayed at 30 min)

Medical Device Alert

Ref: MDA/2012/075 Issued: 25 October 2012 at 12:00

Device

All medical devices and medicinal products containing chlorhexidine

Problem

Risk of anaphylactic reaction due to chlorhexidine allergy.

Action by

All medical and nursing staff involved in the use of these devices and medicinal products.

CAS deadlines

Action underway: 22 November 2012

Action complete: 25 January 2013

Note: These deadlines are for systems to be in place to ensure there is continued awareness of this problem.

Action

- Be aware of the potential for an anaphylactic reaction to chlorhexidine.
- Ensure that known allergies are recorded in patient notes.
- Check the labels and instructions for use to establish if products contain chlorhexidine prior to use on patients with a known allergy.
- If a patient experiences an unexplained reaction, check whether chlorhexidine was used or was impregnated in a medical device that was used.
- Report allergic reactions to products containing chlorhexidine to the MHRA.
- Further guidance on anaphylaxis is available from [NICE](#), the [Resuscitation Council](#) and the [AAGBI](#).

The MHRA does not hold a comprehensive list of products containing chlorhexidine. However, examples of products which contain chlorhexidine are: antiseptic creams, wipes, cleansers and skin preparations; antiseptic mouthwashes, toothpastes and dental implants; eye drops and contact lens solutions; antiseptic lozenges and throat sprays; urinary catheters; central venous catheters; and antimicrobial dressings.

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What's Happening

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Chlorhexidine

Chlorhexidine is often used as an active ingredient in *mouthwash* designed to reduce dental plaque and oral bacteria.

There is some evidence of an increasing number of cases of allergy to chlorhexidine, possibly

BANHO CLOREXIDINA

Qual é a adesão a essa medida?

ORIGINAL INVESTIGATION

Effectiveness of Chlorhexidine Bathing to Reduce Catheter-Associated Bloodstream Infections in Medical Intensive Care Unit Patients

Susan C. Bleasdale, MD; William E. Trick, MD; Joao M. Gonzalez, MD; Rosie D. Lyles, MD; Mary K. Hayden, MD; Robert A. Weinstein, MD

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.

Daily chlorhexidine bathing to reduce bacteraemia in critically ill children: a multicentre, cluster-randomised, crossover trial

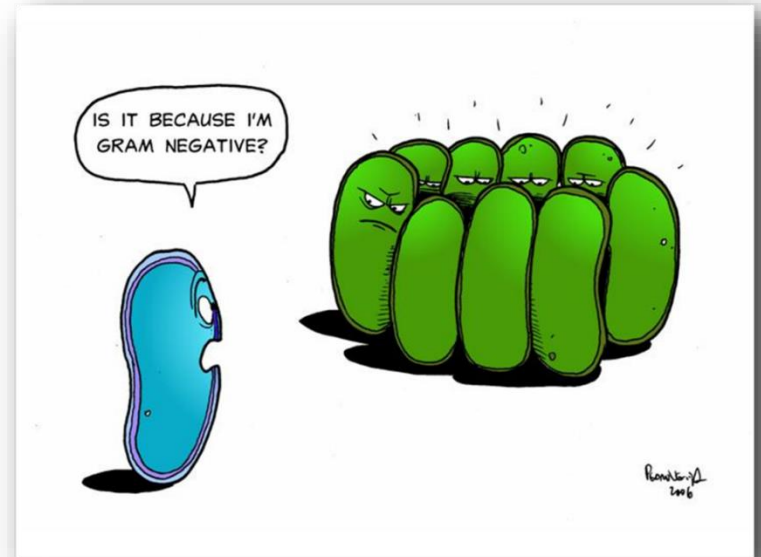


Aaron M Milstone, Alexis Elward, Xiaoyan Song, Danielle M Zerr, Rachel Orscheln, Kathleen Speck, Daniel Obeng, Nicholas G Reich, Susan E Coffin, Trish M Perl, for the Pediatric SCRUB Trial Study Group

Estudo	População estudada	Tempo de observação	Redução ICS	Gram +	Gram -	MR	Resistencia CLOREX
Arch Intern Med 2007	1 UTIs clínica	6 meses	P:0,004	SCN	Não	Não avaliado	↑ MIC pós - clorex
N Engl J Med 2013	8 UTIs 1 TCTH	6 meses	P:0,007	SCN	Não	↓ col VRE MRSA	Não teve mudança de MIC
Lancet 2013	10 UTIs pediátricas	6 meses	P:0,015	SCN	Não	Não avaliado	Não avaliado

Clorexidina e impacto Gram-negativo??

- *A. baumannii*
- Trauma e UTI
- PAV (p=0.0024)
- KPC
- Surtos
- Situação endêmica – longa permanência
- Pacotes de medidas



- Lin MY, Lolans K Infect Control Hosp Epidemiol. 2014 Apr;35(4):440-2.
- Robustillo Rodela A, Euro Surveill. 2012 Feb 16;17(7).
- Munoz-Price LS, Infect Control Hosp Epidemiol. 2010 Apr;31(4):341-7.
- Mendoza-Olazarán S, Am J Infect Control. 2014 Aug;42(8):874-8.
- Martínez-Reséndez MF, Am J Infect Control. 2014 Jul;42(7):713-7.

Indicadores Processo uso banho clorexidina

- Consumo
- Paciente/dia

- Observação??
- amostral



- Reação alérgica
- Resistência
- Custo???
- Concentração na pele?

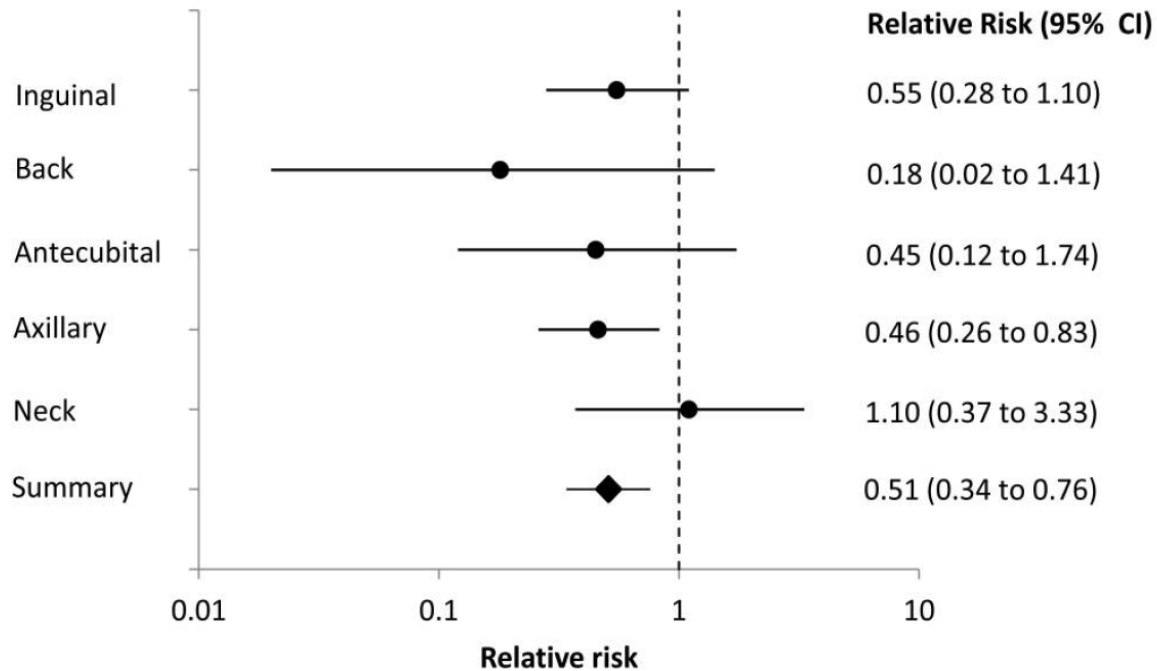
The Effectiveness of Routine Daily Chlorhexidine Gluconate Bathing in Reducing *Klebsiella pneumoniae* Carbapenemase–Producing Enterobacteriaceae Skin Burden among Long-Term Acute Care Hospital Patients

- 4 LT acute care -Chigaco banho diário Clore 2%
- Amostras 15 antes e 15 depois

Variable	Inguinal	Back	Antecubital	Axilla	Neck	P
KPC positive, %						
Before bath	37	8	10	39	8	<.001
After bath	15	5	5	11	15	.16
CHG concentration, median $\mu\text{g/mL}$						
Before bath	312.5	19.5	58.6	156.3	14.7	<.001
After bath	1,250.0	234.4	312.5	625.0	78.1	<.001
CHG concentration $\geq 128 \mu\text{g/mL}$, %						
Before bath	81	23	27	61	6	<.001
After bath	97	66	77	84	47	<.001

Concentração clorexidina pele >128 ug/ml

Risco de colonização MR



Diarreia RR 2.6 (1.3-5.1) p=00.05 colonização inguinal

Sou Resistente até a clorexidina



RESISTÊNCIA À CLOREXIDINA

Clorexidina e Resistência

- Ponto de corte???
- Diluição em àgar
- Testes fáceis
- DD
- Etest



- Faltam estudos CLÍNICOS e PROSPECTIVOS impacto do uso PROLONGADO (>6 meses) no desenvolvimento de resistência .

Clorexidina e Resistência Bacteriana

- In vitro

- Exposição 48hs s: ↑ CIM de MRSA para clorexidina
 - Vali L. J Antimicrob Chemother 2008; 61:524-532.
- ↑↑ circulação de cepas com >> CIM à clorexidina - 6 MESES banho clorexidina
 - Batra R. Clin Infect Dis (2010) 15; 50

- Principal mecanismo: bombas de efluxo - MRSA

- Genes Qac (A, B, AB) –

- McDonnell G et al. Clin Microbiol Rev. (1999); 12
- No Brasil (RJ): 75 cepas MRSA foram avaliadas gene *qacA/B* foi encontrado em 80% delas
 - Miyazaki NH, Mem Inst Oswaldo Cruz. (2007;)102

GRAM NEGATIVOS e resistência à Clorexidina

- ***A. baumannii***
 - n: 283 (isolados clínicos)
 - ↑↑ CIM em 4,6% após BANHO.
- ***K. pneumoniae***
 - n: 64
 - ↑↑ CIM 78,1%
 - Genes: Cep A, qac AE e Qac E
 - ST258 CIM 32-256 ug/ml
- **Inibidor de bomba de efluxo (CCCP)**
 - ↓↓ 8 -128 CIMs da clorexidina
 - 87,5% dos isolados



Abuzaid A, J Hosp Infect. (2012);81

Kawamura-Sato K. J Antimicrob Chemother. (2010) 65



Major article

Influence of whole-body washing of critically ill patients with chlorhexidine on *Acinetobacter baumannii* isolates



Soraya Mendoza-Olazarán MSc^a, Adrian Camacho-Ortiz MD^b,
 Michel Fernando Martínez-Reséndez MD^b, Jorge Martín Llaca-Díaz MSP^c,
 Edelmiro Pérez-Rodríguez MD^d, Elvira Garza-González PhD^{a,c,*}

• Clone A substituído clone B (+ virulento)

	CIM Clorexidina			Biofilme
	CIM50	CIM 90		
• Baseline				
• (N=80)	64	128		+++++
• Intervenção	8	16	p=0.0024	++
• (N=69)				

Racional: transmissão fomites e não cruzada???



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Journal of Hospital Infection

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



Review

Is reduced susceptibility to disinfectants and antiseptics a risk in healthcare settings? A point/counterpoint review

S. Harbarth^a, S. Tuan Soh^b, C. Horner^c, M.H. Wilcox^{c,*}

^a Geneva University Hospitals and Medical School, Geneva, Switzerland

^b Hospital Buloh, Kuala Lumpur, Malaysia

^c Leeds Teaching Hospitals and University of Leeds, Leeds, UK

Selection of studies describing bacterial survival at high or in-use concentrations of antiseptics

Authors	Year	Study	Finding
Bridges and Lowbury ⁶¹	1977	Drug resistance in relation to use of silver sulfadiazine cream in a burns unit	Changes in the susceptibility of Enterobacteriaceae to sulfadiazine before and after use of silver sulfadiazine cream
Thomas et al. ⁶²	1978	Sensitivity of urine-grown cells of <i>Providencia stuartii</i> to antiseptics	Resistance to chlorhexidine was recorded in <i>P. stuartii</i> , <i>Proteus mirabilis</i> and <i>Pseudomonas aeruginosa</i> . Isolates of <i>P. stuartii</i> were the least affected by chlorhexidine; concentrations of 10,000–20,000 mg/mL of urine were necessary to kill some strains
Gefitic et al. ⁶³	1979	Fourteen year survival of <i>Pseudomonas cepacia</i> in a salts solution preserved with benzalkonium chloride	<i>P. cepacia</i> was isolated from an inorganic salt solution containing 0.05% benzalkonium chloride. The isolate was resistant to higher levels of kanamycin, neomycin and colimycin when compared with a contemporary <i>P. cepacia</i> isolate
Hendry and Stewart ⁶⁴	1979	Silver-resistant Enterobacteriaceae from hospital patients	Of 70 random enteric isolates from a local hospital, isolates from catheters and other silver-exposed sites, and total genomes of enteric bacteria, 10 had recognizable <i>sil</i> genes. The centrally located six genes were found and functional on the chromosome of <i>Escherichia coli</i> K-12, and also occurred on the genome of <i>E. coli</i> O157:H7
Nakahara and Kozukue ⁶⁵	1982	Isolation of chlorhexidine-resistant <i>P. aeruginosa</i> from clinical lesions	84.2% <i>P. aeruginosa</i> ($N = 317$) isolates from hospital patients were resistant to chlorhexidine. Seven isolates grew in 200 µg chlorhexidine/mL (0.02%); an in-use concentration of the antiseptic
Cookson et al. ⁶⁶	1991	Transferable resistance to triclosan in MRSA	Following two weeks of nasal mupirocin and daily triclosan baths, MRSA with resistance to mupirocin (MIC >512 mg/L) and triclosan resistance (MIC 2–4 mg/L) were recovered. Triclosan resistance, always in combination with mupirocin resistance, could be transferred to susceptible <i>Staphylococcus aureus</i>
Anderson ⁶⁷	1989	Iodophor antiseptics: intrinsic microbial contamination with resistant bacteria	<i>P. aeruginosa</i> was isolated from membrane-filter sterilized poloxamer-iodine 48 h after it was added to the interior surface of a PVC water pipe. Continuous exposure of poloxamer-iodine to this pipe resulted in a level of 10 ⁴ colony-forming units/mL of <i>P. aeruginosa</i> at nine days. The population of <i>P. aeruginosa</i> in poloxamer-iodine after its removal from the PVC pipe was resistant to iodine
Wollman and Kaulfers ⁶⁸	1991	Formaldehyde resistance in Enterobacteriaceae and <i>Pseudomonas aeruginosa</i> : identification of resistance genes by DNA hybridization	Genetically stable resistance to formaldehyde found on a plasmid in <i>E. coli</i> and on the chromosome of <i>P. aeruginosa</i>
Langsrud et al. ⁶⁹	2003	Characterization of <i>Serratia marcescens</i> surviving in disinfecting footbaths	<i>S. marcescens</i> strains in disinfecting footbaths used in the food industry were identified, which could multiply at in-use concentrations of amphoteric antiseptic
Martin et al. ⁷⁰	2008	Resistance and cross-resistance to oxidising agents of bacterial isolates from endoscope washer-disinfectors	<i>Bacillus subtilis</i> and <i>Micrococcus luteus</i> recovered from endoscope washers were resistant to chlorine dioxide with cross-resistance to peracetic acid and hydrogen peroxide
Batra et al. ²⁷	2010	Efficacy and limitation of a chlorhexidine-based decolonization strategy in preventing transmission of methicillin-resistant <i>Staphylococcus aureus</i> (MRSA) in an intensive care unit	Selection of a non-epidemic MRSA strain (ST239), which carried the <i>qacA/B</i> genes and had a raised chlorhexidine MBC, occurred following the introduction of a chlorhexidine-based decolonization intervention
Lee et al. ²⁸	2011	Impact of combined low-level mupirocin and genotypic chlorhexidine resistance on persistent MRSA carriage after decolonization therapy	The presence of <i>qacA/B</i> genes, in combination with mupirocin resistance, independently predicted failure of MRSA decolonization ($P = 0.004$)

MIC, minimum inhibitory concentration; MBC, minimum bactericidal concentration; MRSA, methicillin-resistant *Staphylococcus aureus*; PVC, polyvinyl chloride.

Increase in Chlorhexidine Minimal Inhibitory Concentration of *Acinetobacter baumannii* Clinical Isolates after Implementation of Advanced Source Control

Anucha Apisarnthanarak, MD;¹ Li Yang Hsu, MD;²
Tze-Peng Lim, MSc;^{2,3} Linda M. Mundy, MD, PhD⁴

		Prechlorhexidine (<i>n</i> = 50)			Postchlorhexidine (<i>n</i> = 50)		
Hospital unit	<i>n</i>	Chlorhexidine consumption (L/unit/month)	Chlorhexidine MIC 50/90	Incidence of XDR <i>A. baumannii</i> per 1,000 patient-days	Chlorhexidine consumption (L/unit/month)	Chlorhexidine MIC 50/90	Incidence of XDR <i>A. baumannii</i> per 1,000 patient-days
Intensive care	70	2.4	32/32	12.5	15.5	64/128	2.9
General medicine	15	0.9	32/32	11.4	9.8	64/128	6.3
General surgical	10	0.5	16/32	9.6	4.5	64/128	4.6
Other ^a	5	0.1	16/32	1.2	2.5	64/128	0.6

Methicillin-Susceptible and -Resistant *Staphylococcus aureus* with High-Level Antiseptic and Low-Level Mupirocin Resistance in Malaysia

Hamed Ghasemzadeh-Moghaddam,^{1,2} Alex van Belkum,^{3,4} Rukman Awang Hamat,¹
Willem van Wamel,³ and Vasanthakumari Neela¹

- 1 semana de internação
- Swab nasal e infecção
- CIM clorexidina microdiluição

MRSA e resistência à clorexidina

	<i>Genes</i>			<i>MIC for antiseptic agents</i>			<i>MUP Etest μg/ml</i>	<i>spa type/MLST</i>	<i>No.</i>	<i>Source</i>
	<i>qacA/B n = 70</i>	<i>smr n = 6</i>	<i>Mup n = 10</i>	<i>CHG μg/ml</i>	<i>BTC μg/ml</i>	<i>BKC μg/ml</i>				
MRSA (n = 66)	60	—	—	20.7	15.6	15.6	64, 96, 128 (2) 768 64 (2) 64	t037/ST239	56	TA (9), BL (27), pus (4), nose (16)
				20.7	15.6	15.6		t421/ST239	2	BL, nose
				20.7	15.6	15.6		t10562/ST573	2	Nose, BL
	5	5	5	20.7	15.6	15.6		t037/ST239	4	BL (2), nose, pus
				20.7	15.6	15.6		t6811/NT	1	BL
	2	—	2	20.7	15.6	15.6		t037/ST239	2	BL (2)
	—	1	1	10.3	7.8	7.8		t037/ST239	1	Nose
				20.7	15.6	15.6		t5500/ST96	1	Nose
	2	—	—	20.7	15.6	15.6		t127/ST1	1	Nose
				20.7	7.8	15.6		t127/ST1	1	Nose
MSSA (n = 4)	1	—	1	20.7	7.8	15.6	768	t127/ST1	1	Nose
	—	—	1	10.3	3.9	3.9	384	t315/ST361	1	Nose
	—	—	—	10.3	3.9	3.9		t091, t189, t6296	10	
								t1252, t127 (2), t315 NT, t10565, t159		
Controls	—	—	—	10.3	3.9	3.9				

Prevalence of Chlorhexidine-Resistant Methicillin-Resistant *Staphylococcus aureus* following Prolonged Exposure

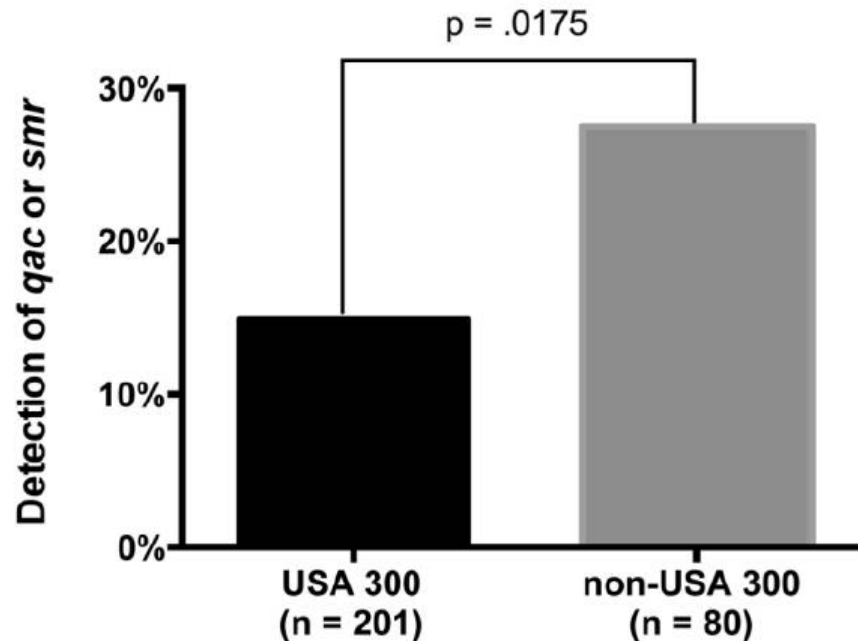
Carey D. Schlett,^a Eugene V. Millar,^a Katrina B. Crawford,^a Tianyuan Cui,^a Jeffrey B. Lanier,^b David R. Tribble,^a Michael W. Ellis^c

Infectious Disease Clinical Research Program, Department of Preventive Medicine and Biometrics, Uniformed Services University, Bethesda, Maryland, USA^a; Martin Army Community Hospital, Fort Benning, Georgia, USA^b; Department of Medicine, Uniformed Services University, Bethesda, Maryland, USA^c

- 20 meses intervenção (banho clorexidina) x não intervenção
- Desfecho: infecção partes moles e descolonização
- **Definição Resistência a clorexedina**
 - Presença gene qaca/B

- 615 MRSA- 10 (1.6%) R a clorexidina
- 3 intervenção X 7 não intervenção p=0.99
 - USA-300

Frequency of Disinfectant Resistance Genes in Pediatric Strains of Methicillin-Resistant *Staphylococcus aureus*



Infection Control and Hospital Epidemiology, Vol. 34, No. 12 (December 2013)

27

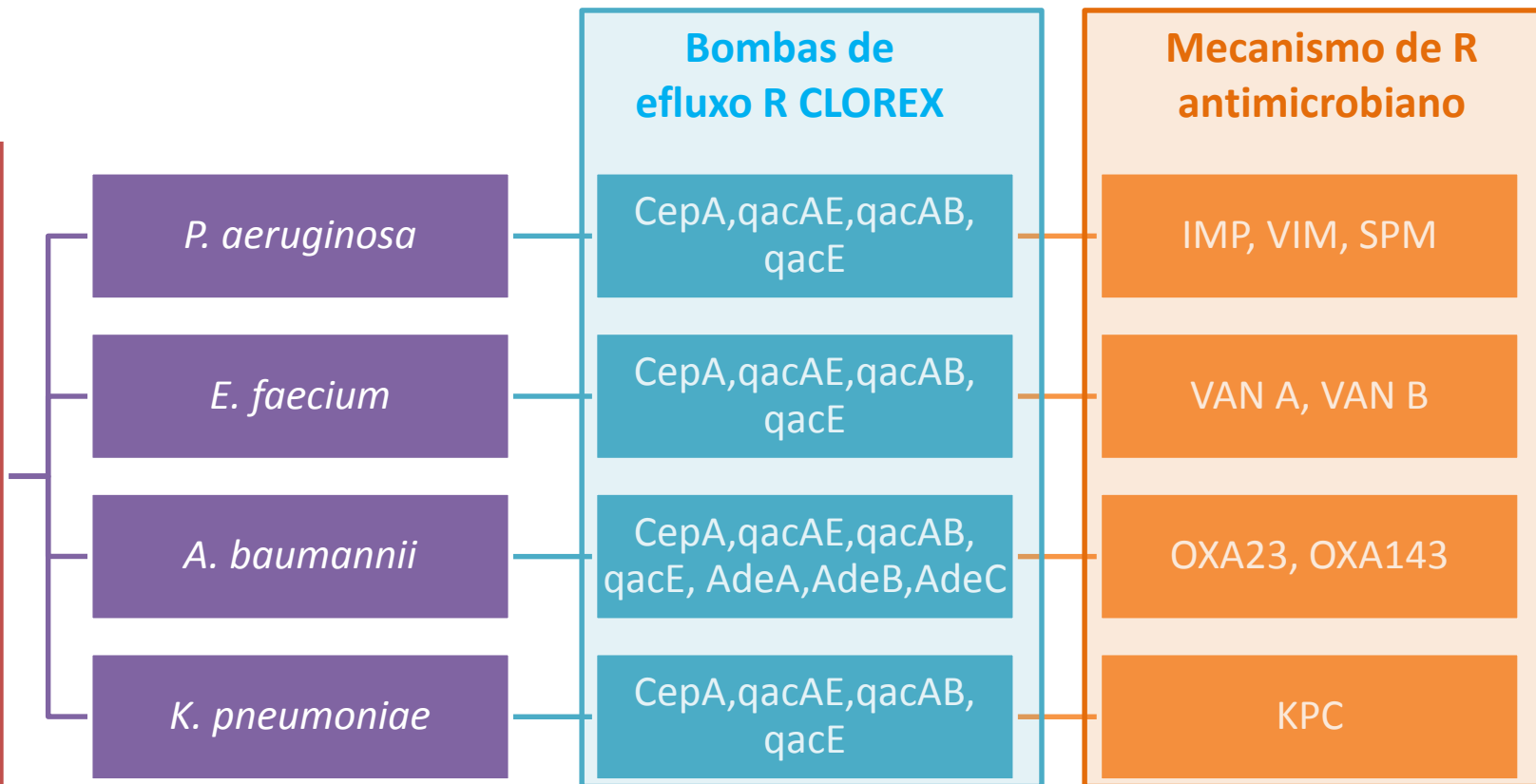
- Definição R presence de genes bomba de efluxo

Banho de Clorexidina Unidade TMO HC-FMUSP

- **Pré e pos intervenção**
 - 1.393 pts TMO
 - 2005-2013
 - 4,5 anos Pre
 - 4,5 anos Pós
-
- Sem impacto mortalidade



Bactérias armazenadas no
LIM 54



MIC CLOREXIDINA
Agar-diluição - Muller-Hinton

MIC CLOREXIDINA
Agar-diluição/Muller-Hinton com adição de CCCP (10mg/L) no meio

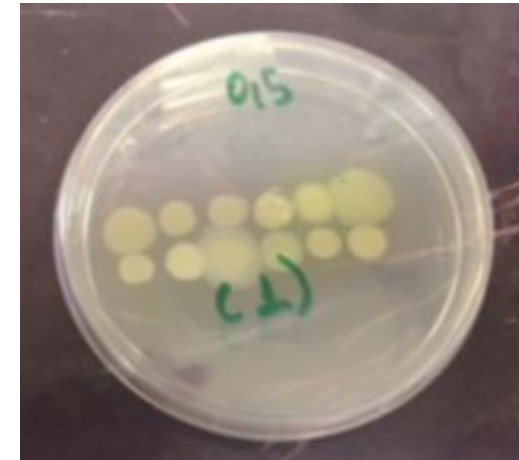
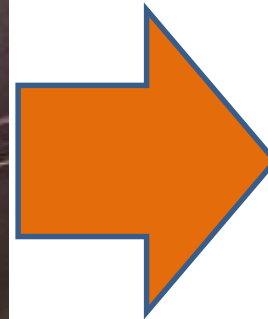
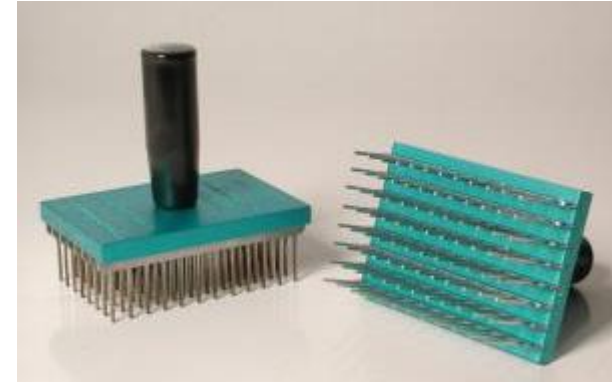
TODAS AS CEPAS
TESTADAS

N: 221

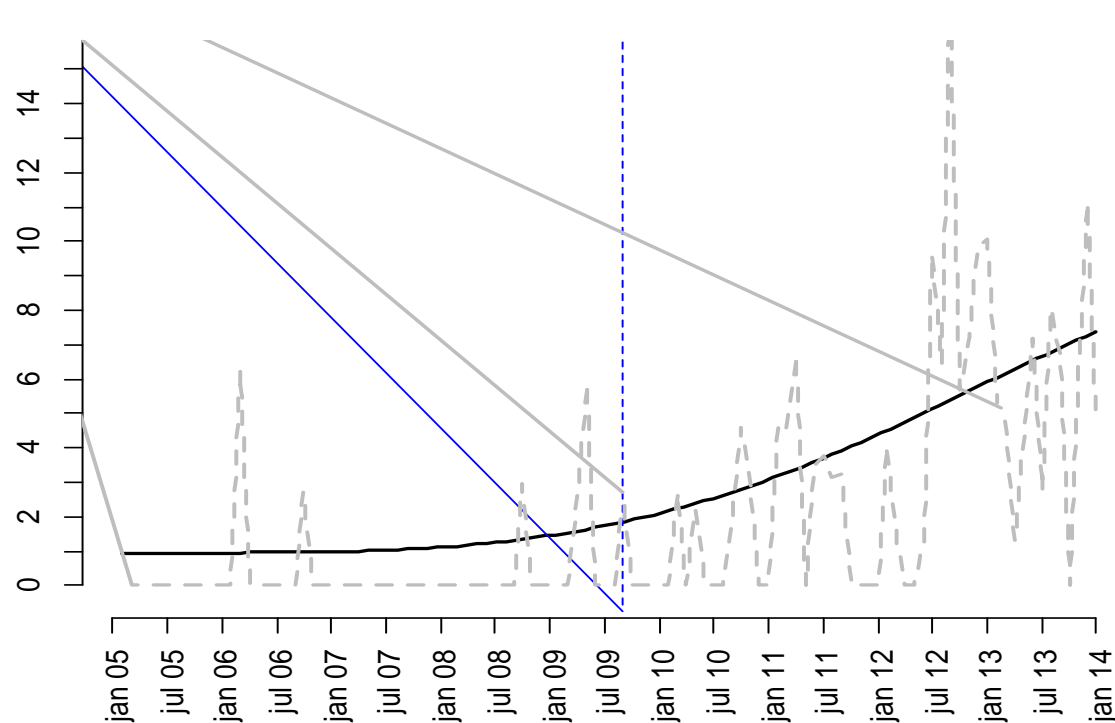
Concentração Inibitória Mínima (CIM) Clorexidina

HC-FMUSP

Ágar diluição



Distribuição temporal das densidades de incidência de infecção por Gram-negativos multirresistentes nos momentos pré e pós intervenção na enfermaria de TCTH do HC-FMUSP EXCLUINDO O SURTO P.AERUGINOSA de 2012



Modelo (0,0,1) GAM não linear

Variável	Betta	SE	P value
Secular	0.018	0.04	0.698
Intervenção	-1.16	2.11	0.585
Pos-intervenção	1.08	0.03	<0.001

Descrição do perfil de sensibilidade das bactérias à Clorexidina por diluição em ágar, nos períodos pré e pós- intervenção e após o uso do inibidor de bomba de efluxo CCCP, HC-FMUSP, 2005-2013

	PRÉ - INTERVENÇÃO					PÓS-INTERVENÇÃO					> CIM PÓS CLOREX
Bactérias N = 221	N	CIM 50 (variação)	CIM 90	CIM 50 CCCP (variação)	Queda 4 diluições com CCCP (%)	N	CIM 50 (variação)	CIM 90	CIM 50 CCCP (variação)	Queda 4 diluições com CCCP (%)	
<i>P. aeruginosa</i>	18	32 (16-64)	64	4 (2 -8)	1 (5)	28	32 (4-64)	64	4 (1-8)	9 (39,1)	NÃO
<i>A.baumannii</i>	33	32 (4-64)	64	4 (0,5-16)	24 (66,7)	6	32 (8-64)	64	4 (0,5-8)	3 (42,8)	NÃO
<i>K.pneumoniae</i>	61	16 (0,5-128)	32	2 (0,5-16)	20 (31,7)	27	64 (16-128)	128	2 (0,5-8)	24 (85,7)	SIM 2 Diluições
<i>E. faecium</i>	28	2 (1-32)	16	0,5 (0,25-4)	7 (25)	20	8 (4-32)	32	0,5 (0,125-4)	18 (90)	SIM 2 Diluições

CIM: concentração inibitória mínima; CCCP: inibidor de bomba de efluxo

**Genes de Resistência à Clorexidina pesquisados nas cepas
CONTROLE e PÓS-INTERVENÇÃO, ETMO HC-FMUSP, 2005-2013**

[illegible]

RESISTÊNCIA A OUTROS ANTIBIÓTICOS

SHORT REPORT

Open Access

High-level tolerance to triclosan may play a role in *Pseudomonas aeruginosa* antibiotic resistance in immunocompromised hosts: evidence from outbreak investigation

Silvia D'Arezzo¹, Simone Lanini^{1,3*}, Vincenzo Puro¹, Giuseppe Ippolito¹ and Paolo Visca²

- Fonte Triclosan contaminado
- *P. aeruginosa* Triclosan CIM 2.12 mg/L Clorexidina 12.5 mg/L
- Sobreviveu Triclosan > 120 hs
 - Mudança CIM S ou I R
 - Quinolonas, Amino glicosídeo, Carbenecilina, Cloranfenicol

Role of Novel Multidrug Efflux Pump Involved in Drug Resistance in *Klebsiella pneumoniae*

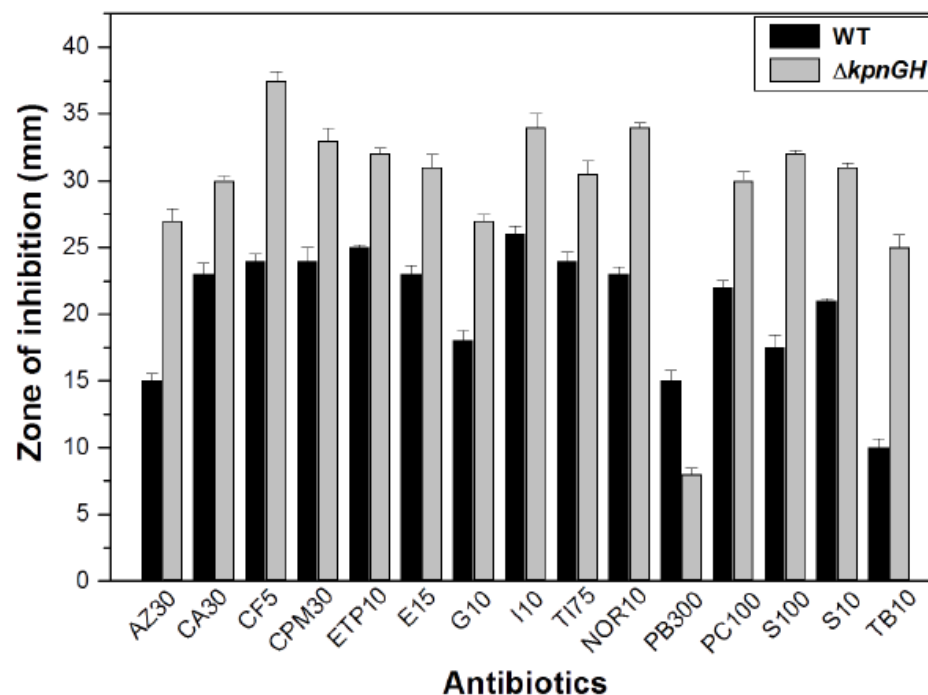
Vijaya Bharathi Srinivasan*, Bharat Bhushan Singh, Nitesh Priyadarshi, Neeraj Kumar Chauhan, Govindan Rajamohan

- WGS *K. pneumoniae*
- 10% Bomba Efluxo
- Estudo *in vitro*
- Sistema Efluxo *knpGH*



Role of Novel Multidrug Efflux Pump Involved in Drug Resistance in *Klebsiella pneumoniae*

Vijaya Bharathi Srinivasan*, Bharat Bhushan Singh, Nitesh Priyadarshi, Neeraj Kumar Chauhan, Govindan Rajamohan




CIM antibiotiocos cepa selvage x mutante

Antibiotics	WT (μg/ml)	$\Delta kpnGH$ (μg/ml)	Fold change ^a
Cefepime	2.56	0.64	4
Ceftazidime	0.256	0.064	4
Ceftriaxone	2.56	0.64	4
Ciprofloxacin	<0.01	<0.005	2
Erythromycin	>4	2	2
Spectinomycin	0.1	0.01	10
Streptomycin	0.1	0.01	10
Tetracycline	5	1	5
Tobramycin	0.1	0.05	2

CIM Clorexidina WT 1.7 > mutante

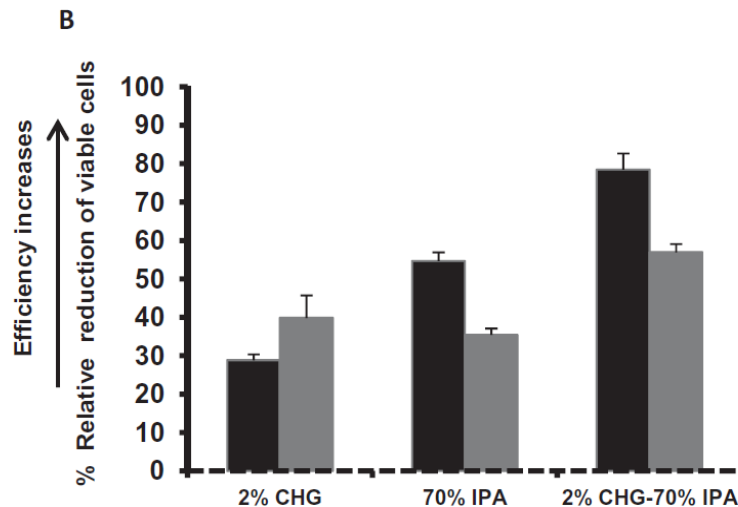
CLOREXIDINA E BIOFILME

Biofilme e Pele

- 20% micro-organismos Pele Biofilme
 - **Fortes produtores biofilme**
 - *S. epidermidis*
 - *S. capitis*
- 
- *Contaminação plaquetas presença de biofilme?*

Biofilm-forming skin microflora bacteria are resistant to the bactericidal action of disinfectants used during blood donation

Mariam Taha,¹ Miloslav Kalab,² Qi-Long Yi,¹ Carey Landry,¹ Valerie Greco-Stewart,¹
Ann Karen Brassinga,³ Costi D. Sifri,⁴ and Sandra Ramirez-Arcos¹



- *S. epidermidis*
- *S. capitis*
- CIM Clorexidina 2%
- MBC : 2-128ug/ml



Mensagem para levar para casa

- Efeitos adversos Subestimados
- Notificação
- Indicadores de processo
- [] pele
- Determinar Corte
- Resistência aumentando
- Resistência cruzada
- Ação biofilme

