PROPOSTE DI MIGLIORAMENTO:

PREVENZIONE DIAGNOSI E TERAPIA

Marianna Meschiari

Clinica di Malattie infettive e Tropicali
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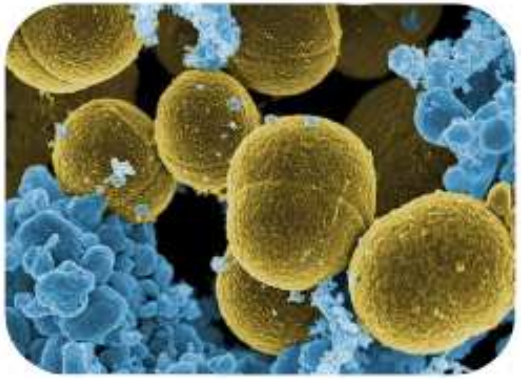
Ospedale di Sassuolo

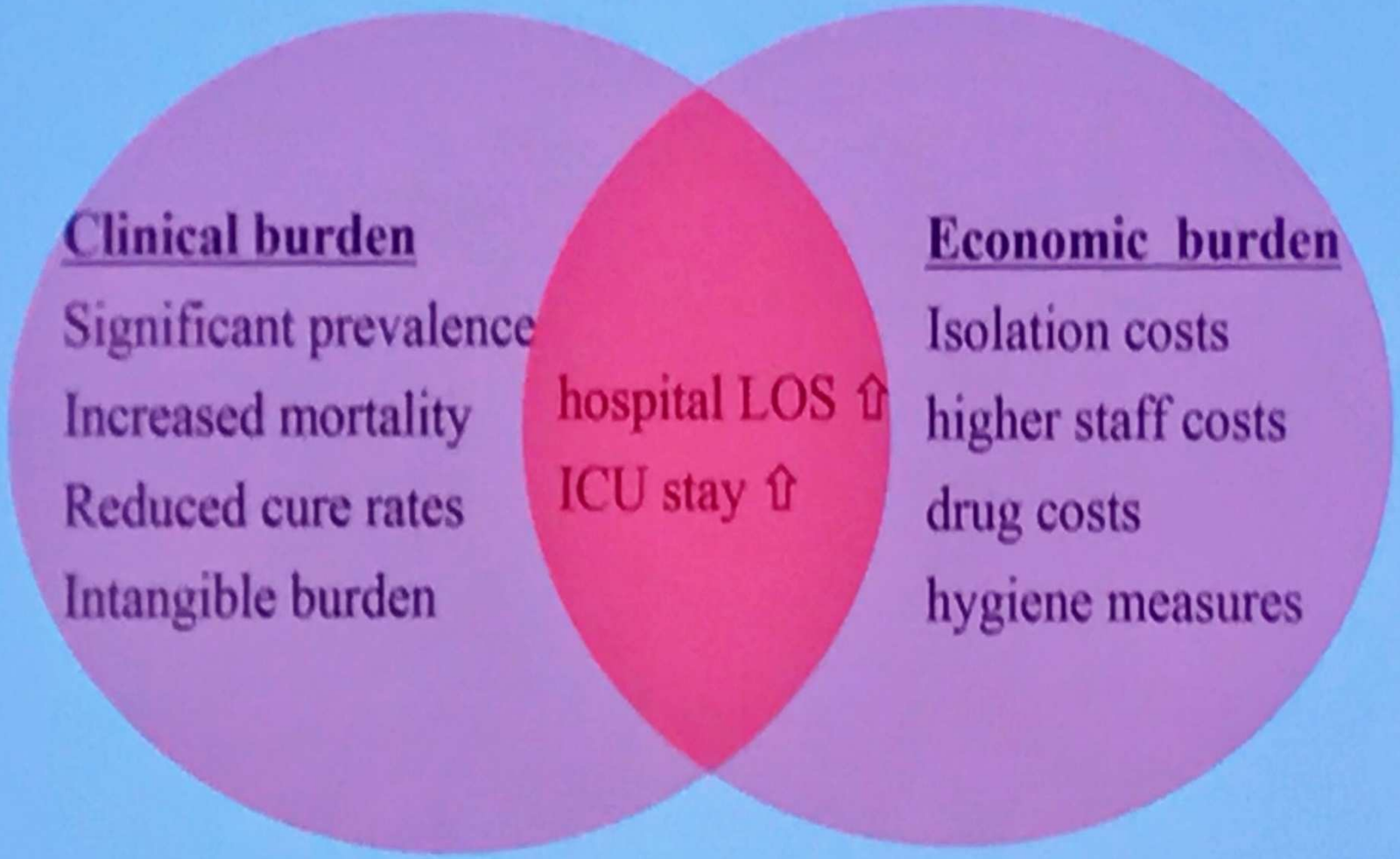


"LE INFEZIONI DA STAFILOCOCCO:
UN AGGIORNAMENTO A PARTIRE
DA UN AUDIT CLINICO
DEL NUOVO OSPEDALE DI SASSUOLO"

10 maggio 2018
14:00—18:00
Sala Conferenze
Ospedale di Sassuolo S.p.A.
Via F. Ruini, 2 41049 Sassuolo (MO)

AGEfor

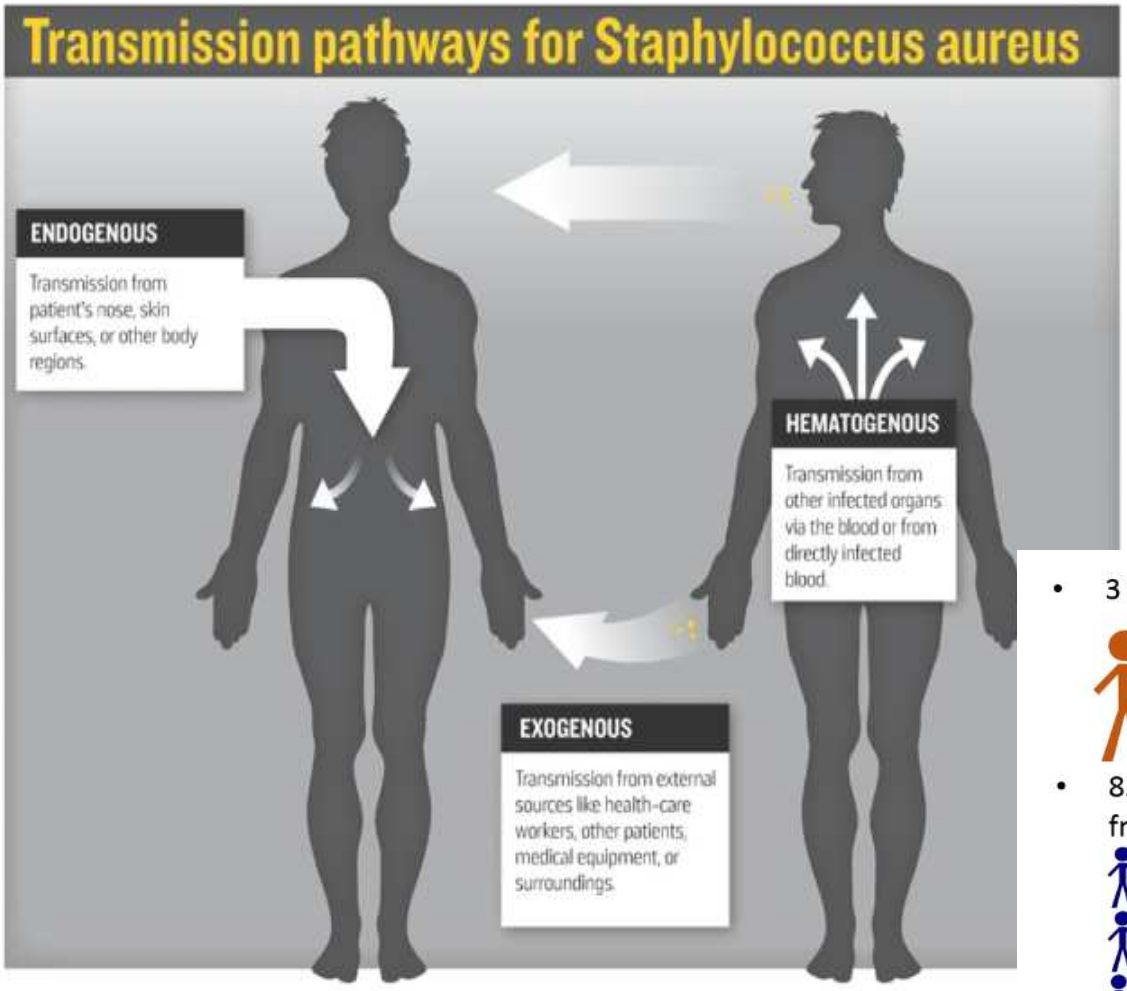
Clinical and economic burden of MRSA



PREVENZIONE

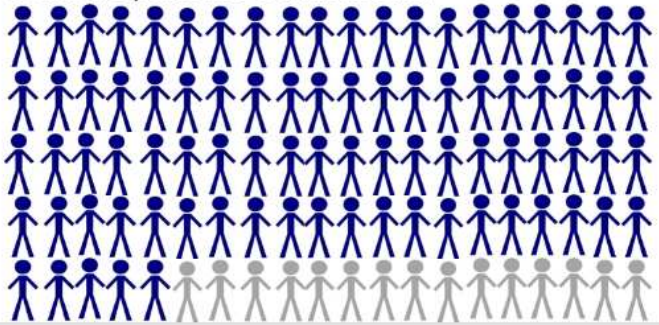
Proposte di miglioramento

Endogenous/exogenous



- 3 in 10 people carry *S. aureus* in their noses

- 85% of surgical site infections involving *S. aureus* come from the patient's own bacteria



Which goal for control S.aureus?

1. prevent disease in the asymptomatic carrier

MSSA/MRSA

2. prevent the cross-transmission

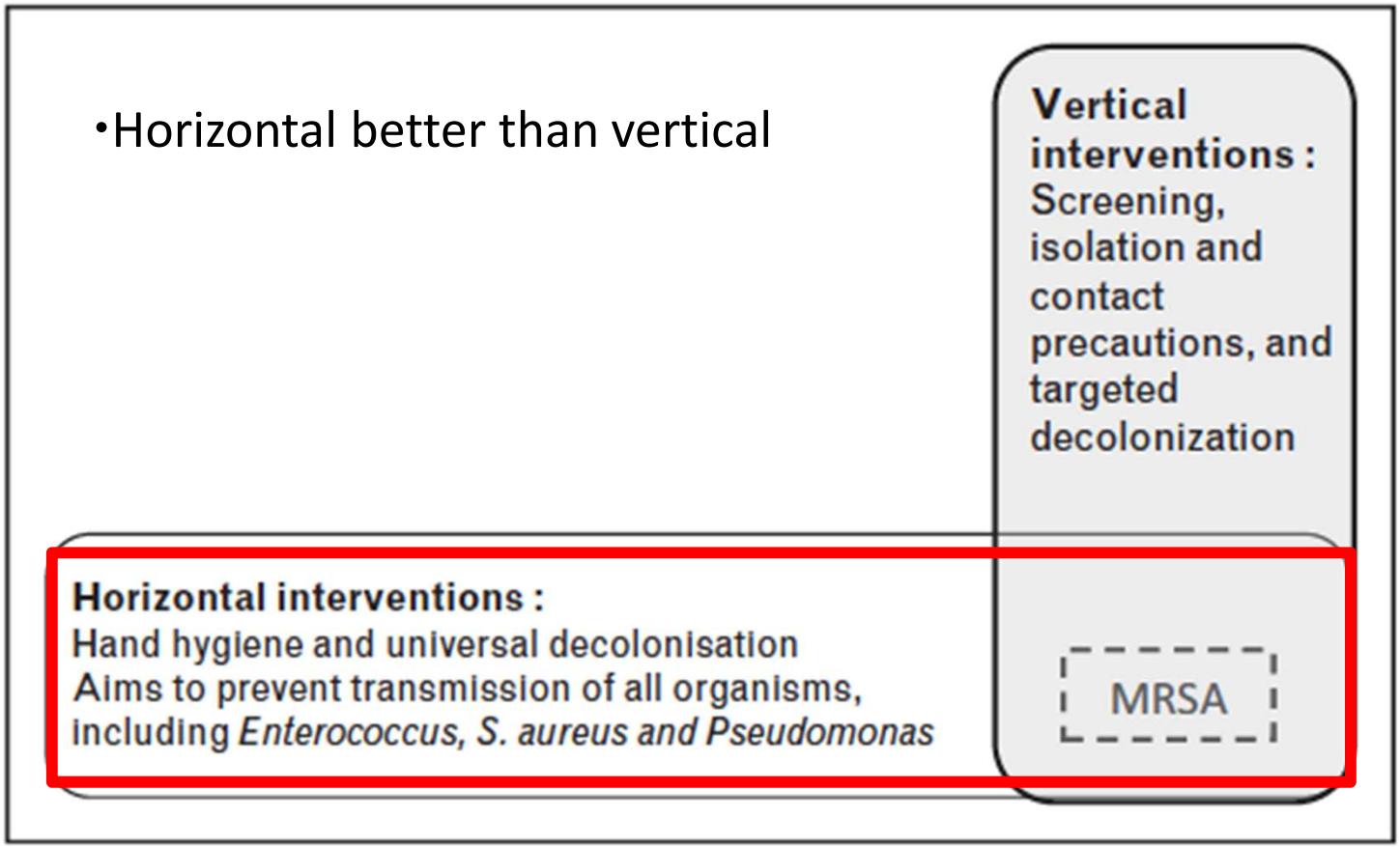
MRSA

EDITORIALS

Screening Inpatients for MRSA — Case Closed

Michael B. Edmond, M.D., M.P.H., and Richard P. Wenzel, M.D.

- Horizontal better than vertical



Edmond, NEJM, 2013

Antibiotic stewardship and MRSA

Effects of national antibiotic stewardship and infection control strategies on hospital-associated and community-associated meticillin-resistant *Staphylococcus aureus* infections across a region of Scotland: a non-linear time-series study

Timothy Lawes, José-María Lopez-Lozano, Cesar A Nebot, Gillian Macartney, Rashmi Subbarao-Sharma, Ceri RJ Dare, Karen D Wares, Ian M Gould

Lancet Infect Dis 2015; 15: 1438–49

- **Hospital prevalence densities of MRSA were inversely related to:**
  - **intensified infection prevention and control,**

but positively associated with:
- **bed occupancy,**
- **use of** fluoroquinolones, co-amoxiclav, and third-generation cephalosporins, or macrolide **antibiotics that exceeded hospital-specific thresholds.**

- Removal of key **antibiotic selection pressures** during a national antibiotic stewardship intervention predicted large and sustained reductions in hospital-associated and community associated MRSA

Journal of Hospital Infection 94 (2016) 295–304

Available online at www.sciencedirect.com

Journal of Hospital Infection

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

Review

Staphylococcus aureus and surgical site infections: benefits of screening and decolonization before surgery

H. Humphreys [a,b,*], K. Becker [c], P.M. Dohmen [d,e], N. Petrosillo [f], M. Spencer [g], M. van Rijen [h], A. Wechsler-Fördös [i], M. Pujol [j], A. Dubouix [k], J. Garau [l]

[a] Department of Clinical Microbiology, Royal College of Surgeons in Ireland, Dublin, Ireland

- Pre-operative screening, using culture- or molecular-based methods, and subsequent decolonization of patients who are positive for MSSA and MRSA **reduces SSIs**, hospital stay, helping to contain costs and minimizing the emergence of resistance

- This applies especially to major clean surgery, such as **cardiothoracic and orthopaedic, involving the insertion of implanted devices**

- However, it requires a **multi-disciplinary approach** (including the preadmission unit, presurgery unit, operating room, postoperative care unit, hospital hygienists, medical microbiologists/ infectious disease specialists, and pharmacy/ nursing/ancillary departments) coupled with patient education

Agenzia sanitaria e sociale regionale

Regione Emilia-Romagna

SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA

Infezioni di protesi articolari: percorso diagnostico e indicazioni per la profilassi antibiotica

Documento di indirizzo regionale

luglio 2017

5. INDICAZIONI PER LA PROFILASSI ANTIBIOTICA NEGLI INTERVENTI DI ARTROPLASTICA

Nel Box 13 sono fornite le indicazioni per la profilassi antibiotica negli interventi di artroplastica; in Allegato 2 sono riportate e discusse le fonti delle raccomandazioni.

Box 13. Indicazioni regionali per la profilassi antibiotica

SCREENING PREOPERATORIO PER LA RICERCA DEI PAZIENTI COLONIZZATI DA *STAPHYLOCOCCUS AUREUS*

- Qualora le condizioni organizzative consentano di applicare l'intero protocollo di decolonizzazione nei tempi utili, si raccomanda di eseguire lo screening per la ricerca di *Staphylococcus aureus* nei pazienti candidati a interventi di artroplastica in elezione.
- Lo screening si effettua mediante coltura del secreto nasale entro al massimo 4 settimane prima della data dell'intervento; il secreto viene raccolto utilizzando un solo tampone che viene introdotto (non oltre 1-2 cm), strisciato e ruotato in entrambe le narici per almeno 5 secondi.
- Nei pazienti positivi per *Staphylococcus aureus*, per la decolonizzazione nasale si utilizza mupirocina unguento, 3 applicazioni per narice al giorno per 5 giorni, prevedendo il termine del trattamento il più vicino possibile alla data dell'intervento.
- Nei pazienti colonizzati da MRSA, la decolonizzazione locale è associata a una doccia al giorno con clorexidina per 5 giorni consecutivi.

STOP SSI Intervention

- Screen patients for *S. aureus* nasal colonization (methicillin-susceptible and methicillin-resistant *S. aureus*)
  - Positive: 5 days mupirocin nasal ointment and chlorhexidine gluconate body wash
  - Negative: 2 days chlorhexidine gluconate body wash

- Peri-operative prophylaxis
  - MRSA positive: vancomycin and cefazolin
  - All others: cefazolin alone

<u>If colonization status unknown</u>
(Urgent, emergent, missed)

✓ Collect swab to test for colonization

✓Start mupirocin and CHG decolonization
  ✓Can discontinue if test result negative

✓Receive vancomycin and cefazolin perioperative prophylaxis

PROPOSAL: Prosthetic surgery

S. aureus SSIs PREVENTION

▪**Departments involved**: orthopedics, vascular surgery

Screening policy: screening for S. aureus all patients with prosthetic implant (INCLUDED synthetic means) at the time of pre-admission (and/or at the entrance in ps)

▪**How many sample**: NASAL sample

▪*consider also all the injuries, wounds and continuous solutions of the patient's skin and in case of positivity for S. aureus contact the IDS

▪If the patient is hospitalized, it is recommended to perform contact isolation

▪Perform decontamination for *S.aureus* positive patients using mupirocin ointment

▪For skin decontamination using pre-operative shower based on chlorhexidine 4% (5 days before)

▪In case of ineffectiveness, contact the IDS because the reclamation cycle can be repeated or continued compatibly with the tolerability of the patient

▪In case of urgent surgery if risk factors for MRSA and/or known colonization of the patient for MRSA are present, contact IDS in order to use vancomycin as a molecule in perioperative prophylaxis

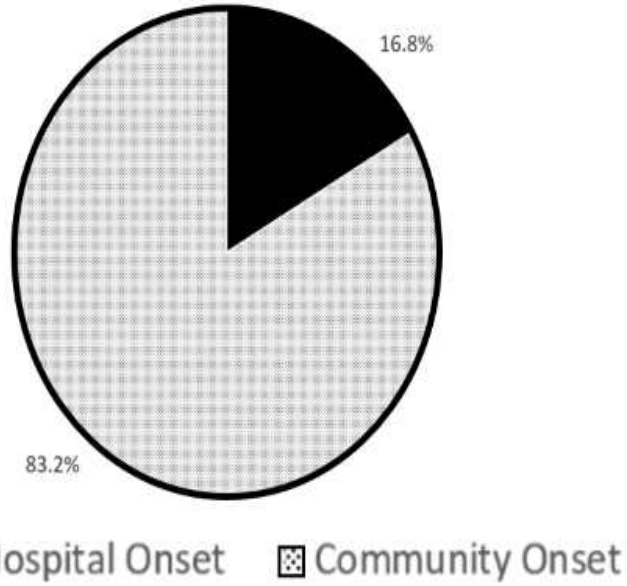
Future of *S. aureus* Prevention

- Community-Based Interventions
  - Long-term care facilities
  - Dialysis centers
  - Other shared spaces- locker rooms?
- Difficult since limited infection control staff in these areas

For More Information

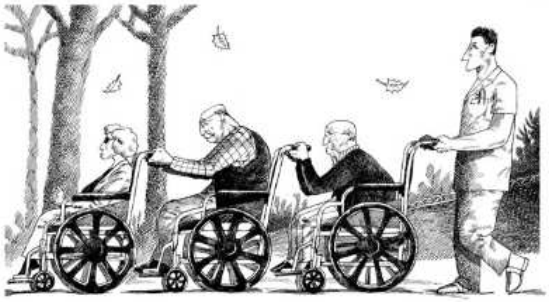
CDC NHSN
https://www.cdc.gov/hai/surveillance/data-reports/index.html

Figure 17. Proportion of MRSA bacteremia events by type of onset, NHSN 2015 (N=72,852)



Interventions in Long-Term Care Facilities

- Intervening in a person's home, contact precautions not feasible
- Need to socialize and perform activities of daily living even if colonized
- Cluster randomized trials in long-term care



CONCLUSIONS

- The greatest reduction in MRSA acquisition and infection is likely to be achieved through a multi-faceted approach
- Intensive care: universal STRATEGIES are a hypothesis
- Resistance to mupirocin and chlorhexidine: monitoring is necessary
- Clean surgery: screening more decolonization is acceptable
- Screening and isolation: adequate outside of ICUs, in particular if medium-high MRSA rates and low hand hygiene
- Flexibility to adapt and institute evidence-based measures in the context of local epidemiology, infrastructure, and resources is essential for successful MRSA control

REVIEW

CURRENT OPINION

Screening for methicillin-resistant *Staphylococcus aureus* . . . all doors closed?

Kalisvar Marimuthu[a,b] *and Stephan Harbarth*[b]

Curr Opin Infect Dis , 2014, 27:356–362

DIAGNOSI E GESTIONE CLINICA

Proposte di miglioramento

MRSA: FATTORI DI RISCHIO

CA-MRSA	HA-MRSA
Attività sportive che prevedano contatto fisico con altri soggetti	> 14 di degenza
Pazienti reclusi o residenti in comunità professionali (militari)	Antibioticoterapia in corso/recente
Esposizione a terapia antibiotica nei 6 mesi precedenti	Procedure chirurgiche recenti
TD	Ricovero in terapia intensiva
Contatto con portatori di MRSA	CVC
Bambini, specie se in età scolare	

RESEARCH ARTICLE

Newly identified risk factors for MRSA carriage in The Netherlands

W. S. N. Lekkerkerk[1,2], A. Haenen[2], M. A. B. van der Sande[2,3,4], T. Leenstra[2], S. de Greeff[2], A. Timen[2], A. Tjon-a-Tsien[5], J. H. Richardus[5,6], N. van de Sande-Bruinsma[2], M. C. Vos[1]*

The proportion of reported MRSA without known risk factors (MUO), thus not defined as risk patients, became substantial. in 2008– 2009, 25% (1350/5545) of all MRSA were reported as MRSA without known risk factors , In 2016, this has increased to 38% .

Table 3. Risk factors for MUO.

Risk factors		MUO (%; n = 232)	
All cases with the risk factor:			
	Antibiotic use in the last 12 months	150	(64.7)
	Screened as part of a contact tracing but not found to be a MRSA carrier at the time	24	(10.3)
	At least one foreign parent	48	(20.7)
	Ambulatory care received	55	(23.7)
Number of cases that only have this one risk factor			
	Antibiotic use in the last 12 months	52	(22.4)
	Screened as part of a contact tracing but not found to be a MRSA carrier at the time	5	(2.2)
	At least one foreign parent	8	(3.4)
	Ambulatory care received	6	(2.6)
Number of cases that only have one risk factor		71	(30.6)
Number of cases with a combination of 2 or more of the above risk factors		121	(52.2)
Total cases of MUO explained by these risk factors		192	(82.8)
Remaining unexplained MUO		40	(17.2)

PREDICTOR of MORTALITY

PLOS ONE | PLOS ONE December 21, 2015

RESEARCH ARTICLE

Comparison of Outcomes among Adult Patients with Nosocomial Bacteremia Caused by Methicillin-Susceptible and Methicillin-Resistant *Staphylococcus aureus*: A Retrospective Cohort Study

Jann-Tay Wang[1], Le-Yin Hsu[2], Tsai-Ling Lauderdale[3], Wen-Chien Fan[4], Fu-Der Wang[4,5]*

1 Department of Internal Medicine, National Taiwan University Hospital, Taipei, Taiwan, 2 Institute of Epidemiology and Preventive Medicine, National Taiwan University, Taipei, Taiwan, 3 National Institute of Infectious Diseases and Vaccinology, National Health Research Institutes, Zhunan, Taiwan, 4 Department of Internal Medicine, Taipei Veterans General Hospital, Taipei, Taiwan, 5 National Yang-Ming University School of Medicine, Taipei, Taiwan

Table 3. Multivariate analysis for risk factors associated with all-cause in-hospital mortality.

Variables in final model	Odds ratio	95% confidence interval		*p* value
		Lower	Upper	
Model 1				
Causative strains (using MSSA as baseline)				
CA-MRSA-S	0.998	0.453	2.200	0.996
HA-MRSA-S	2.249	1.188	4.259	0.013
Unclassified MRSA	1.223	0.466	3.210	0.683
Charlson co-morbidity index	1.239	1.139	1.348	<0.001
Septic shock	7.379	3.464	15.721	<0.001
Thrombocytopenia	1.809	1.007	3.248	0.047
Persistent bacteremia	2.283	1.214	4.292	0.010
Model 2				
Causative strains by SCC*mec* (using no SCC*mec* as baseline)				
Type II SCC*mec*	2.360	1.039	5.360	0.040
Type III SCC*mec*	2.443	1.226	4.868	0.011
Type IV SCC*mec*	0.762	0.169	3.433	0.724
Type V SCC*mec*	1.129	0.498	2.560	0.772
Unknown SCC*mec* type	1.744	0.723	4.203	0.216
Charlson co-morbidity index	1.242	1.145	1.347	<0.001
Septic shock	6.347	3.143	12.815	<0.001
Persistent bacteremia	2.062	1.123	3.788	0.020
Model 3				
Causative strains (using MSSA as baseline)				
CA-MRSA-S	1.106	0.545	2.242	0.780
HA-MRSA-S	2.653	1.515	4.646	<0.001
Unclassified MRSA	1.633	0.715	3.731	0.244
Charlson co-morbidity index	1.228	1.137	1.327	<0.001

CLINICAL INVESTIGATION

JAGS 2018

Predictors of Mortality with *Staphylococcus aureus* Bacteremia in Elderly Adults

Matteo Bassetti, MD, PhD, Elda Righi, MD, PhD,* Paola Del Giacomo, MD,† Assunta Sartor, MD,* Filippo Ansaldi, MD,‡ Cecilia Trucchi, MD,‡ Cristiano Alicino, MD,‡ Enrico Maria Trecarichi, MD,† Teresa Spanu, MD,§ Chiara Paganino, MD,‡ Mario Tumbarello, MD,† and Alessia Carnelutti, MD**

Mortality is significantly higher in:

- Elderly
- septic shock,
- liver cirrhosis
- SAB due to MRSA
- inappropriate empiric antibiotic treatment
- Pts not receiving

an infectious disease consultation

ENDOCARDITE

Clinical Microbiology and Infection 23 (2017) 900–906

Contents lists available at ScienceDirect

Clinical Microbiology and Infection

journal homepage: www.clinicalmicrobiologyandinfection.com

Systematic review

Clinical predictors and clinical prediction rules to estimate initial patient risk for infective endocarditis in *Staphylococcus aureus* bacteraemia: a systematic review and meta-analysis

A.D. Bai [1], A. Agarwal [2,3], M. Steinberg [4], A. Showler [5], L. Burry [4,6], G.A. Tomlinson [5,7], C.M. Bell [4,5,7,8], A.M. Morris [4,5,7,*]

Meta-analysis to summarize diagnostic properties of risk factors and clinical prediction rules for diagnosing infective endocarditis (IE) in Staphylococcus aureus bacteraemia (SAB)

Trans-esophageal echocardiography (TEE) should be performed for patients with **high-risk features** :
-embolic events,
-pacemakers,
-prosthetic valves,
-previous IE
-intravenous drug use.

The only clinical factor with negative likelihood ratio (NLR) less than 0.5 was documented clearance of bacteraemia **within 72 hours** (NLR range 0.32e0.35).

Clinical prediction rules show promise in safely ruling out endocarditis, but require validation in future studies.

CID 2013:57 (1 November)

Impact of an Evidence-Based Bundle Intervention in the Quality-of-Care Management and Outcome of *Staphylococcus aureus* Bacteremia

«BUNDLE» BSI

Luis F. López-Cortés [1,a] María Dolores del Toro [1,2] Juan Gálvez-Acebal [1,2] Elena Bereciartua-Bastarrica [3]

Table 4. Adherence to Quality-of-Care Indicators

Quality-of-Care Indicator	Preintervention Period	Intervention Period	Median Improvement in Percentage of Adherence to QCI (IQR)	Relative Risk for Adherence to QCI (95% CI)	*P* Value	Adjusted OR for Adherence to QCI (95% CI)[a]	*P* Value
Follow-up blood culture	131/214 (61.2)	159/198 (80.3)	25 (5.9–54.4)	1.31 (1.15–1.49)	<.001	2.83 (1.78–4.49)[b]	<.001
Source control	86/122 (70.2)	105/115 (91.3)	22 (10.2–50)	1.29 (1.13–1.49)	<.001	4.56 (2.12–9.79)[c]	<.001
Echocardiography	76/144 (52.8)	74/101 (73.3)	18.8 (0–65.7)	1.38 (1.13–1.68)	.001	2.50 (1.42–4.41)[d]	.002
Early cloxacillin in MSSA	120/211 (56.9)	124/174 (71.3)	11.1 (0–51.1)	1.25 (1.07–1.45)	.014	1.79 (1.15–2.78)[e]	.009
Vancomycin dosing	23/49 (46.9)	30/54 (55.6)	20 (0–54.3)	1.18 (.80–1.73)	.38	1.42 (.65–3.10)[f]	.38
Treatment duration	151/207 (72.9)	161/189 (85.2)	10.2 (2–20.2)	1.16 (1.05–1.29)	.003	2.13 (1.24–3.64)[g]	.006

Early use of intravenous cloxacillin for MSSA as definitive therapy	Definitive thera (at least 2 g renal functio methicillin-su patients exc started withi sensitivity w patients, cef hemodialysis	13] [79] [81]
Adjustment of vancomycin dose according to trough levels	Measurement in patients tr antibiotic an achieve plas and 20 mg/L	[59] [76–80]
Treatment duration according to the complexity of infection	Duration of ant d for uncomp complicated treatment wi rifampin, trin linezolid was selected cas	[12–14] [21] [78]

Table 7. Multivariate Analyses of Variables Associated With 14- and 30-Day Mortality Among Patients With *Staphylococcus aureus* Bacteremia

Variables	OR (95% CI)	*P* Value
14-day mortality		
Age >60 y	2.97 (1.51–5.87)	.002
Pitt score >2	3.04 (1.74–5.33)	<.001
High-risk source[a]	2.80 (1.32–5.92)	.007
Intervention	0.49 (.28–.87)	.016
30-day mortality		
Age >60 y	3.48 (1.89–6.41)	<.001
Pitt score >2	2.34 (1.40–3.92)	.001
High-risk source[a]	3.11 (1.54–6.26)	.001
Intervention	0.59 (.36–.97)	.04

REVIEW ARTICLE

Current and future trends in antibiotic therapy of acute bacterial skin and skin-structure infections

A. Russo[1], E. Concia[2], F. Cristini[2], F. G. De Rosa[4], S. Esposito[5], F. Menichetti[6], N. Petrosillo[7], M. Tumbarello[8], M. Venditti[1], P. Viale[3], C. Viscoli[9] and M. Bassetti[10]

«BUNDLE» ABSSSI

TABLE 2. Risk factors for different bacterial skin and soft-tissue infections

Methicillin-resistant *Staphylococcus aureus*	Gram-negative, anaerobes and polymicrobial
Anamnestic factors:	**Surgical site infections:**
Previous colonization	Axillary cavity
Contact with patients colonized	Gastrointestinal tract
Antibiotic therapy in the previous 12 months	Perineum
Hospitalization in the previous 12 months	Female genital tract
History of previous infection	
Recent travel in Latin America, Africa, South East Asia	
Residence in long-term care facilities	
Previous intensive care unit admission	
Co-morbidities:	**Co-morbidities:**
Cardiovascular disease	Diabetes mellitus
Diabetes mellitus	Cirrhosis
Peripheral vascular disease	Intravenous drug abuse
Chronic wounds	Subcutaneous drug abuse
Immunodepression	
Central venous catheter	
Chronic renal disease	
Dialysis	
Intravenous drug abuse	

TABLE 3. Checklist for early discharge of patients with acute bacterial skin and skin-structure infection[a]

Discharge checklist	Comments
Results of blood cultures and other tests	Negative cultures, reduction of inflammatory indices, normalizing white blood cell count
Evaluation of all co-morbidities	No significant alterations of chronic diseases, glycaemic control in patients with diabetes, no systemic signs of infection
Switch to oral therapy or plan for outpatient parenteral antibiotic therapy	Plan for length of antibiotic therapy after discharge, access to day-hospital services, ability to take oral medications
Use of long-acting antibiotics	In empiric therapy or as early switch to these antibiotics
Follow up scheduled	Follow up within 7 days from discharge
Education to wound care	Correct management of chronic wounds
Continued cares in structures enabled or home-care evaluation	Transfer to long-term care facilities or evaluation by primary-care physician within 48 h from discharge

[a]Adapted by Amin et al. [69].

Clin Microbiol Infect 2016; **22:** S27–S36

BSI in ED

Staphylococcus aureus in emergency department

Table 3 Comparison of the clinical characteristics of patients with MRSA and MSSA infections

	MRSA (n = 93)	MSSA (n = 145)	*P*
Before admission			
Suspected infection, n (%), (40%)	35 (38)	41 (28)	.005
Previous antibiotic treatment, n (%)	21 (23)	24 (17)	NS
Diagnosis in the ED, n (%)			
Superinfected wound	34 (37)	45 (31)	.003
Dermatitis/hypodermatitis	8 (9)	44 (30)	
Cutaneous abscess	3 (3)	11 (8)	
Urinary infection	12 (13)	9 (6)	
Infection on implantable device	14 (15)	7 (5)	
Pulmonary infection	11 (12)	16 (11)	
Osteoarticular infection	3 (3)	5 (3)	
Other	8 (8)	8 (6)	
Severity of sepsis, n (%)			
Sepsis	88 (95)	140 (97)	NS
Severe sepsis	2 (2)	4 (2.5)	
Septic shock	3 (3)	1 (0.5)	
Antibiotic treatment in the ED			
Amoxicillin	25 (27)	51 (35)	.001
Oxacillin	4 (4)	7 (5)	
Cephalosporin	23 (25)	23 (16)	
Pristinamycin	9 (10)	34 (23)	
Fluoroquinolone	8 (9)	3 (2)	
Other antistaphylococcal agent	1 (1)	0	
No antibiotic	23 (25)	34 (23)	
In-hospital mortality	4 (4.3)	2 (1.4)	

Table 2 Comparison of comorbidity factors and other risk factors for contracting MRSA in patients with MRSA and MSSA infections

	MRSA (n = 93)	MSSA (n = 145)	*P*
McCabe score, n (%)			
A	53 (57)	112 (77)	.008
B	39 (42)	31 (21)	
C	1 (1)	2 (2)	
Chronic diseases, n (%)			
Cardiovascular	69 (74)	74 (51)	.001
Pulmonary	25 (27)	19 (13)	.007
Neurologic	33 (35)	22 (15)	.001
Hepatic	13 (14)	15 (10)	NS
Renal insufficiency	13 (14)	6 (4)	.07
Cancer	17 (18)	18 (12)	NS
Diabetes	37 (40)	33 (23)	.004
Psychiatric	12 (13)	11 (8)	NS
Risk factors for contracting MRSA, n (%)			
Institutional care or home nursing	70 (75)	64 (44)	.0001
Implantable device	34 (37)	23 (16)	.0001
Chronic wound	31 (33)	39 (27)	NS
No. of hospital stays during the last 12 mo	1	0	.0001
Interquartile	0-2	0-0.5	

Table 4 Sites from which staphylococci were isolated

	MRSA (n = 93)	MSSA (n = 145)
1 Site only		
Skin	37 (40)	93 (65)
Urine	25 (27)	4 (3)
Blood culture	16 (17)	31 (21)
Sputum	1 (1)	2 (1)
Other sites	2 (2)	5 (3)
2 Sites		
Blood culture and skin	1 (1)	6 (4)
Blood culture and urine	7 (8)	1 (1)
Blood culture and another site	0	3 (2)
Urine and skin	2 (2)	0
3 Sites		
Blood culture, skin and urine	2 (2)	0

American Journal of Emergency Medicine (2007) 25, 880–886

BSI in ED

Acute Medicine & Surgery 2018; 5: 140–145 doi: 10.1002/ams2.316

Original Article

Adherence rate of quality-of-care indicators for *Staphylococcus aureus* bacteremia is extremely low in Japanese emergency and critical care departments: a multicenter retrospective observational study

Kyohei Miyamoto,[1] Seiya Kato,[1] Junichi Kitayama,[2] Junpei Okawa,[3] Ayana Okamoto,[4] Jun Kamei,[5] Kazuhisa Yoshiya,[6] Hideki Asai,[7] Shingo Adachi,[8] Hidekazu Yukioka,[9] Hiroshi Akimoto,[10] and Kazuo O

Table 1. Characteristics of 118 hospitalized adult patients wi

Characteristics	All pa (n =			
Age, year, mean ± SD	63.6			
Male, *n* (%)	82 (6			
APACHE II score, mean ± SD†	19.8			
Pitt bacteremia score, median (IQR)‡	2 (1			
Comorbidity				
Immunosuppression, *n* (%)	14 (1			
Chronic dialysis, *n* (%)	7 (6			
Home oxygenation therapy, *n* (%)	4 (3			
Liver cirrhosis, *n* (%)	3 (3			
Decompensated heart failure, *n* (%)	3 (3			
Acquisition				0.2300
Community-acquired infection, *n* (%)	32 (27)	26 (30)	6 (20)	
Health-care-related, community-acquired infection, *n* (%)	12 (10)	6 (7)	6 (20)	
Hospital-acquired infection, *n* (%)	42 (36)	32 (36)	10 (33)	
Unclassified, *n* (%)§	32 (27)	24 (27)	8 (27)	
Source of bacteremia				0.9200
Pneumonia, *n* (%)	22 (19)	16 (18)	6 (20)	
Skin and soft tissue infection, *n* (%)	18 (15)	15 (17)	3 (10)	
Osteoarticular infection, *n* (%)	15 (13)	12 (14)	3 (10)	
Deep-seated abscess, *n* (%)	11 (9)	8 (9)	3 (10)	
Urinary tract infection, *n* (%)	9 (8)	7 (8)	2 (7)	
Catheter-related bloodstream infection, *n* (%)	9 (8)	7 (8)	2 (7)	
Infective endocarditis, *n* (%)	3 (3)	3 (3)	0 (0)	
Others, *n* (%)	9 (8)	6 (7)	3 (10)	
Unknown, *n* (%)	22 (19)	14 (16)	8 (27)	
Prosthetic device infection, *n* (%)¶	17 (14)	16 (21)	1 (3)	0.0370
Complicated bacteremia, *n* (%)	62 (53)	46 (52)	16 (53)	1.0000
Metastatic infection, *n* (%)	23 (19)	19 (22)	4 (13)	0.4300
Persistent fever (>72 h), *n* (%)	34 (29)	25 (29)	9 (30)	1.0000
Positive follow up blood culture, *n* (%)	14 (12)	8 (9)	6 (20)	0.1900
Implanted prosthesis, *n* (%)	13 (11)	10 (13)	3 (10)	1.0000
Resistance to methicillin				0.7500
Methicillin susceptible, *n* (%)	64 (54)	49 (56)	15 (50)	
Methicillin resistant, *n* (%)	53 (45)	38 (43)	15 (50)	
Unknown, *n* (%)	1 (1)	1 (1)	0 (0)	

Table 2. Adherence to quality-of-care indicators and clinical outcomes in 118 hospitalized adult patients with *Staphylococcus aureus* bacteremia

	All patients (*n* = 118)	Survivors (*n* = 88)	Non-survivors (*n* = 30)	*P*-value
Quality-of-care indicator, *n* (%)				
Follow-up blood culture	21/112 (19)	17/86 (20)	4/26 (15)	0.78
Treatment duration	49/87 (56)	40/71 (56)	9/16 (56)	1.00
Echocardiography	39/59 (66)	31/45 (69)	8/14 (57)	0.52
Non-adherent to any of three indicators	101/118 (86)	76/88 (86)	25/30 (83)	0.76

For these patients, anti-MRSA agents were prescribed on the day of the first positive blood culture in 22 patients (42%) and the day after the blood culture (47%)

Anti-MRSA agents were not prescribed in the remaining six patients (11%).

The first-choice anti-MRSA agents used included vancomycin in 28 patients (60%), teicoplanin in 11 patients (23%), linezolid in six patients (13%), and daptomycin in two patients (4%).

Milder patients were prone to low quality of care

Thirty patients (25%) died in hospital

Median length of hospital stay was 38 (16–76) days

CONCLUSIONS

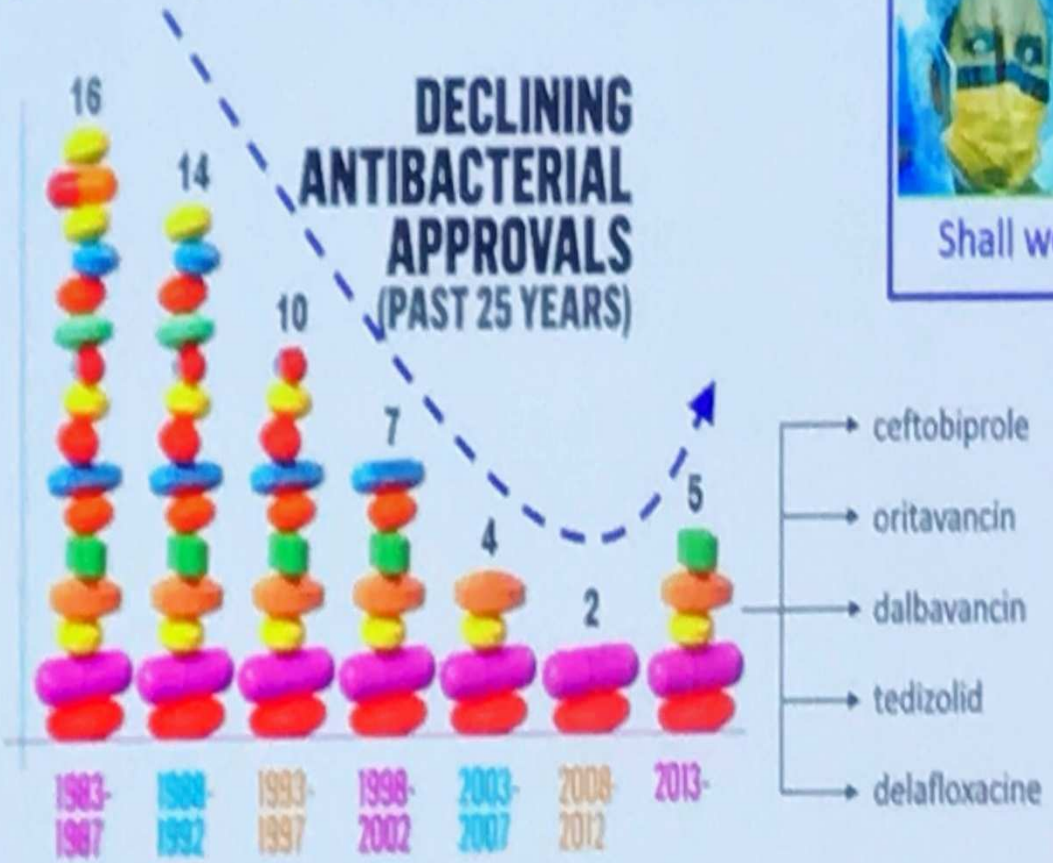
- There was a **high prevalence of MRSA** infections among the staphylococcal infections diagnosed in the ED, with high mortality rates
- A rational approach designed to identify this type of infection and prescribe appropriate antibiotics is needed
- The initial antibiotic therapy was rarely appropriate in the case of an infection due to MRSA
- A rapid identification of specific **Risk factors** could play a role in correct management of MRSA infections, even if they were absent in 10-20% of the patients
- The ED could play a role in monitoring the prevalence of these infections due to methicillin-resistant staphylococci, as well as in the description of community-acquired infections involving these strains
- The **low adherence rate** to "Bundle" (follow-up blood culture) was OFTEN notable
- *Staphylococcus aureus* bacteremia should be an **important target for quality improvement** interventions in this special setting

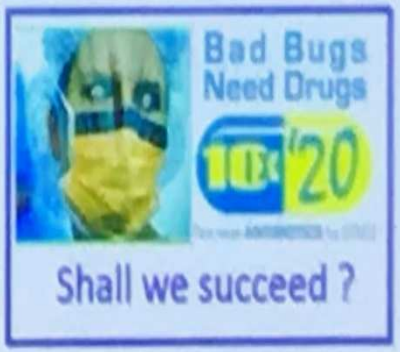
TERAPIA

Proposte di miglioramento

Newly registered anti-Gram (+) antibiotics since 2013

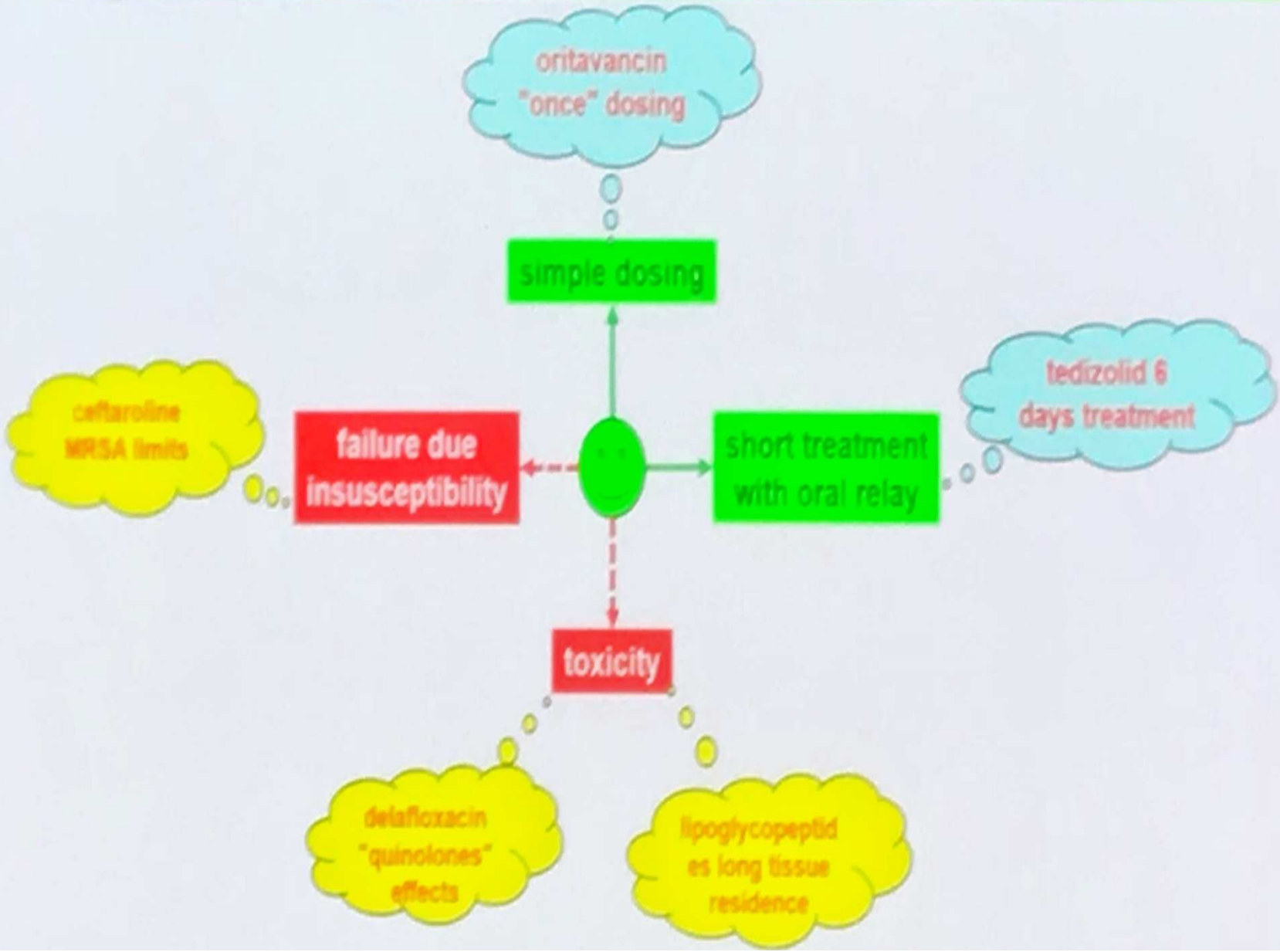
Approvals by FDA/EMA – systemic antibiotics





company	drug	class	approved indications [1]	useful activity against		
				MRSA	MDRSP	VRE
Theravance	Telavancin	lipoglyco-peptides	cSSSI / HABP/VABP	✓	✓	VanB only
Durata Ther.	Dalbavancin		ABSSSI	✓	✓	VanB only
The MedCo	Oritavancin		ABSSSI	✓	✓	✓
MSD / Bayer	Tedizolid	oxazolidinone	ABSSSI	✓	✓	✓
Forrest Astra-Zeneca	Ceftaroline	β-lactams	ABSSSI / CABP	✓	✓	✓
Basilea	Ceftobiprole[2]		CAP / HAP	✓	✓	✓
Melinta	Delafloxacin[3]	fluoro-quinolone[4]	ABSSSI	✓	✓	

How to choose ?



J Infect Chemother 22 (2016) 351–359

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Journal of Infection and Chemotherapy

journal homepage: http://www.elsevier.com/locate/jic

Review article

Empirical therapy in Methicillin-resistant *Staphylococcus Aureus* infections: An Up-To-Date approach

Alison S. VanEperen, John Segreti*

Section of Infectious Diseases, Rush University Medical Center, 600 South Paulina, Suite 143 Armour Academic Facility, Chicago, IL 60612, USA

Table 1
Empiric antibiotic choices for suspected MRSA infections.

Site of infection	Empirical therapy	Alternatives	Future considerations	Other notes
Bacteremia/IE	Vancomycin	Daptomycin Teicoplanin Daptomycin + Ceftaroline (synergy)	Ceftaroline Ceftobiprole	Avoid: Clindamycin TMP-SMX Tigecycline
Mild SSTI with abscess <5 cm	Incision and drainage			
Moderate SSTI	TMP-SMX Clindamycin* Doxycycline/Minocycline Linezolid			* Limited due to increased resistance
Severe or complicated SSTI	Vancomycin	Daptomycin Linezolid Telavancin*	Ceftaroline Ceftobiprole Dalbavancin Oritavancin Tedizolid	* Only to be used when alternative treatments are not suitable due to safety concerns
Pneumonia	Vancomycin Linezolid	Telavancin*	Ceftobiprole	* Only to be used when alternative treatments are not suitable due to safety concerns Avoid: Daptomycin, Tigecycline
Bond and joint infections	Vancomycin	Daptomycin Vancomycin + Rifampin Linezolid Consider: TMP-SMX Clindamycin Fluroquinolone* Doxycycline/Minocycline	Tedizolid	*Not to be used as monotherapy

* = see "Other notes" column.

Clinical Microbiology and Infection 23 (2017) 659–666

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Clinical Microbiology and Infection

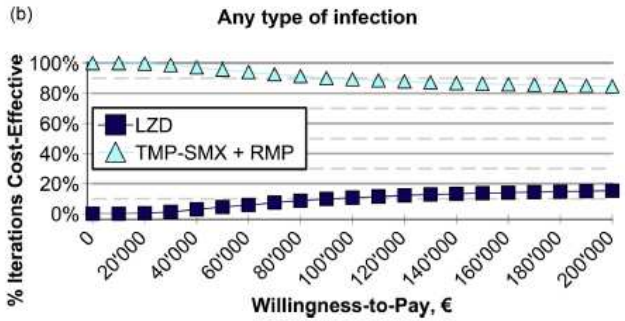
journal homepage: www.clinicalmicrobiologyandinfection.com

Original article

Comparing the cost-effectiveness of linezolid to trimethoprim/sulfamethoxazole plus rifampicin for the treatment of methicillin-resistant *Staphylococcus aureus* infection: a healthcare system perspective

E. von Dach [1], C.M. Morel [1,2], A. Murthy [3], L. Pagani [4,5], M. Macedo-Vinas [6], F. Olearo [7], S. Harbarth [1,7,*]

Combined treatment of trimethoprim-sulfamethoxazole plus rifampicin is more costeffective than linezolid in the treatment of MRSA infection.



Clinical Microbiology and Infection 23 (2017) 406.e1–406.e8

Contents lists available at ScienceDirect

Clinical Microbiology and Infection

journal homepage: www.clinicalmicrobiologyandinfection.com

Original article

Combination antimicrobial therapy in patients with *Staphylococcus aureus* bacteraemia—a *post hoc* analysis in 964 prospectively evaluated patients

S. Rieg [1,*], I. Joost [1], V. Weiß [3], G. Peyerl-Hoffmann [1], C. Schneider [2], M. Hellmich [4], H. Seifert [5,6], W.V. Kern [1], A. Kaasch [5]

- CoRx was not associated with lower mortality within 30 and 90 days in the multivariable Cox model that included CoRx as a time-dependent variable, thus accounting for survivor bias;
- CoRx was independently associated with a survival benefit within **the subgroup of SAB patients with implanted foreign bodies or devices**;
- Consultation by ID specialists was consistently associated with improved patient outcomes.

Clinical Microbiology and Infection 23 (2017) 124–125

Contents lists available at ScienceDirect

Clinical Microbiology and Infection

journal homepage: www.clinicalmicrobiologyandinfection.com

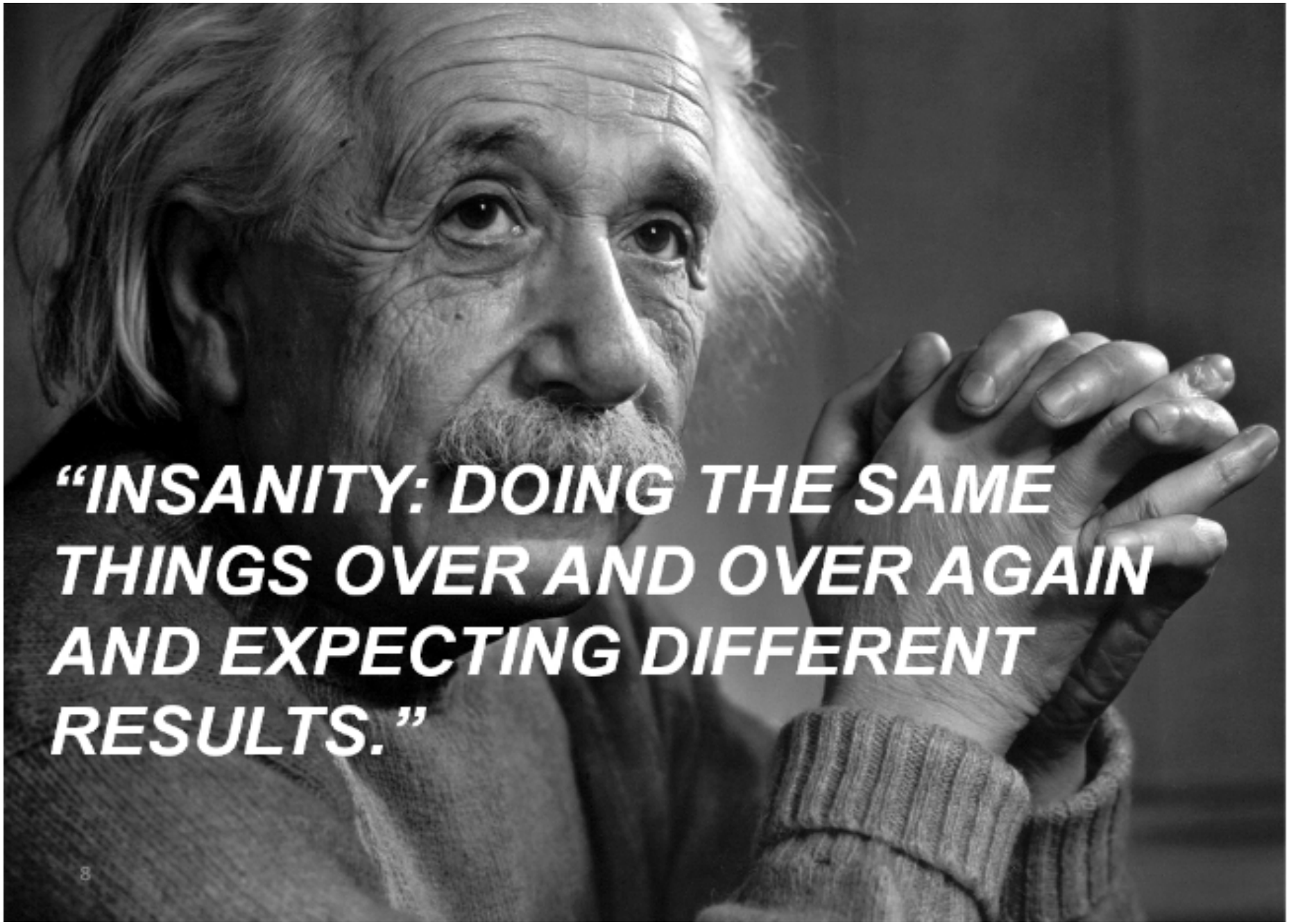
Letter to the Editor

Efficacy of the switch to oral antibiotics in the treatment of non-*Staphylococcus aureus* infective endocarditis in non-severely ill patients

- Retrospective cohort study of 426 patients with infective endocarditis, including right- and leftsided infective endocarditis and prosthetic valve endocarditis
- In multivariate analysis, a switch to the oral route,occurred after a median of 21 days, was not associated with an increased risk of mortality
- The switch to oral route oral switch in infective endocarditis may be a good alternative in non-severely ill patients and the absence of other alternatives (due to toxicity or allergy), especially when the intravenous route is compromised.

CONCLUSIONS

- Timely and **appropriate choice of empiric antimicrobial therapy** in the setting of MRSA infection is imperative due to the high rate of associated **morbidity and mortality** with MRSA infection
- Failure to initiate an antimicrobial therapy active against the causative pathogen within 48 h has been reported as an independent risk factor for WORST outcome
- Initial choices should be made based on the site and **severity of the infection**, most notably moderate skin and soft tissue infections which may be treated with oral antibiotics in the outpatient setting, versus choice of parenteral therapy as an inpatient in the setting of more invasive or severe disease (BSI MRSA)
- The current recommendations continue to rely on **vancomycin as a standard empiric choice** in the setting of severe/invasive infections
- Newer antimicrobial agents may have limited use but have been proven effective for MRSA infection in specific settings
- Recent reports on patients with MRSA bacteraemia, endocarditis and pneumonia treated with ceftaroline have been published
- Ceftobiprole has showed to be a safe and effective treatment of hospitalized MRSA CAP and HAP (excluding VAP).
- The characteristics of long-acting antibiotics could represent an opportunity for the management of ABSSSI and could profoundly modify the management of these infections by reducing or in some cases eliminating both **costs and risks of hospitalization**
- **Combination therapy** may theoretically be another alternative and may overcome some of the old drug limitations (poor tissue penetration, slow bacterial killing and emerging resistance) and yield more time for new drugs to be routinely administered.


“INSANITY: DOING THE SAME THINGS OVER AND OVER AGAIN AND EXPECTING DIFFERENT RESULTS.”