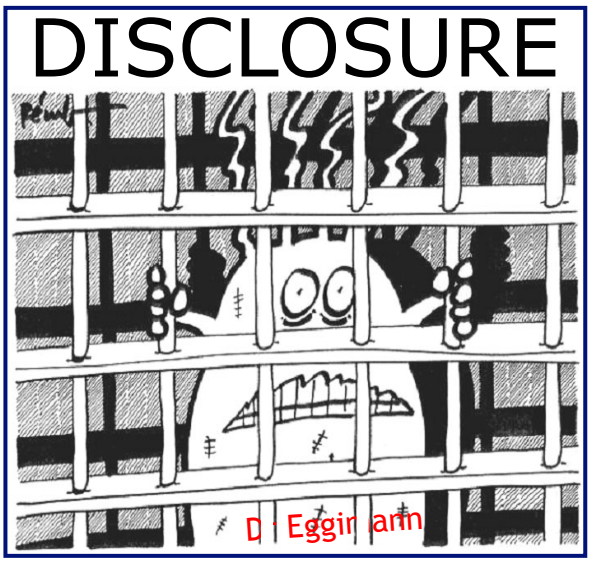
Severe MRSA in Acute Care Setting
Dr. Philippe Eggimann, Service de médecine intensive adulte, Lausanne University
A Webber Training Teleclass

Anything I say can be highly biased

Dr Eggimann collaborated to several industry-sponsorized clinical trials since 1990.

No offshore account ! all goes to the Hospital to pay research nurse data manager



Dr Eggimann served on an advisory board for and/or sponsorized lectures for Astellas 3M, Janssen, Lilly, Medex MSD, Pfizer, Weyth-Lederle

2

Hosted by Martin Kiernan martin@webbertraining.com
www.webbertraining.com

Severe MRSA in Acute Care Setting
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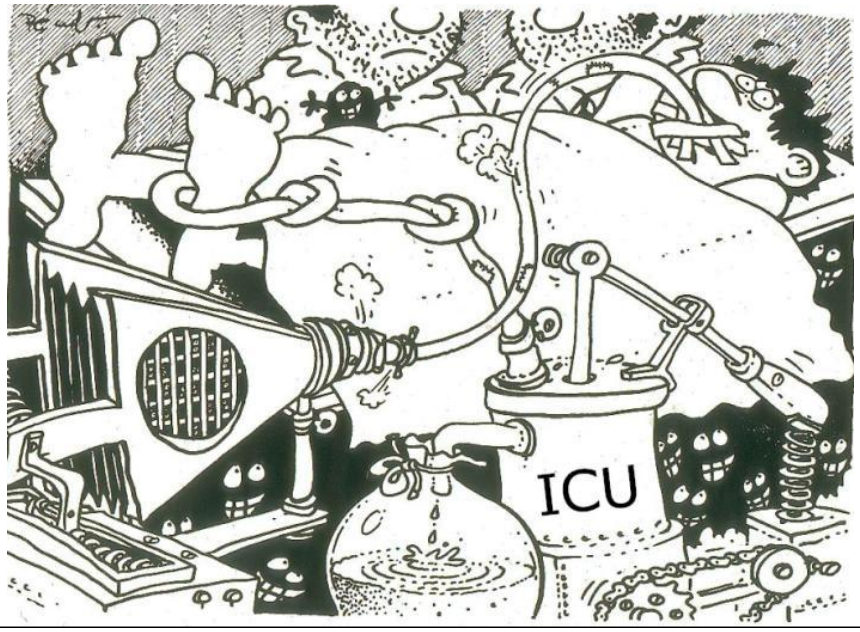
ICUs, the world of infection



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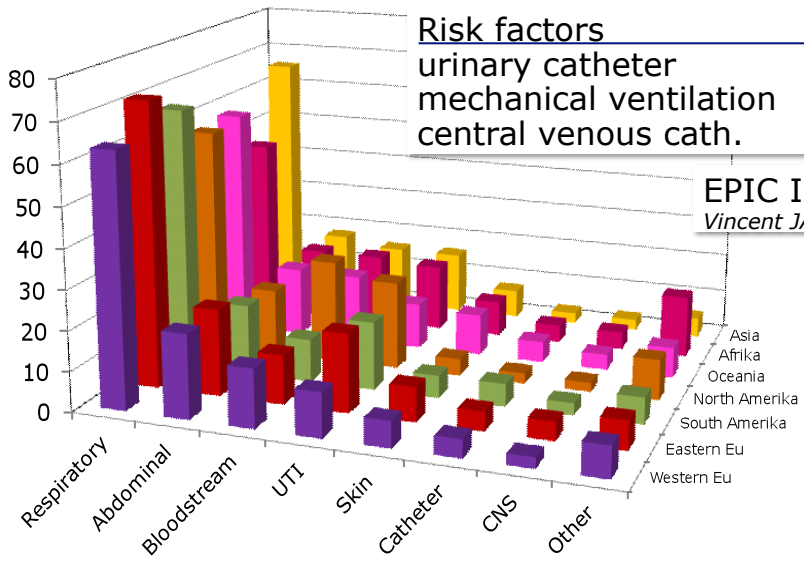
ICUs, the world of infection



Risk factors	OR
urinary catheter	1.41
mechanical ventilation	2.07
central venous cath.	4.40

EPIC I study
Vincent JAMA 1995

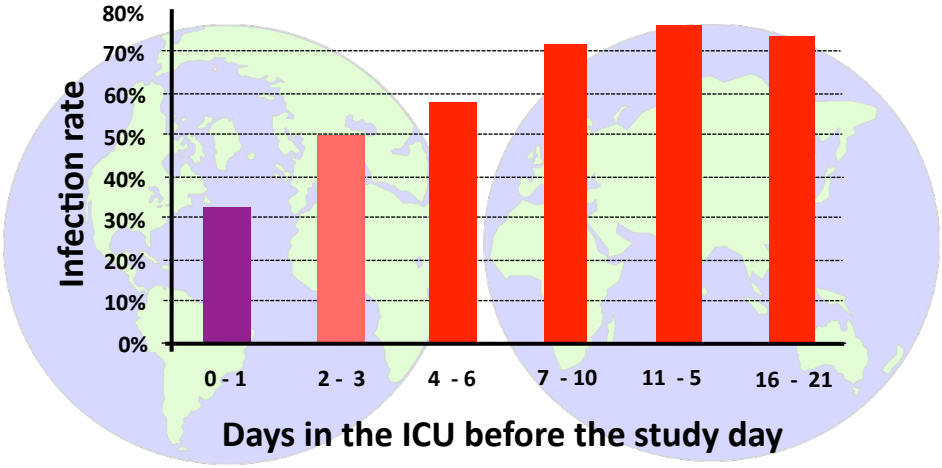
Prevalence of infection among 14'414 patients (1'265 ICU)
51% with infection

EPIC II study
Vincent JAMA 2009

5

The world of nosocomial infections

1'265 worldwide ICU
14'414 patients



EPIC II study
Vincent JAMA 2009

6

The world of nosocomial infections

Including MSSA and MRSA

	All	Western Europe	Eastern Europe	Central/ South America	North America	Oceania	Africa	Asia
No. (%)	7087 (51.4)	3683 (49)	426 (56.4)	1290 (60.3)	607 (48.4)	285 (48.2)	89 (46.1)	707 (52.6)
Microorganisms								
Positive isolates	4947 (69.8)	2678 (72.7)	357 (83.8)[b]	719 (55.7)[b]	457 (75.3)	204 (71.6)	54 (60.7)	478 (67.6)[b]
Gram-positive	2315 (46.8)	1311 (49.0)	185 (51.8)	273 (38.0)[b]	252 (55.1)	104 (51.0)	27 (50.0)	163 (34.1)[b]
Staphylococcus aureus	1012 (20.5)	525 (19.6)	77 (21.6)	138 (19.2)	123 (26.9)[b]	56 (27.5)[b]	16 (29.6)	77 (16.1)
MRSA	507 (10.2)	233 (8.7)	37 (10.4)	79 (11.0)	80 (17.5)[b]	19 (9.3)	11 (20.4)[b]	48 (10.0)
S epidermidis	535 (10.8)	301 (11.2)	43 (12)	67 (9.3)	56 (12.3)	17 (8.3)	8 (14.8)	43 (9.0)
Streptococcus pneumoniae	203 (4.1)	127 (4.7)	16 (4.5)	24 (3.3)	20 (4.4)	5 (2.5)	3 (5.6)	8 (1.7)[b]
VSE	352 (7.1)	250 (9.3)	35 (9.8)	17 (2.4)[b]	24 (5.3)[b]	9 (4.4)	0[b]	17 (3.6)[b]
VRE	186 (3.8)	113 (4.2)	16 (4.5)	15 (2.1)[b]	22 (4.8)	10 (4.9)	0	10 (2.1)
Other	319 (6.4)	184 (6.9)	15 (4.2)	29 (4.0)[b]	48 (10.5)	19 (9.3)	4 (7.4)	20 (4.2)
Gram-negative	3077 (62.2)	1573 (58.7)	258 (72.3)[b]	510 (70.9)[b]	228 (49.9)[b]	122 (59.8)	31 (57.4)	355 (74.3)[b]

EPIC II study
Vincent JAMA 2009

7

The world of nosocomial infections

Increased mortality associated with meticillin-resistant *Staphylococcus aureus* (**MRSA**) infection in the Intensive Care Unit: results from the EPIC II study

Håkan Hanberger[a], Sten Walther[b], Marc Leone[c], Philip S. Barie[d], Jordi Rello[e], Jeffrey Lipman[f], John C. Marshall[g], Antonio Anzueto[h], Yasser Sakr[i], Peter Pickkers[j], Peter Felleiter[k], Milo Engoren[l], Jean-Louis Vincent[m,*], EPIC II Group of Investigators

Variable	OR (95% CI)	*P*-value
Age (per year)	1.01 (1.00–1.03)	0.01
Type of admission		
Surgery: elective	Ref.	
Medical	1.70 (0.91–3.19)	0.10
Surgery: emergency	1.52 (0.87–2.65)	0.14
Trauma	1.46 (0.52–4.11)	0.48
Source of admission		
Operating room/recovery	Ref.	
Emergency department/ambulance	0.50 (0.28–0.88)	0.02
Hospital ward	0.96 (0.57–1.60)	0.87
Other hospital	0.82 (0.46–1.47)	0.51
Other	1.21 (0.41–3.58)	0.73
SAPS II score (per point)	1.05 (1.04–1.07)	<0.001
Co-morbid conditions		
Chronic renal failure	1.84 (1.16–2.94)	0.01
Type of microorganism		
Pseudomonas spp.	1.73 (1.09–2.74)	0.02
Acinetobacter spp.	2.63 (1.34–5.17)	<0.01
MRSA	1.46 (1.03–2.06)	0.03

International Journal of Antimicrobial Agents 38 (2011) 331–335

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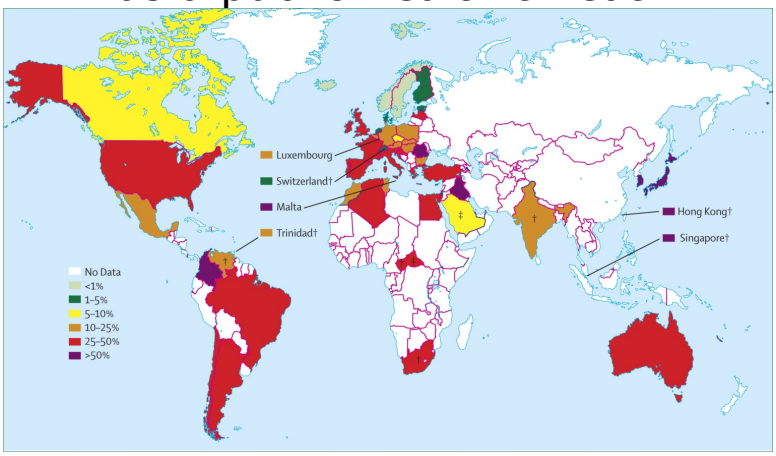
The world of nosocomial infections

Emergence and resurgence of MRSA as a public-health threat



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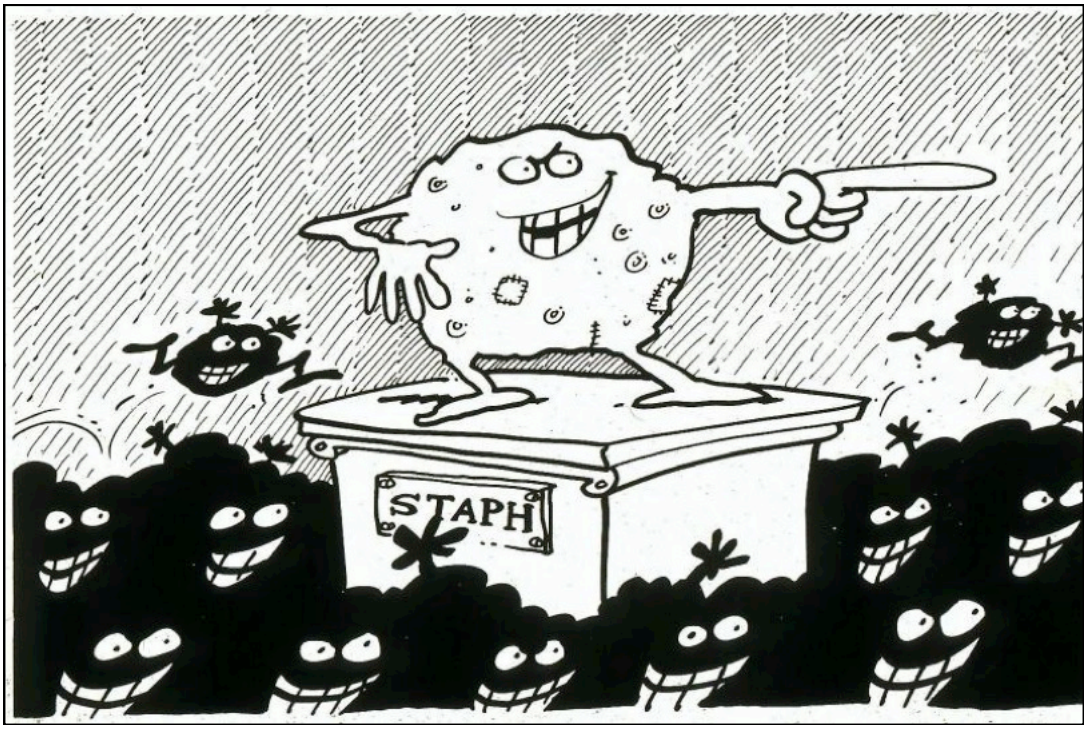
Grundmann M, Aires-de-Sousa M, Boyce J, Tiemersma E Lancet 2006; 368:874-85



HA-MRSA ≠ CA-MRSA ≠ LA-MRSA

MRSA	Definition and/or salient features
HA-MRSA	Identified >48 h after admission to a healthcare facility, or MRSA identified in an individual with history of MRSA infection or colonisation, admission to a healthcare facility, dialysis, surgery or insertion of indwelling devices in the past year
CA-MRSA	Identified in the outpatient setting or within 48 h following hospital admission in an individual with no medical history of MRSA infection or colonisation, admission to a healthcare facility, dialysis, surgery or insertion of indwelling devices in the past year
LA-MRSA	No formal definition. Usually belong to CC398 lineage in Europe but often CC9 in Asia. Acquired via occupational contact with livestock

Bal AM et al. Journal of Global Antimicrobnial Resistance 2016; 6:95-101

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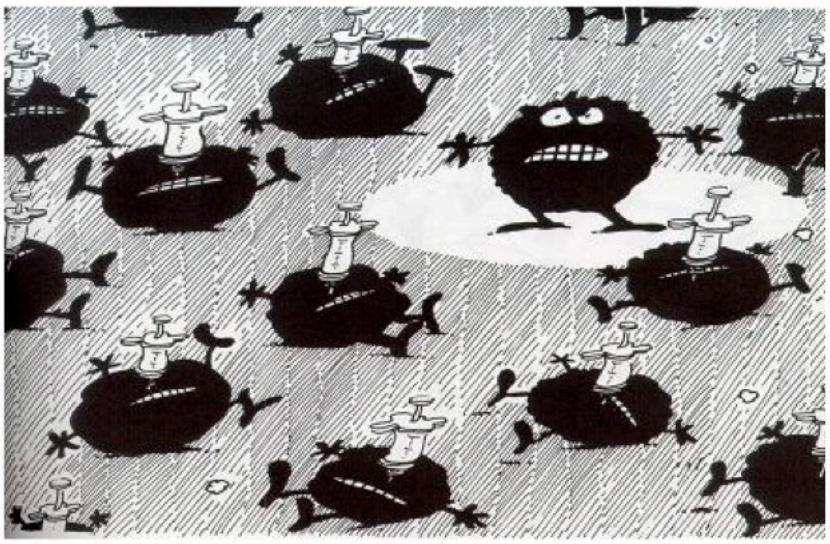
Risk factors for HA-MRSA

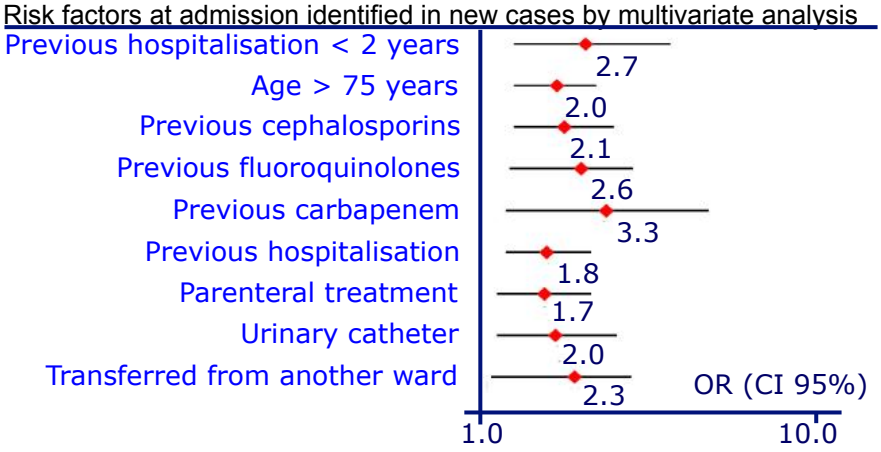


12

Risk factors for HA-MRSA

10,072 pts screened within 24 hrs of admission (90%) over 8 months
355 cases (3.5%) including 204 new cases (2.0%)

Risk factors at admission identified in new cases by multivariate analysis



Harbarth S et al. Am J Med 06

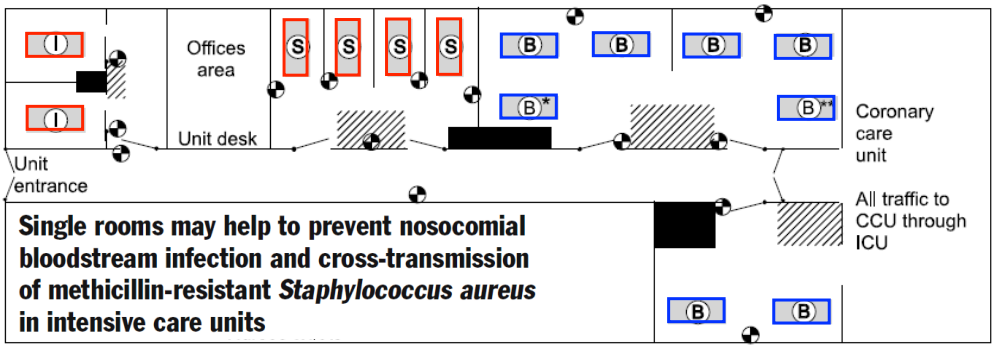
13

Intensive Care Med (2007) 33:836–840
DOI 10.1007/s00134-007-0559-5

BRIEF REPORT

David Bracco
Marc-Jacques Dubois
Redouane Bouali
Philippe Eggimann

Risk of MRSA acquisition	Multivariate analysis Effect [OR (95% CI)]	*p* value
Outcome (ICU dead)	1.04 (0.57–1.84)	NS
Mechanical ventilation	0.82 (0.58–1.18)	NS
Days with MV (per day)	1.28 (1.20–1.36)	<0.001
Parenteral nutrition	2.95 (1.17–7.52)	0.02
Type of bed (single room or cubicles vs. bays)	0.65 (0.42–0.98)	<0.05

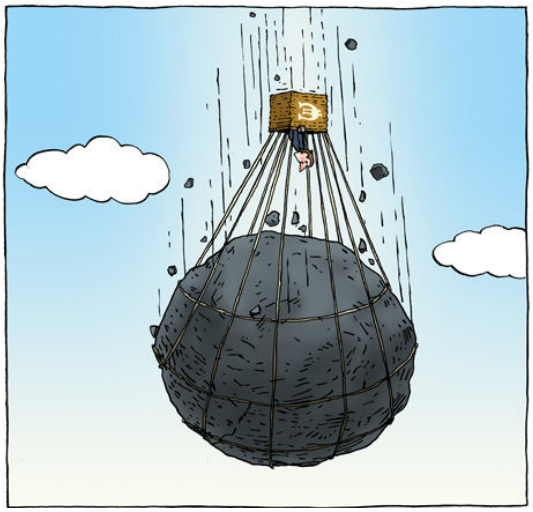


Single rooms may help to prevent nosocomial bloodstream infection and cross-transmission of methicillin-resistant *Staphylococcus aureus* in intensive care units

Ⓘ Isolation negative pressure rooms
Ⓢ Single bed rooms
Ⓑ Bay rooms
Nurse's workstations
Sink & waste discard area
Wall dispensers of disinfecting solution for handrub

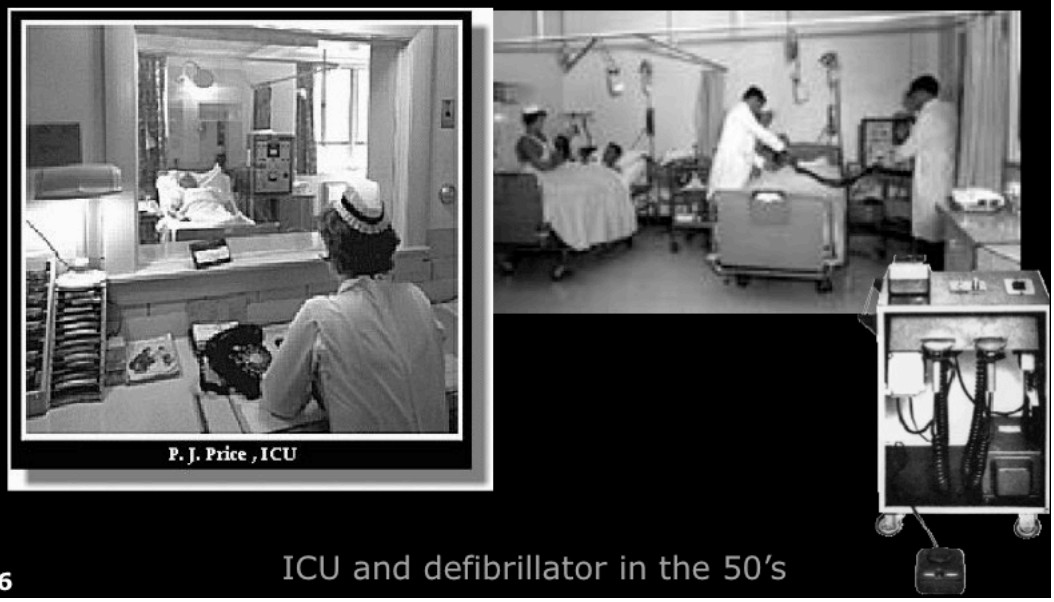
14

?? How did we reach that ??



15

At that time,...



ICU and defibrillator in the 50's

16

Anything was easy !

Patients >>> nurses

Pandemia of poliomyelitis in the 50's

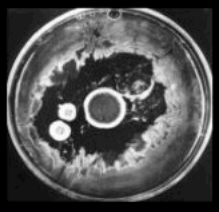
17

So easy !!

1928:
Alexander Fleming

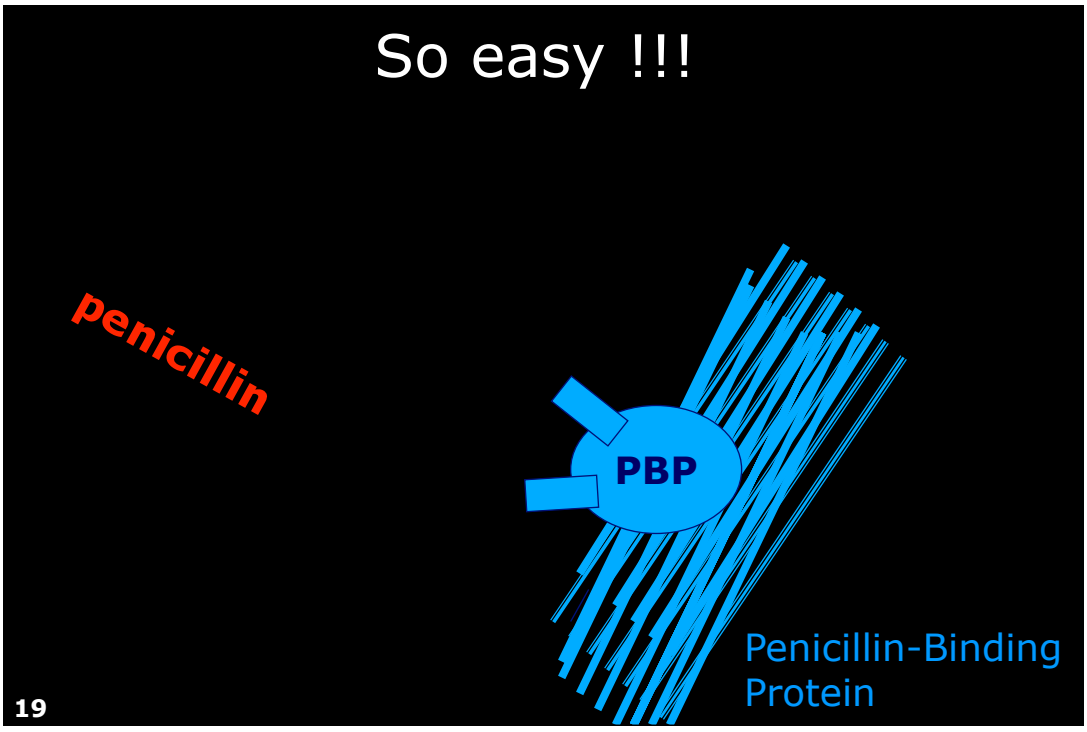
1940:
Ernst Chain

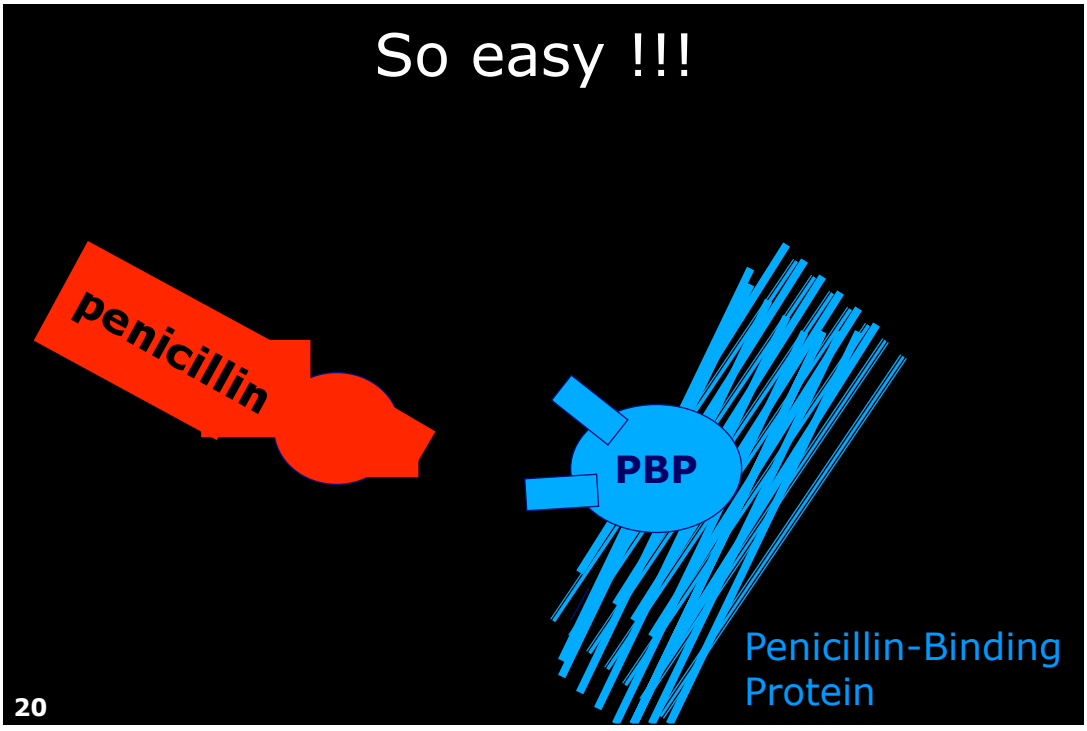
1940:
Hrward Foley

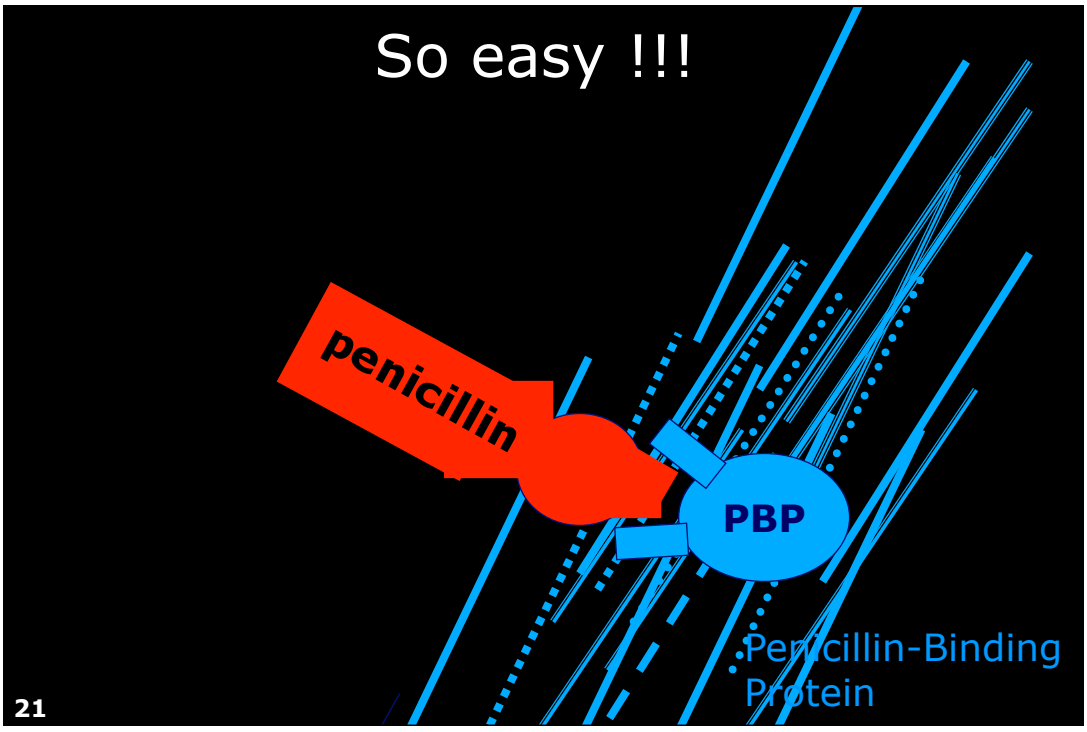


43-year-old Oxford policeman who had nicked the corner of his mouth shaving.
->Facial and orbital cellulitis -> improvement ->relapse and death

18


So easy !!!
penicillin
PBP
Penicillin-Binding Protein
19


So easy !!!
penicillin
PBP
Penicillin-Binding Protein
20

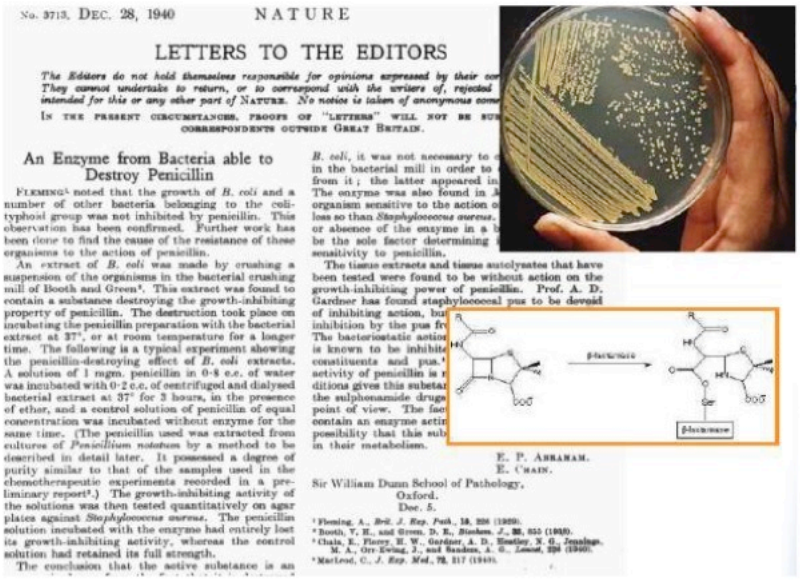

So easy !!!
penicillin
PBP
Penicillin-Binding Protein
21


Maybe too easy !!
PENICILLIN
THRASH THE AXIS
BUY BONDS
PENICILLIN CURES GONORRHEA IN 4 HOURS
SEE YOUR DOCTOR TODAY
Publicity in the 50's
22

INFECTIONS ➔ ANTIBIOTICS

23

INFECTIONS ➔ ANTIBIOTICS ➔ RESISTANCE



No. 3713, DEC. 28, 1940 NATURE

LETTERS TO THE EDITORS

The Editors do not hold themselves responsible for opinions expressed by their cor
They cannot undertake to return, or to correspond with the writers of, rejected
intended for this or any other part of NATURE. *No notice is taken of anonymous comm*

IN THE PRESENT CIRCUMSTANCES, PROOFS OF "LETTERS" WILL NOT BE SUP
CORRESPONDENTS OUTSIDE GREAT BRITAIN.

An Enzyme from Bacteria able to Destroy Penicillin

FLEMING[1] noted that the growth of *B. coli* and a number of other bacteria belonging to the coli-typhoid group was not inhibited by penicillin. This observation has been confirmed. Further work has been done to find the cause of the resistance of these organisms to the action of penicillin.

An extract of *B. coli* was made by crushing a suspension of the organisms in the bacterial crushing mill of Booth and Green[2]. This extract was found to contain a substance destroying the growth-inhibiting property of penicillin. The destruction took place on incubating the penicillin preparation with the bacterial extract at 37°, or at room temperature for a longer time. The following is a typical experiment showing the penicillin-destroying effect of *B. coli* extracts. A solution of 1 mgm. penicillin in 0·8 c.c. of water was incubated with 0·2 c.c. of centrifuged and dialysed bacterial extract at 37° for 3 hours, in the presence of ether, and a control solution of penicillin of equal concentration was incubated without enzyme for the same time. (The penicillin used was extracted from cultures of *Penicillium notatum* by a method to be described in detail later. It possessed a degree of purity similar to that of the samples used in the chemotherapeutic experiments recorded in a preliminary report[3].) The growth-inhibiting activity of the solutions was then tested quantitatively on agar plates against *Staphylococcus aureus*. The penicillin solution incubated with the enzyme had entirely lost its growth-inhibiting activity, whereas the control solution had retained its full strength.

The conclusion that the active substance is an

B. coli, it was not necessary to
in the bacterial mill in order to
from it; the latter appeared in
The enzyme was also found in
organism sensitive to the action o
less so than *Staphylococcus aureus*,
or absence of the enzyme in a
be the sole factor determining
sensitivity to penicillin.

The tissue extracts and tissue autolysates that have been tested were found to be without action on the growth-inhibiting power of penicillin. Prof. A. D. Gardner has found staphylococcal pus to be devoid of inhibiting action, bu
inhibition by the pus fr
The bacteriostatic actio
is known to be inhibit
constituents and pus.
activity of penicillin is
ditions gives this substa
the sulphonamide drugs
point of view. The fac
contain an enzyme acti
possibility that this sub
in their metabolism.

E. P. ABRAHAM.
E. CHAIN.

Sir William Dunn School of Pathology,
Oxford.
Dec. 5.

[1] Fleming, A., *Brit. J. Exp. Path.*, **10**, 226 (1929).
[2] Booth, V. H., and Green, D. E., *Biochem. J.*, **30**, 555 (1936).
[3] Chain, E., Florey, H. W., Gardner, A. D., Heatley, N. G., Jennings, M. A., Orr-Ewing, J., and Sanders, A. G., *Lancet*, **228** (1940).
[4] MacLeod, C., *J. Exp. Med.*, **72**, 217 (1940).

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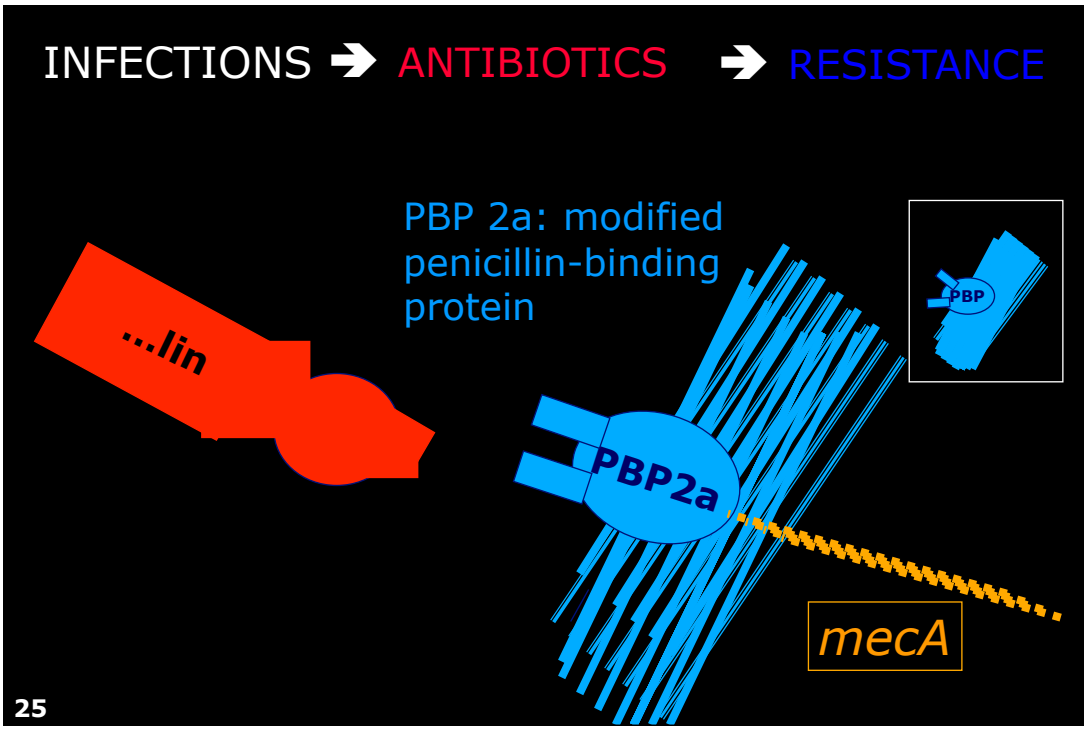
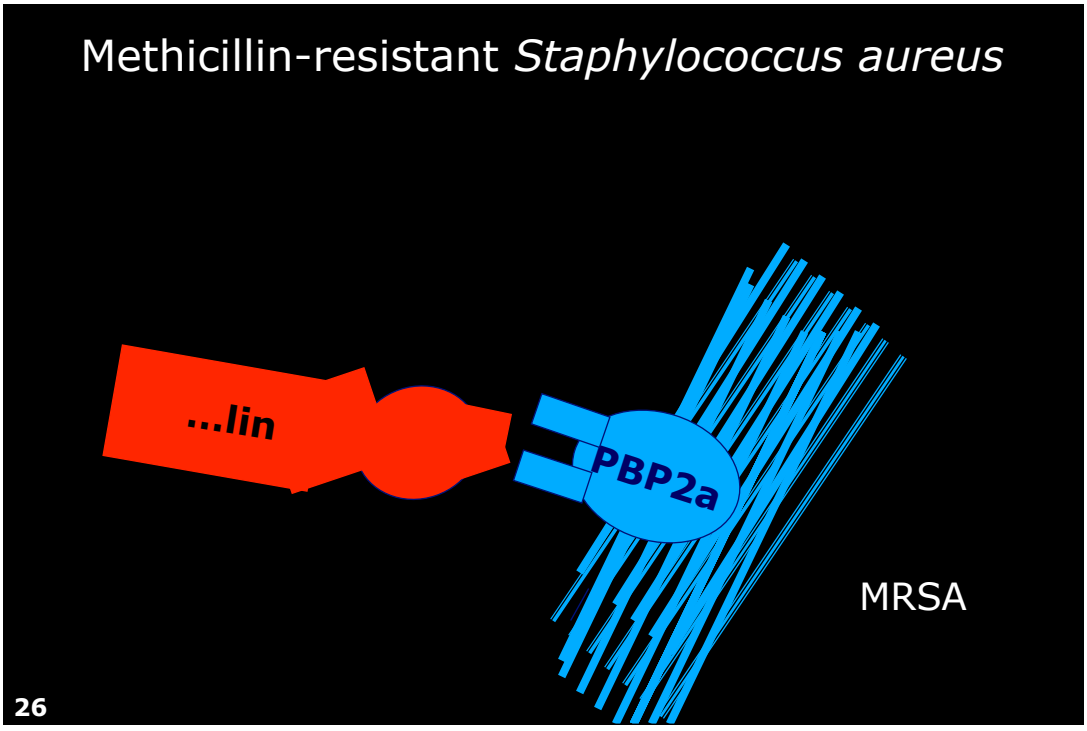
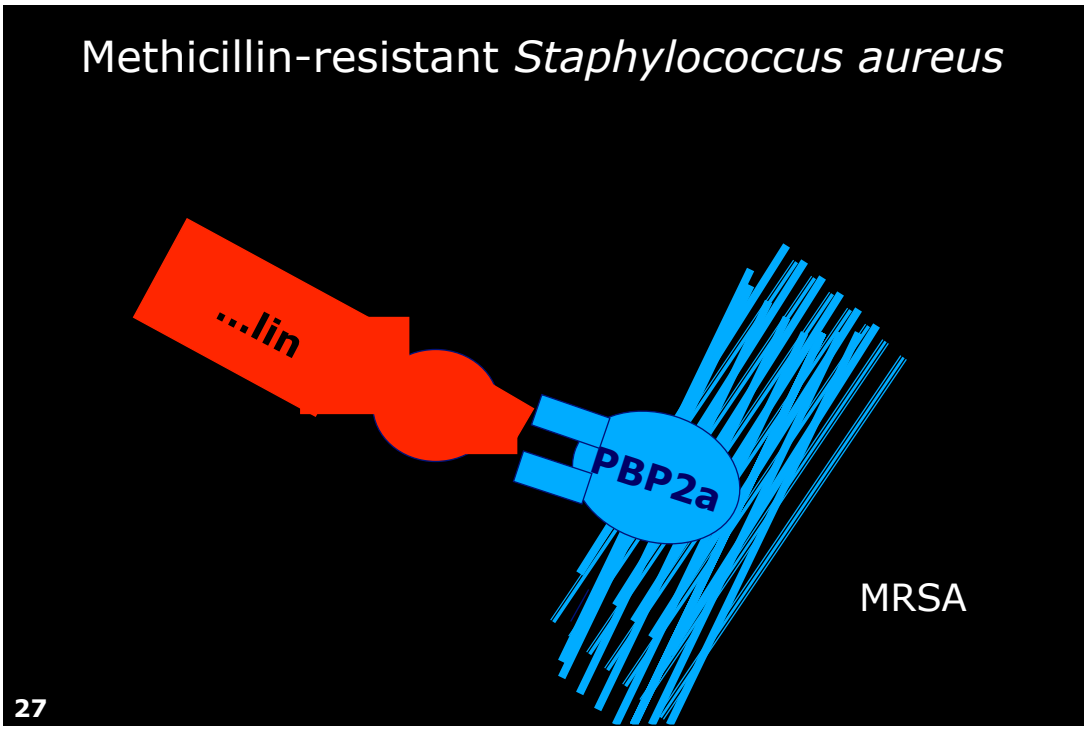

INFECTIONS ➔ ANTIBIOTICS ➔ RESISTANCE
PBP 2a: modified penicillin-binding protein
...lin
PBP2a
PBP
mecA
25


Methicillin-resistant *Staphylococcus aureus*
...lin
PBP2a
MRSA
26



INFECTIONS ➔ ANTIBIOTICS ➔ RESISTANCE

INFECTION BY PENICILLIN-RESISTANT STAPHYLOCOCCI

MARY BARBER
M.D. Lond.
MARY ROZWADOWSKA-DOWZENKO
M.D. Warsaw
From the Bacteriology Department, Postgraduate Medical School of London

MANY studies have been carried out on the incidence of penicillin-resistant strains of *Staph. pyogenes* in cases of infection. Until 1944 few such strains were encountered. Since then, however, the incidence has been increasing rapidly, particularly in hospitals. Studies in which more than 10% of all strains tested were found to be resistant to penicillin have been recorded by Spink et al. (1944), Bondi and Dietz (1945), Gallardo (1945), Plough (1945), Harley et al. (1946), Barber (1947a and b), and Simpson (1947). In a previous report one of us (Barber 1947b) showed that in less than a year the incidence of penicillin-resistant strains of *Staph. pyogenes* giving rise to infection in this hospital had gone up from 14·1 to 38%. The work reported here shows that this increase is continuing.

All pus swabs received in the laboratory during this investigation have been plated directly on to plain blood-agar plates and penicillin-ditch plates, the ditch containing 10 units

of these patients the mixture was present in a single specimen, and 8 gave only a few penicillin-resistant colonies. From 3 the first specimen received yielded only penicillin-sensitive staphylococci, but from later specimens penicillin-resistant strains were isolated. These 3 patients will be referred to again in connexion with the source of resistant strains. The results according to type of infection were as follows :

Type of infection	*Total patients*	*Patients yielding penicillin-resistant strains*
Septicæmia	2	2
Boils, abscesses, &c.	23	8
Superficial skin lesions	12	8
Infected operation wounds	12	10
Pulmonary	10	7
Conjunctivitis	22	11
Aural	5	3
Nasopharyngeal	6	5
Umbilical of newborn	3	3
Urinary	3	1
Vaginal	2	1
Total	100	59

The 2 patients with septicæmia both died, in spite of intensive penicillin treatment.

One was a newborn infant in whom the infection appeared to enter via the umbilical cord. The infant had had no penicillin before the infection.

The other was a patient with bilateral cortical necrosis of both kidneys following toxæmia of pregnancy and treated with the artificial kidney. Penicillin treatment was started when the patient was put on the artificial kidney, and

INFECTIONS ➔ ANTIBIOTICS ➔ RESISTANCE

INFECTION BY PENICILLIN-RESISTANT STAPHYLOCOCCI

MARY BARBER
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From the Bacteriology Department, Postgraduate Medical School of London

MANY studies have been carried out on the incidence of penicillin-resistan… of infection. Until 19… Since then, however… rapidly, particularly… more than 10% of… resistant to penicilli… (1944), Bondi and D… (1945), Harley et al… Simpson (1947). In a previous report one of us (Barber 1947b) showed that in less than a year the incidence of penicillin-resistant strains of *Staph. pyogenes* giving rise to infection in this hospital had gone up from 14·1 to 38%. The work reported here shows that this increase is continuing.

All pus swabs received in the laboratory during this investigation have been plated directly on to plain blood-agar plates and penicillin-ditch plates, the ditch containing 10 units

The penicillin sensitivity of *Staph. pyogenes* in relation to previous recent treatment with penicillin was as follows :

	Penicillin	*No penicillin*
Penicillin-sensitive strains only ..	4	37
Penicillin-resistant strains isolated	29	30

of these patients the mixture was present in a single specimen, and 8 gave only a few penicillin-resistant colonies. From 3 the first specimen received yielded only penicillin-sensitive staphylococci, but from later specimens penicillin-resistant strains were isolated. These 3 patients will be referred to again in connexion with the source of resistant strains. The results according to type of infection were as follows :

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Superficial skin lesions	12	8
	.. ..	10
	.. ..	7
	.. ..	11
	.. ..	3
	.. ..	5
	.. ..	3
	.. ..	1
	.. ..	1
		59

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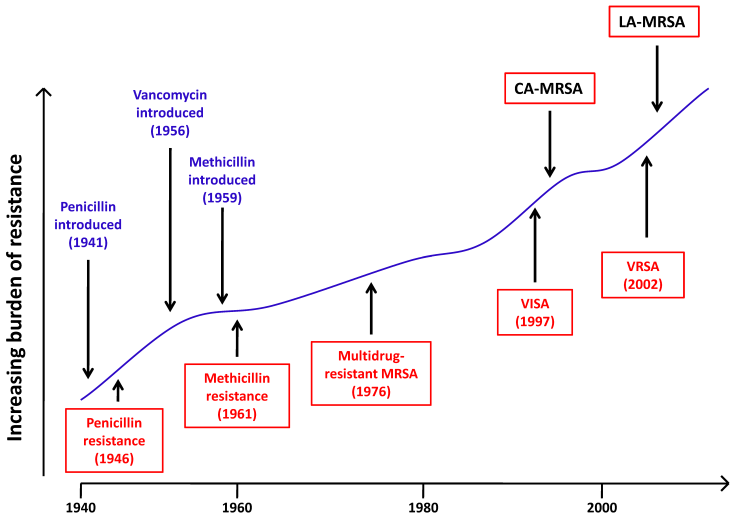
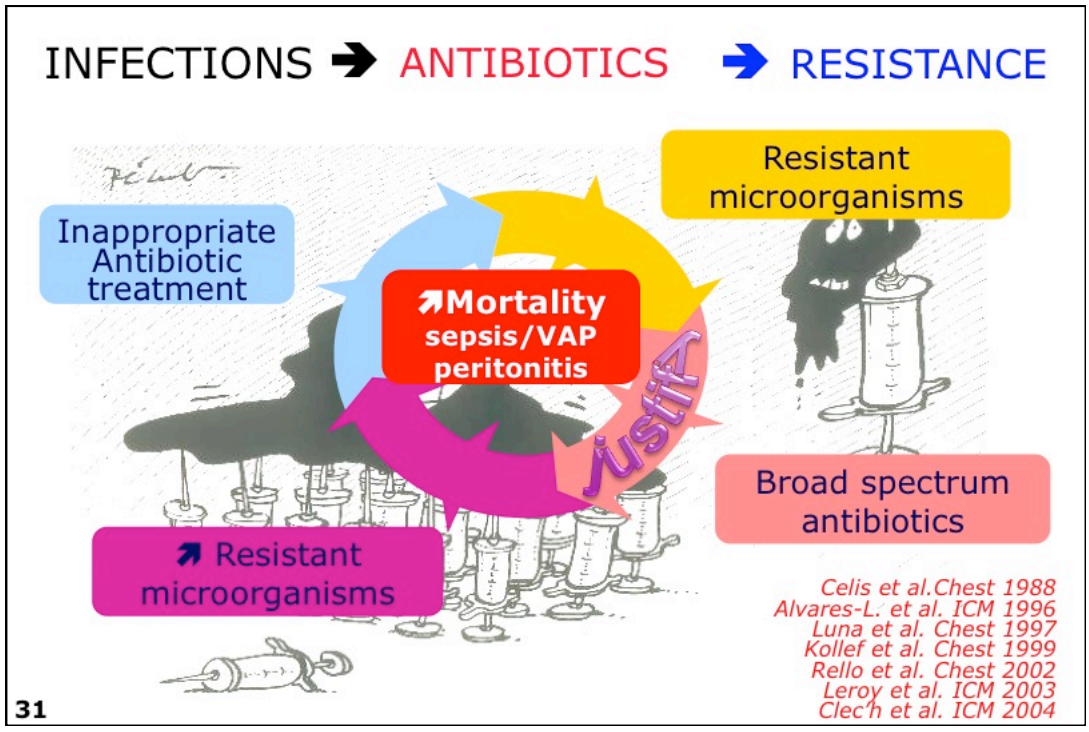
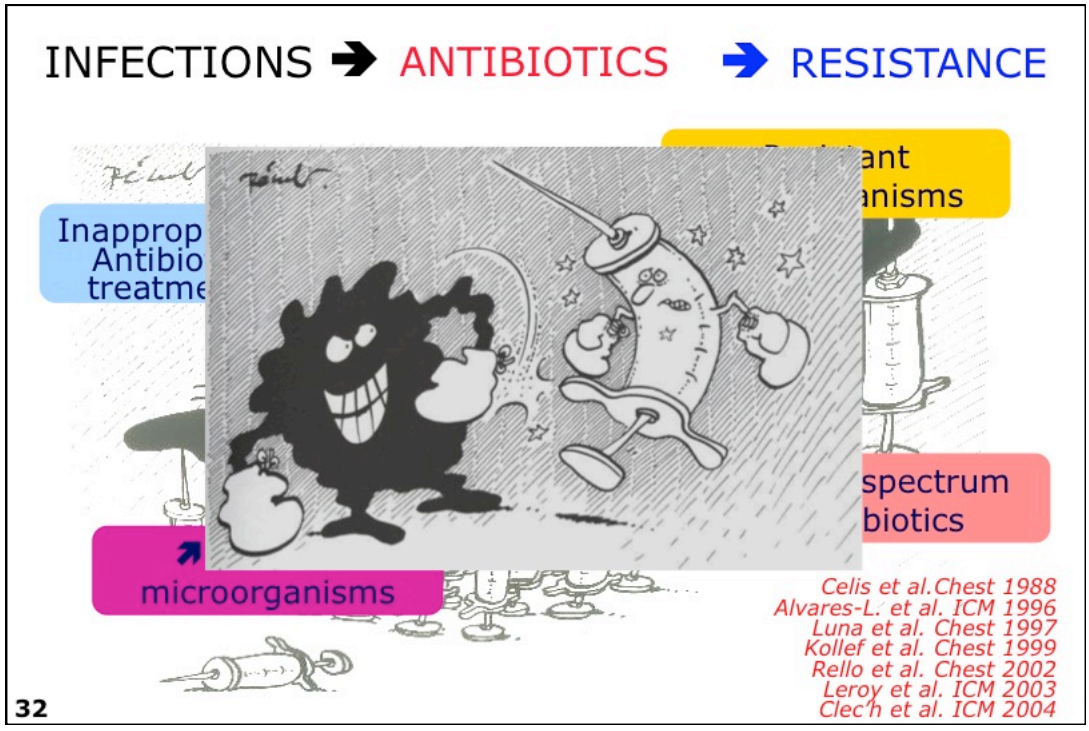
INFECTIONS ➔ ANTIBIOTICS ➔ RESISTANCE



Schmidt T et al. Antimicrobial Resistance in Staphylococci at the Human– Animal Interface. In: Immunology and Microbiology "Antimicrobial Resistance – An Open Challenge". Edited by Maria Cristina Ossiprandi, ISBN 978-953-51-2222-7, Published: November 26, 2015. http://www.intechopen.com/books/antimicrobial-resistance-an-open-challenge/antimicrobial-resistance-in-staphylococci-at-the-human-animal-interface


INFECTIONS ➔ ANTIBIOTICS ➔ RESISTANCE
Resistant microorganisms
Inappropriate Antibiotic treatment
↗Mortality sepsis/VAP peritonitis
Broad spectrum antibiotics
↗ Resistant microorganisms
Celis et al.Chest 1988
Alvares-L. et al. ICM 1996
Luna et al. Chest 1997
Kollef et al. Chest 1999
Rello et al. Chest 2002
Leroy et al. ICM 2003
Clec'h et al. ICM 2004
31


INFECTIONS ➔ ANTIBIOTICS ➔ RESISTANCE
Inapprop
Antibio
treatme
microorganisms
spectrum
biotics
Celis et al.Chest 1988
Alvares-L. et al. ICM 1996
Luna et al. Chest 1997
Kollef et al. Chest 1999
Rello et al. Chest 2002
Leroy et al. ICM 2003
Clec'h et al. ICM 2004
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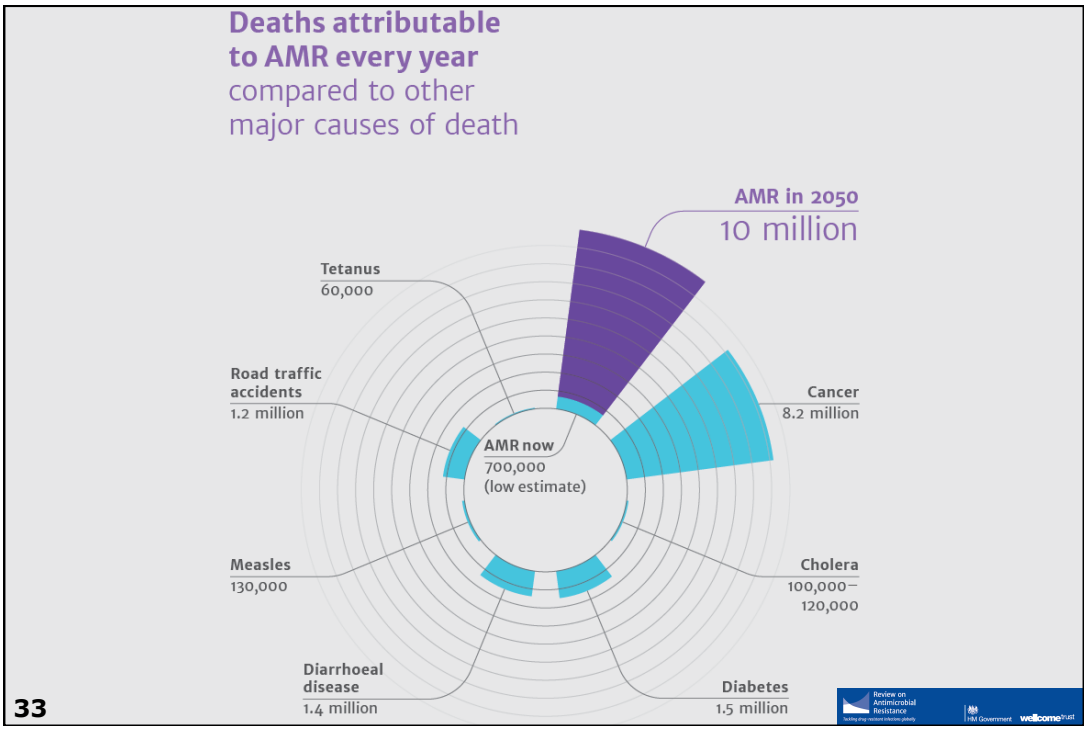
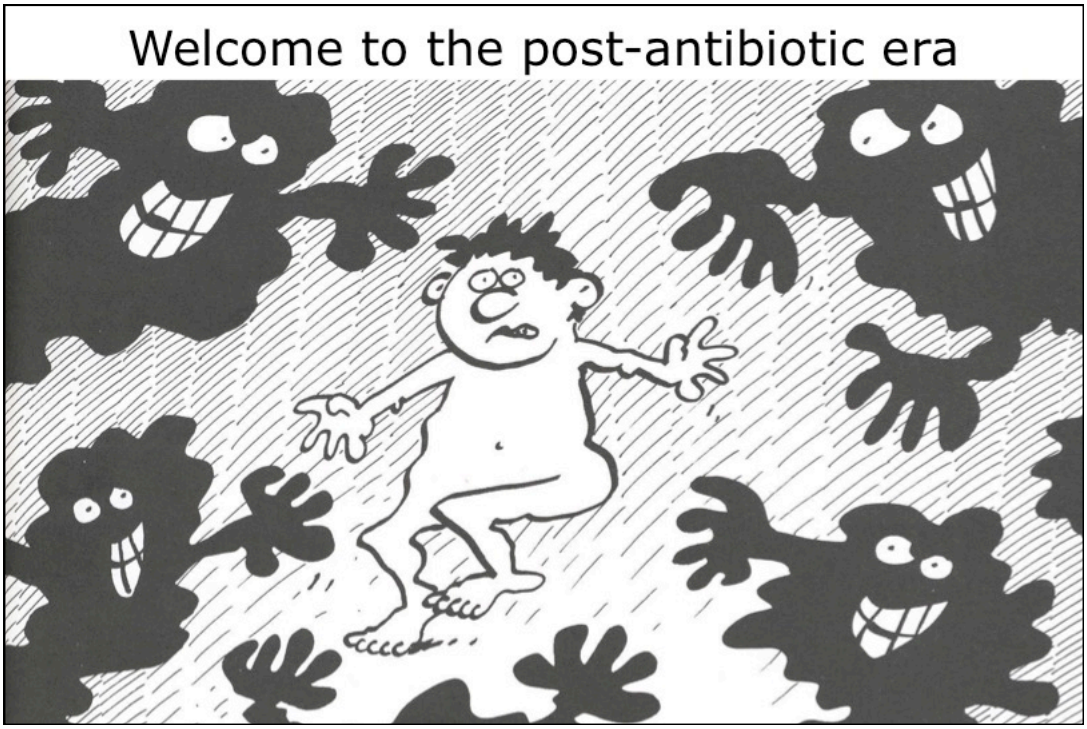
Severe MRSA in Acute Care Setting

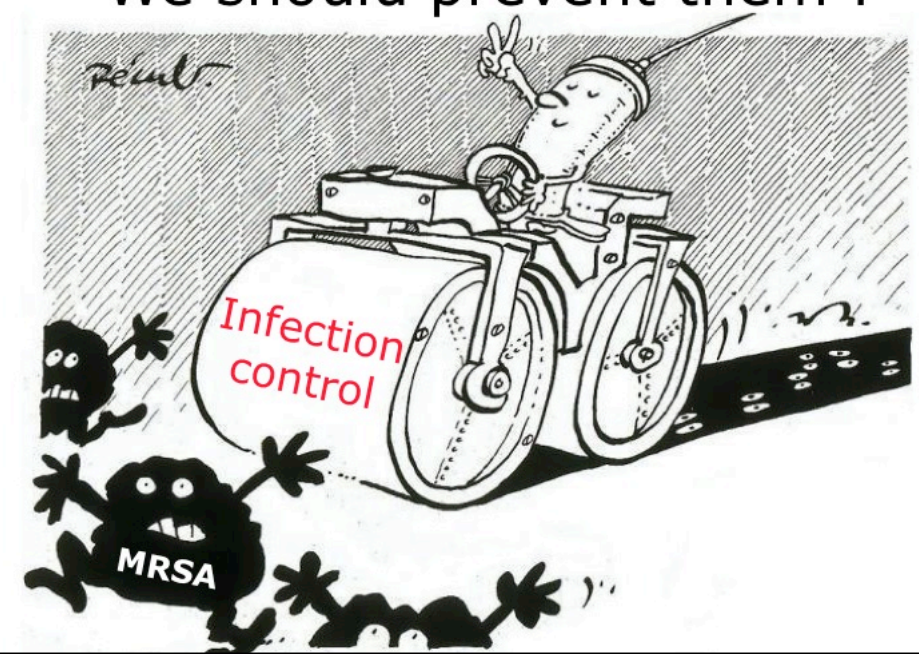
Dr. Philippe Eggimann, Service de médecine intensive adulte, Lausanne University

A Webber Training Teleclass



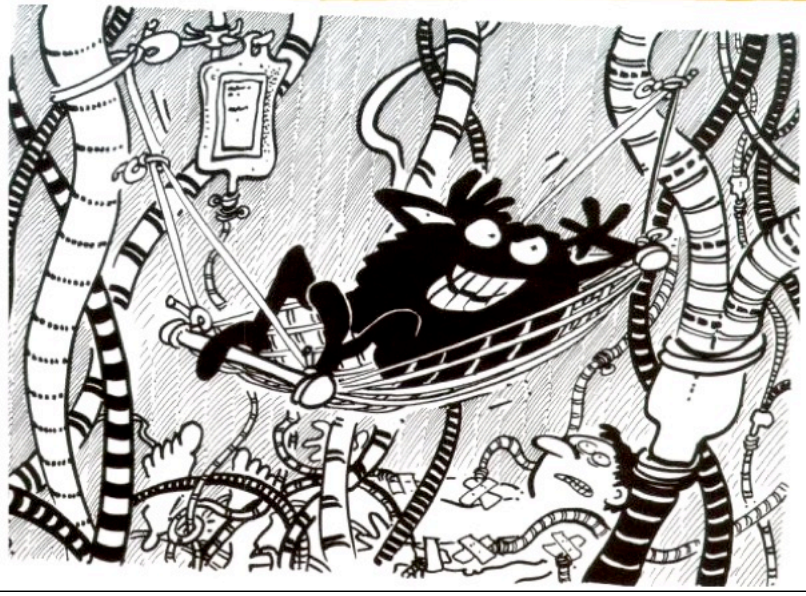


We should prevent them !



35

Because MRSA is now everywhere !!!

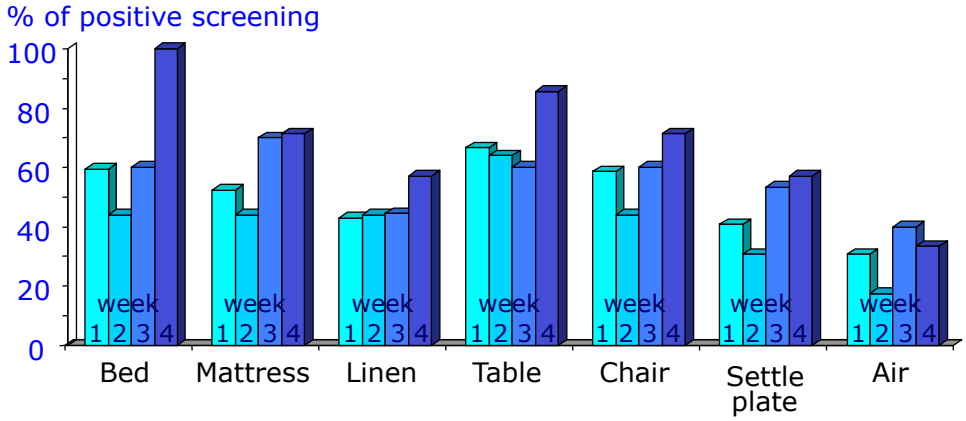


36

Because MRSA is now everywhere !!!

Environemental reservoir of MRSA in isolation rooms

25 MRSA positive patients isolated in single-rooms

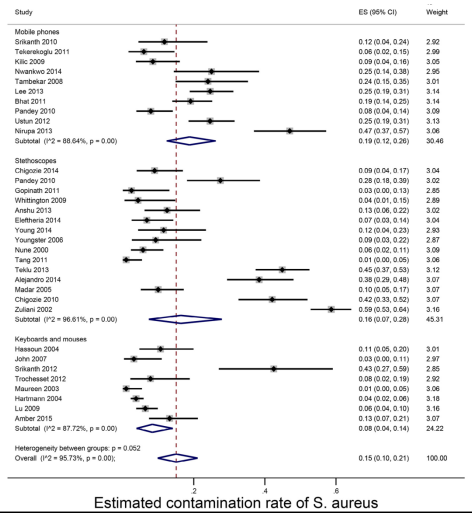


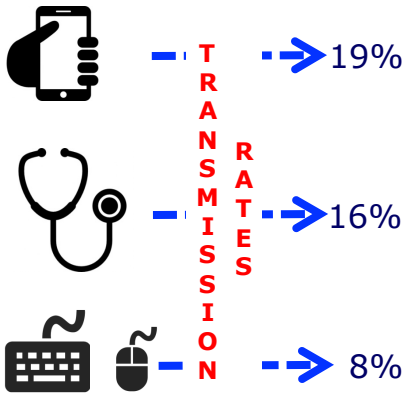
37

Sexton T et al. J Hosp Infect 06; 62:187-94

A meta-analysis of the rates of *Staphylococcus aureus* and methicillin-resistant *S aureus* contamination on the surfaces of environmental objects that health care workers frequently touch

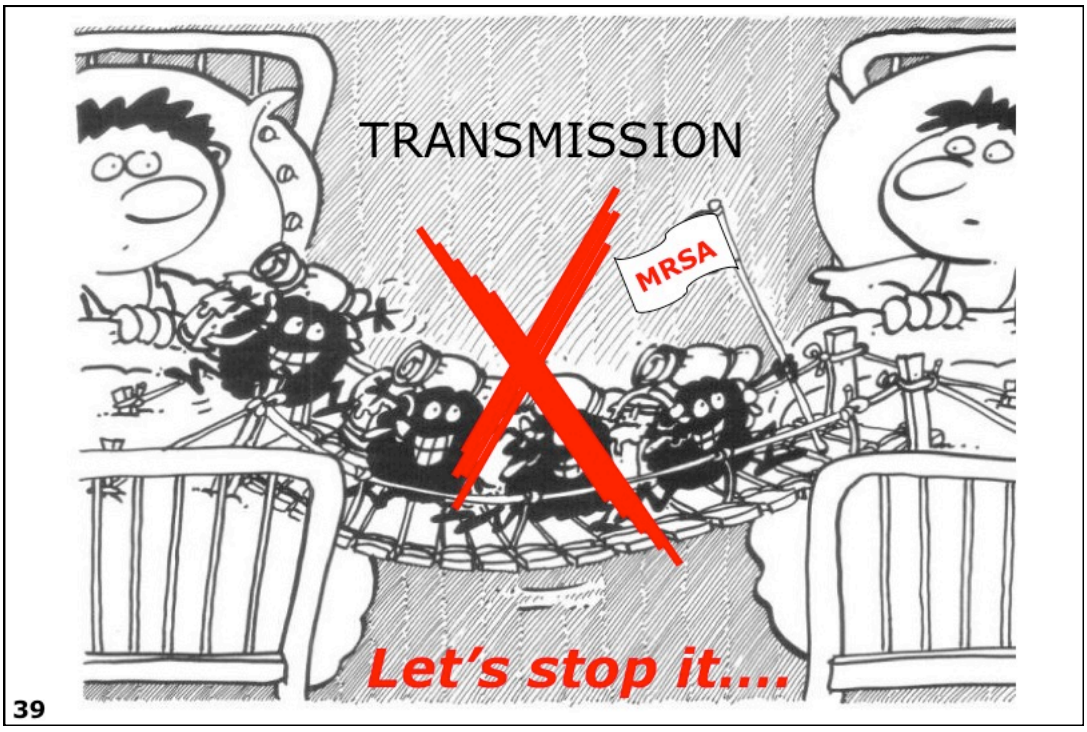
Dongxin Lin MSc [a], Qianting Ou MSc [a], Jialing Lin MSc [a], Yang Peng MSc [b], Zhenjiang Yao PhD [a,*]

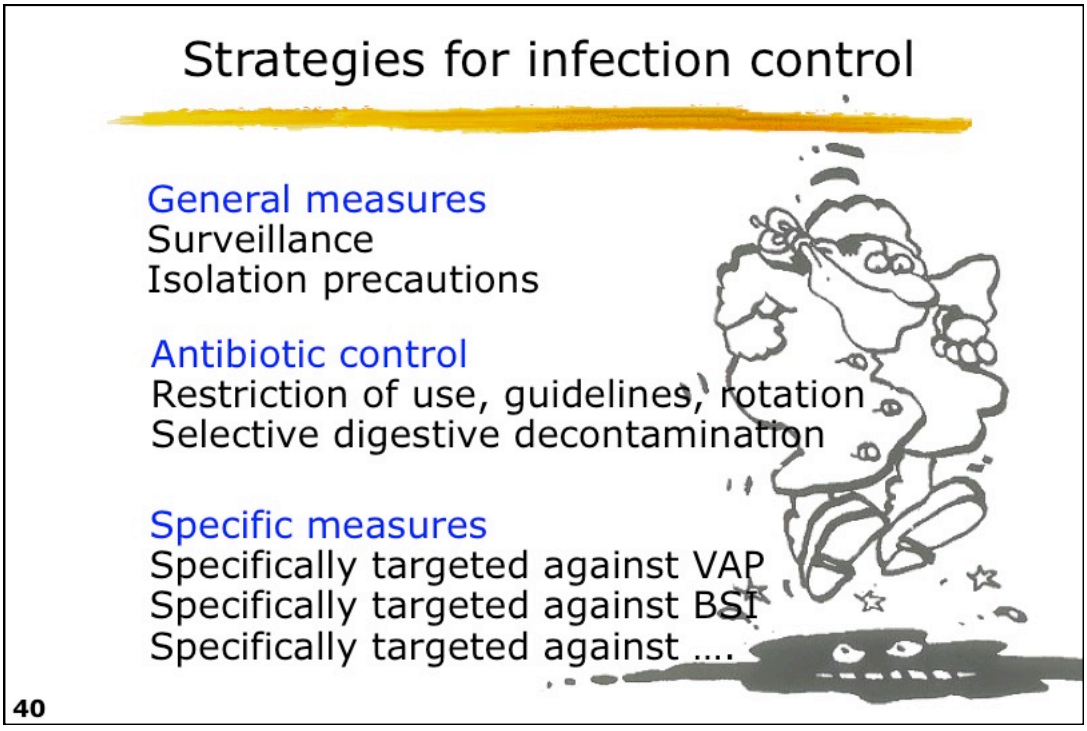




38

American Journal of Infection Control ■■ (2016) ■■-■■


TRANSMISSION
MRSA
Let's stop it....
39


Strategies for infection control
General measures
Surveillance
Isolation precautions
Antibiotic control
Restriction of use, guidelines, rotation
Selective digestive decontamination
Specific measures
Specifically targeted against VAP
Specifically targeted against BSI
Specifically targeted against ....
40

Intensive Care Med (2012) 38:1930–1945
DOI 10.1007/s00134-012-2695-9

SPECIAL ARTICLE

Alexis Tabah
Despoina Koulenti
Kevin Laupland
Benoit Misset
Jordi Valles
Frederico Bruzzi de Carvalho
José Artur Paiva
Nahit Çakar
Xiaochun Ma
Philippe Eggimann
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Jean-Ralph Zahar
Stijn Blot
Jean Carlet
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Claude Martin
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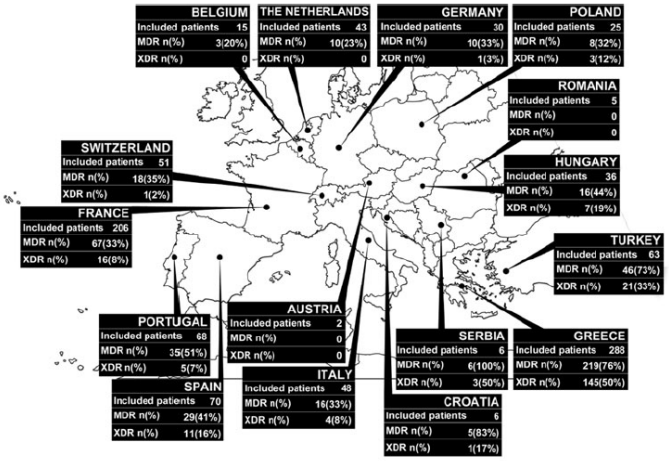
Georges Dimopoulos
Jean-François Timsit

41

Characteristics and determinants of outcome of hospital-acquired bloodstream infections in intensive care units: the EUROBACT International Cohort Study



Intensive Care Med (2012) 38:1930–1945
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42

Characteristics and determinants of outcome of hospital-acquired bloodstream infections in intensive care units: the EUROBACT International Cohort Study

	Susceptible, *n* (%)	MDR,[a] *n* (%)	XDR,[a] *n* (%)	PDR,[a] *n* (%)	Total
Gram-negative					759 (57.6 %)
Acinetobacter spp.	13 (8.1 %)	147 (91.9 %)	114 (71.3 %)	1 (0.6 %)	160 (12.2 %)
Klebsiella spp.	46 (29.5 %)	110 (70.5 %)	76 (48.7 %)	3 (1.9 %)	156 (11.9 %)
Pseudomonas spp.	95 (63.3 %)	55 (36.7 %)	41 (27.3 %)	1 (0.7 %)	150 (11.4 %)
Escherichia coli	57 (58.2 %)	41 (41.8 %)	5 (5.1 %)	0 (0 %)	98 (7.4 %)
Enterobacter spp.	48 (54.6 %)	40 (45.5 %)	17 (19.3 %)	0 (0 %)	88 (6.7 %)
Other gram-negative	69 (64.5 %)	38 (35.5 %)	15 (14.0 %)	0 (0 %)	107 (8.1 %)
Gram-positive					440 (33.4 %)
Enterococcus spp	103 (71.5 %)	41 (28.5 %)	2 (1.4 %)	0 (0 %)	144 (10.9 %)
Coagulase-negative staphylococci and other staphylococci	141 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	141 (10.7 %)
Staphylococcus aureus	60 (50.4 %)	59 (49.6 %)	0 (0 %)	0 (0 %)	119 (9 %)
Other gram-positive	36 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	36 (2.7 %)
Anaerobes					20 (1.5 %)
Bacteroides spp.	13 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	13 (1 %)
Other anaerobes	7 (100 %)	0 (0 %)	0 (0 %)	0 (0 %)	7 (0.5 %)
Fungi					98 (7.4 %)
Candida albicans	0 (0 %)	56 (100 %)	0 (0 %)	0 (0 %)	56 (4.3 %)
Candida non-*albicans*	0 (0 %)	39 (100 %)	0 (0 %)	0 (0 %)	39 (3 %)
Other	0 (0 %)	3 (100 %)	0 (0 %)	0 (0 %)	3 (0.2 %)
Total (patient)[b]	570 (49.3 %)	586 (50.7 %)	254 (22 %)	5 (0.43 %)	1,156
Total (micro-organisms)	688 (52.2 %)	629 (47.8 %)	270 (20.5 %)	5 (0.38 %)	1,317

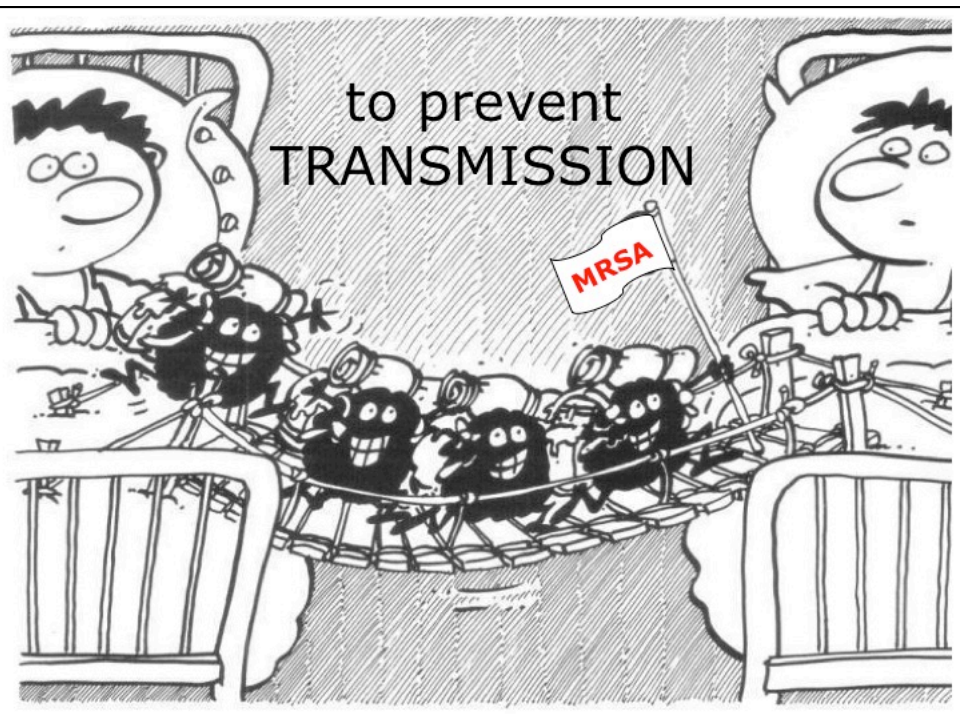
Strategies for infection control

General measures
Surveillance
Isolation precautions

Antibiotic control
Restriction of use, guidelines, rotation
Selective digestive decontamination

Specific measures
Specifically targeted against VAP
Specifically targeted against BSI
Specifically targeted against ….

43



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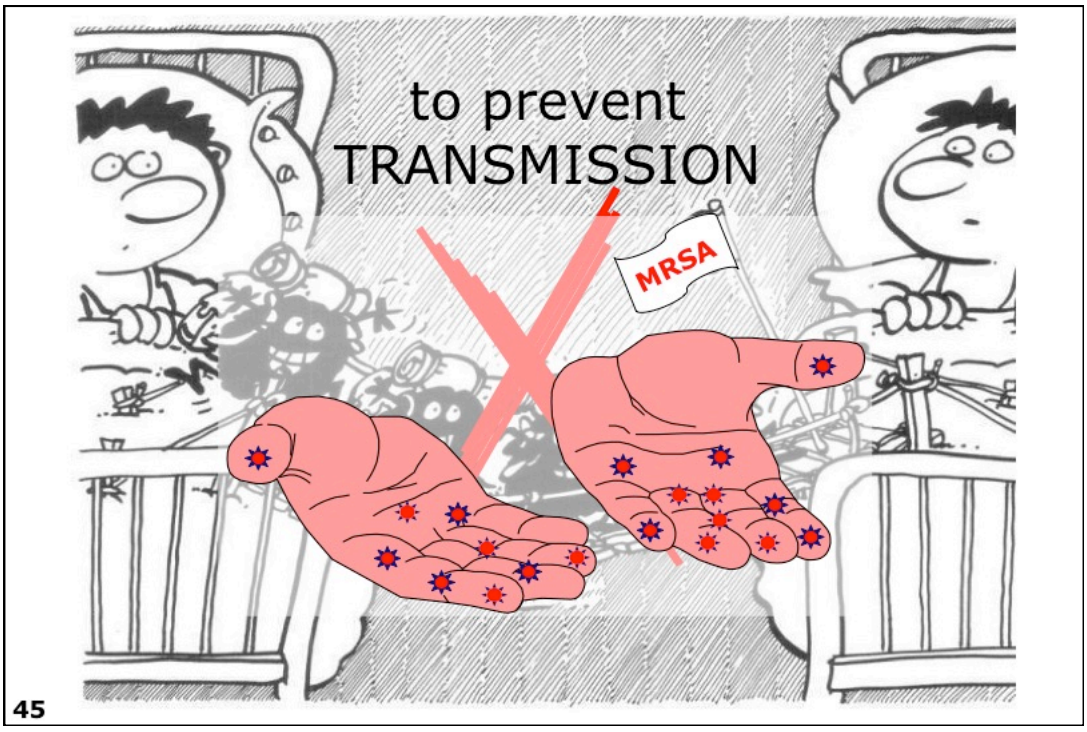
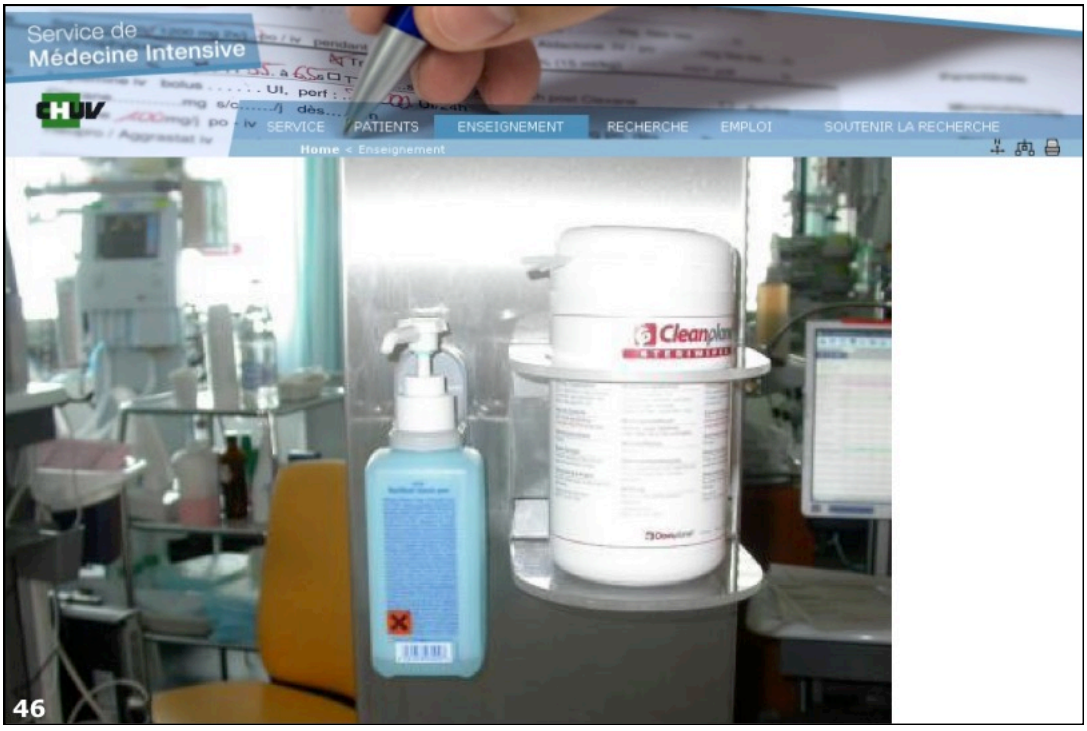
Severe MRSA in Acute Care Setting
Dr. Philippe Eggimann, Service de médecine intensive adulte, Lausanne University
A Webber Training Teleclass





Severe MRSA in Acute Care Setting
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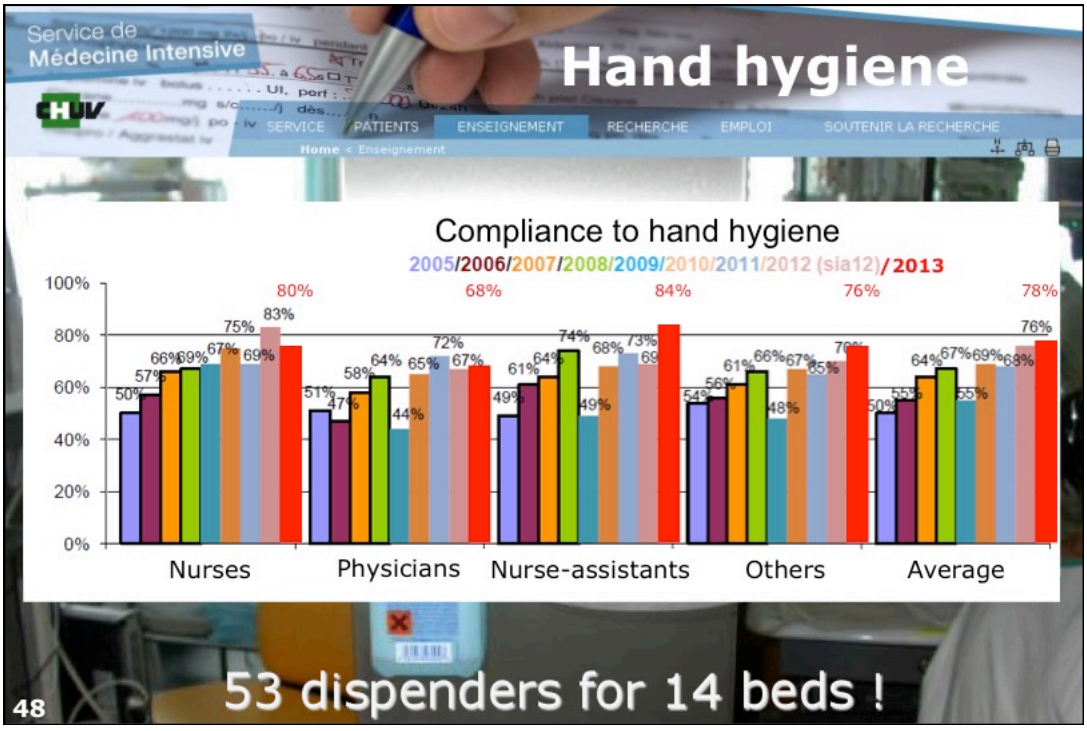

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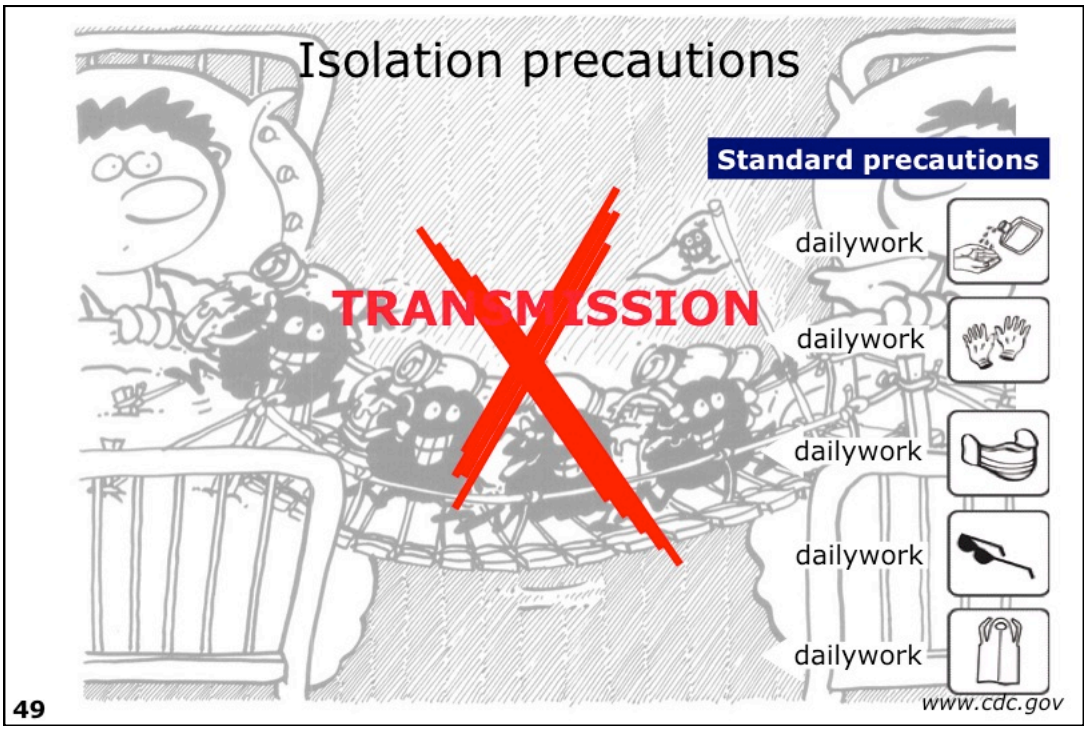
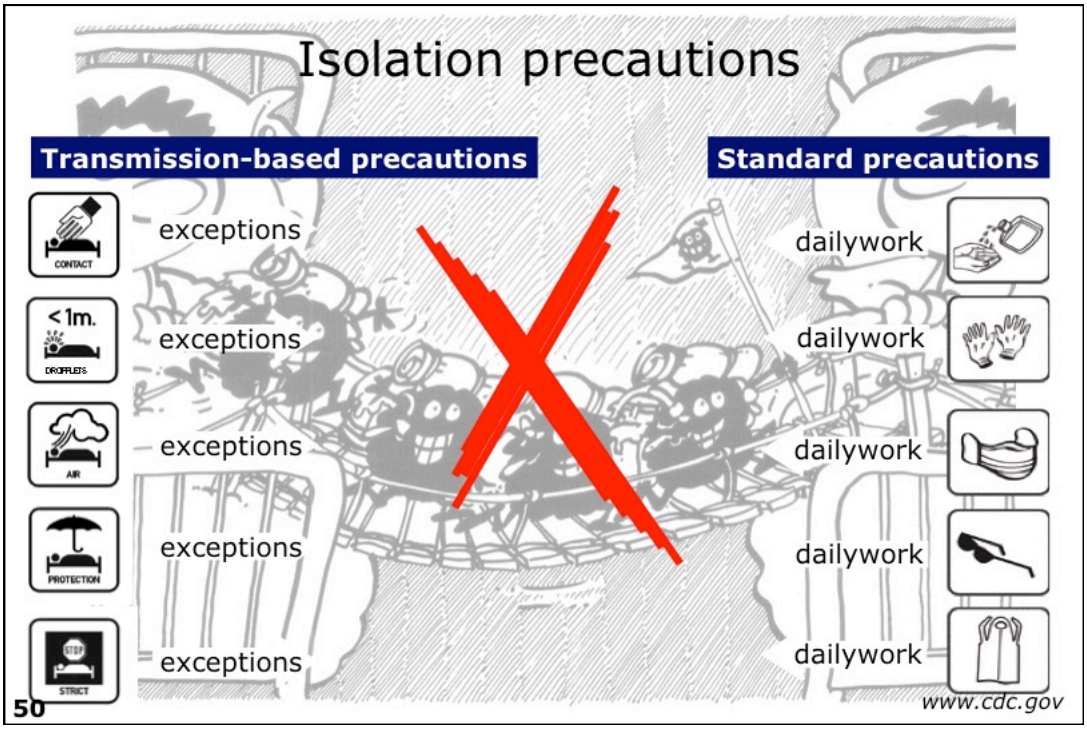
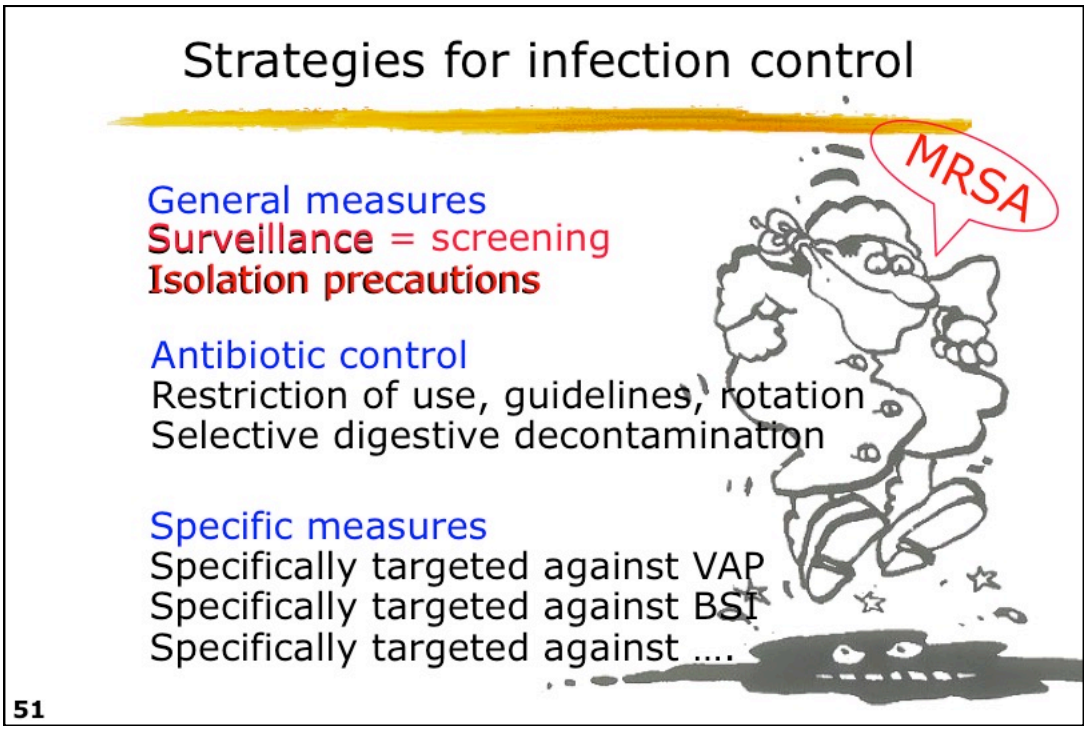

Isolation precautions
Standard precautions
TRANSMISSION
dailywork
dailywork
dailywork
dailywork
dailywork
www.cdc.gov
49


Isolation precautions
Transmission-based precautions
Standard precautions
CONTACT
<1m.
DROPLETS
AIR
PROTECTION
STRICT
exceptions
exceptions
exceptions
exceptions
exceptions
dailywork
dailywork
dailywork
dailywork
dailywork
www.cdc.gov
50


Strategies for infection control
General measures
Surveillance = screening
Isolation precautions
Antibiotic control
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Selective digestive decontamination
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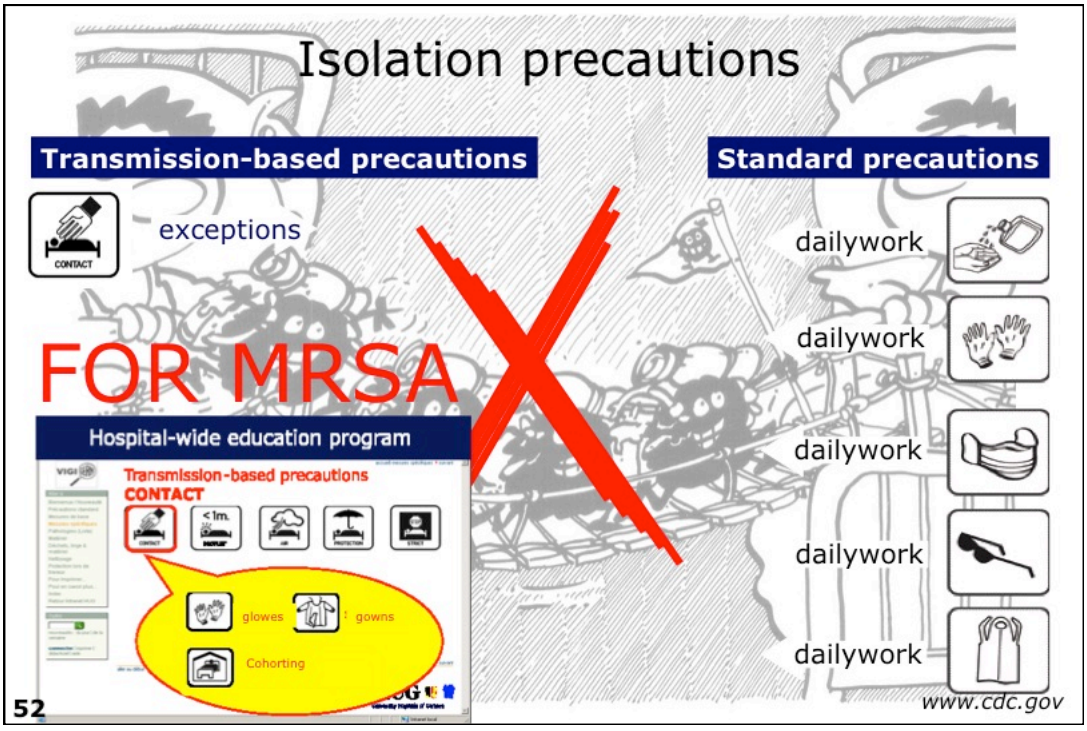
Specifically targeted against VAP
Specifically targeted against BSI
Specifically targeted against ....
MRSA
51


Isolation precautions
Transmission-based precautions
exceptions
FOR MRSA
Hospital-wide education program
Transmission-based precautions
CONTACT
gloves
gowns
Cohorting
Standard precautions
dailywork
dailywork
dailywork
dailywork
dailywork
www.cdc.gov
52

Efficacy of screening + isolation

Intensive Care Med (2005) 31:1051–1057
DOI 10.1007/s00134-005-2679-0

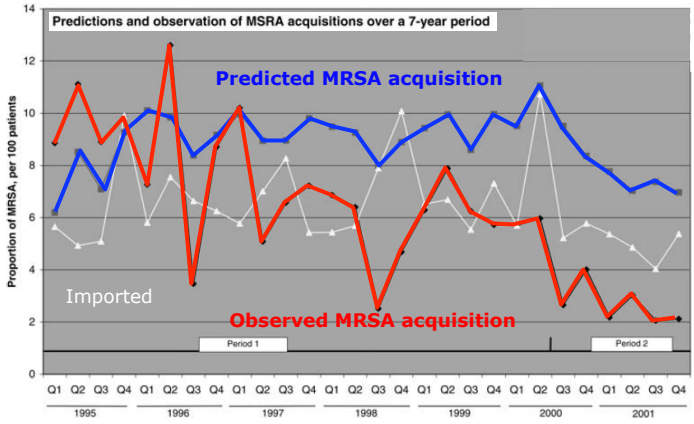
ORIGINAL

Jean-Christophe Lucet
Xavier Paoletti
Isabelle Lolom
Catherine Paugam-Burtz
Jean-Louis Trouillet
Jean-François Timsit
Claude Deblangy
Antoine Andremont
Bernard Regnier

Successful long-term program for controlling methicillin-resistant *Staphylococcus aureus* in intensive care units

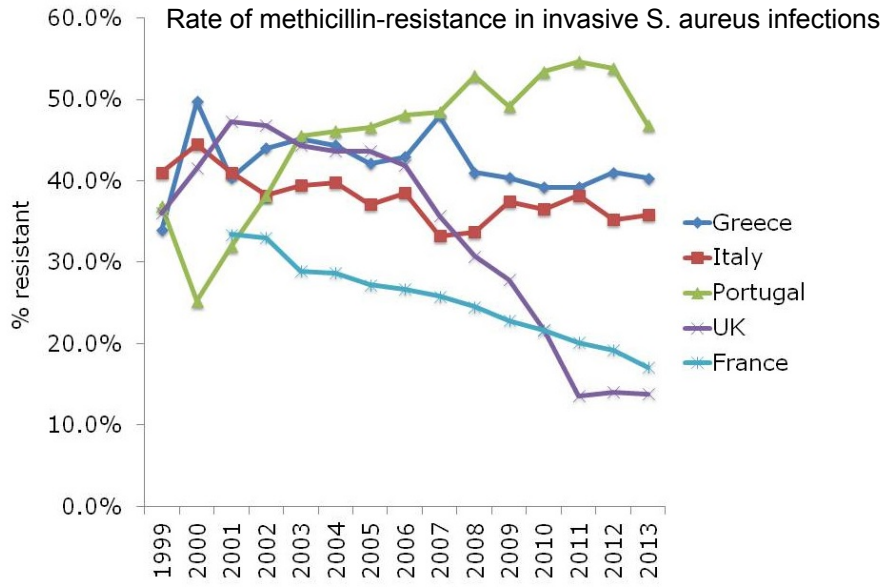
→Screening
→Standard precautions
- OH-handrub

→Contact precautions
- preemptive isolation



53

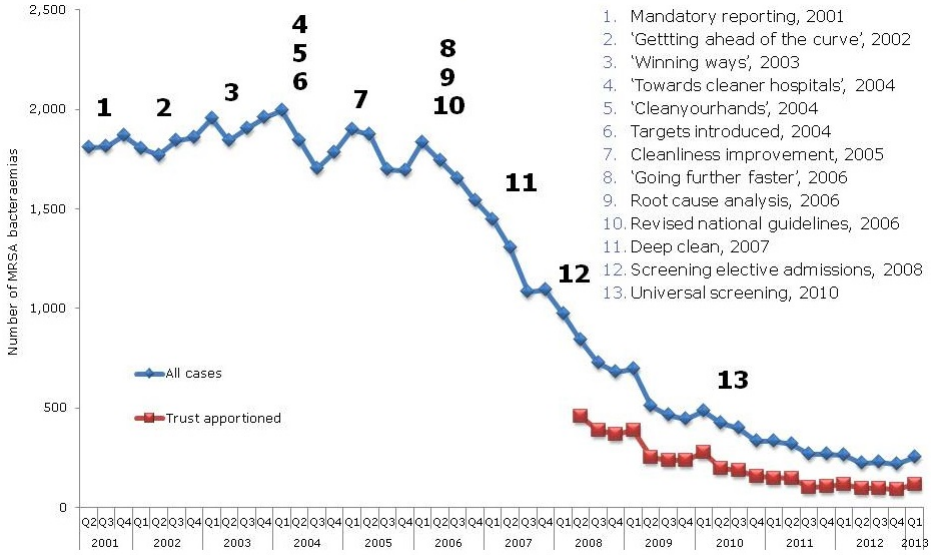
Efficacy of screening + isolation



54

http://reflectionsipc.com/category/mrsa/page/2/

Efficacy of screening + isolation

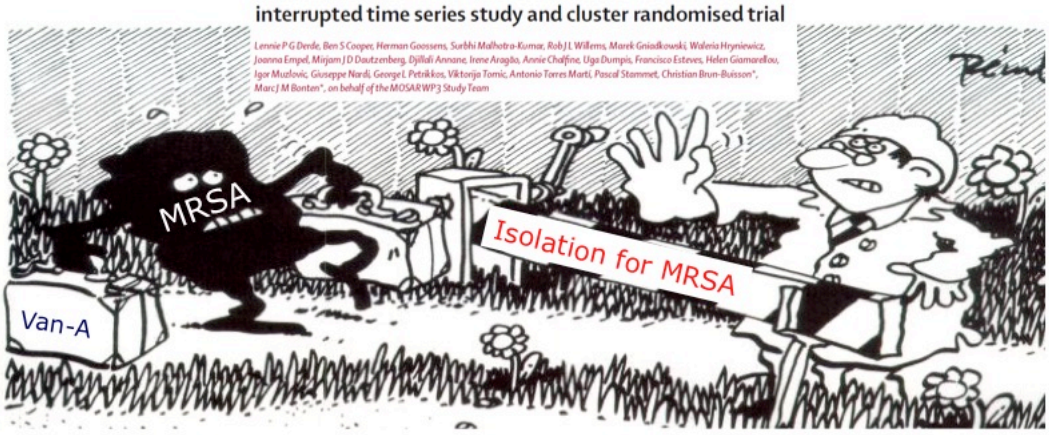


55 https://reflectionsipc.files.wordpress.com/2015/03/mrsa-bacteraemia-whats-made-the-differecnce.jpg

Doubts on screening + isolation

Interventions to reduce colonisation and transmission of antimicrobial-resistant bacteria in intensive care units: an interrupted time series study and cluster randomised trial

Lennie P G Derde, Ben S Cooper, Herman Goossens, Surbhi Malhotra-Kumar, Rob J L Willems, Marek Gniadkowski, Waleria Hryniewicz, Joanna Empel, Mirjam J D Dautzenberg, Djilali Annane, Irene Aragão, Annie Chalfine, Uga Dumpis, Francisco Esteves, Helen Giamarellou, Igor Muzlovic, Giuseppe Nardi, George L Petrikkos, Viktorija Tomic, Antonio Torres Marti, Pascal Stammet, Christian Brun-Buisson*, Marc J M Bonten*, on behalf of the MOSAR WP3 Study Team



Interpretation Improved hand hygiene plus unit-wide chlorhexidine body-washing reduced acquisition of antimicrobial-resistant bacteria, particularly MRSA. In the context of a sustained high level of compliance to hand hygiene and chlorhexidine bathings, screening and isolation of carriers do not reduce acquisition rates of multidrug-resistant bacteria, whether or not screening is done with rapid testing or conventional testing.

Lancet Infect Dis 2014; 14: 31-39

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Severe MRSA in Acute Care Setting
Dr. Philippe Eggimann, Service de médecine intensive adulte, Lausanne University
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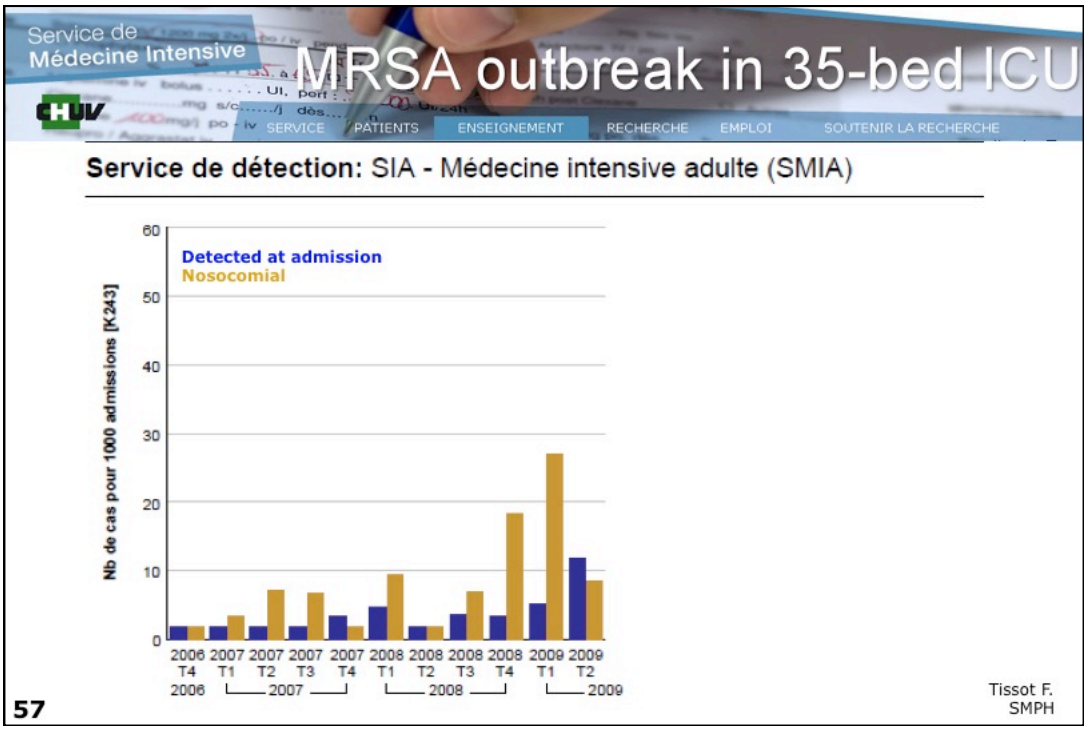

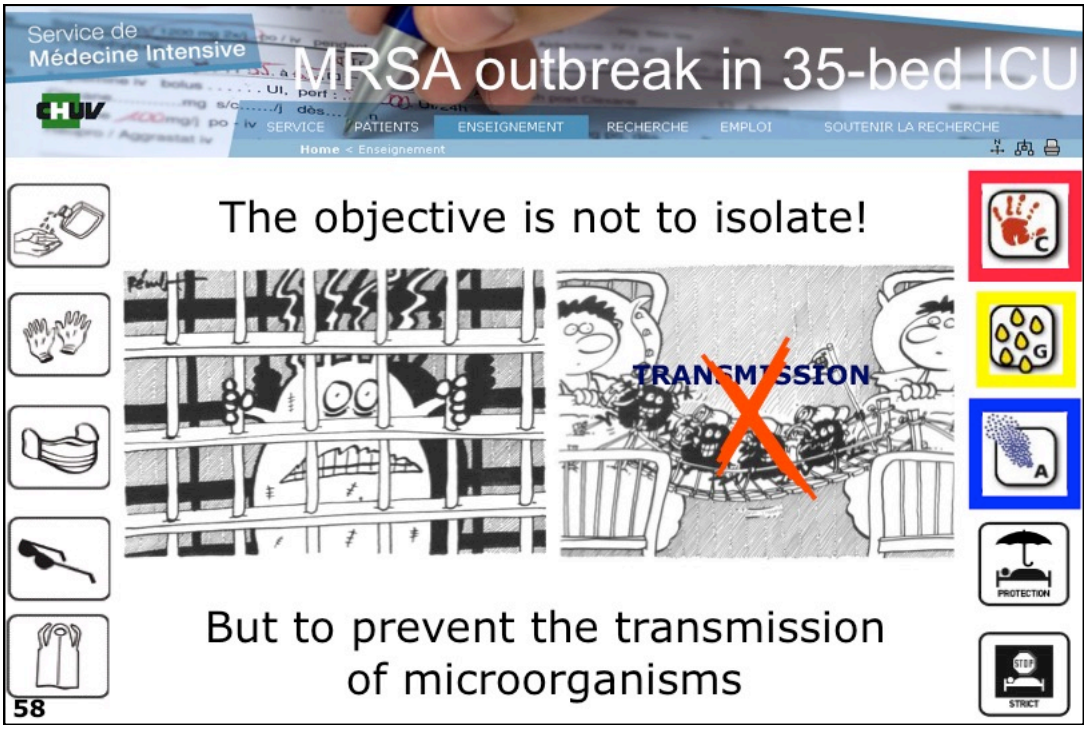

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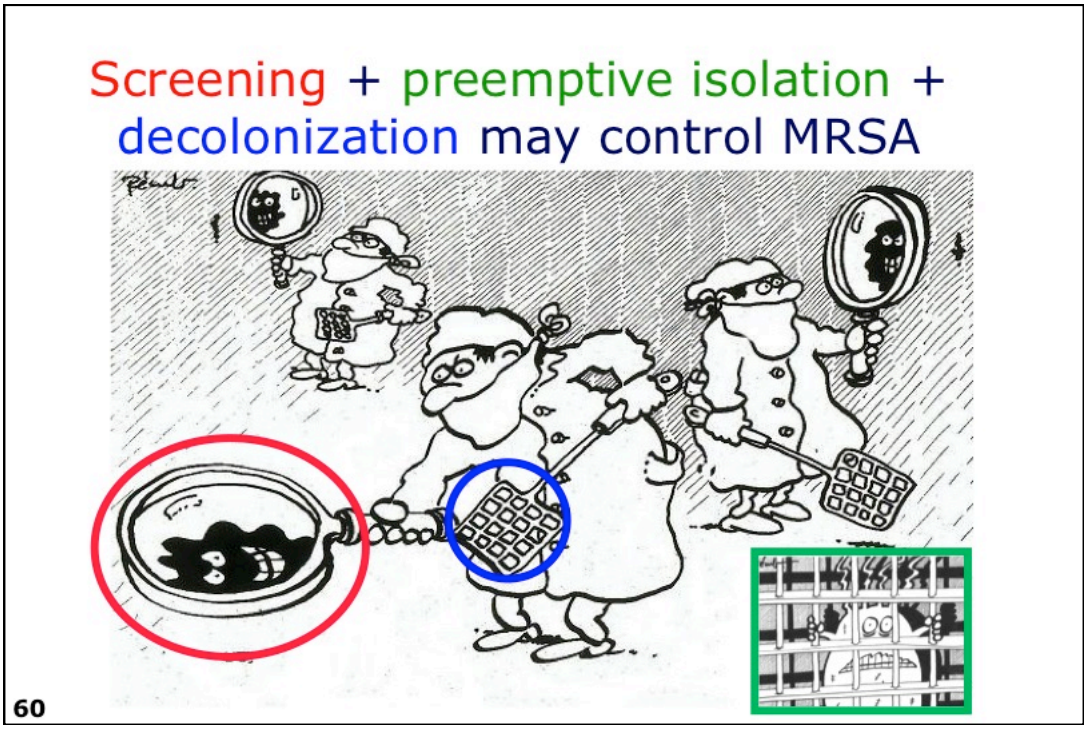

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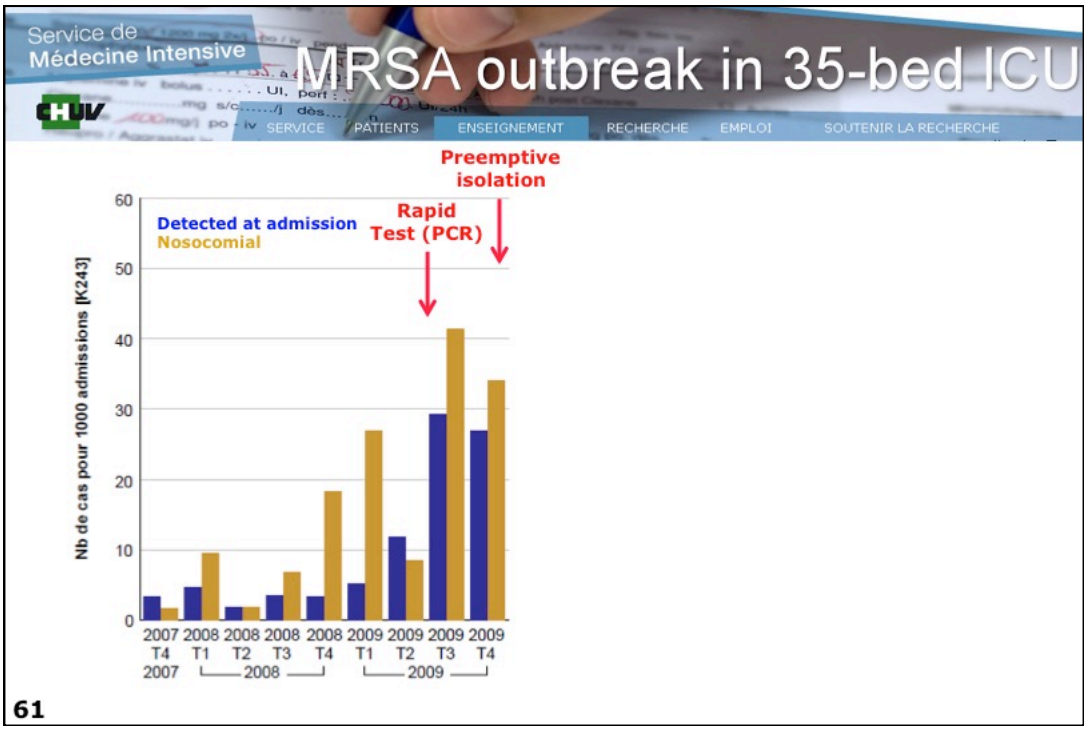
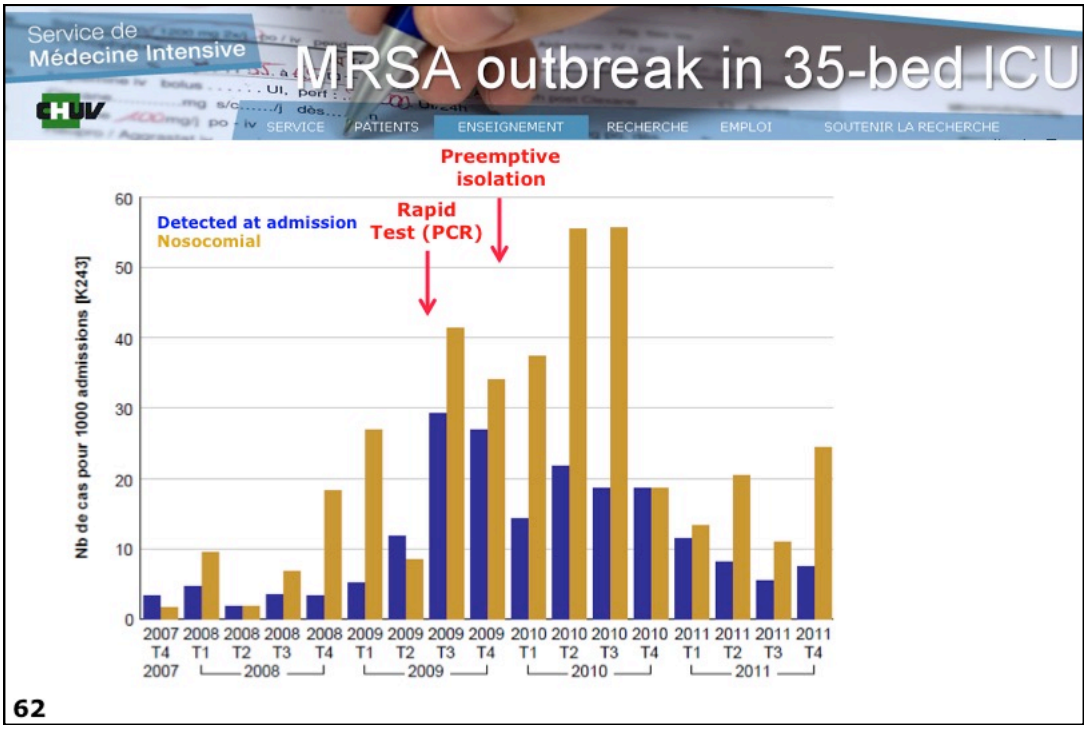

Service de
Médecine Intensive
MRSA outbreak in 35-bed ICU
CHUV
SERVICE
PATIENTS
ENSEIGNEMENT
RECHERCHE
EMPLOI
SOUTENIR LA RECHERCHE
Preemptive isolation
Detected at admission
Nosocomial
Rapid Test (PCR)
Nb de cas pour 1000 admissions [K243]
0
10
20
30
40
50
60
2007 T4
2008 T1
2008 T2
2008 T3
2008 T4
2009 T1
2009 T2
2009 T3
2009 T4
2007
2008
2009
61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2009 T3
2009 T4
2010 T1
2010 T2
2010 T3
2010 T4
2011 T1
2011 T2
2011 T3
2011 T4
2007
2008
2009
2010
2011
62

Strategies for infection control

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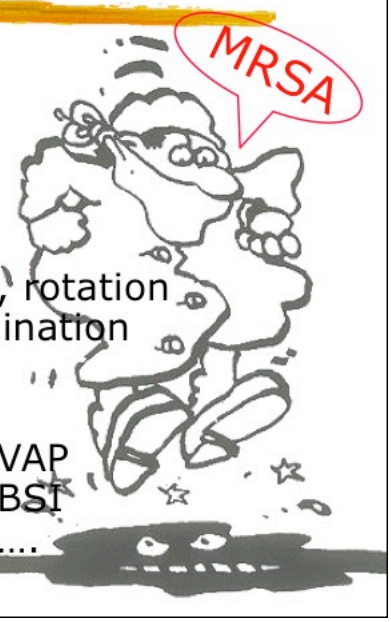


63

CHX washing

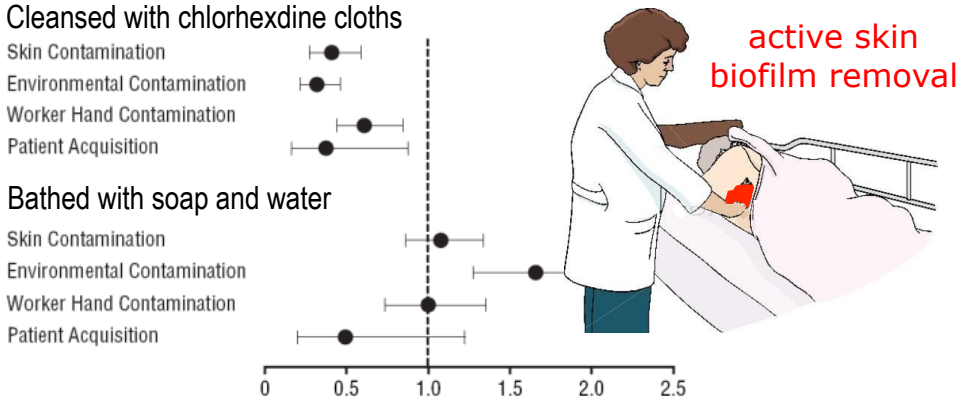
?

64

CHX washing → source control

Chlorhexidine Gluconate to Cleanse Patients in a Medical Intensive Care Unit

Source Control to Reduce the Bioburden of Vancomycin-Resistant Enterococci



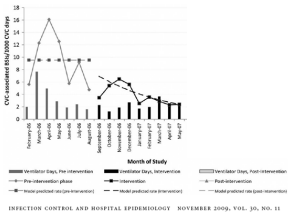
Vernon Arch Intern Med 06

65

CHX washing → source control

Prevention of Bloodstream Infections by Use of Daily Chlorhexidine Baths for Patients at a Long-Term Acute Care Hospital

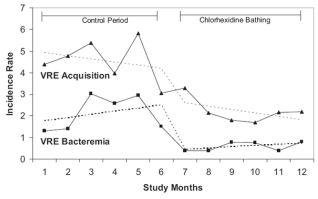
L. Silvia Munoz-Price, MD; Bala Hota, MD, MPH; Alexander Stemer, MD; Robert A. Weinstein, MD



INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY NOVEMBER 2009, VOL. 30, NO. 11

The effect of daily bathing with chlorhexidine on the acquisition of methicillin-resistant *Staphylococcus aureus*, vancomycin-resistant *Enterococcus*, and healthcare-associated bloodstream infections: Results of a quasi-experimental multicenter trial*

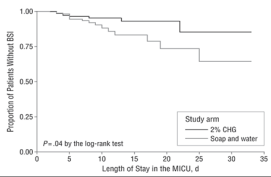
Michael W. Climo, MD; Kent A. Sepkowitz, MD; Gianna Zuccotti, MD, MPH; Victoria J. Fraser, MD; David K. Warren, MD; Trish M. Perl, MD, MSc; Kathleen Speck; John A. Jernigan, MD; Jaime R. Robles, PhD; Edward S. Wong, MD



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

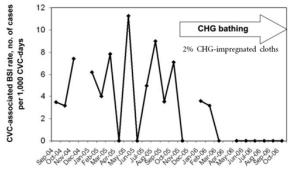
Susan C. Bleasdale, MD; William E. Trick, MD; Ines M. Gonzalez, MD; Rosie D. Lyles, MD; Mary K. Hayden, MD; Robert A. Weinstein, MD

Arch Intern Med. 2007;167(19):2073-2079



Effectiveness of Routine Patient Cleansing with Chlorhexidine Gluconate for Infection Prevention in the Medical Intensive Care Unit

Kyle J. Popovich, MD; Bala Hota, MD, MPH; Robert Hayes, BA; Robert A. Weinstein, MD; Mary K. Hayden, MD



INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY OCTOBER 2009, VOL. 30, NO. 10

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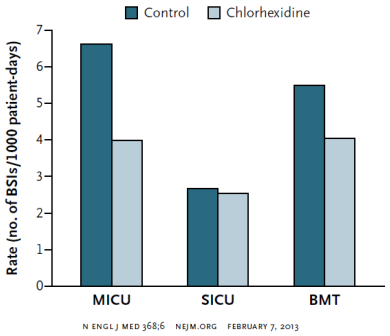
Severe MRSA in Acute Care Setting
Dr. Philippe Eggimann, Service de médecine intensive adulte, Lausanne University
A Webber Training Teleclass

CHX washing → source control

The NEW ENGLAND JOURNAL of MEDICINE

Effect of Daily Chlorhexidine Bathing on Hospital-Acquired Infection

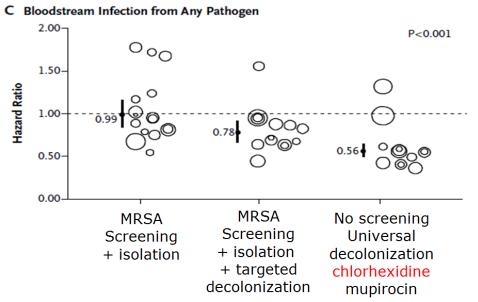
Michael W. Climo, M.D., Deborah S. Yokoe, M.D., M.P.H., David K. Warren, M.D., Trish M. Perl, M.D., Maureen Bolon, M.D., Loreen A. Herwaldt, M.D., Robert A. Weinstein, M.D., Kent A. Sepkowitz, M.D., John A. Jernigan, M.D., Kakotan Sanogo, M.S., and Edward S. Wong, M.D.



N ENGL J MED 368;6 NEJM.ORG FEBRUARY 7, 2013

Targeted versus Universal Decolonization to Prevent ICU Infection

Susan S. Huang, M.D., M.P.H., Edward Septimus, M.D., Ken Kleinman, Sc.D., Julia Moody, M.S., Jason Hickok, M.B.A., R.N., Taliser R. Avery, M.S., Julie Lankiewicz, M.P.H., Adrijana Gombosev, B.S., Leah Terpstra, B.A., Fallon Hartford, M.S., Mary K. Hayden, M.D., John A. Jernigan, M.D., Robert A. Weinstein, M.D., Victoria J. Fraser, M.D., Katherine Haffenreffer, B.S., Eric Cui, B.S., Rebecca E. Kaganov, B.A., Karen Lolans, B.S., Jonathan B. Perlin, M.D., Ph.D., and Richard Platt, M.D., for the CDC Prevention Epicenters Program and the AHRQ DECIDE Network and Healthcare-Associated Infections Program*



This article was published on May 29,

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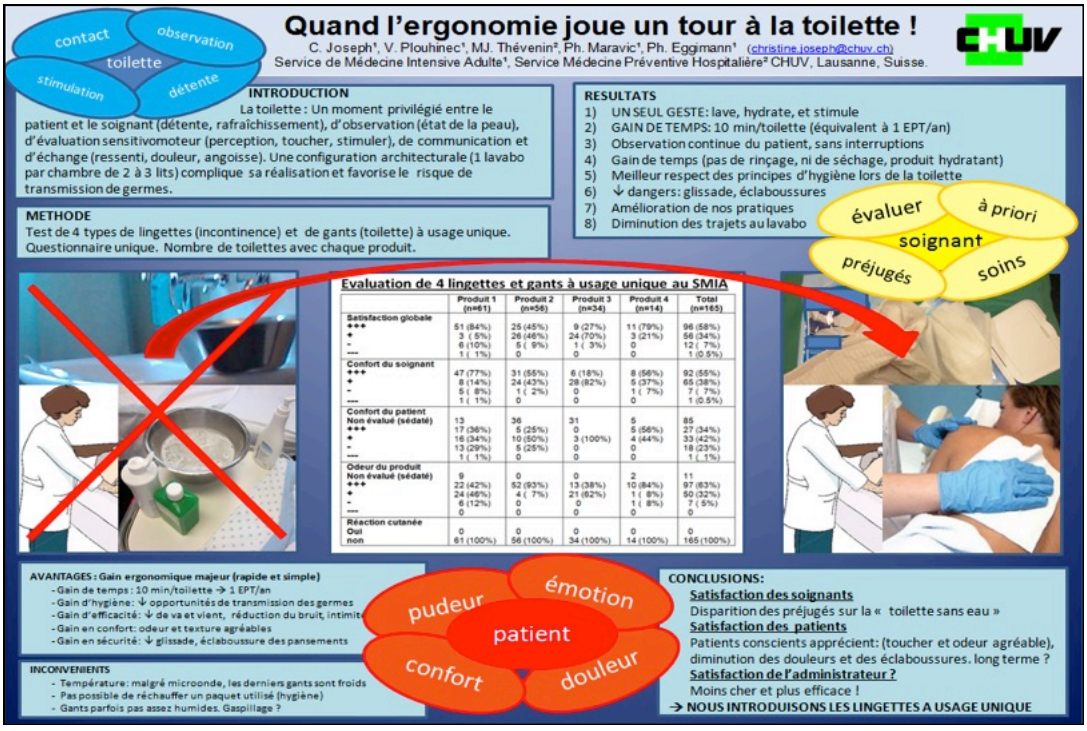

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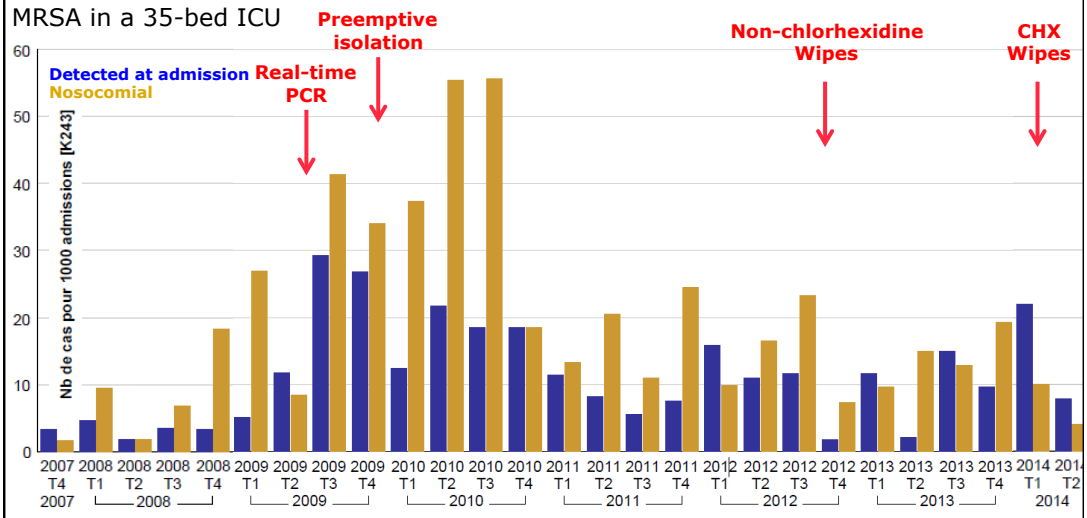
CHX washing → source control



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CHX washing → source control

Insights into bacterial colonization of intensive care patients' skin: the effect of chlorhexidine daily bathing

N. Cassir · L. Papazian · P.-E. Fournier · D. Raoult · B. La Scola

Table 1 Comparison of the number of different species identified per site

Site	Chlorhexidine group, $N=10$, Median (IQR)	Water and soap group, $N=10$, Median (IQR)	P value
Nares	3.3 (3–4.75)	4 (3.25–4.75)	0.68
Axillary vault	0.5 (0–1.65)	5 (3.25–6)	<0.001[a]
Inguinal crease	3 (2–3)	5 (4–5)	0.04[a]
Manubrium	2 (1.25–2)	3 (3–4)	<0.001[a]
Back	1 (1–2)	2 (1–2)	0.20
All sites	17 (12.25–23)	33 (25.25–37.5)	0.004[a]

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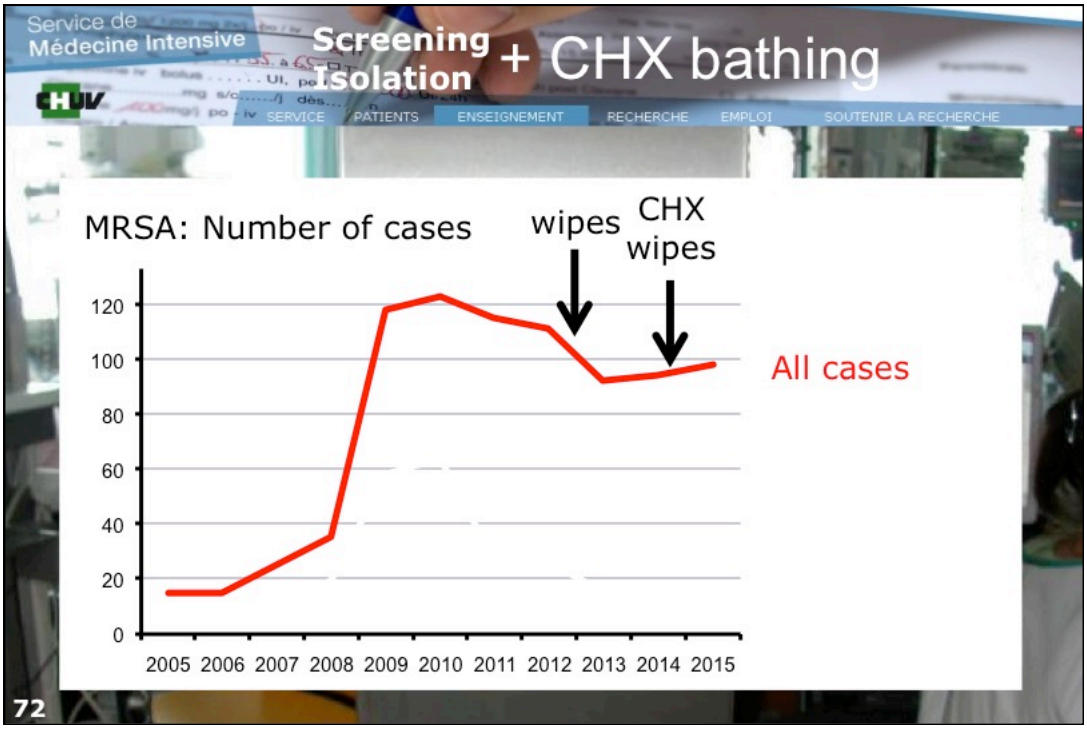
Eur J Clin Microbiol Infect Dis (2015) 34:999–1004

Severe MRSA in Acute Care Setting
Dr. Philippe Eggimann, Service de médecine intensive adulte, Lausanne University
A Webber Training Teleclass



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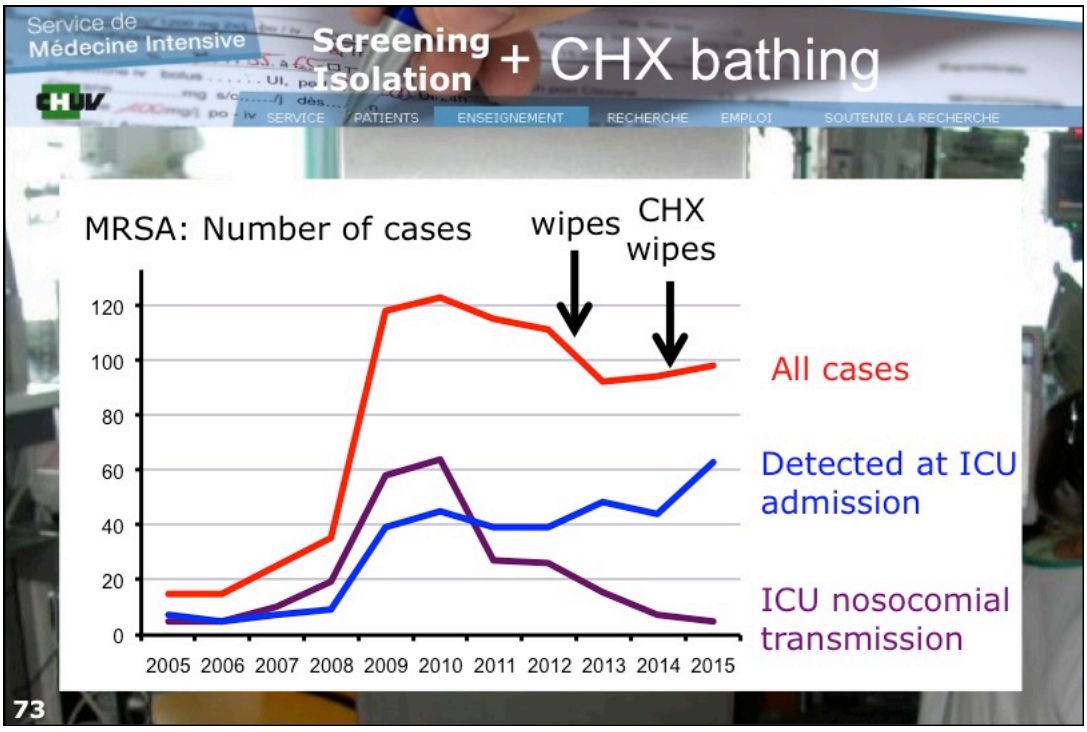

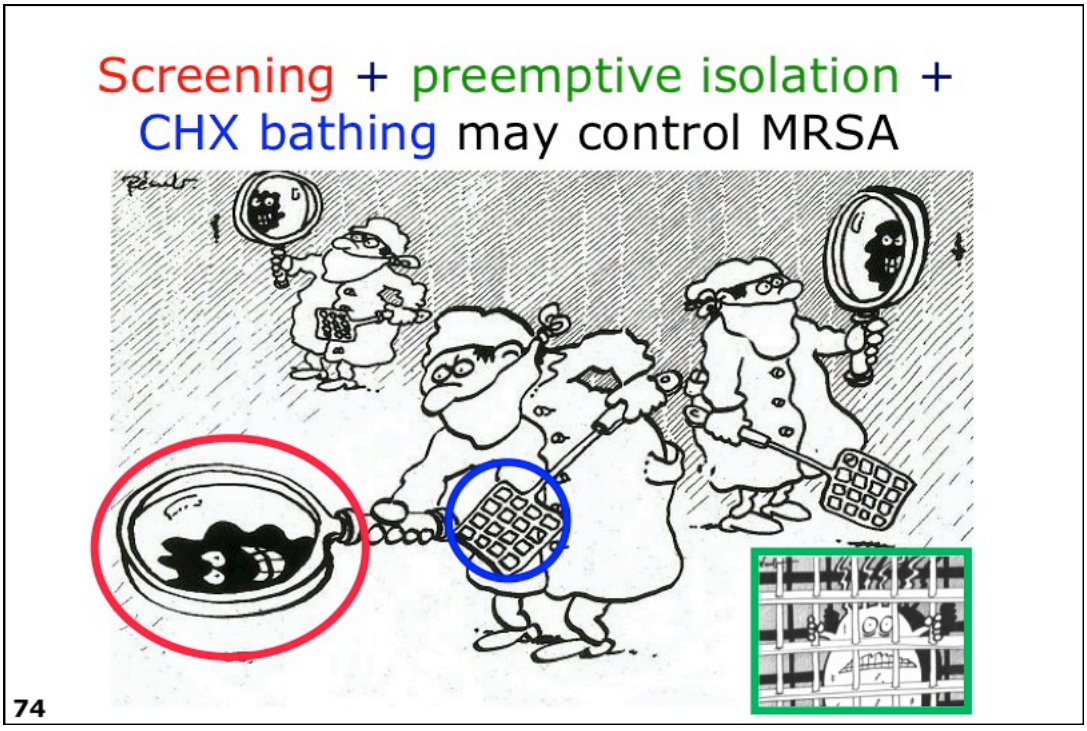

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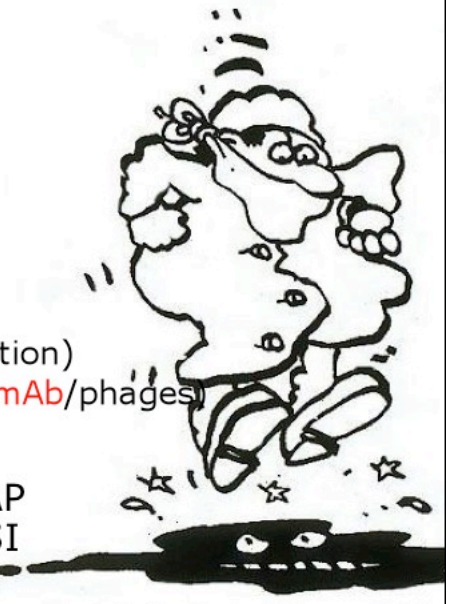
Strategies for infection control

General measures
Surveillance
Isolation precautions

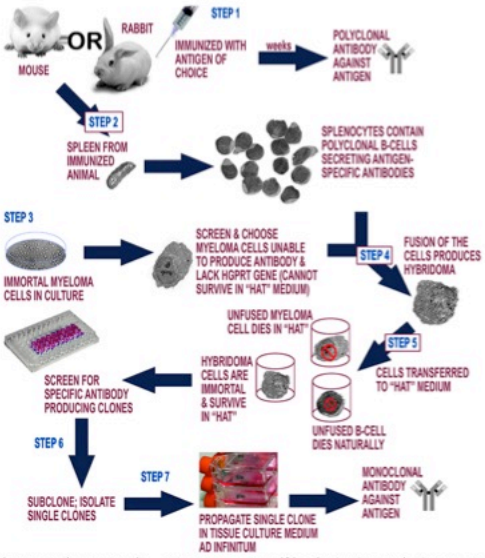
Antibiotic control
Combination therapy
SDD; probiotics
Stewardship (guidelines; deescalation)
New strategies (TDM/aerosols/mAb/phages)

Specific strategies
Specifically targeted against VAP
Specifically targeted against BSI
Specifically targeted against ....



75 *Eggimann et al. Swiss Fedical Forum 2015*

mAb



76 http://www.scilogs.com/in_scientio_veritas/files/MOUSE-MAb-SMALL.jpg

mAb

The SAATELLITE and EVADE Clinical Studies Within the COMBACTE Consortium: A Public–Private Collaborative Effort in Designing and Performing Clinical Trials for Novel Antibacterial Drugs to Prevent Nosocomial Pneumonia

Bruno François,[1] Jean Chastre,[2] Philippe Eggiman,[3] Pierre-François Laterre,[4] Antoni Torres,[5] Miguel Sanchez,[6] Mark T. Esser,[7] Brian Bishop,[7] Marc Bonten,[8] Herman Goosens,[9] and Hasan S. Jafri[7]

The Innovative Medicines Initiative–funded COMBACTE consortium fosters academic-industry partnership in pioneering studies to combat serious bacterial infections. We describe how this partnership is advancing the development of 2 monoclonal antibodies, MEDI4893 and MEDI3902, for the prevention of nosocomial pneumonia.

Anti-Pseudomonas

Anti-MSSA/MRSA

Clinical Infectious Diseases® 2016;63(S2):S46–51

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Prevention and Control of Methicillin-Resistant *Staphylococcus aureus* in Acute Care Settings

Andie S. Lee, MB BS, DTM&H, MSc[a,*], Benedikt Huttner, MD, MS[b,c], Stephan Harbarth, MD, MS[b]

KEY POINTS

- Methicillin-resistant *Staphylococcus aureus* (MRSA) is an important cause of health care–associated infections and is endemic in many health care facilities worldwide.
- Decreasing rates of invasive MRSA infections have been reported in many countries over recent years, often following implementation of concerted and coordinated multifaceted interventions at a national level.
- Despite these successes, the optimal approach to MRSA control remains controversial, particularly with regards to MRSA screening, isolation, decolonization, and environmental cleaning.
- Over the last decade, new data from robust large-scale studies have emerged, particularly with regards to MRSA screening and decolonization (targeted and universal) strategies.
- Flexibility to adapt and institute evidence-based measures in the context of local epidemiology, infrastructure, and resources is essential for successful MRSA control.

Infect Dis Clin N Am 30 (2016) 931–952

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The world of nosocomial infections

Emergence and resurgence of MRSA as a public-health threat

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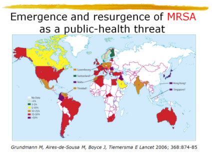
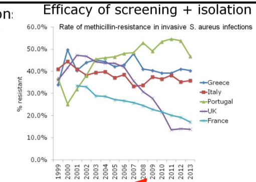
The world of nosocomial infection:

Emergence and resurgence of MRSA as a public-health threat



Grundmann H, Aires-de-Sousa M, Boyce J, Tiemersma E Lancet 2006; 368:874-85

Efficacy of screening + isolation



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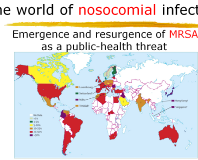

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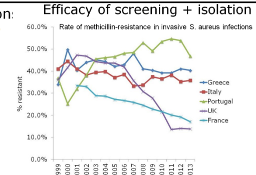
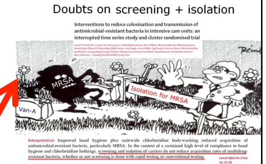


Doubts on screening + isolation



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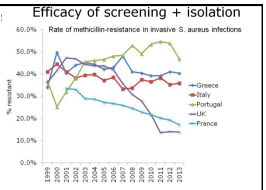
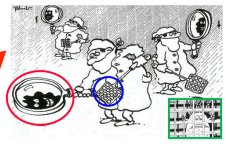
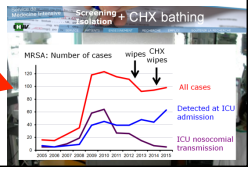


Doubts on screening + isolation

Screening + preemptive isolation + CHX bathing may control MRSA





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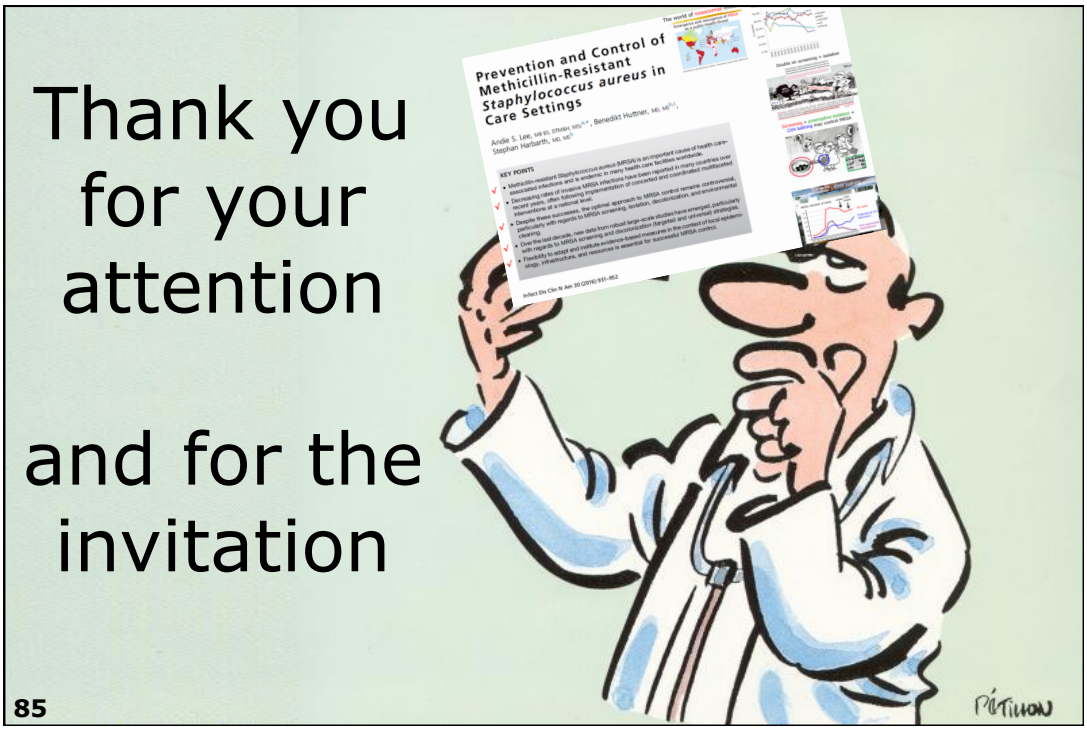

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March 29, 2017	*(South Pacific Teleclass)* **CATHETER-ASSOCIATED URINARY TRACT INFECTION PREVENTION IN THE CONTINUUM OF ACUTE CARE** Speaker: **Jan Gralton**, Australian Commission on Safety and Quality in Healthcare
March 30, 2017	**SCREENING FOR *STAPHYLOCOCCUS AUREUS* BEFORE SURGERY ... WHY BOTHER** Speaker: **Dr. Hilary Humphreys**, The Royal College of Surgeons in Ireland
April 6, 2017	**TECHNOLOGIC INNOVATIONS TO PREVENT CATHETER-RELATED BLOODSTREAM INFECTIONS** Speaker: **Prof. Mark Rupp**, University of Nebraska Medical Center
April 25, 2017	*(FREE European Teleclass ... Denver Russell Memorial Teleclass Lecture)* **DO'S AND DONT'S FOR HOSPITAL CLEANING** Speaker: **Dr. Stephanie Dancer**, Health Protection Scotland
April 27, 2017	**COST ANALYSIS OF UNIVERSAL SCREENING VS. RISK FACTOR-BASED SCREENING FOR MRSA** Speaker: **Dr. Virginia Roth**, University of Ottawa
	(FREE ... WHO Teleclass - Europe)

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