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iame UMR 1137
Infection • Antimicrobials • Modelling • Evolution

Mentimeter

Pneumonies en réanimation
RFE

Lila Bouadma
Medical and Infectious Diseases ICU
Bichat Hospital
Inserm UMR 1137 IAME
Paris-Diderot University
Paris FRANCE

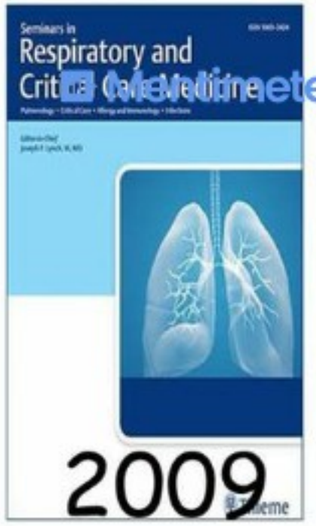
Mentimeter

Déclaration de liens

mon intervention
ne présente
aucun conflit d'intérêt

The Alphabet Soup of Pneumonia: CAP, HAP, HCAP, NHAP, and VAP

Nitin Anand, M.D.[1] and Marin H. Kollef, M.D.[1]



Pneumonia in ICU

Mentimeter

CAP
Community-acquired pneumonia

HCAP
Healthcare- associated pneumonia

HAP
Hospitalized-acquired pneumonia

- HAP acquired in ward
- HAP acquired in ICU

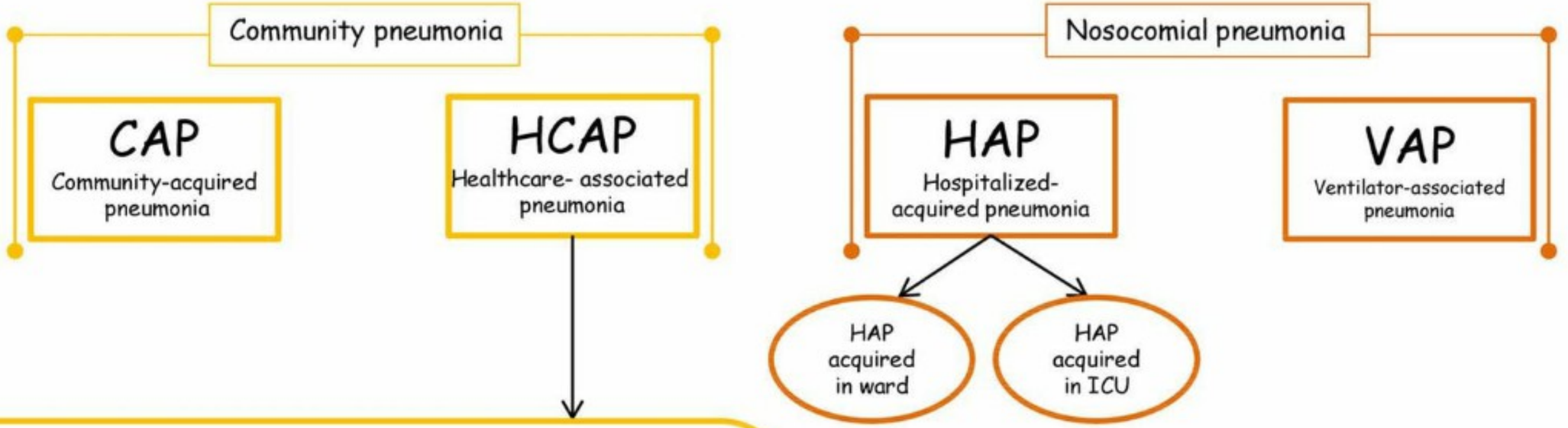
VAP
Ventilator-associated pneumonia

HEALTHCARE RISK FACTORS FOR ACQUIRING HCAP :

- -Hospitalization for at least 2 days in the preceding 90 days
- -Residence in a nursing home or extended care facility
- -Home infusion therapy (including antibiotics)
- -Chronic dialysis within 30 days
- -Home wound care
- -Family member with infection involving MDR pathogen
- -Immunosuppressive disease and/or therapy

Pneumonia in ICU

Mentimeter



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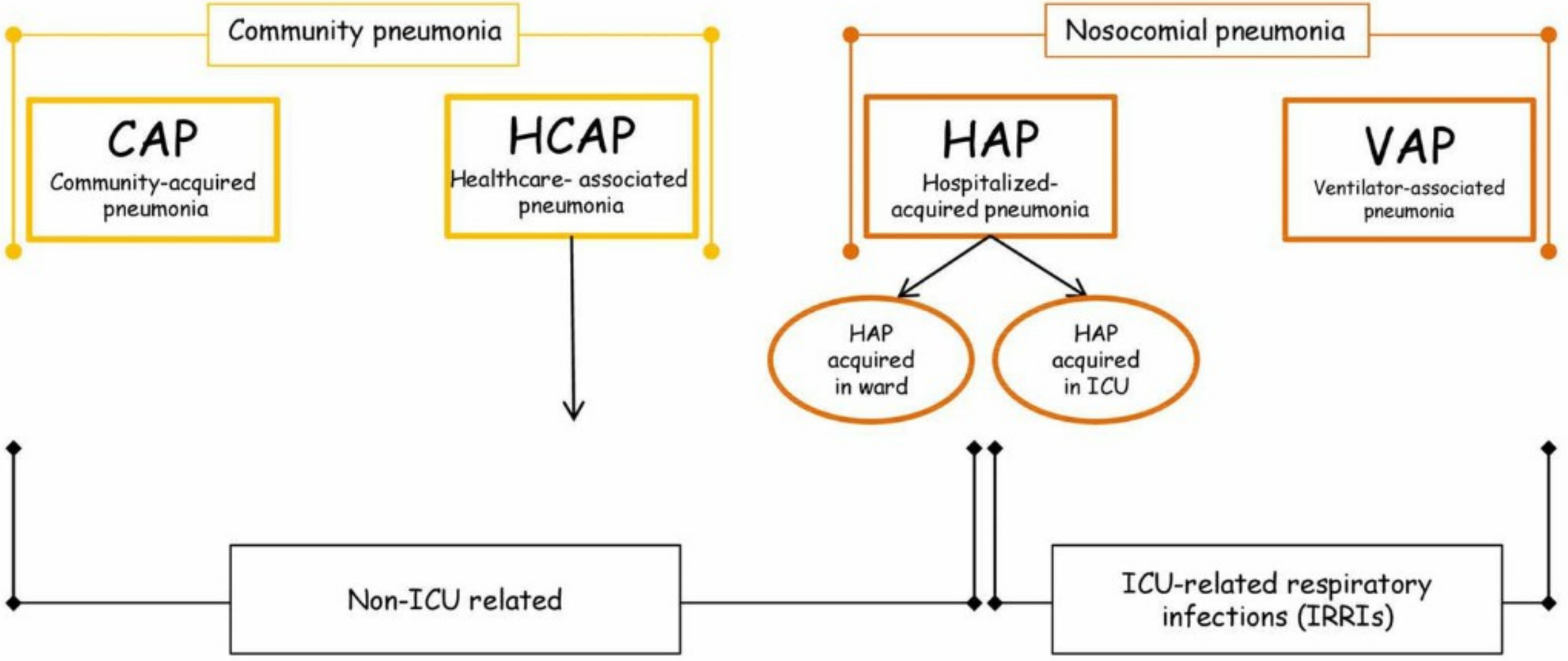
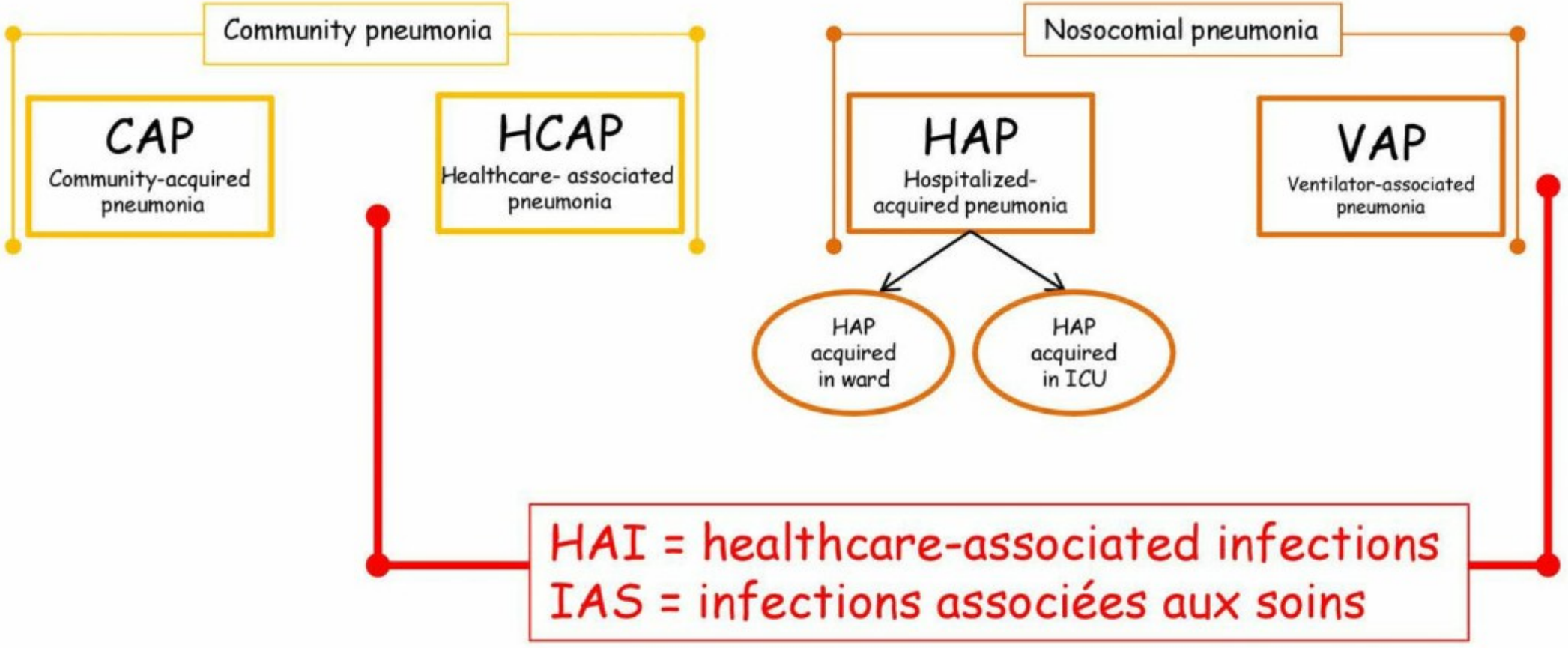
Pneumonia in ICU



Pneumonia in ICU

Mentimeter



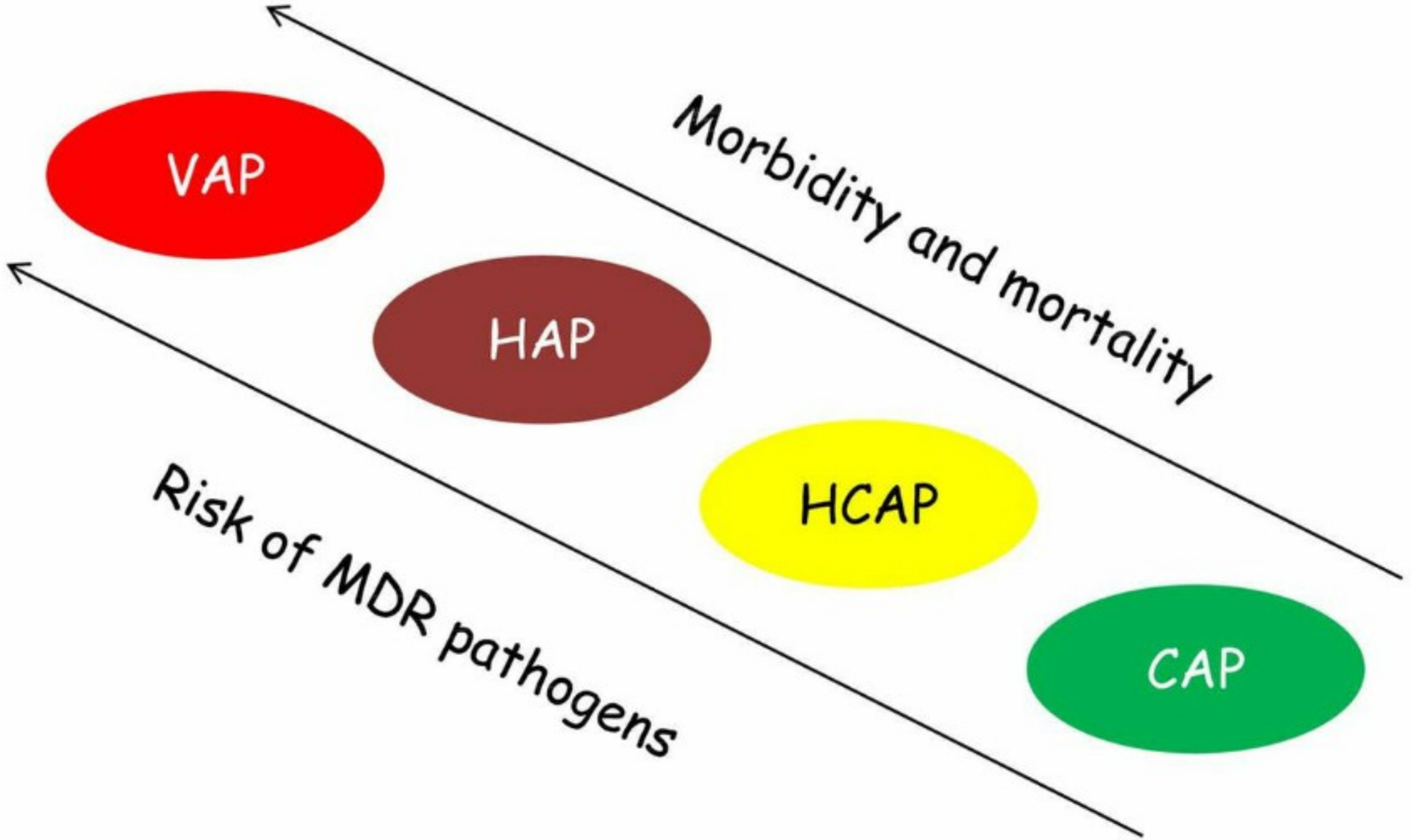
Respiratory research networks in Europe and beyond: aims, achievements and aspirations for the 21st century.

2017

Martin-Loeches I, Zampieri F, Povoa P, *et al.*

Mentimeter

breathe PRACTICE-FOCUSED EDUCATION FOR RESPIRATORY PROFESSIONALS



American Thoracic Society Documents

Guidelines for the Management of Adults with Hospital-acquired, Ventilator-associated, and Healthcare-associated Pneumonia

THIS OFFICIAL STATEMENT OF THE AMERICAN THORACIC SOCIETY AND THE INFECTIOUS DISEASES SOCIETY OF AMERICA WAS APPROVED BY THE ATS BOARD OF DIRECTORS, DECEMBER 2004 AND THE IDSA GUIDELINE COMMITTEE, OCTOBER 2004

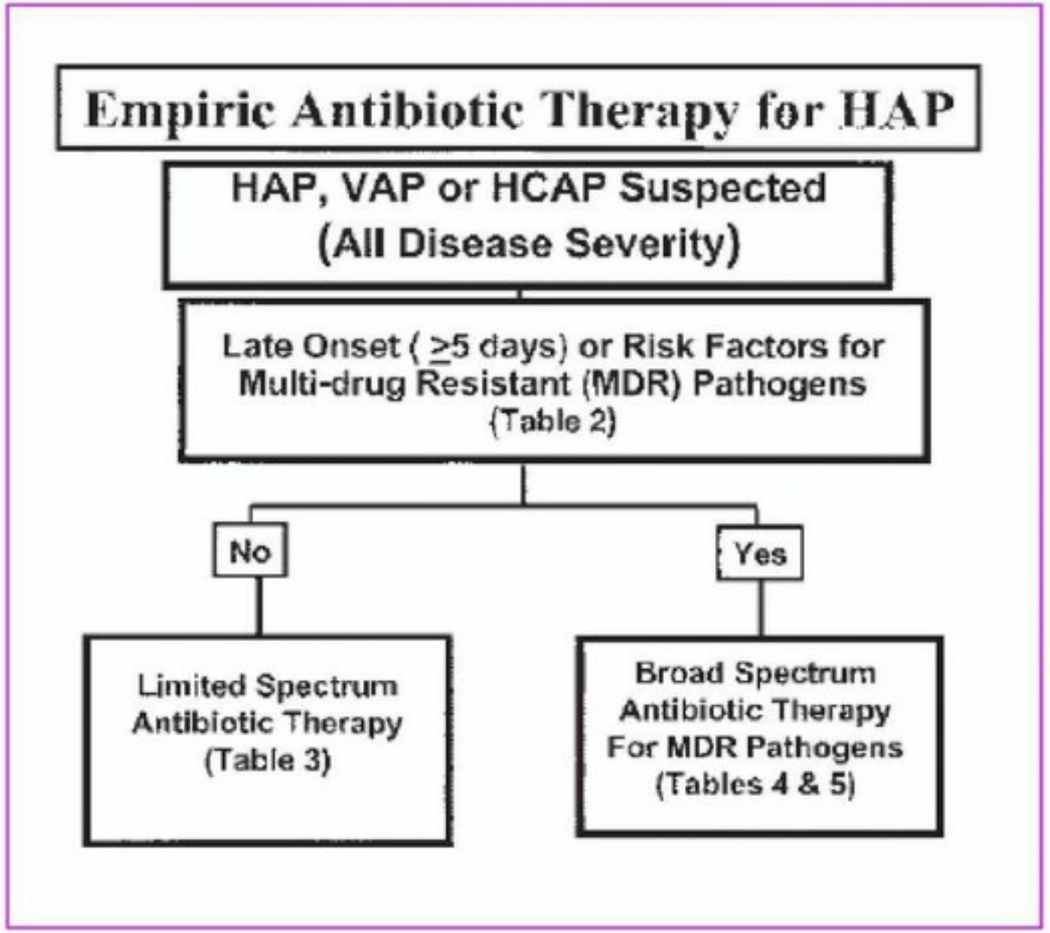


TABLE 2. RISK FACTORS FOR MULTIDRUG-RESISTANT PATHOGENS CAUSING HOSPITAL-ACQUIRED PNEUMONIA, HEALTHCARE-ASSOCIATED PNEUMONIA, AND VENTILATOR-ASSOCIATED PNEUMONIA

- Antimicrobial therapy in preceding 90 d
- Current hospitalization of 5 d or more
- High frequency of antibiotic resistance in the community or in the specific hospital unit
- Presence of risk factors for HCAP:
  - Hospitalization for 2 d or more in the preceding 90 d
  - Residence in a nursing home or extended care facility
  - Home infusion therapy (including antibiotics)
  - Chronic dialysis within 30 d
  - Home wound care
  - Family member with multidrug-resistant pathogen
- Immunosuppressive disease and/or therapy

Epidemiology and Outcomes of Health-care–associated Pneumonia : Results From a Large US Database of Culture-Positive Pneumonia

Marin H. Kollef, MD, FCCP, Andrew Shorr, MD, MPH, FCCP, Ying P. Tabak, PhD, Vikas Gupta, harmD, BCPS, Larry Z. Liu, MD, PhD, and R. S. Johannes, MD, MS

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Frequency of Occurrence of Bacterial Pathogens Associated With CAP, HCAP, HAP, and VAP (n = 4,543)

Bacterial Pathogens	CAP (n =2,221)	HCAP (n = 988)	HAP (n = 835)	VAP (n = 499)
Gram-positive pathogens, %				
S aureus				
S aureus (all)	25.5	46.7	47.1	42.5
MSSA (all)	17.2	21.1	26.2	28.5
MSSA only	12.0	14.3	19.3	19.0
MRSA (all)	8.9	26.5	22.9	14.6
MRSA only	6.2	18.3	16.8	11.8
All MRSA as percentage of all *SA*	34.8	56.8	48.6	34.4
Streptococcus nongroup	13.4	7.8	13.9	7.0
S pneumoniae	16.6	5.5	3.1	5.8
Other Gram positive	7.1	7.7	8.1	8.6
Gram-negative pathogens, %				
Pseudomonas sp	17.1	25.3	18.4	21.2
Haemophilus sp	16.6	5.8	5.6	12.2
Klebsiella sp	9.5	7.6	7.1	8.4
Escherichia sp	4.8	5.2	4.7	6.4
Enterobacter sp	2.9	3.5	4.3	5.6
Acinetobacter sp	1.6	2.6	2.0	3.0
Other Gram negative	4.1	9.5	3.7	6.2

Epidemiology and Outcomes of Health-care–associated Pneumonia : Results From a Large US Database of Culture-Positive Pneumonia

Marin H. Kollef, MD, FCCP, Andrew Shorr, MD, MPH, FCCP, Ying P. Tabak, PhD, Vikas Gupta, harmD, BCPS, Larry Z. Liu, MD, PhD, and R. S. Johannes, MD, MS

CHEST
2005

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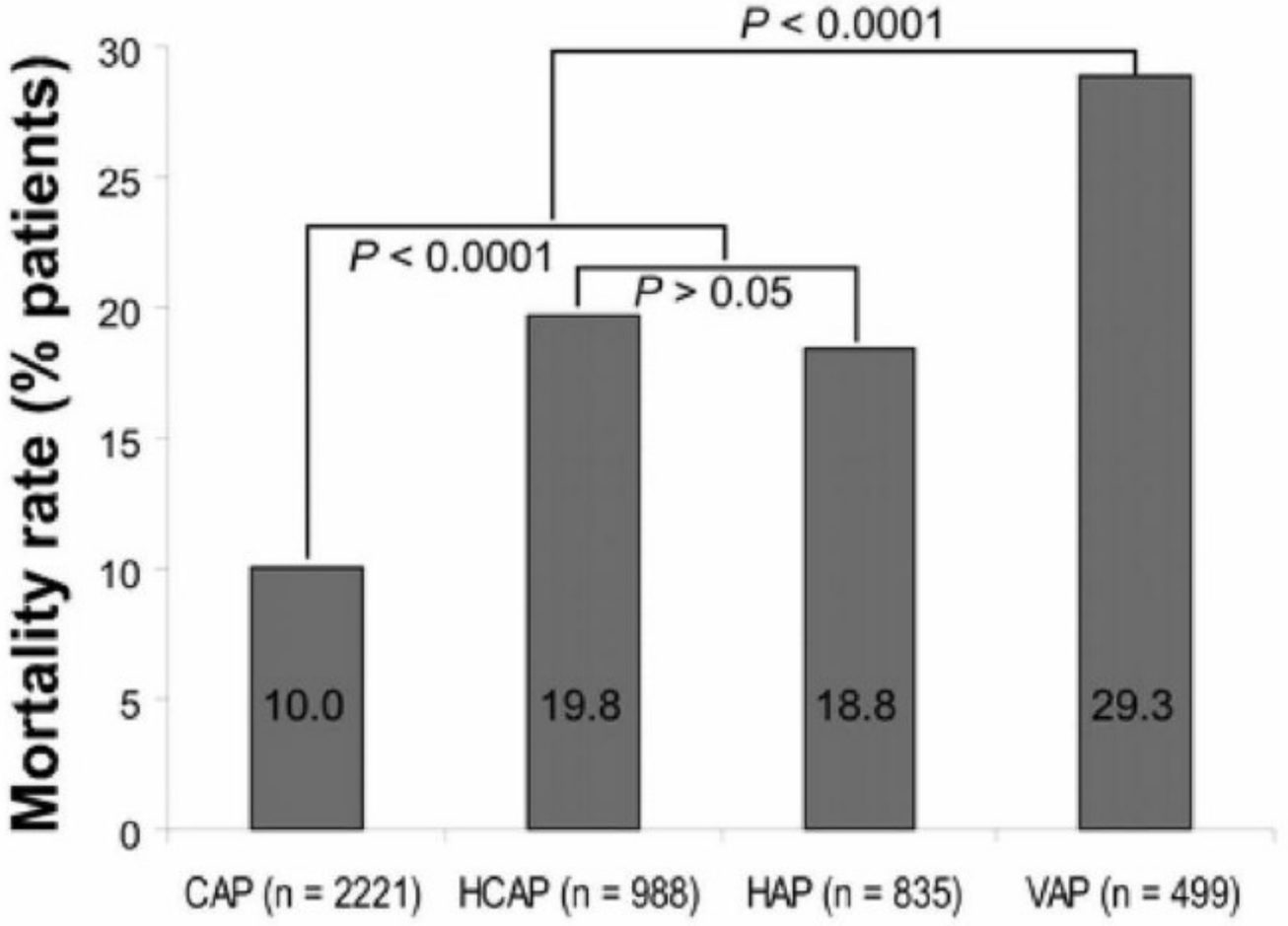


Personal view

2011

Guidelines for HAP and HCAP: a vulnerability, a pitfall, and a fatal flaw.

Yu VL

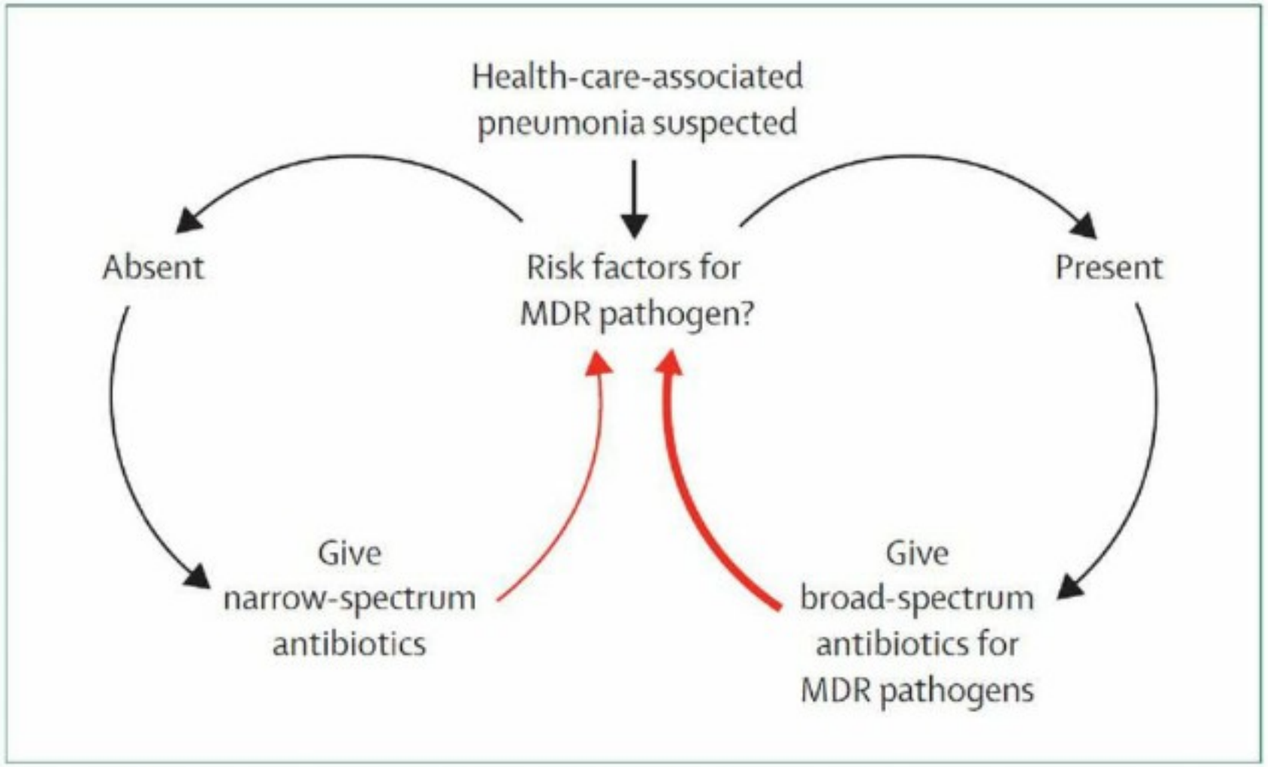


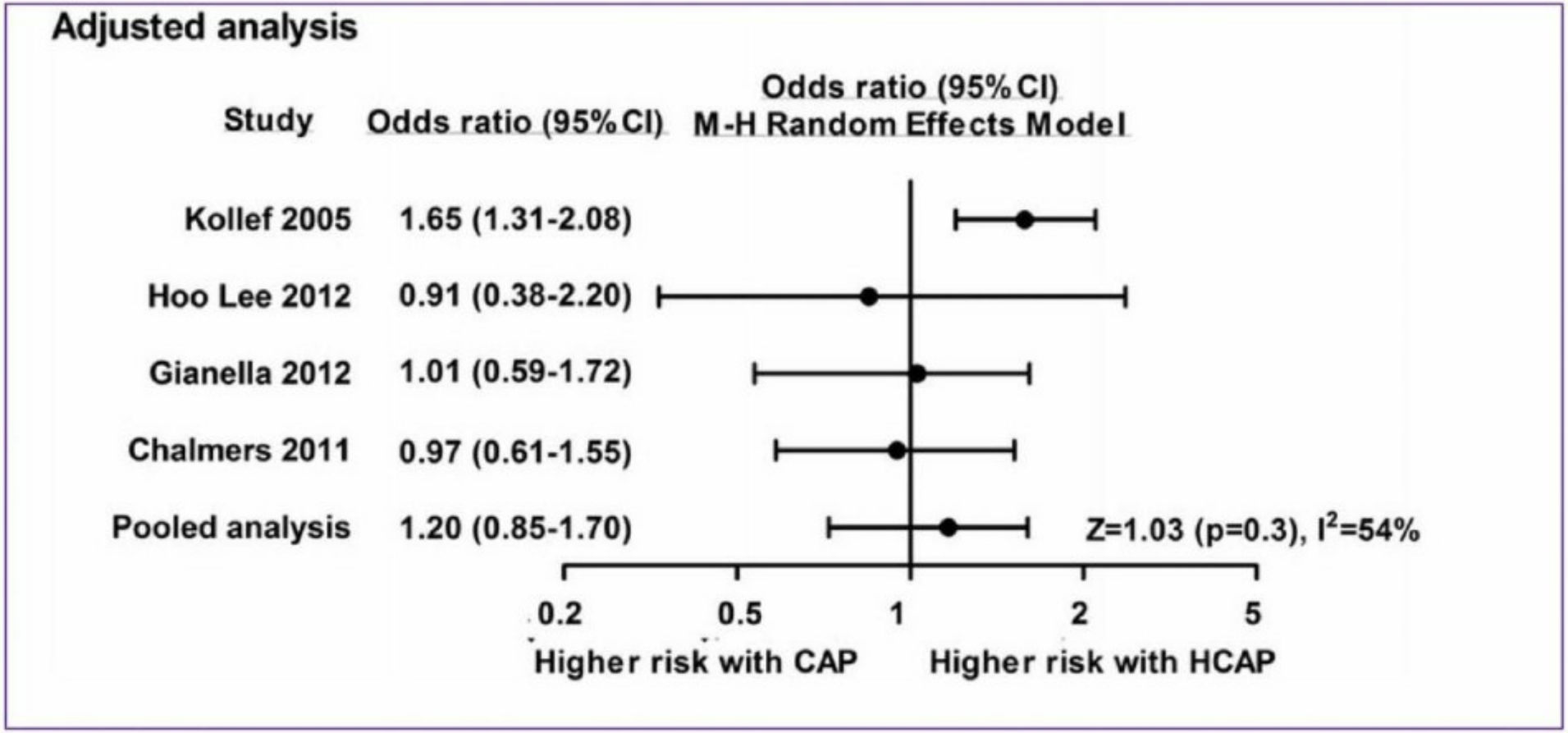
***Figure*: The vicious circle within the hospital-acquired pneumonia and health-care-associated pneumonia guidelines[1]**

Major article

Healthcare-Associated Pneumonia Does Not Accurately Identify Potentially Resistant Pathogens: A Systematic Review and Meta-Analysis

James D. Chalmers,1 Catriona Rother, Waleed Salih, and Santiago Ewig

Mentimeter



Major article

Healthcare-Associated Pneumonia Does Not Accurately Identify Potentially Resistant Pathogens: A Systematic Review and Meta-Analysis

James D. Chalmers,1 Catriona Rother, Waleed Salih, and Santiago Ewig

Mentimeter

Table 3. Discrimination of the Healthcare-Associated Pneumonia Concept for Identifying Potentially Resistant Microorganisms Across All Included Studies

Organisms	PLR (95% CI)	NLR (95% CI)	Sensitivity (95% CI)	Specificity (95% CI)	AUC (95% CI)
All resistant microorganisms	1.94 (1.67–2.24)	0.57 (0.50–0.66)	53.7 (52.2–55.2)	71.2 (70.5–71.9)	0.70 (0.69–0.71)
MRSA	1.97 (1.74–2.22)	0.44 (0.35–0.55)	69.0 (65.9–72.0)	65.7 (65.0–66.4)	0.74 (0.72–0.76)
Enterobacteriaceae	1.37 (1.26–1.49)	0.76 (0.69–0.84)	42.9 (41.0–44.8)	66. 1 (65.5–66.8)	0.60 (0.58–0.62)
P. aeruginosa	1.68 (1.53–1.84)	0.62 (0.52–0.74)	52.2 (49.2–55.1)	67.7 (67.1–68.4)	0.68 (0.66–0.70)

Abbreviations: AUC, area under the curve; CI, confidence interval; MRSA, methicillin-resistant *Staphylococcus aureus*; NLR, negative likelihood ratio; *P. aeruginosa*, *Pseudomonas aeruginosa*; PLR, positive likelihood ratio.

Pneumonia in ICU

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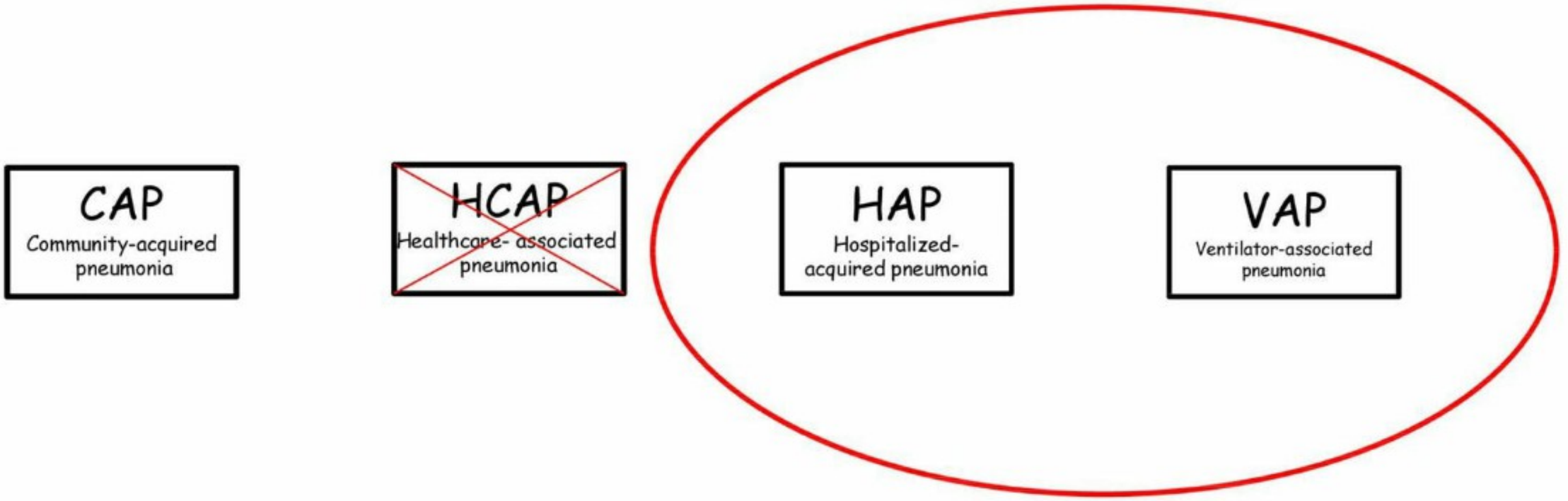


Intensive Care Med (2014) 40:572–581
DOI 10.1007/s00134-014-3239-2

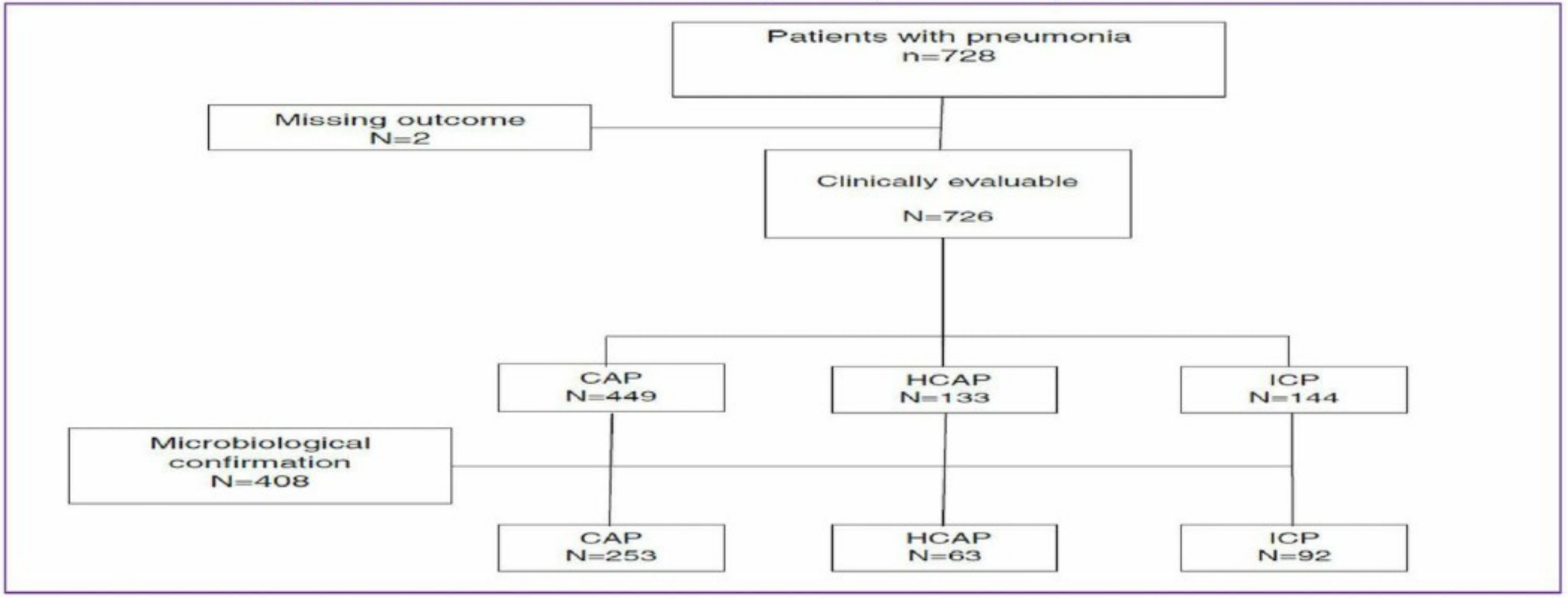
ORIGINAL

Jordi Vallés
Ignacio Martin-Loeches
Antoni Torres
Emili Díaz
Iratxe Seijas
María José López
Pau Garro
Carlos Castillo
Jose Garnacho-Montero
María del Mar Martín
María Victoria de la Torre
Pedro Olaechea
Catia Cilloniz
Jordi Almirall
Fernando García
Roberto Jiménez
Estrella Serrano
Cruz Soriano
Eduard Mesalles
Pilar Posada

Epidemiology, antibiotic therapy and clinical outcomes of healthcare-associated pneumonia in critically ill patients: a Spanish cohort study

Mentimeter

Prospective observational study, one year, 34 Spanish ICUs



2018 Annals of Intensive Care

RESEARCH Open Access

Brief summary of French guidelines for the prevention, diagnosis and treatment of hospital-acquired pneumonia in ICU

Marc Leone[1*], Lila Bouadma[2], Bélaïd Bouhemad[3], Olivier Brissaud[4], Stéphane Dauger[5], Sébastien Gibot[6], Sami Hraiech[7], Boris Jung[8], Eric Kipnis[9], Yoann Launey[10], Charles-Edouard Luyt[11], Dimitri Margetis[12], Fabrice Michel[13], Djamel Mokart[14], Philippe Montravers[15], Antoine Monsel[16], Saad Nseir[17], Jérôme Pugin[18], Antoine Roquilly[19], Lionel Velly[20], Jean-Ralph Zahar[21], Rémi Bruyère[22], Gérald Chanques[23], ADARPEF and GFRUP

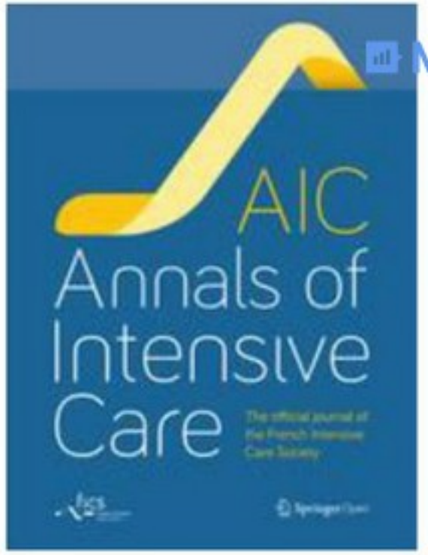


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Table 2 Guideline timeline

5 December 2016	Start-up meeting
6 March 2017	Vote: first round
13 March 2017	Post-vote deliberation meeting
1 April 2017	Vote: second round
16 April 2017	Amendment of two guidelines
28 April 2017	Vote of the two amended guidelines
10 May 2017	Guideline finalisation meeting

Areas of guidelines

Mentimeter

First area, PREVENTION	• Which HAP prevention approaches decrease morbidity and mortality in ICU patients?
Second area, DIAGNOSIS	• What methods to diagnose HAP should be used to decrease ICU patient morbidity and mortality?
Third area, TREATMENT	• What therapeutic options for HAP should be used to decrease ICU patient morbidity and mortality?

CAS CLINIQUE

- Homme, 62 ans
- Peu d'antécédents en dehors d'un épisode de bronchite traitée par 7 jours d'amoxicilline il y a 4 mois
- Arrêt cardiaque sur FV (24 h de contrôle ciblé de la température)
- Récupération neurologique de bonne qualité
- Sevrage ventilatoire à J4 (O_2 à 3 L/min)

Chez ce type de patient :

1. Une politique de prévention des pneumonies est nécessaire
2. Il faut privilégier un axe unique de prévention plutôt qu'une approche multimodale
3. Une approche multimodale est associée à une diminution des infections pulmonaires
4. La décontamination digestive sélective est associée à une diminution des infections pulmonaires et de la mortalité
5. Toutes les méthodes de prévention sont efficaces

Chez ce type de patient :

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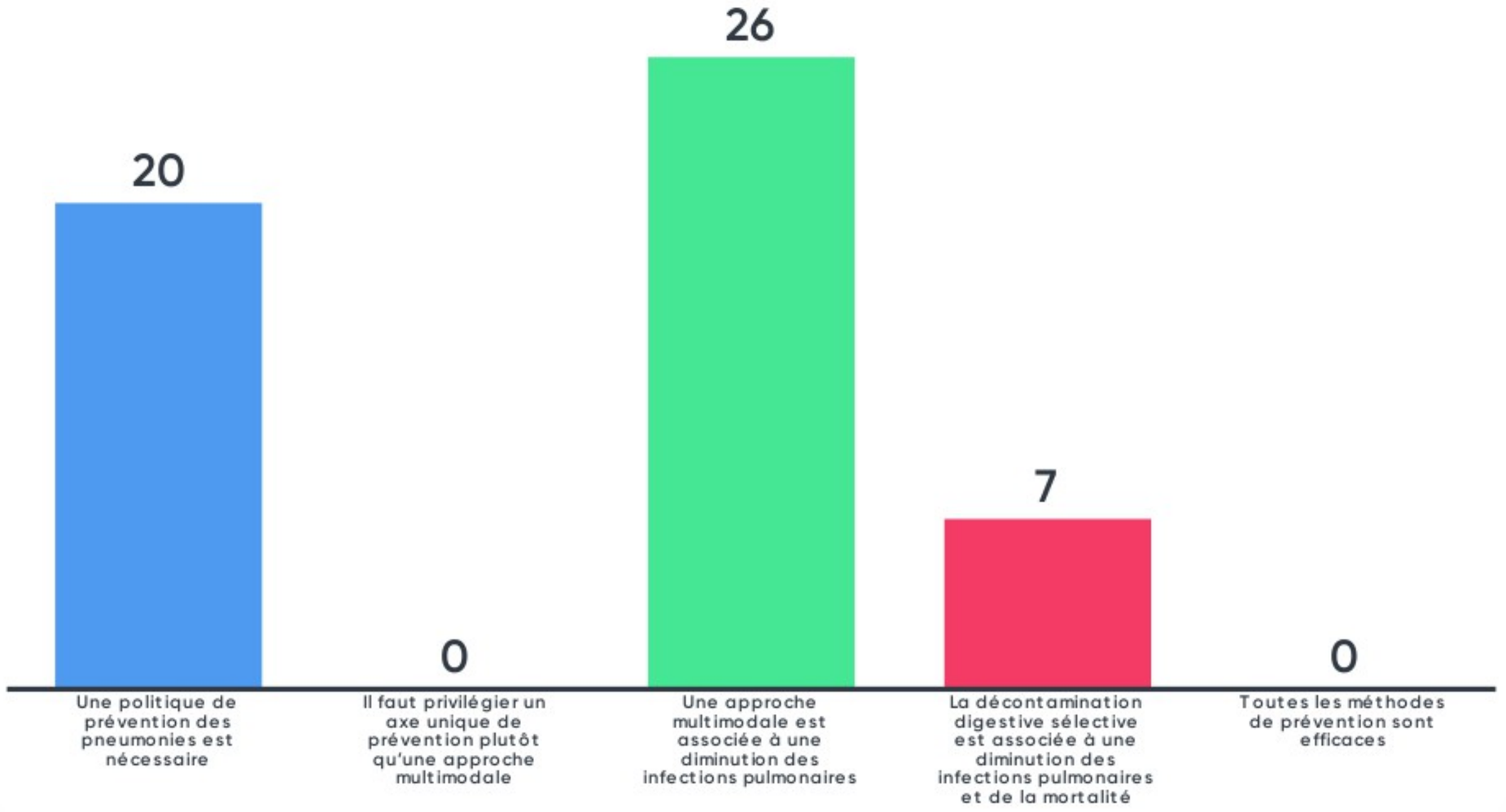

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RESEARCH Open Access

Brief summary of French guidelines for the prevention, diagnosis and treatment of hospital-acquired pneumonia in ICU

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AIC Annals of Intensive Care 2018

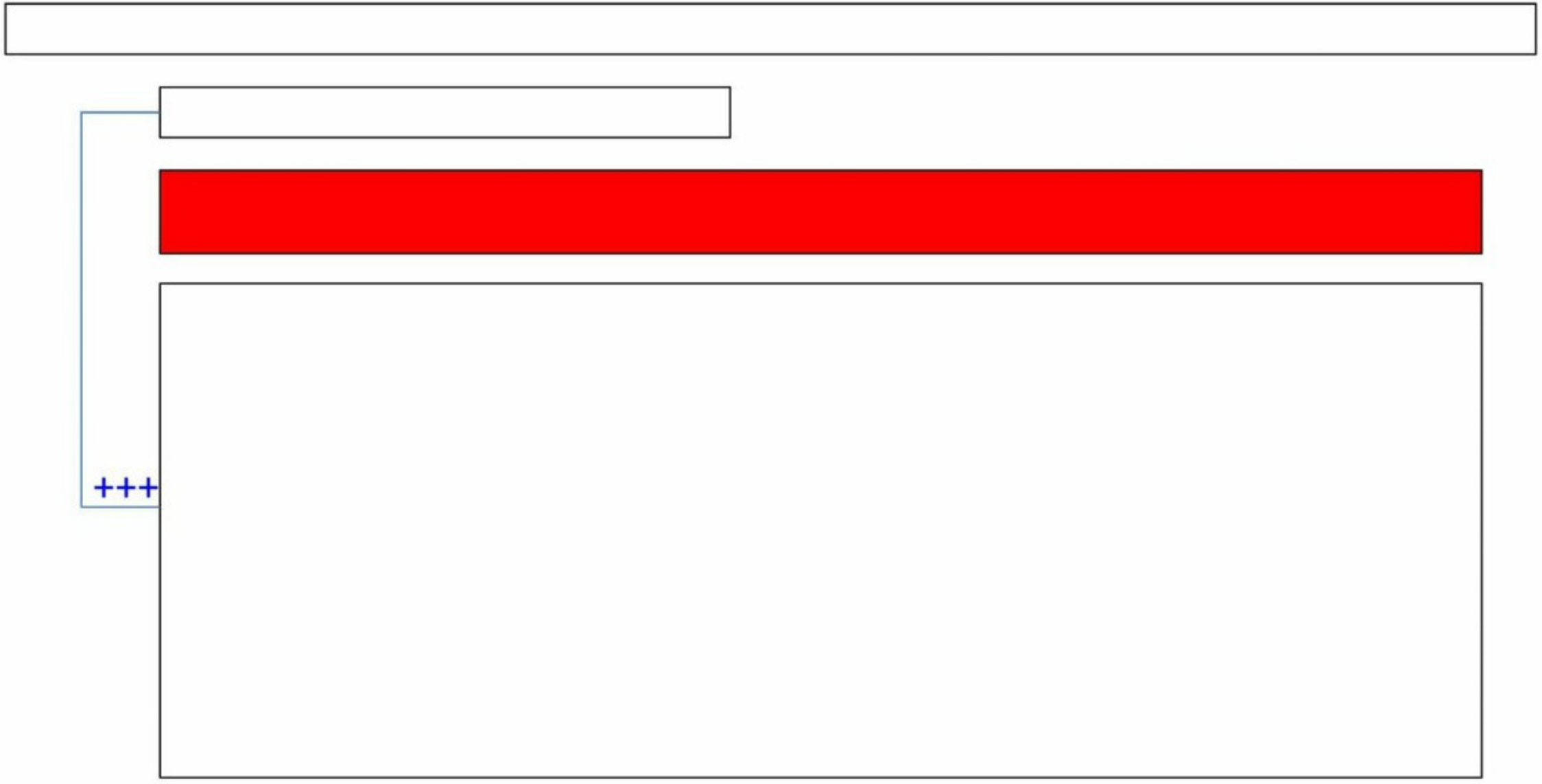
First area, PREVENTION

- Which HAP prevention approaches decrease morbidity and mortality in ICU patients?

R1.1 – We recommend using **a standardized multimodal HAP prevention approach** in order to decrease ICU patient <u>morbidity.</u>

GRADE 1+, STRONG AGREEMENT

Protocole multimodal de prévention des pneumonies associées aux soins: AVIS d'experts



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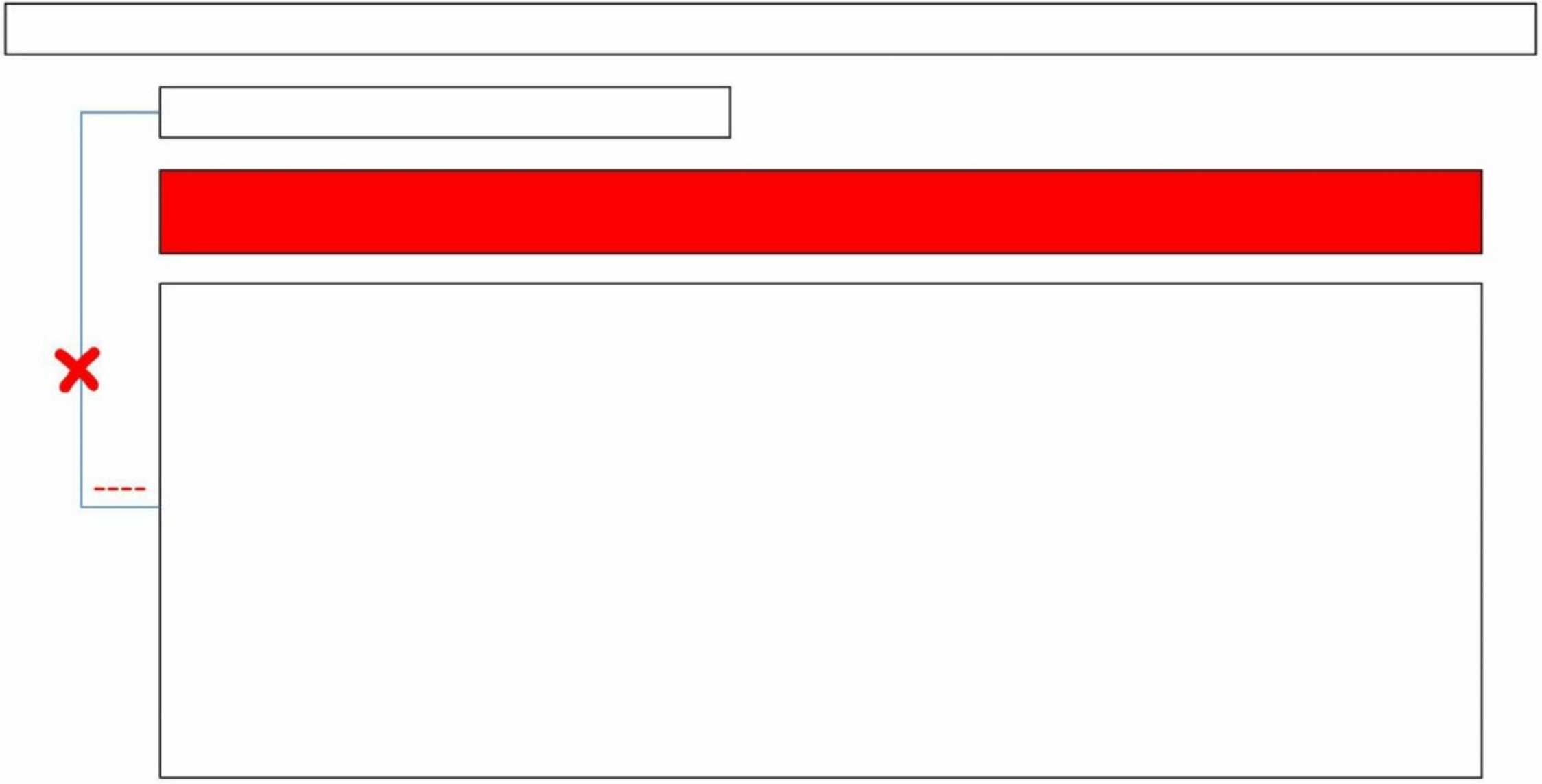

TASKS ☛ BUNDLE OF CARE

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DEFINITION according to Institute for Healthcare Improvement (IHI)

OUTILS

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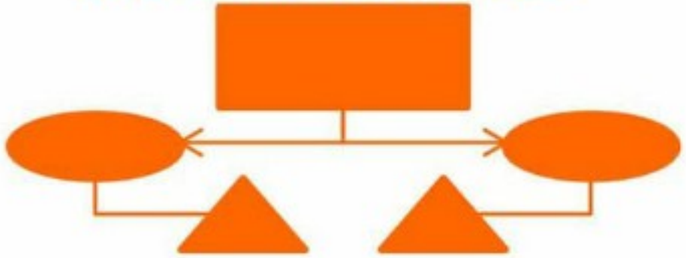
CHECKLISTS

BUNDLES

RECOMMANDATIONS

ALGORITHMES



Traduction de « bundle » = faisceau
fasces lictoriae (latin)
fasci, fasco (italien)

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Bundles of the lictors
The *fasces lictoriae*

TASKS ☛ BUNDLE OF CARE

Mentimeter

DEFINITION according to Institute for Healthcare Improvement (IHI)

C'est une méthode structurée pour améliorer le processus de soin (et donc le pronostic des patients).

Il est composé d'un petit ensemble simple et cohérent de plusieurs pratiques,

- généralement 3 à 5, bien définies,
- fondées sur des preuves scientifiques solides
- et qui mis en œuvre correctement (95% d'adhérence), se traduit par un meilleur résultat sur le pronostic des patients que lorsque chaque mesure est utilisée seule.

DEFINITION « Bundle »
selon l'Institute for Healthcare Improvement (IHI)

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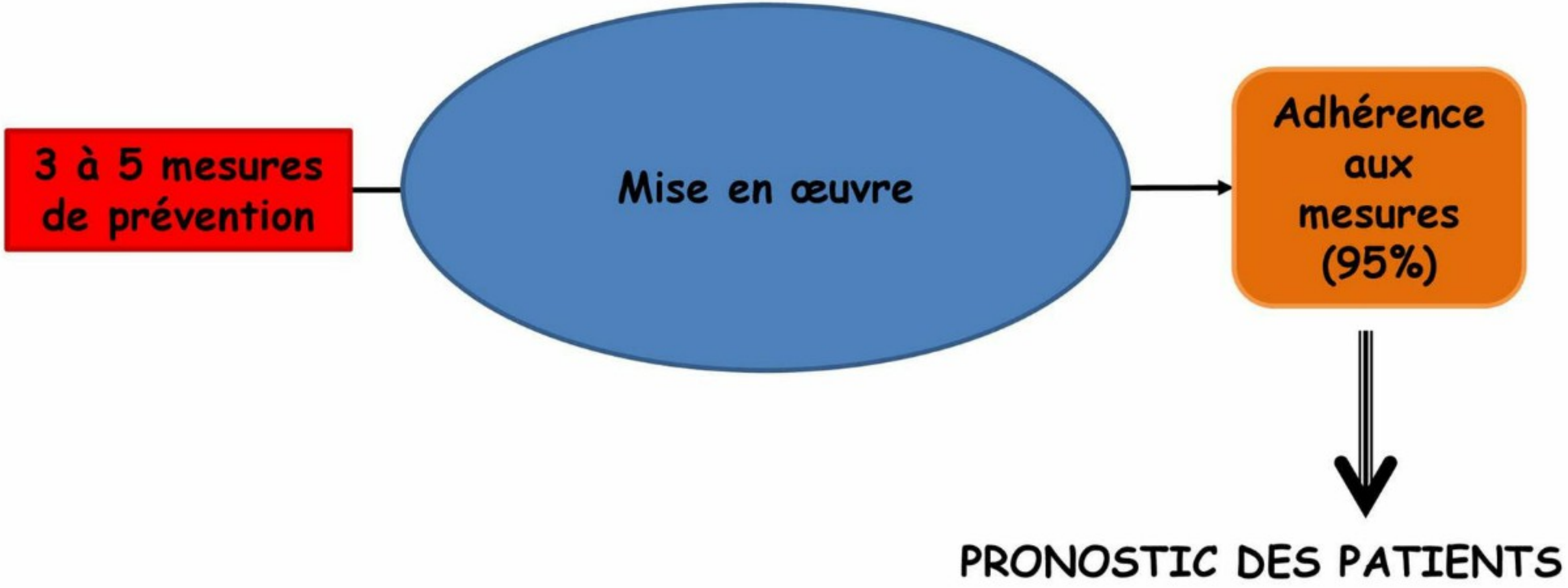
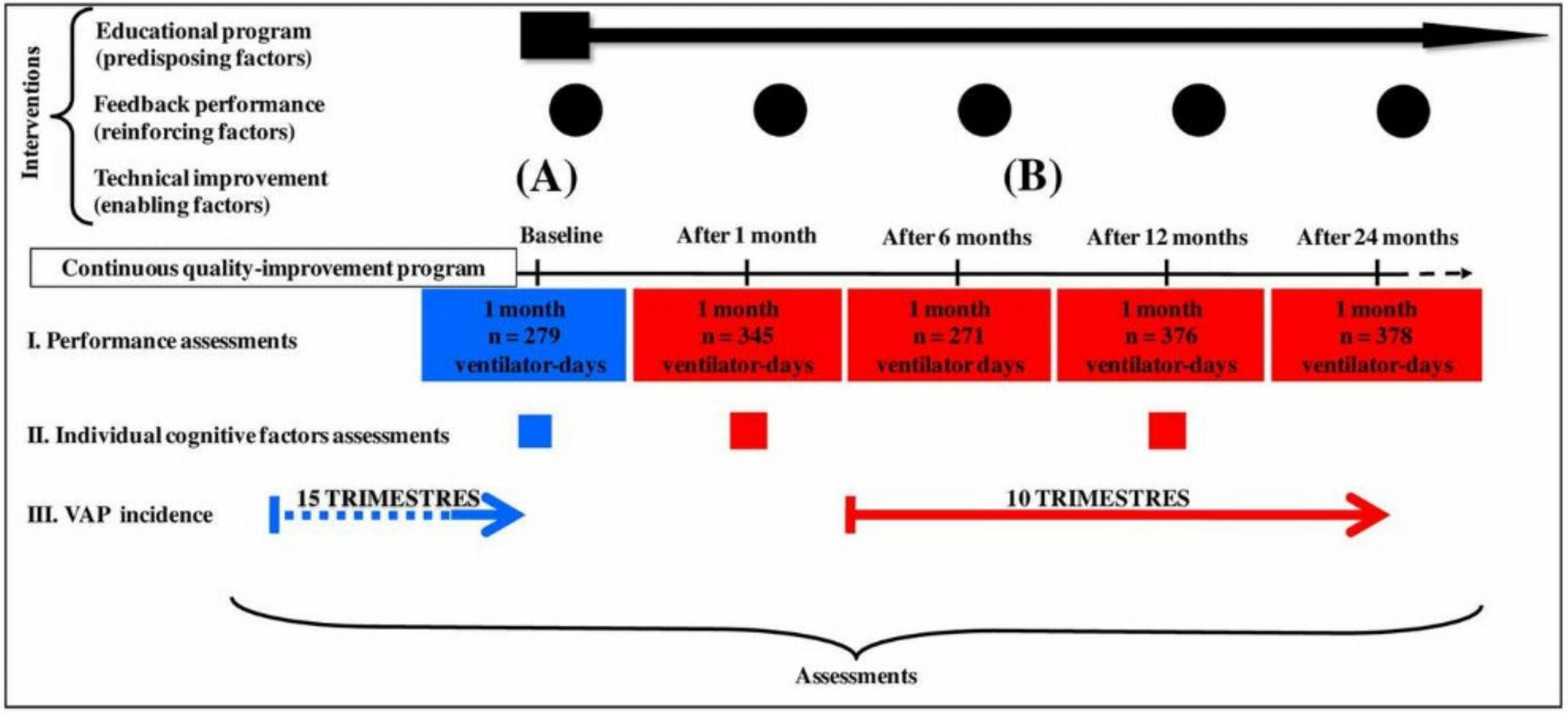


Clinical Investigations

A multifaceted program to prevent ventilator-associated pneumonia: Impact on compliance with preventive measures*

Lila Bouadma, MD; Bruno Mourvillier, MD; Veronique Deiler, RN; Bertrand Le Corre, RN; Isabelle Lolom, BS; Bernard Regnier, MD; Michel Wolff, MD; Jean-Christophe Lucet, MD, PhD



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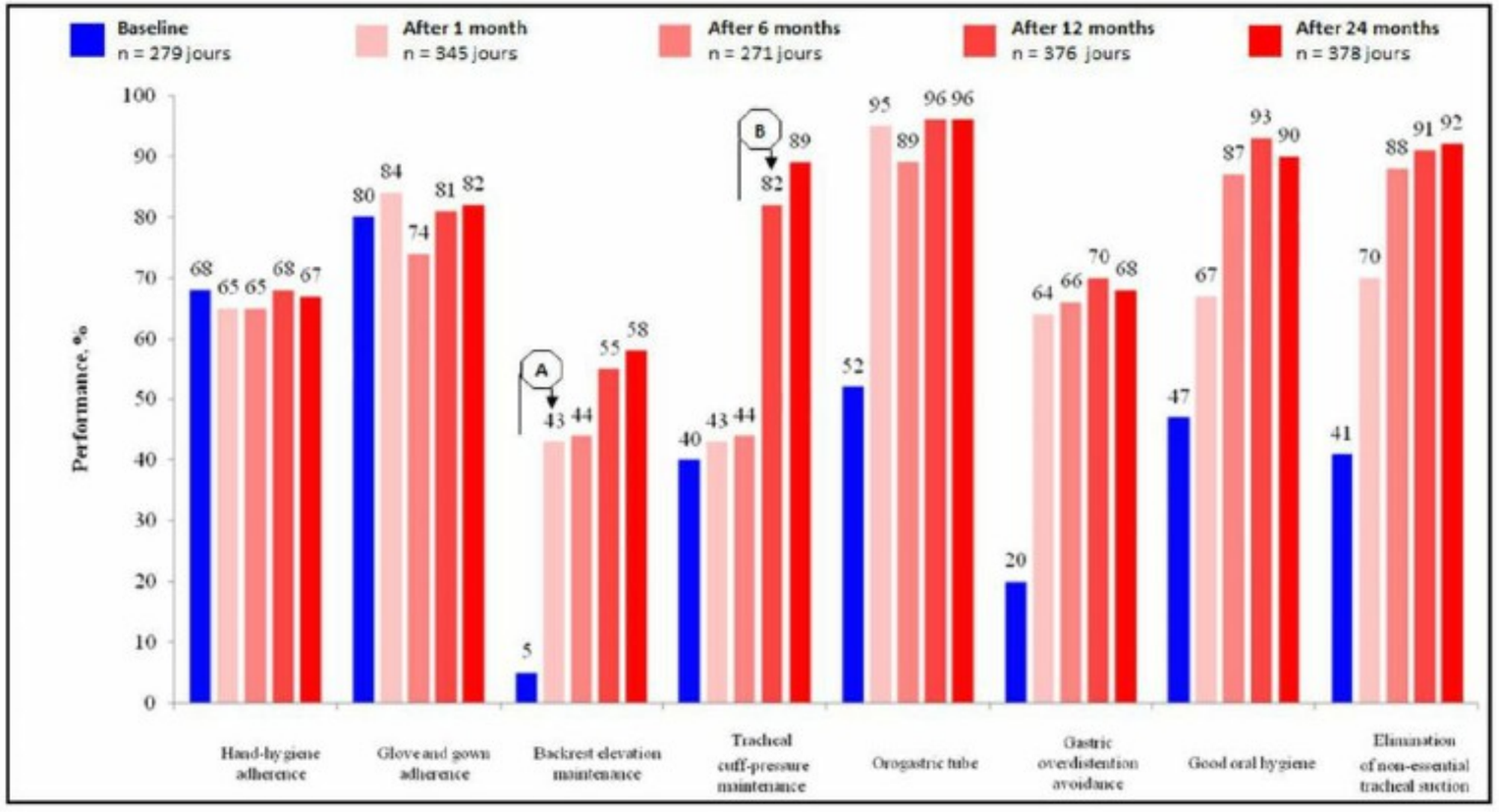
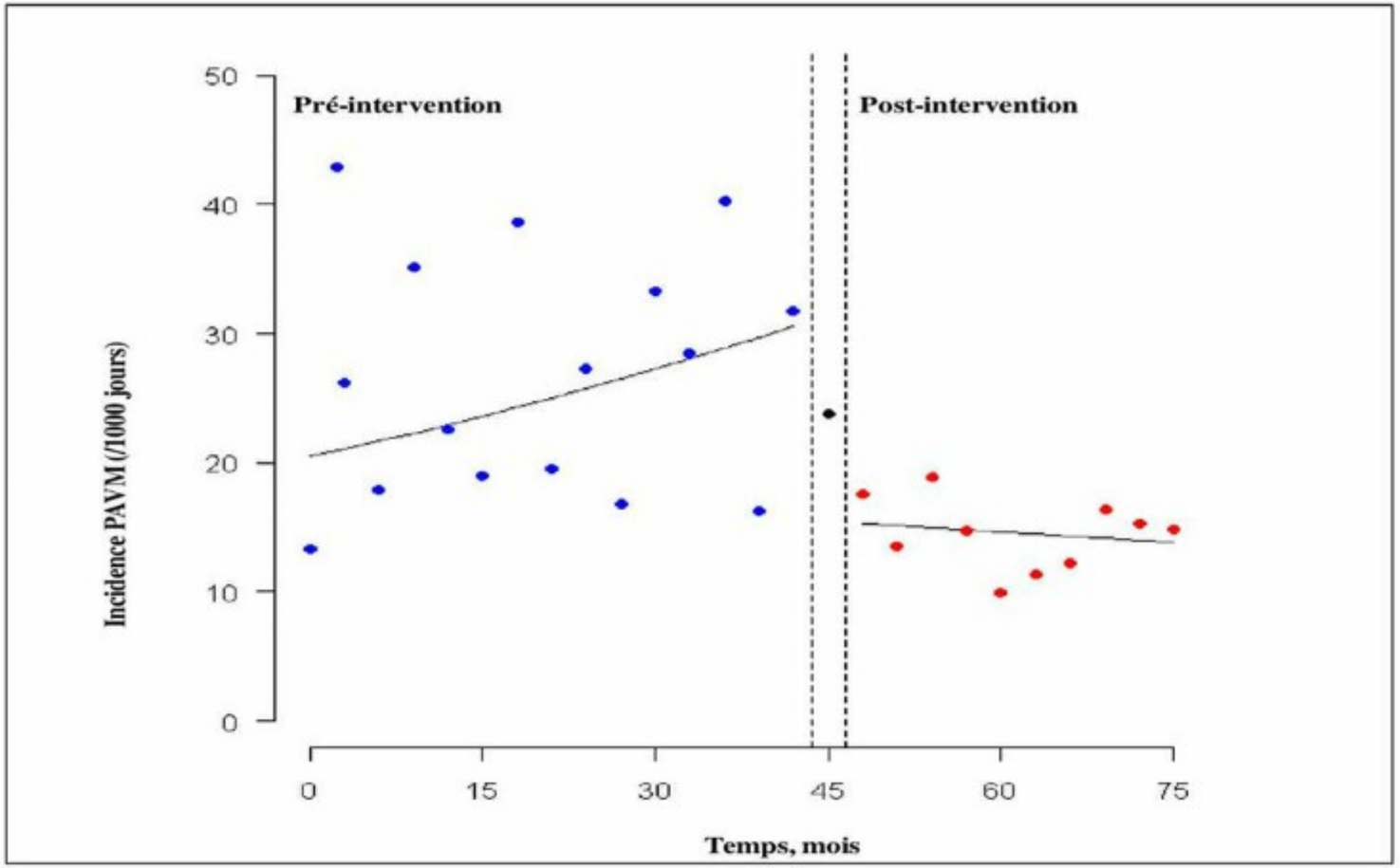
Performance changes over time for the 8 clinical practices targeted



Major article

Long-Term Impact of a Multifaceted Prevention Program on Ventilator-Associated Pneumonia in a Medical Intensive Care Unit

Lila Bouadma, Emmanuelle Deslandes, Isabelle Lolom, Bertrand Le Corre, Bruno Mourvillier, Bernard Régnier, Raphael Porcher, Michel Wolff, and Jean-Christophe Lucet



L'intervention diminue l'incidence des PAVM de 43% (HRajusté: 0,58; 95% IC = 0,46-0,72; p < 0,001).

REVIEW

Update on ventilator-associated pneumonia

Jean-Francois Timsit [1,2], Wafa Esaied[1], Mathilde Neuville[2], Lila Bouadma[1,2], Bruno Mourvillier[1,2]

F1000 Research 2017

Mentimeter

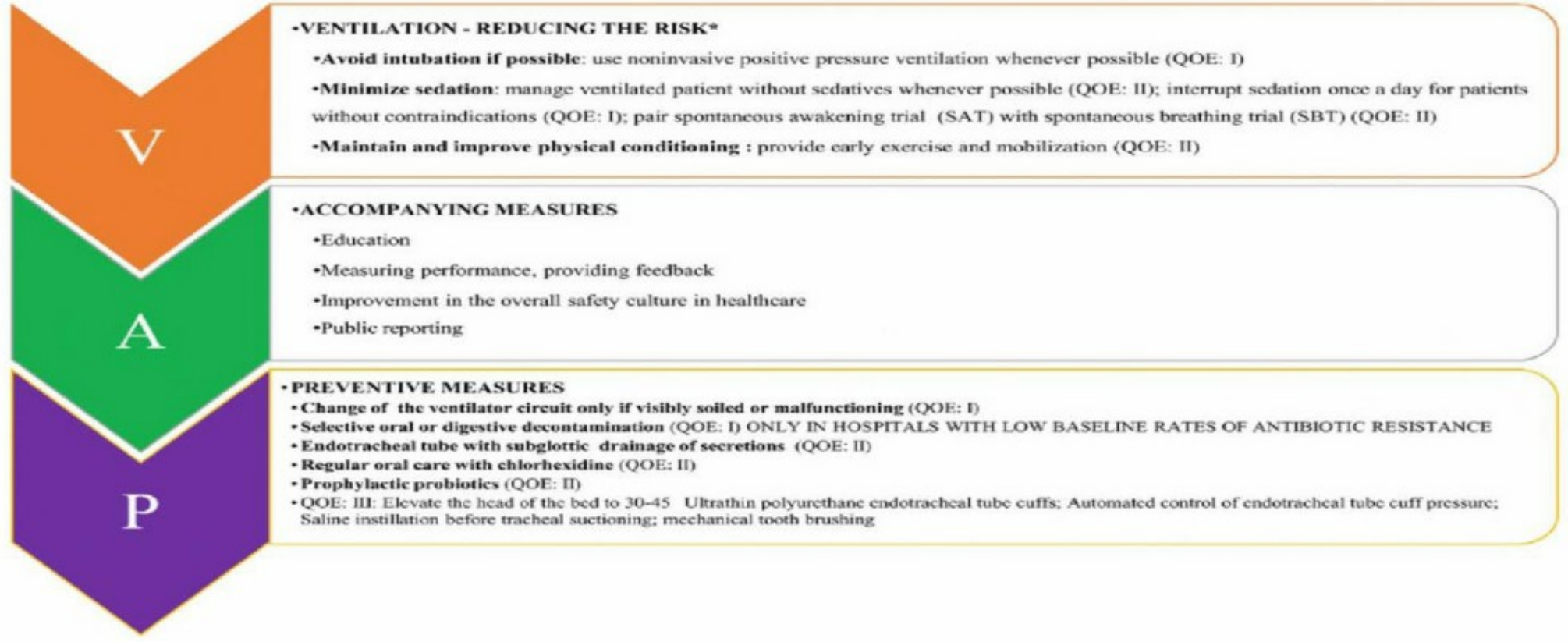


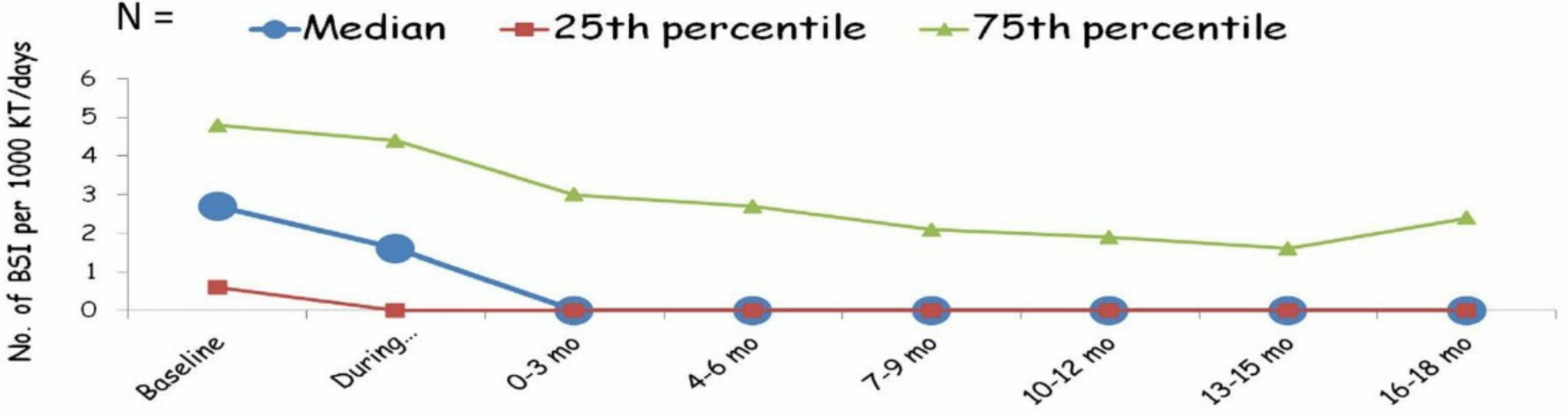
Figure 1. Preventive measures of ventilator-associated pneumonia. Adapted from 37,39. QOE, quality of evidence.

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED in 1812 DECEMBER 28, 2006 Vol. 355 NO. 26

An Intervention to Decrease Catheter-Related Bloodstream Infections in the ICU

Peter Pronovost, M.D., Ph.D., Dale Needham, M.D., Ph.D., Sean Berenholtz, M.D., David Sinopoli, M.P.H., M.B.A., Haitao Chu, M.D., Ph.D., Sara Cosgrove, M.D., Bryan Sexton, Ph.D., Robert Hyzy, M.D., Robert Welsh, M.D., Gary Roth, M.D., Joseph Bander, M.D., John Kepros, M.D., and Christine Goeschel, R.N., M.P.A.



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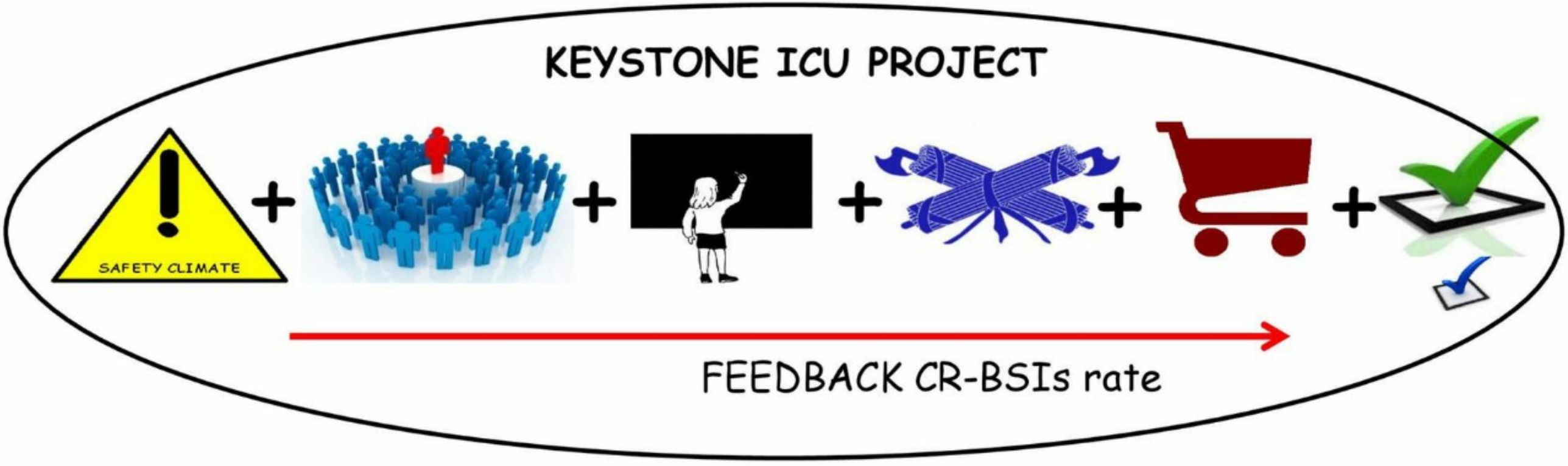
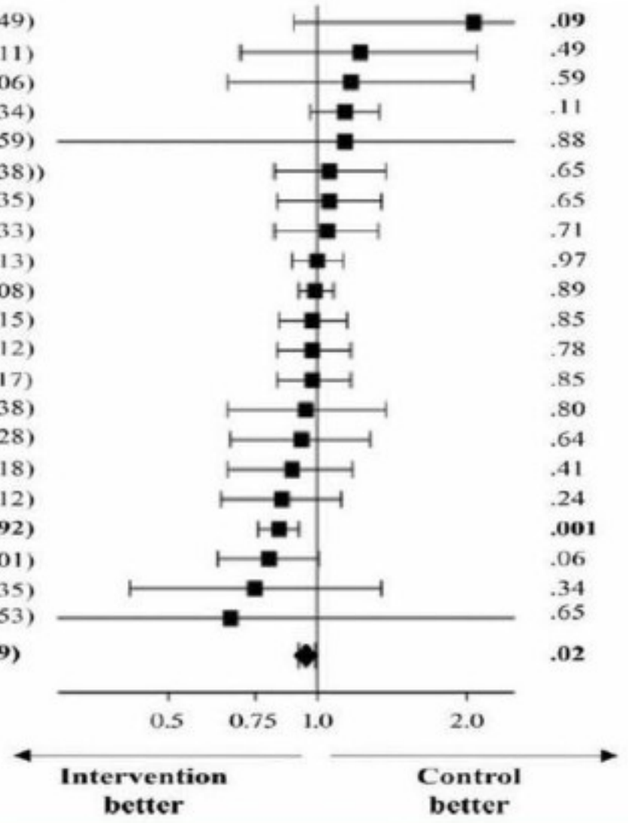


MAJOR ARTICLE

Pneumonia Prevention to Decrease Mortality in ICU: A Systematic review and Meta-analysis

Antoine Roquilly, Emmanuel Marret, Edward Abraham and Karim Asehnoune

Intervention	No. of RCTs; No. of Patients (N); I^2, %	Relative Risk (95% CI)	*P* Value
Acidified enteral feeding	1; 120; NA	2.07 (.90–4.49)	**.09**
Tracheal cuff monitoring	2; 264; 0	1.22 (.70–2.11)	.49
PEEP	1; 127; NA	1.17 (.66–2.06)	.59
Silver-coated ET	1; 1509; NA	1.14 (.97–1.34)	.11
Physiotherapy	2; 204; 81	1.14 (.20–6.59)	.88
Patient position	5; 785; 0	1.06 (.82–1.38))	.65
Decreased gastric content	3; 810; 0	1.06 (.83–1.35)	.65
Tracheal saline instillation	1; 262; NA	1.05 (.82–1.33)	.71
Ulcer prophylaxis	16; 3365; 0	1.00 (.89–1.13)	.97
SOD	23; 9666; 0	0.99 (.92–1.08)	.89
Subglottic secretion drainage	9; 2241; 0	0.98 (.84–1.15)	.85
Heat moisture exchanger	13; 2431; 0	0.98 (.86–1.12)	.78
Closed suctioning system	5; 909; 0	0.98 (.83–1.17)	.85
Aerosolized antibiotic	5; 450; 23	0.95 (.66–1.38)	.80
Post pyloric feeding	6; 582; 0	0.93 (.67–1.28)	.64
Probiotic/symbiotic	13; 1569; 23	0.89 (.66–1.18)	.41
Early tracheotomy	6; 1050; 45	0.85 (.64–1.12)	.24
SDD	**30; 10 227; 16**	**0.84 (.76–0.92)**	**.001**
Sinusitis prophylaxis	1; 399; NA	0.80 (.63–1.01)	.06
Early enteral feeding	1; 150; NA	0.75 (.42–1.35)	.34
Phytotherapy	1; 36; NA	0.67 (.13–3.53)	.65
Overall	**145; N=37156; 4**	**0.95 (.92–.99)**	**.02**



R1.2 – **In units where multidrug-resistant bacteria prevalence is weak (< 20%),** we suggest applying a selective digestive decontamination using a topical antiseptic administered enterally and a prophylactic antibiotic through systemic administration for < 5 days to decrease <u>mortality.</u>

Mentimeter

GRADE 2+, STRONG AGREEMENT

SDD has shown a significant decrease in hospitality mortality, lengths of mechanical ventilation and HAP incidence in ICU patients [Liberati, Cochrane Database Syst Rev, 2009].

The effect of SDD on mortality

- was similar in medical and surgical patients [Melsen, Br J Surg, 2012].
- was greater in patients with high overall mortality [Roquilly, CID, 2015].
- was only observed for strategies including a topical antiseptic administered enterally and systemic prophylactic antibiotic use [Roquilly, CID, 2015].

Studies testing SDD were conducted in environments where the prevalence of multiresistant bacteria was low [de Smet, NEJM, 2009], with no link between SDD and the development of bacterial resistance [Daneman, LID, 2017].

R1.2 – **In units where multidrug-resistant bacteria prevalence is weak (< 20%),** we suggest applying a selective digestive decontamination using a topical antiseptic administered enterally and a prophylactic antibiotic through systemic administration for < 5 days to decrease mortality.

Mentimeter

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Studies testing SDD were conducted in environments where the prevalence of multiresistant bacteria was low [de Smet, NEJM, 2009], with no link between SDD and the development of bacterial resistance [Daneman, LID, 2017].

It is probably best to limit the duration of systemic antibiotic therapy in SDD protocols to a maximum of 5 days [Roquilly, ERJ, 2016].

Mentimeter

Protocol 2

Oro-pharyngeal application (x4/ day, until tracheal extubation) of a paste or gel containing

- polymyxin E (2%)
- tobramycin (2%)
- amphotericin B (2%)

+

Administration (x4/ day, until tracheal extubation) through a nasogastric tube of 10ml of a suspension containing

- 100 mg Polymyxin E
- 80 mg Tobramycin
- 500 mg Amphotericin B

+

Intravenous administration of a prophylactic antibiotic treatment during 48 to 72 hours for patients who do not require curative antibiotic therapy

- cefazolin 1 g x 3 / d*
- In case of allergy to cephalosporins:
  - ofloxacin 200 mg x 2 / d*
  - ciprofloxacin 400 mg x 2 / d *

*(*dosages in the absence of renal failure, provided for information purposes only)*

Preparation for *selective digestive decontamination*
(provided for information purposes only)

	Oral gel (jar 125 ml)	Suspension (bottles 15 ml)
polymyxin E	4 g	1 g
gentamicin	4 g	0.8 g
amphotericin B	4 g	5 g
sterile water	134 ml	100 ml
methylcarboxycellulose	6 g	
methylparahydroxybenzoate	0.3 g	
propylene glycol	50 ml	
menthol alcohol	6 ml	

Quelle(s) mesure(s) de prévention proposez-vous?

Mentimeter

proclive 30

proclive 30 degre

arrêt quotidien sédation

soins de bouche

surveillance pression bal

sonde oro gastrique

sevrage precoce

proclive 30°

6

MAJOR ARTICLE

Pneumonia Prevention to Decrease Mortality in ICU: A Systematic review and Meta-analysis

Antoine Roquilly, Emmanuel Marret, Edward Abraham and Karim Asehnoune

Intervention	No. of RCTs; No. of Patients (N); I^2, %	Relative Risk (95% CI)	*P* Value
Acidified enteral feeding	1; 120; NA	2.07 (.90–4.49)	**.09**
Tracheal cuff monitoring	2; 264; 0	1.22 (.70–2.11)	.49
PEEP	1; 127; NA	1.17 (.66–2.06)	.59
Silver-coated ET	1; 1509; NA	1.14 (.97–1.34)	.11
Physiotherapy	2; 204; 81	1.14 (.20–6.59)	.88
Patient position	5; 785; 0	1.06 (.82–1.38))	.65
Decreased gastric content	3; 810; 0	1.06 (.83–1.35)	.65
Tracheal saline instillation	1; 262; NA	1.05 (.82–1.33)	.71
Ulcer prophylaxis	16; 3365; 0	1.00 (.89–1.13)	.97
SOD	23; 9666; 0	0.99 (.92–1.08)	.89
Subglottic secretion drainage	9; 2241; 0	0.98 (.84–1.15)	.85
Heat moisture exchanger	13; 2431; 0	0.98 (.86–1.12)	.78
Closed suctioning system	5; 909; 0	0.98 (.83–1.17)	.85
Aerosolized antibiotic	5; 450; 23	0.95 (.66–1.38)	.80
Post pyloric feeding	6; 582; 0	0.93 (.67–1.28)	.64
Probiotic/symbiotic	13; 1569; 23	0.89 (.66–1.18)	.41
Early tracheotomy	6; 1050; 45	0.85 (.64–1.12)	.24
SDD	**30; 10 227; 16**	**0.84 (.76–0.92)**	**.001**
Sinusitis prophylaxis	1; 399; NA	0.80 (.63–1.01)	.06
Early enteral feeding	1; 150; NA	0.75 (.42–1.35)	.34
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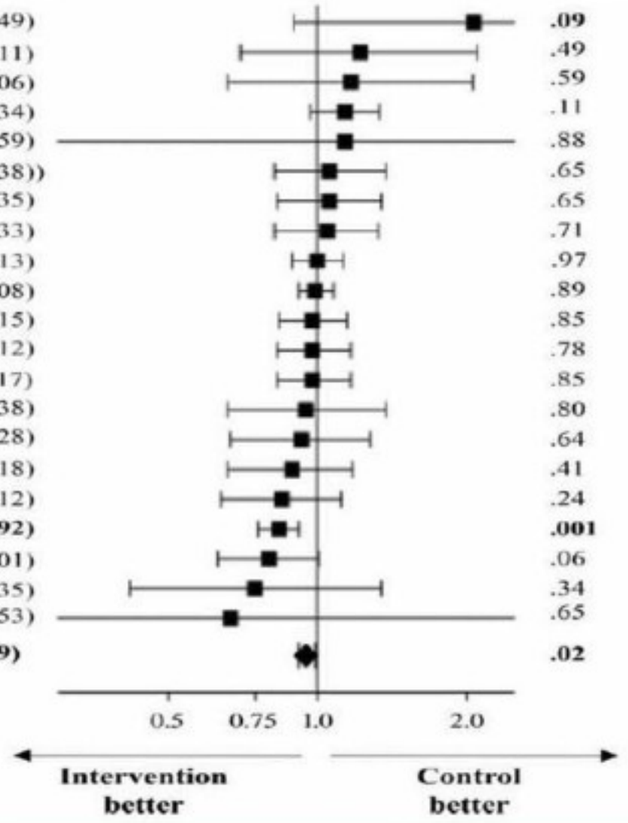
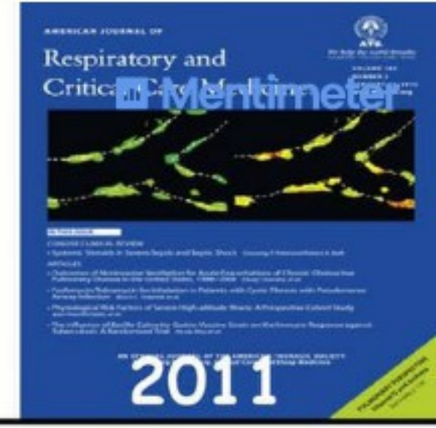
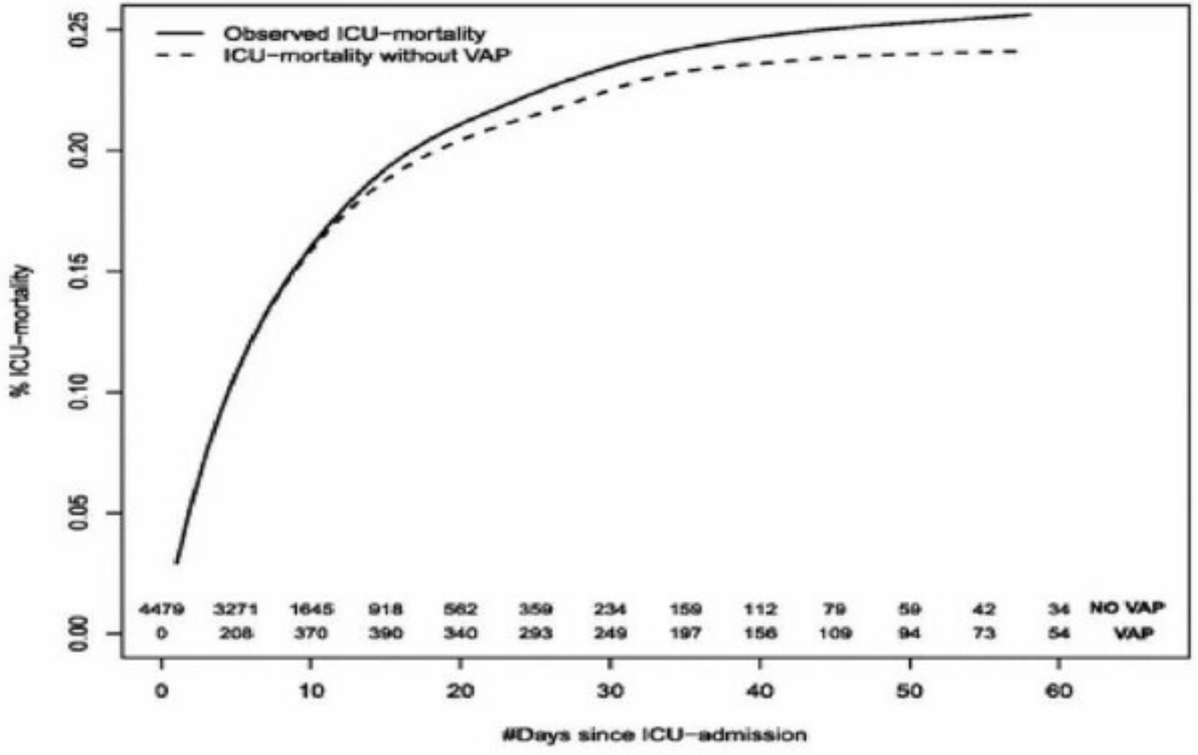
Overall	**145; N=37156; 4**	**0.95 (.92–.99)**	**.02**

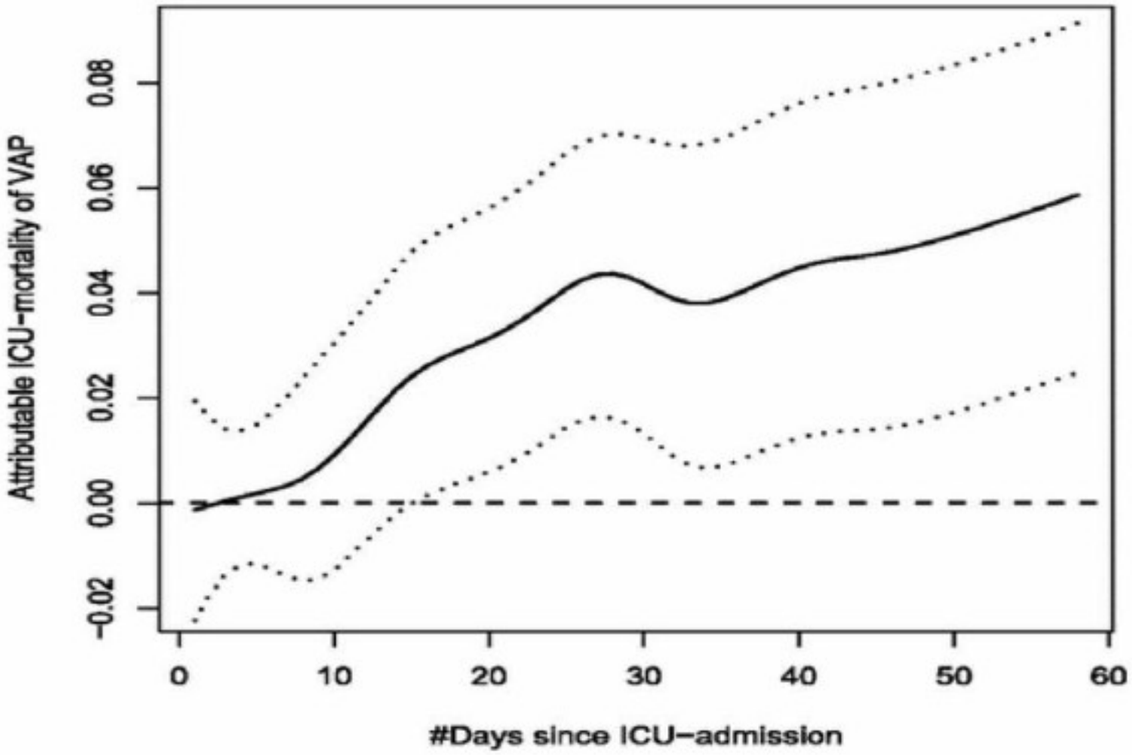


Attributable mortality of ventilator-associated pneumonia: a reappraisal using causal analysis.

Bekaert M, Timsit JF, Vansteelandt S, Depuydt P, Vésin A, Garrouste-Orgeas M, Decruyenaere J, Clec'h C, Azoulay E, Benoit D; Outcomerea Study Group







REVIEW

CURRENT OPINION

Ventilator-associated pneumonia and its prevention

Lila Bouadma, Michel Wolff and Jean-Christophe Lucet

Beaucoup d'études ++++++++++

Les mesures de prévention citées dans les recommandations sont:

- soit non évaluées mais reposant sur des principes généraux de prévention des infections nosocomiales
- soit évaluées par rapport à un mécanisme physiopathologique supposé
- soit LE PLUS SOUVENT évaluées par rapport à des variations de taux d'infections RAREMENT sur des critères de jugement robustes

1. Favoriser la ventilation non-invasive (notamment en post-opératoire de chirurgie digestive et chez les BPCO)

En cas de nécessité de ventilation invasive

2. Appliquer un protocole de **DDS** avec une antibiothérapie systémique < 5 jours si prévalence de BMR faible (20%)

3. <u>Associer certaines des méthodes suivantes (1ére intention):</u>

+++

- Limiter les doses et la durée d'administration de sédatifs et analgésiques liés à la ventilation mécanique
- Initier précocement une nutrition entérale
- Contrôler régulièrement la pression de gonflage de la sonde d'intubation
- Réaliser une aspiration sous-glottique (6-8 heures) à l'aide de sonde endotrachéale adaptée
- Préférer la voie orale pour l'intubation

NB. L'association d'un proclive > 30° et/ou d'une décontamination oro-pharyngée à la chlorhexidine 0,12% ou 0,2% pourraient être propose en association à ces mesures malgré une faible efficacité car elles sont peu couteuses et bien tolérées

4. Eviter d'utiliser les méthodes suivantes:

- Trachéotomie précoce systématique (hors indication spécifique
- Nutrition entérale post-pylorique (hors indication spécifique
- Administration de probiotiques
- Changement précoce des filtres
- Utilisation des systèmes clos d'aspiration
- Utilisation de sonde de sonde d'intubation imprégnée avec un antiseptique, ou à forme « optimisée du ballonnet
- Décontamination oro-pharyngée à la polyvidone iodée
- Utilisation d'une antibioprophylaxie par aérosols
- Décontamination cutanée quotidienne par antiseptique

Articles

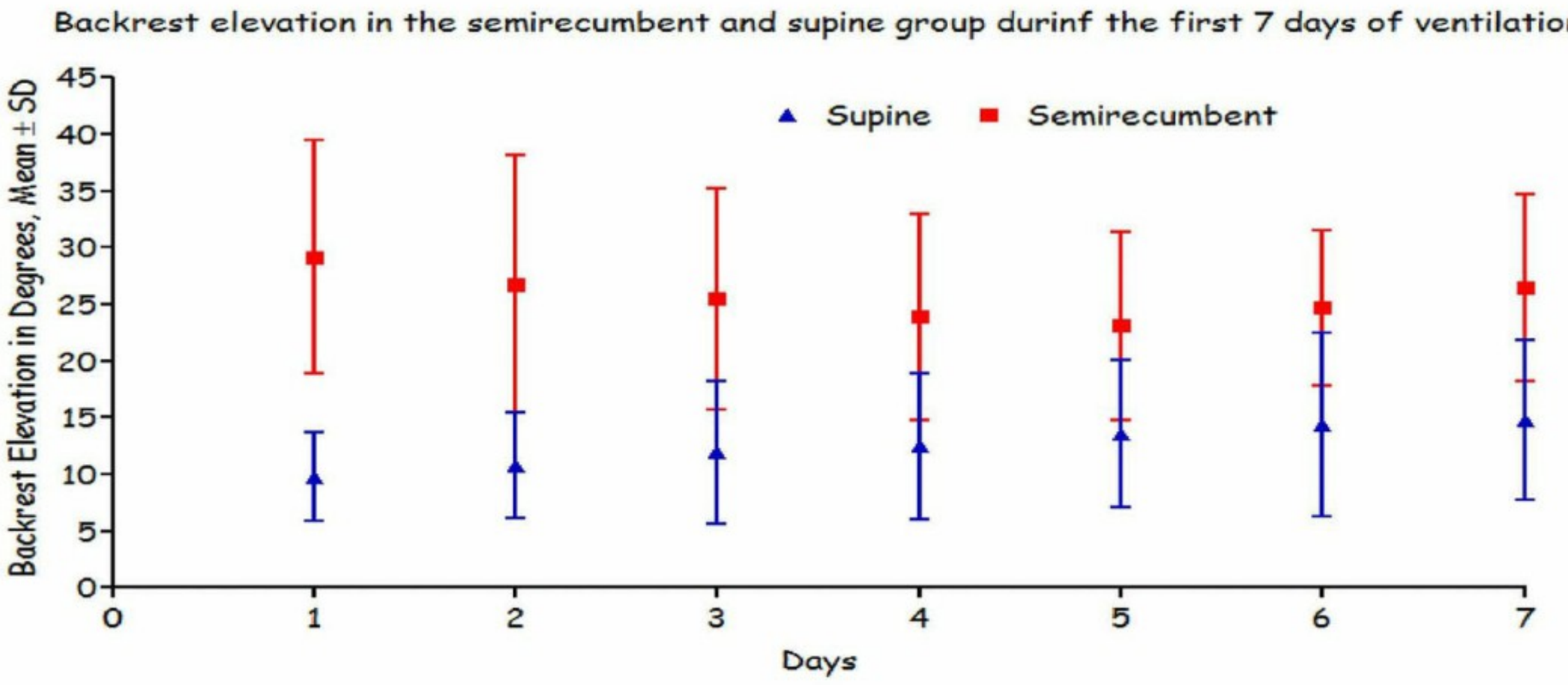
Supine body position as a risk factor for nosocomial pneumonia in mechanically ventilated patients: a randomised trial

Mitra B Drakulovic , Antoni Torres, Torsten T Bauer , Jose M Nicolas, Santiago Nogué, Miquel Ferrer

	Position allongée (0°)	Position ½ assise (≠ 0°)	p
PAVM clinique	16/47 (34%)	3/39 (8%)	P = 0,003
PAVM documentée	11/47 (23%)	2/39 (5%)	P < 0,02

Feasibility and effects of the semirecumbent position to prevent ventilator-associated pneumonia: a randomized study*

van Nieuwenhoven CA, Vandenbroucke-Grauls C, van Tiel FH, Joore HC, van Schijndel RJ, van der Tweel I, Ramsay G, Bonten MJ



PAVM

13
(10,7%)

8
(6.5%)

Intensive Care Med (2008) 34:1002

SYSTEMATIC REVIEW

Abroug F
Ouanes-Besbes L
Elatrous S
Brochard L.

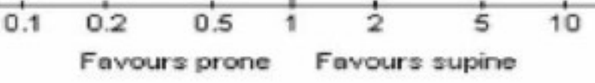
The effect of prone positioning in acute respiratory distress syndrome or acute lung injury: a meta-analysis. Areas of uncertainty and recommendations for research.

Mentimeter

Review: Prone vs Supine position in ARDS
Comparison: 01 Prone vs Supine Ventilation
Outcome: 05 Ventilator associated pneumonia

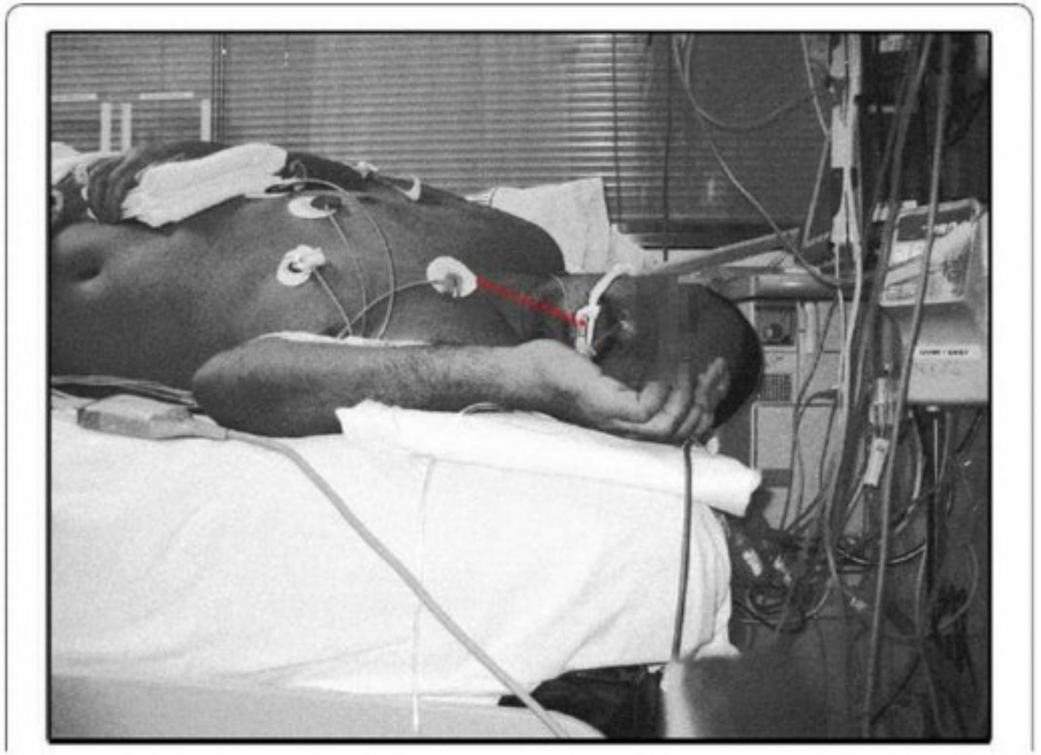
Study or sub-category	Prone n/N	Supine n/N	OR (fixed) 95% CI	Weight %	OR (fixed) 95% CI	Order
Guerin_2004	85/413	91/378		76.62	0.82 [0.58, 1.14]	1
Voggenreiter_2005	13/21	17/18		7.08	0.10 [0.01, 0.86]	2
Mancebo_2006	14/76	9/60		8.33	1.28 [0.51, 3.20]	3
Beuret_2002	5/25	10/26		7.96	0.40 [0.11, 1.41]	4
Total (95% CI)	535	482		100.00	0.77 [0.57, 1.04]	

Total events: 117 (Prone), 127 (Supine)
Test for heterogeneity: Chi² = 5.79, df = 3 (P = 0.12), I² = 48.2%
Test for overall effect: Z = 1.71 (P = 0.09)



ORIGINAL

Randomized, multicenter trial of lateral Trendelenburg versus semirecumbent body position for the prevention of ventilator-associated pneumonia



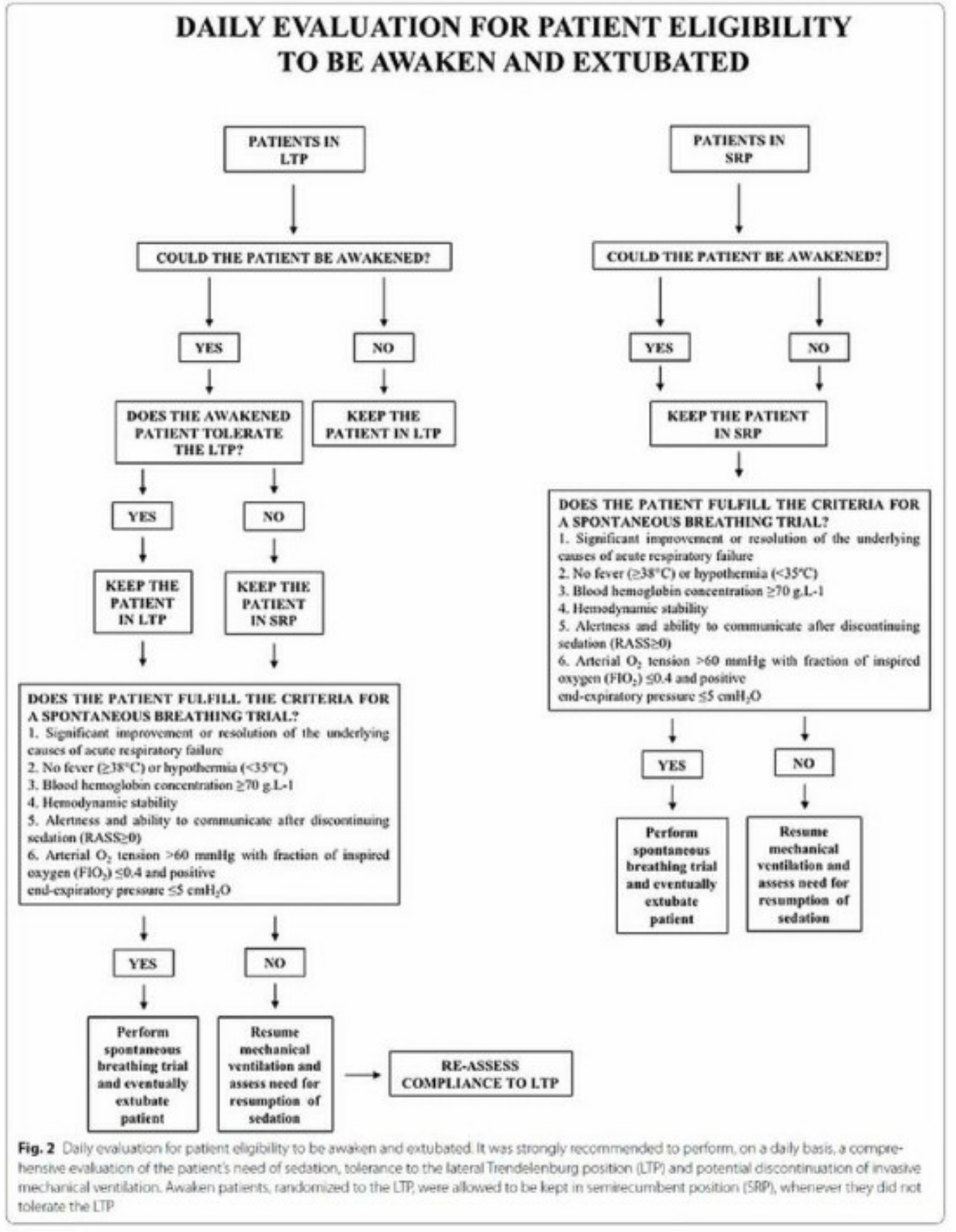
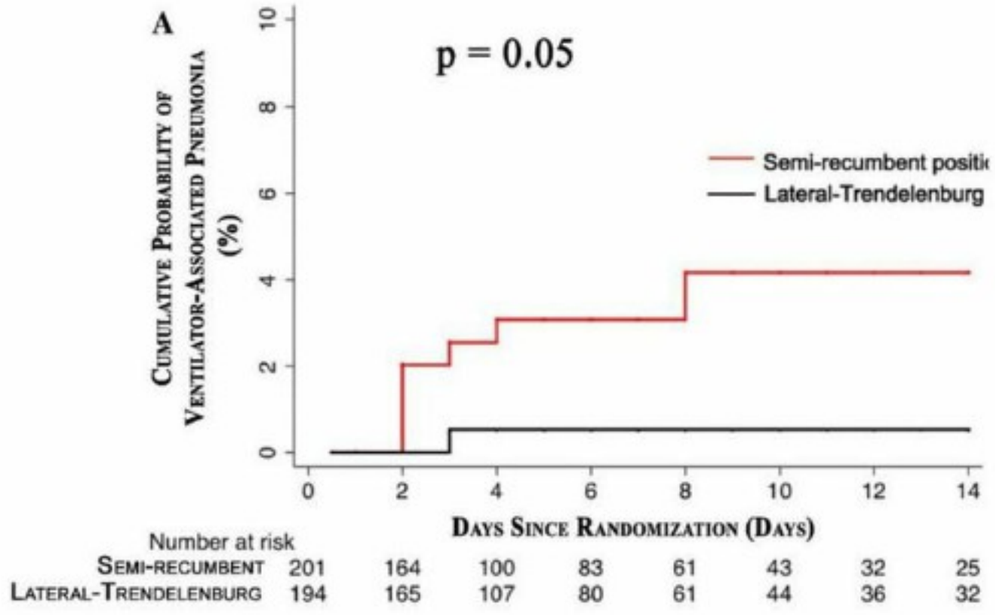


Fig. 2 Daily evaluation for patient eligibility to be awaken and extubated. It was strongly recommended to perform, on a daily basis, a comprehensive evaluation of the patient's need of sedation, tolerance to the lateral Trendelenburg position (LTP) and potential discontinuation of invasive mechanical ventilation. Awaken patients, randomized to the LTP, were allowed to be kept in semirecumbent position (SRP), whenever they did not tolerate the LTP

Mentimeter

ORIGINAL

Randomized, multicenter trial of lateral Trendelenburg versus semirecumbent body position for the prevention of ventilator-associated pneumonia



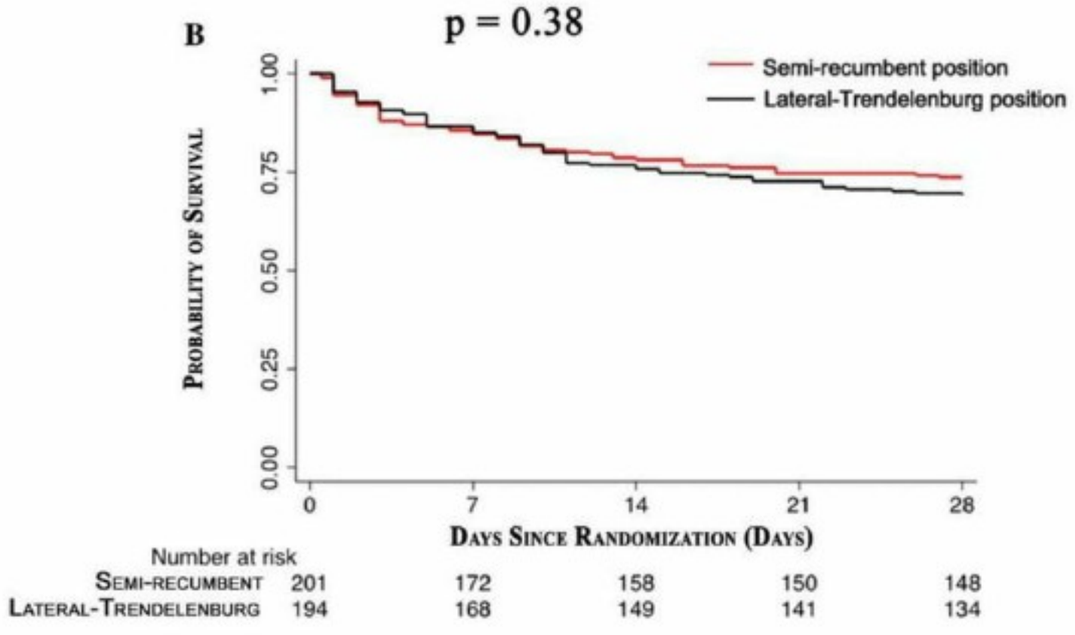


Table 3 Adverse events

Adverse events	Semirecumbent ($n = 201$)	Lateral Trendelenburg ($n = 194$)	p value
New pressure ulcer	21 (10.5%)	21 (10.8%)	>0.99
Displacement of endotracheal tube, no. (%)	13 (6.5%)	11 (5.7%)	0.83
Loss of intravascular access, no. (%)	2 (1.0%)	5 (2.6%)	0.28
Displacement of drainage tube, no (%)	1 (0.5%)	0 (0%)	>0.99
Severe obstruction of endotracheal tube, no. (%)	1 (0.5%)	2 (1.0%)	0.62
Vomiting, no. (%)	5 (2.5%)	16 (8.3%)	0.01
Displacement of nasogastric tube, no. (%)	2 (1.0%)	7 (3.6%)	0.10

Serious adverse events in lateral Trendelenburg position				
Time of occurrence after enrollment (days)	**Patient comorbidities**	**Report of the event**	**Association with the intervention**	**Outcome**
1	Hepatic fibrosis and cirrhosis Diabetes Renal failure	Oxygen desaturation during positioning	Definitely	Required prompt intervention to prevent further damage
2	Asthma Hepatic fibrosis and cirrhosis Diabetes Valvular heart disease	Severe hemodynamic impairment, shortly after positioning	Definitely	Required prompt intervention to prevent further damage
3	Liver transplant	Endotracheal extubation	Definitely	Required prompt intervention to prevent further damage
0	Arterial hypertension Cardiac arrhythmia	Sustained bradycardia, shortly after positioning	Definitely	Required prompt intervention to prevent further damage
12	Kyphoscoliosis Restrictive pulmonary disease	Neurological damage of the left brachial plexus	Possible	Permanent damage
8	End-stage liver failure	Intracerebral hemorrhage	Possible	Fatal

Mentimeter

EDITORIAL

Oral care with chlorhexidine: beware!

Lila Bouadma[1,2*] and Michael Klompas[3,4]

Table 1. Evidence for and against daily oral care with chlorhexidine in mechanically ventilated patients

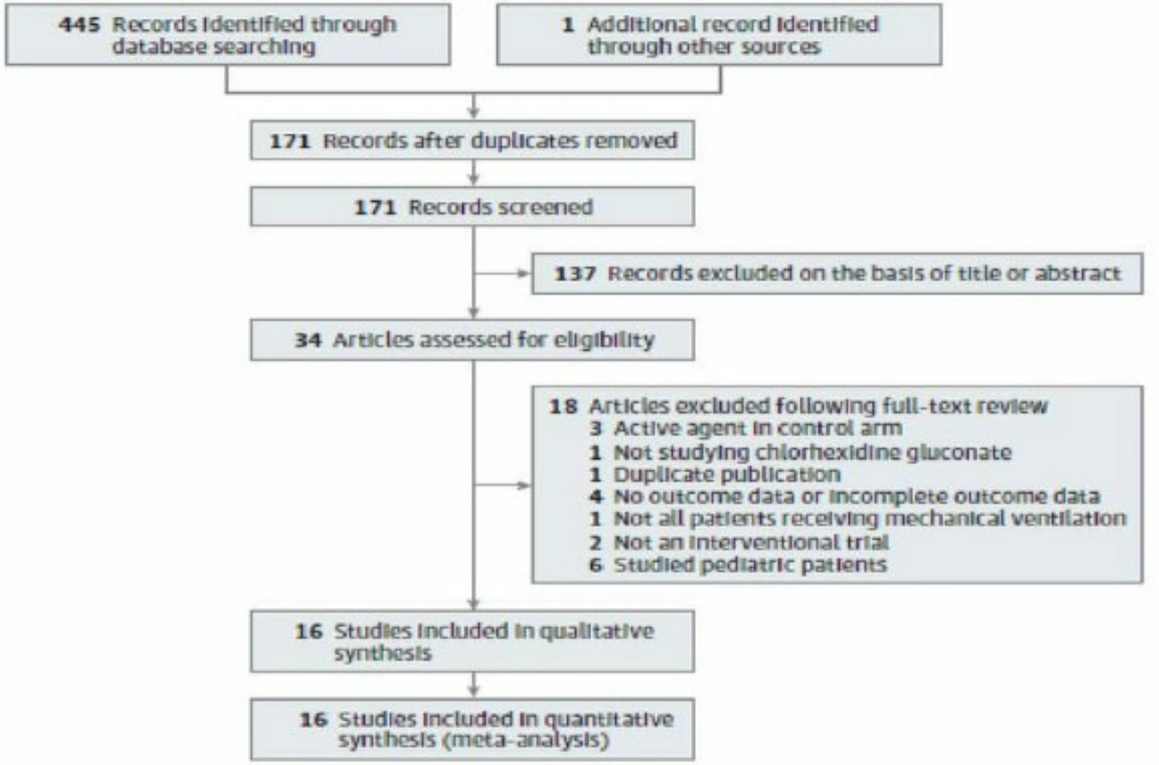
	Evidence in favor of oral care with CHG	Evidence against oral care with CHG
RCT	A few RCT have reported significant decreases in VAP rates	Almost all RCT have reported no significant impact on VAP rates
Meta analyses of RCT	Multiple meta-analyses have reported significantly lower VAP rates	No significant decrease in VAP rates on meta-analysis of double-blind studies Meta-analyses suggest higher mortality rates
Observational studies	Multiple observational studies of VAP bundle implementations have reported lower VAP rates; many of these bundles have included oral care with CHG in addition to other prevention strategies	Observational studies that have tried to determine the individual effect of each bundle component have reported associations between oral CHG and higher mortality rates

Original Investigation

Reappraisal of Routine Oral Care With Chlorhexidine Gluconate for Patients Receiving Mechanical Ventilation
Systematic Review and Meta-Analysis

Michael Klompas, MD; Kathleen Speck, MPH; Michael D. Howell, MD; Linda R. Greene, RN; Sean M. Berenholtz, MD

Figure 1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Study Flowchart



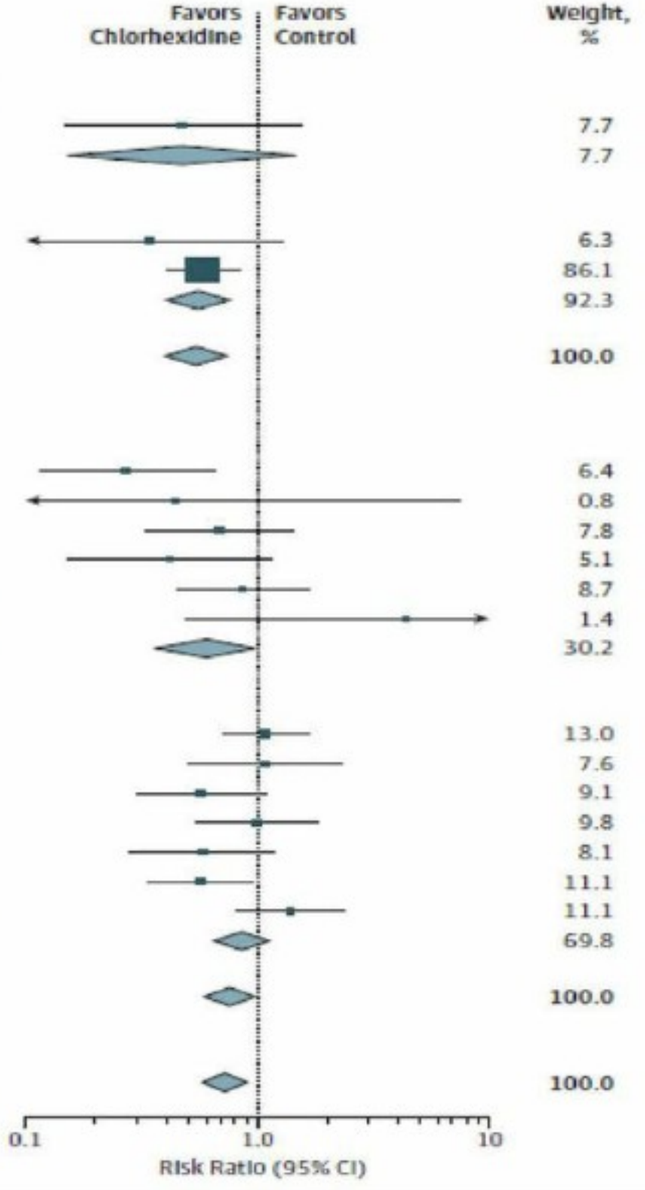
Original Invest

Reappr
Glucon
System

Michael Klompas,
Linda R. Greene, F

Figure 2. Impact of Chlorhexidine Gluconate Use vs Comparators on Nosocomial Pneumonia in Cardiac Surgery Patients and Ventilator-Associated Pneumonia in Non–Cardiac Surgery Patients

Study or Subgroup	Chlorhexidine Events	Chlorhexidine Patients	Control Events	Control Patients	Risk Ratio (95% CI)	Weight, %
Cardiac Surgery Studies						
Open-label Studies						
Houston et al,[11] 2002	4	270	9	291	0.48 (0.15-1.54)	7.7
Subtotal	4	270	9	291	0.48 (0.15-1.54)	7.7
Double-blind Studies						
De Riso et al,[10] 1996	3	173	9	180	0.35 (0.10-1.26)	6.3
Segers et al,[12] 2006	45	485	74	469	0.59 (0.42-0.83)	86.1
Subtotal	48	658	83	649	0.57 (0.41-0.79)	92.3
Total	**52**	**928**	**92**	**940**	**0.56 (0.41-0.77)**	**100.0**
Non-Cardiac Surgery Studies						
Open-label Studies						
Fourrier et al,[20] 2000	5	30	18	30	0.28 (0.12-0.65)	6.4
Bopp et al,[22] 2006	0	2	1	3	0.44 (0.03-7.52)	0.8
Jafari et al,[19] 2007	9	40	13	40	0.69 (0.33-1.43)	7.8
Tantipong et al,[24] 2008	5	102	12	105	0.43 (0.16-1.17)	5.1
Panchabhai et al,[26] 2009	14	88	15	83	0.88 (0.45-1.71)	8.7
Berry et al,[28] 2011	4	71	1	78	4.39 (0.50-38.39)	1.4
Subtotal	37	333	60	339	0.61 (0.35-1.04)	30.2
Double-blind Studies						
Macnaughton et al,[18] 2004	32	91	28	88	1.11 (0.73-1.67)	13.0
Fourrier et al,[21] 2005	13	114	12	114	1.08 (0.52-2.27)	7.6
Koeman et al,[23] 2006	13	127	23	130	0.58 (0.31-1.09)	9.1
Bellissimo-Rodrigues et al,[25] 2009	16	64	17	69	1.01 (0.56-1.83)	9.8
Scannapieco et al,[27] 2009	14	116	12	59	0.59 (0.29-1.20)	8.1
Ozcaka et al,[30] 2012	12	32	22	34	0.58 (0.35-0.97)	11.1
Meinberg et al,[23] 2012	18	28	11	24	1.40 (0.84-2.35)	11.1
Subtotal	118	572	125	518	0.88 (0.66-1.16)	69.8
Total	**155**	**905**	**185**	**857**	**0.78 (0.60-1.02)**	**100.0**
All Studies						
Total	**207**	**1833**	**277**	**1797**	**0.73 (0.58-0.92)**	**100.0**



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Michael Klompas, I
Linda R. Greene, R

Figure 3. Impact of Chlorhexidine Gluconate Use vs Comparators on Mortality

Study or Subgroup	Chlorhexidine Events	Chlorhexidine Patients	Control Events	Control Patients	Risk Ratio (95% CI)	Weight, %
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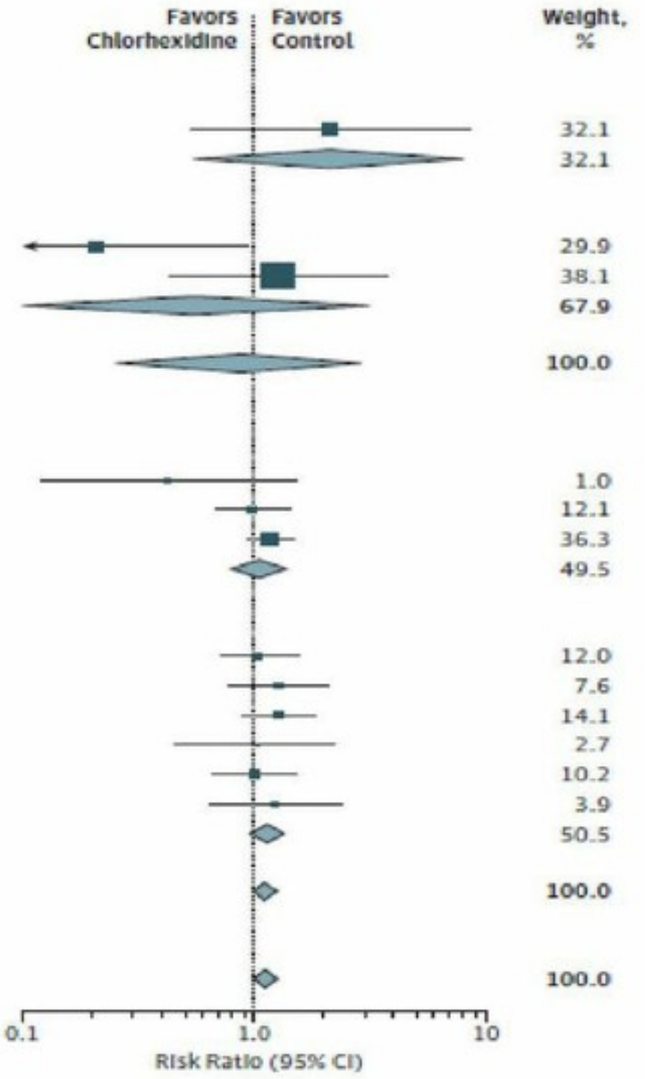
Subtotal	6	270	3	291	2.16 (0.54-8.53)	32.1
Double-blind Studies						
De Riso et al,[10] 1996	2	173	10	180	0.21 (0.05-0.94)	29.9
Segers et al,[12] 2006	8	485	6	469	1.29 (0.45-3.69)	38.1
Subtotal	10	658	16	649	0.56 (0.09-3.40)	67.9
Total	**16**	**928**	**19**	**940**	**0.88 (0.25-3.14)**	**100.0**
Non-Cardiac Surgery Studies						
Open-label Studies						
Fourrier et al,[20] 2000	3	30	7	30	0.43 (0.12-1.50)	1.0
Tantipong et al,[24] 2008	36	102	37	105	1.00 (0.69-1.45)	12.1
Panchabhai et al,[26] 2009	64	88	51	83	1.18 (0.96-1.46)	36.3
Subtotal	103	220	95	218	1.06 (0.80-1.41)	49.5
Double-blind Studies						
Macnaughton et al,[18] 2004	36	91	33	88	1.05 (0.73-1.53)	12.0
Fourrier et al,[21] 2005	31	114	24	114	1.29 (0.81-2.06)	7.6
Koeman et al,[23] 2006	49	127	39	130	1.29 (0.91-1.81)	14.1
Scannapieco et al,[27] 2009	16	97	8	49	1.01 (0.46-2.20)	2.7
Ozcaka et al,[30] 2012	19	32	20	34	1.01 (0.68-1.51)	10.2
Meinberg et al,[29] 2012	13	28	9	24	1.24 (0.65-2.38)	3.9
Subtotal	164	489	133	439	1.15 (0.96-1.38)	50.5
Total	**267**	**709**	**228**	**657**	**1.13 (0.99-1.29)**	**100.0**
All Studies						
Total	**283**	**1637**	**247**	**1597**	**1.13 (0.99-1.28)**	**100.0**



Protocole multimodal de prévention des pneumonies associées aux soins

Mentimeter

1. Favoriser la ventilation non-invasive (notamment en post-opératoire de chirurgie digestive et chez les BPCO)

En cas de nécessité de ventilation invasive

2. Appliquer un protocole de **DDS** avec une antibiothérapie systémique < 5 jours si prévalence de BMR faible (20%)

+++

3. <u>Associer certaines des méthodes suivantes (1ére intention):</u>

- Limiter les doses et la durée d'administration de sédatifs et analgésiques liés à la ventilation mécanique
- Initier précocement une nutrition entérale
- Contrôler régulièrement la pression de gonflage de la sonde d'intubation
- Réaliser une aspiration sous-glottique (6-8 heures) à l'aide de sonde endotrachéale adaptée
- Préférer la voie orale pour l'intubation

4. Eviter d'utiliser les méthodes suivantes:

- Trachéotomie précoce systématique (hors indication spécifique
- Nutrition entérale post-pylorique (hors indication spécifique
- Administration de probiotiques
- Changement précoce des filtres
- Utilisation des systèmes clos d'aspiration
- Utilisation de sonde de sonde d'intubation imprégnée avec un antiseptique, ou à forme « optimisée du ballonnet
- Décontamination oro-pharyngée à la polyvidone iodée
- Utilisation d'une antibioprophylaxie par aérosols
- Décontamination cutanée quotidienne par antiseptique

CAS CLINIQUE

Détresse respiratoire aigue à J8

Nécessité de ré-intubation

Hyperleucocytose (GB: 21 mm^{-3})

PaO_2:FiO_2 : 180 mmHg à FiO_2 0,5

PCT : 1,4 mcg/L

Radio précédente normale

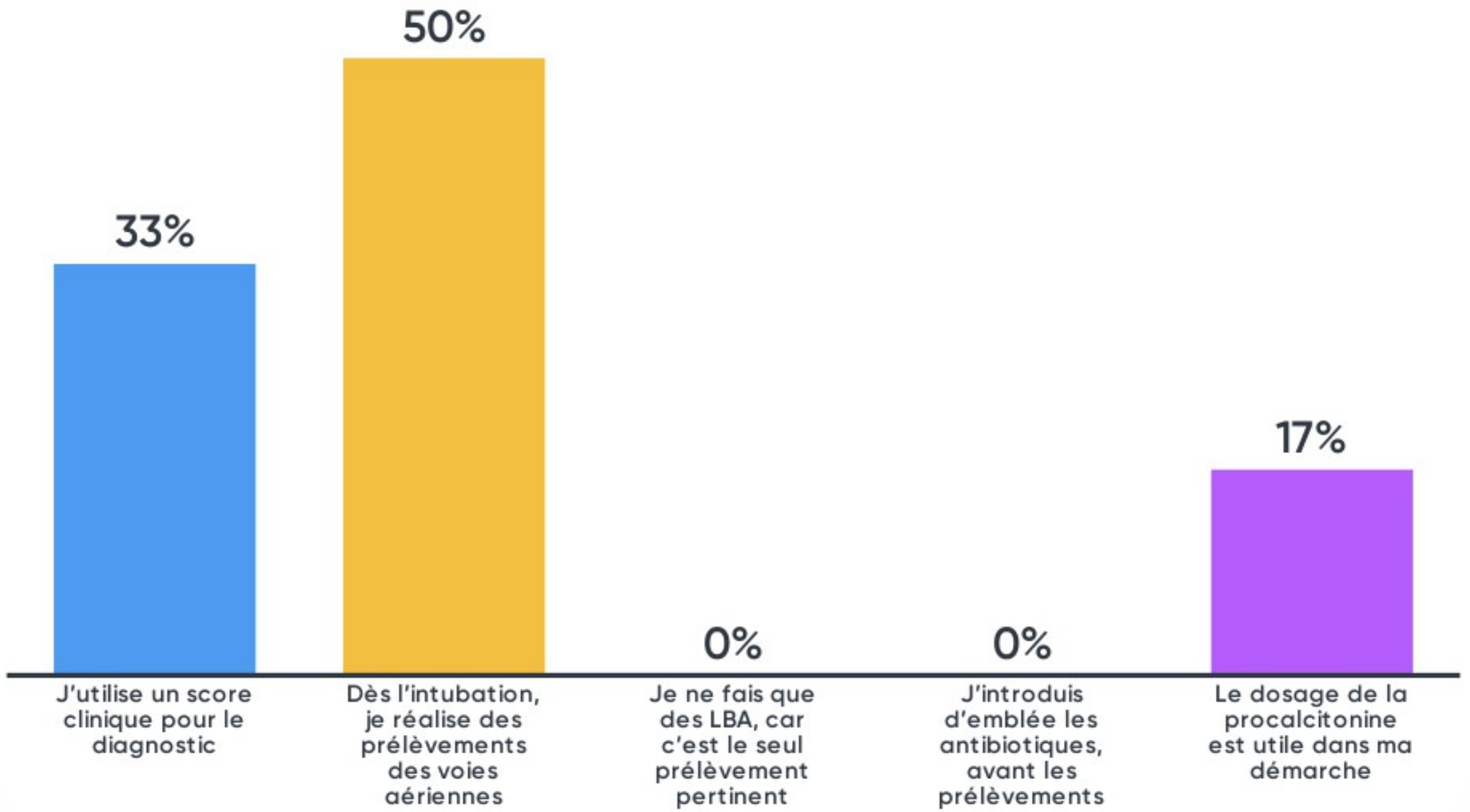
QCM

A ce stade :

1. J'utilise un score clinique pour le diagnostic
2. Dès l'intubation, je réalise des prélèvements des voies aériennes
3. Je ne fais que des LBA, car c'est le seul prélèvement pertinent
4. J'introduis d'emblée les antibiotiques, avant les prélèvements
5. Le dosage de la procalcitonine est utile dans ma démarche

A ce stade :

Mentimeter



RECOMMENDATION

Il ne faut probablement pas **utiliser les scores cliniques (CPIS, CPIS modifié) pour le diagnostic des pneumonies associées aux soins.**

GRADE 2-, ACCORD FORT

RECOMMENDATION

Il faut probablement **réaliser des prélèvements microbiologiques des voies aériennes,** quel que soit le type, avant toute introduction ou modification de l'antibiothérapie.

GRADE 2+, ACCORD FORT

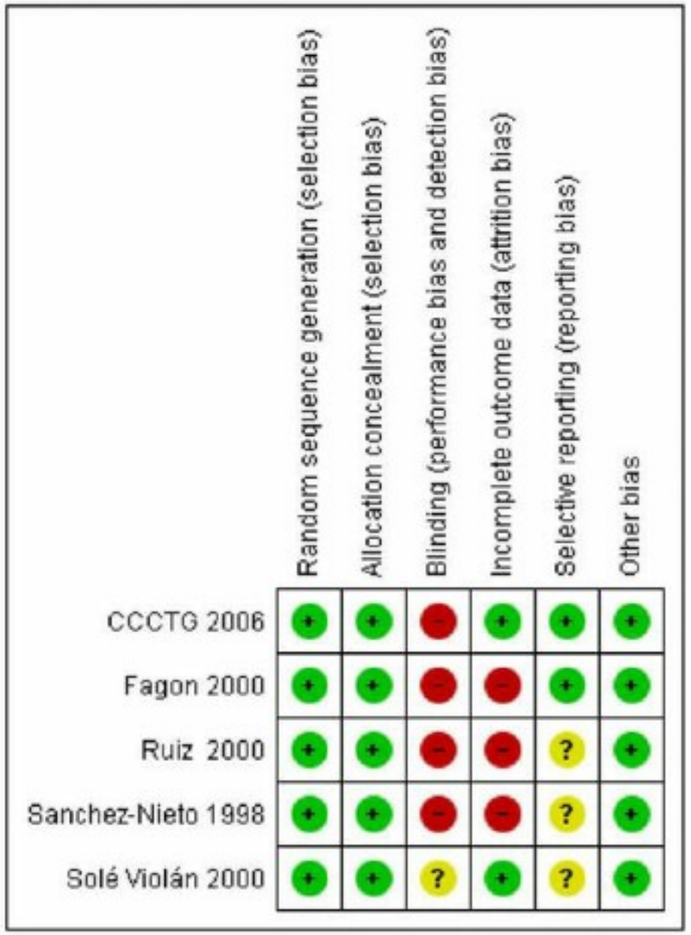
Quantitative versus qualitative cultures of respiratory secretions for clinical outcomes in patients with ventilator-associated pneumonia (Review)

Cochrane Library
Cochrane Database of Systematic Reviews

Mentimeter

2014

Berton DC, Kalil AC, Teixeira PJZ



srlf

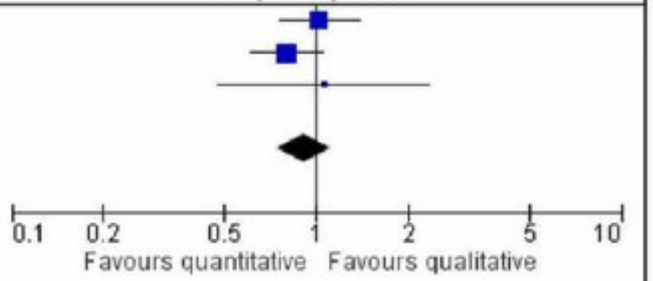
RATIONNEL

SFAR

MORTALITY

Study or Subgroup	Quantitative culture Events	Total	Qualitative culture Events	Total	Weight	Risk Ratio M-H, Fixed, 95% CI
CCCTG 2006	69	365	69	374	43.3%	1.02 [0.76, 1.38]
Fagon 2000	63	204	81	209	50.8%	0.80 [0.61, 1.04]
Solé Violán 2000	10	45	9	43	5.8%	1.06 [0.48, 2.36]
Total (95% CI)		**614**		**626**	**100.0%**	**0.91 [0.75, 1.11]**
Total events	142		159			

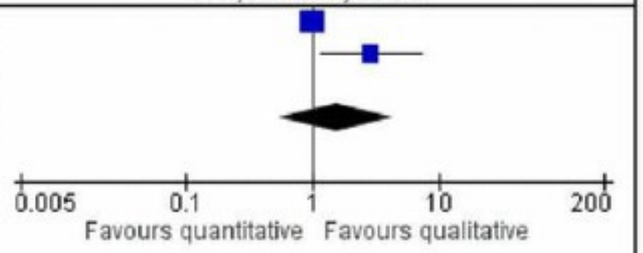
Heterogeneity: Chi² = 1.70, df = 2 (P = 0.43); I² = 0%
Test for overall effect: Z = 0.94 (P = 0.35)



ANTIBIOTIC CHANGE

Study or Subgroup	Quantitative culture Events	Total	Qualitative culture Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
CCCTG 2006	271	365	279	374	59.2%	1.00 [0.91, 1.08]
Solé Violán 2000	15	45	5	43	40.8%	2.87 [1.14, 7.21]
Total (95% CI)		**410**		**417**	**100.0%**	**1.53 [0.54, 4.39]**
Total events	286		284			

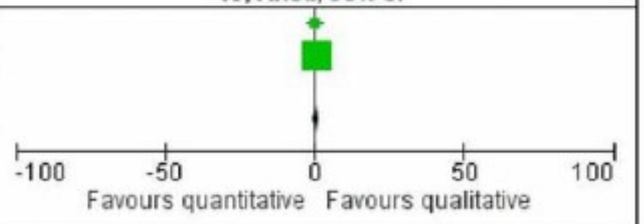
Heterogeneity: Tau² = 0.49; Chi² = 5.35, df = 1 (P = 0.02); I² = 81%
Test for overall effect: Z = 0.80 (P = 0.43)



DURATION ON MV

Study or Subgroup	Quantitative culture Mean	SD	Total	Qualitative culture Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
CCCTG 2006	8.9	16.16	365	8.8	18.34	374	19.2%	0.10 [-2.39, 2.59]
Solé Violán 2000	19.9	2.8	45	19.2	3	43	80.8%	0.70 [-0.51, 1.91]
Total (95% CI)			**410**			**417**	**100.0%**	**0.58 [-0.51, 1.68]**

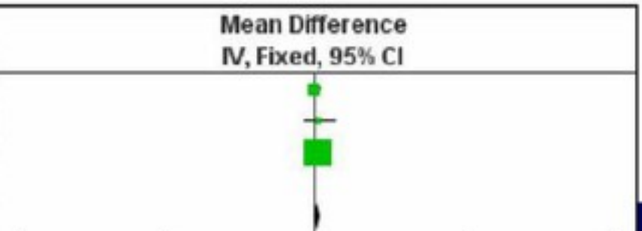
Heterogeneity: Chi² = 0.18, df = 1 (P = 0.67); I² = 0%
Test for overall effect: Z = 1.05 (P = 0.29)



ICU STAY

Study or Subgroup	Quantitative culture Mean	SD	Total	Qualitative culture Mean	SD	Total	Weight	Mean Difference IV, Fixed, 95% CI
CCCTG 2006	12.3	14.1	365	12.2	16.3	374	24.6%	0.10 [-2.10, 2.30]
Fagon 2000	26.7	23.9	204	25.1	28.5	209	4.6%	1.60 [-3.47, 6.67]
Solé Violán 2000	23.6	3.1	45	22.4	3.1	43	70.7%	1.20 [-0.10, 2.50]
Total (95% CI)			**614**			**626**	**100.0%**	**0.95 [-0.14, 2.04]**

Heterogeneity: Chi² = 0.78, df = 2 (P = 0.68); I² = 0%
Test for overall effect: Z = 1.70 (P = 0.09)



Mentimeter

RECOMMENDATION

Il ne faut probablement pas **mesurer les concentrations plasmatiques de procalcitonine ou alvéolaires de TREM-1 soluble** pour diagnostiquer une pneumonie associée aux soins.

GRADE 2-, ACCORD FORT

PCT : performance insuffisante pour diagnostic

8 études : 589 patients

Prévalence : 55 %

Se : 54 % (48-59 %)
Sp : 67 % (61-73 %)
VPP : 67 %
VPN : 54 %
Ratio de vraisemblance positive (LR+) : 1,65
LR- : 0,68
Seuils retenus : 0,15 à 3,9 ng/mL

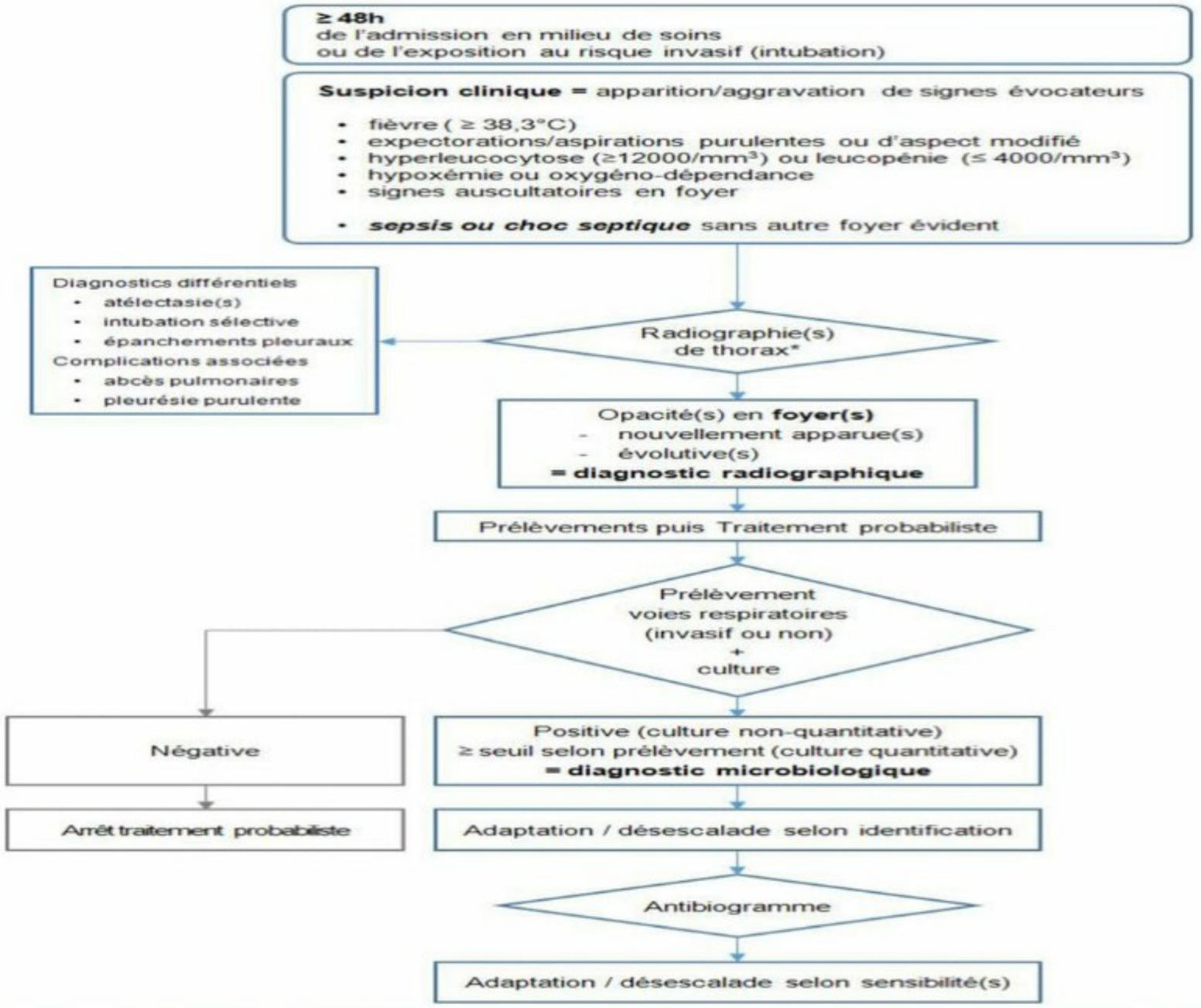
sTREM1 : performance insuffisante pour diagnostic

7 études : 317 patients

Prévalence : 48 %

Se : 83 % (76-89 %)
Sp : 77% (69- 83%)
VPP : 77%
VPN : 83%
Ratio de vraisemblance positive (LR+) : 3,56
LR- : 0,22
Seuils retenus : 5 à 900 pg/mL

Mentimeter



Mentimeter

AVIS D'EXPERTS: DIAGNOSTIC

CAS CLINIQUE

Mini-LBA

Examen direct : bacille à Gram négatif

PaO_2:FiO_2 après 1 h de VM : 185 mmHg avec FiO_2 à 0,4

Nécessité d'un remplissage vasculaire, sans aucun vasopresseur

Lactatémie : 1,6 mmol/L

Dans l'unité, PAVM à SARM : 2 % des PAVM

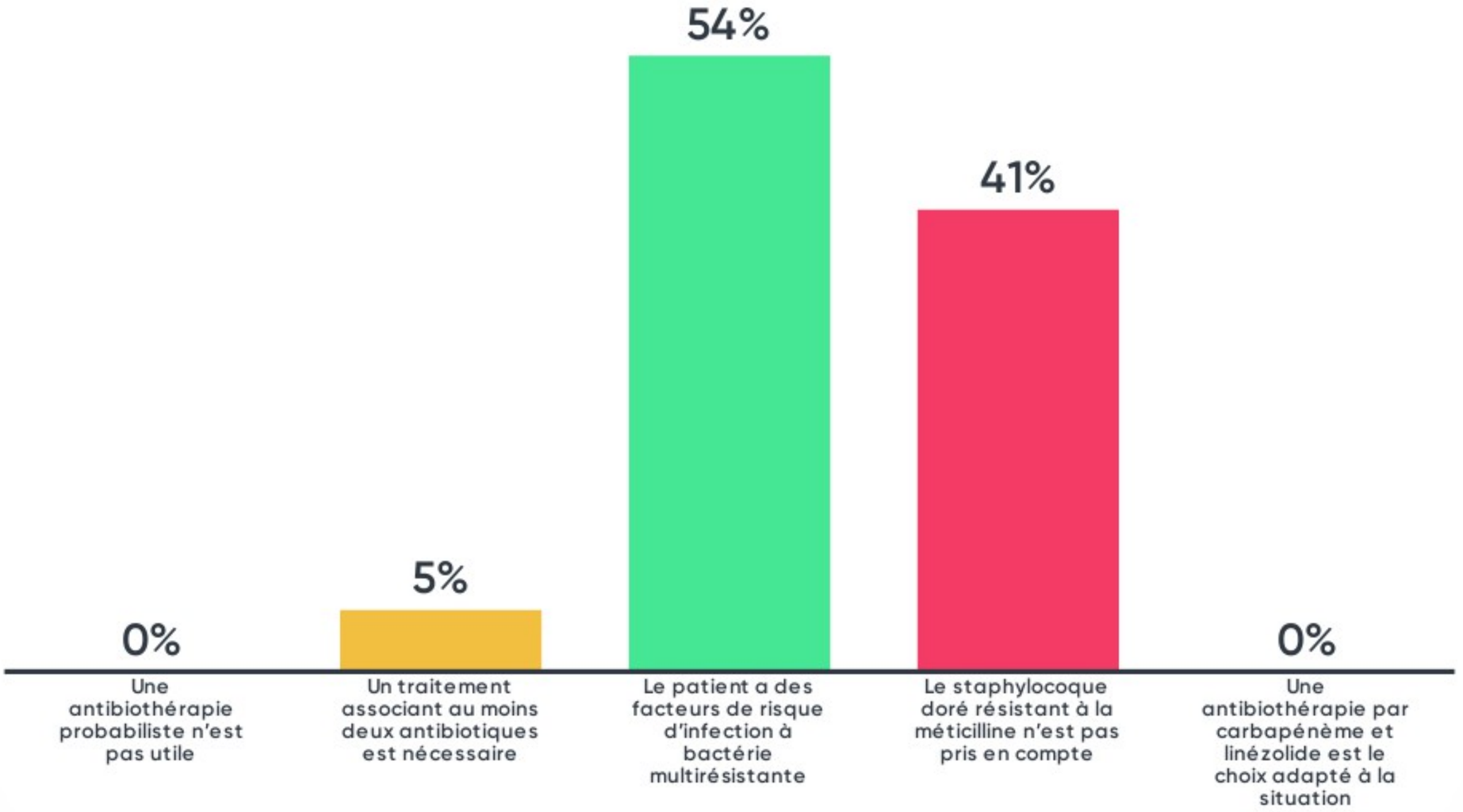
QCM

A ce stade :

1. Une antibiothérapie probabiliste n'est pas utile
2. Un traitement associant au moins deux antibiotiques est nécessaire
3. Le patient a des facteurs de risque d'infection à bactérie multirésistante
4. Le staphylocoque doré résistant à la méticilline n'est pas pris en compte
5. Une antibiothérapie par carbapénème et linézolide est le choix adapté à la situation

A ce stade :

Mentimeter



RECOMMENDATION

Il faut probablement **réaliser les prélèvements et initier le traitement antibiotique** en tenant compte des facteurs de risque de bactéries résistantes aux antibiotiques immédiatement en cas de suspicion de pneumonie avec signes de gravité hémodynamique (choc), respiratoire (syndrome de détresse respiratoire aigu) ou de terrain fragile (immunodépression).

GRADE 2+, ACCORD FORT

Choc septique : dans l'heure!

Pneumonie associée aux soins :

pas d'étude randomisée « immédiat » *vs.* « après documentation microbiologique ».

Etudes observationnelles suggèrent un meilleur pronostic si le traitement est « immédiat ».

RATIONNEL

RECOMMENDATION

Il faut traiter par **monothérapie en probabiliste les pneumonies associées aux soins du patient immunocompétent sous ventilation mécanique**, en dehors de la présence de facteurs de risque de bactéries multirésistantes, de bacilles à Gram négatif non fermentant, et/ou de facteurs de risque élevé de mortalité (choc septique, défaillances d'organes).

GRADE 1+, ACCORD FORT

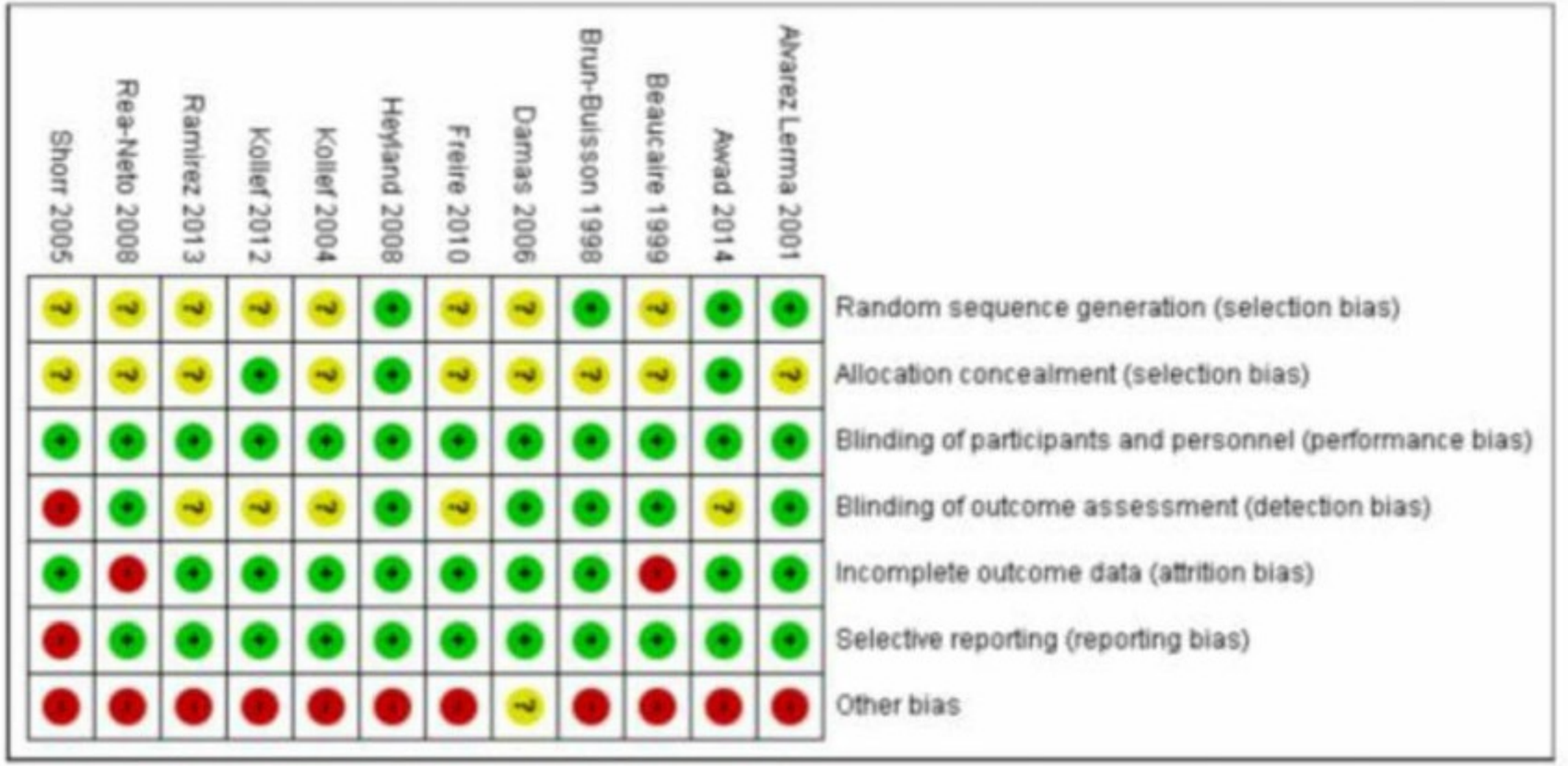
Antibiotics for ventilator-associated pneumonia (Review)

Cochrane Library
Cochrane Database of Systematic Reviews

Mentimeter

Arthur LE, Kizor RS, Selim AG, van Driel ML, Seoane L

2016



srlf

RATIONNEL

SFAR

Antibiotics for ventilator-associated pneumonia (Review)

Cochrane Library
Cochrane Database of Systematic Reviews

Mentimeter

Arthur LE, Kizor RS, Selim AG, van Driel ML, Seoane L

2016

Monothérapie *vs.* Bithérapie

Mortalité (OR : 0,97 ; IC 95 % [0,73-1,30])

Guérison clinique (OR : 0,88 ; IC 95 % [0,56-1,36])

Durée de séjour (OR : 0,65 ; IC 95 % [0,07-1,23])

Effets secondaires (OR : 0,93 ; IC 95 % [0,68-1,26])

RECOMMENDATION

Les experts suggèrent **de ne pas utiliser de manière probabiliste et systématique un antibiotique actif contre *Staphylococcus aureus* résistant à la méticilline** dans le traitement des pneumonies associées aux soins.

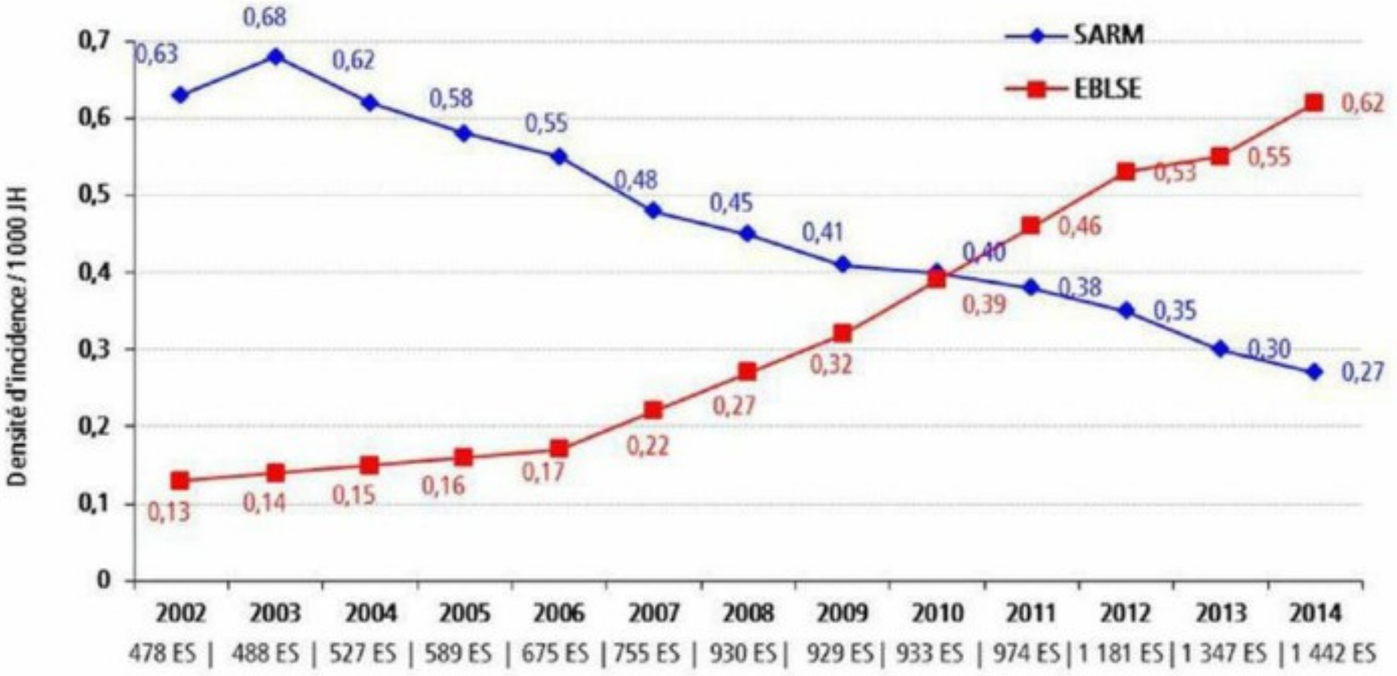
AVIS D'EXPERTS, ACCORD FORT

Evolution de l'incidence SARM et EBLSE dans les établissements de santé français, Réseau BMR-Raisin

EUROPEAN ANTIBIOTIC AWARENESS DAY

Mentimeter

Densité d'incidence des SARM et des EBLSE pour 1000 journées d'hospitalisation (incidence globale par année).



RAISIN

Santé publique France

Source : Rapport BMR-Raisin : Surveillance nationale des bactéries multirésistantes dans les établissements de santé : réseau BMR-Raisin.

Disponible sous : http://invs.santepubliquefrance.fr//bmr-raisin

srlf Société de Réanimation de Langue Française

RATIONNEL

SFAR Société Française d'Anesthésie et de Réanimation

CAS CLINIQUE

Pipéracilline- Tazobactam

J3 : staphylocoque doré sensible à la méticilline

Amélioration du rapport PaO_2:FiO_2 > 250 mmHg (FiO_2 0,3)

Extubation envisagée

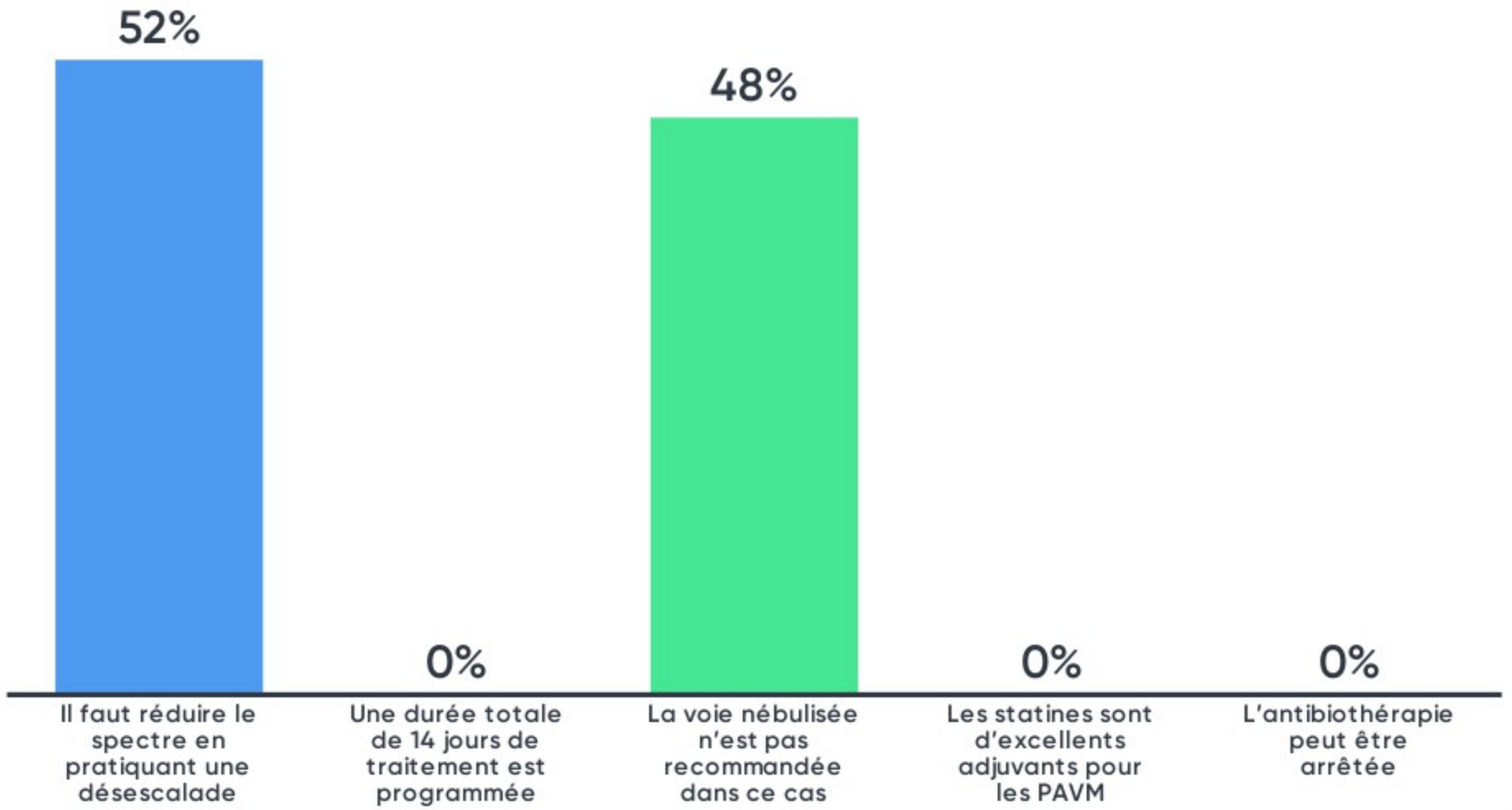
PCT : 0,15 mcg/L

A ce stade :

1. Il faut réduire le spectre en pratiquant une désescalade
2. Une durée totale de 14 jours de traitement est programmée
3. La voie nébulisée n'est pas recommandée dans ce cas
4. Les statines sont d'excellents adjuvants pour les PAV
5. L'antibiothérapie peut être arrêtée

A ce stade :

Mentimeter



RECOMMENDATIONS

R3.4 – Il faut probablement réduire le spectre et privilégier une monothérapie pour l'antibiothérapie des pneumonies associées aux soins après documentation, y compris pour les bacilles à Gram négatif non fermentant.

GRADE 2+, ACCORD FORT

R3.5 – Il ne faut pas prolonger plus de 7 jours la durée du traitement antibiotique pour les pneumonies associées aux soins, y compris pour les pneumonies à bacilles à Gram négatif non fermentant en dehors de certaines situations (immunodépression, empyème, pneumonie nécrosante ou abcédée).

GRADE 1-, ACCORD FORT

R3.6 –Dans le cadre des pneumonies documentées à bacilles à Gram négatif multirésistants, définis comme sensibles à la colimycine (colistiméthate sodique) et/ou aux aminosides et lorsqu'aucun autre antibiotique n'est efficace, il faut probablement administrer la colimycine et/ou un aminoside par voie nébulisée.

GRADE 2+, ACCORD FORT

R3.7 – Il ne faut pas administrer des statines comme traitement adjuvant des pneumonies associées aux soins.

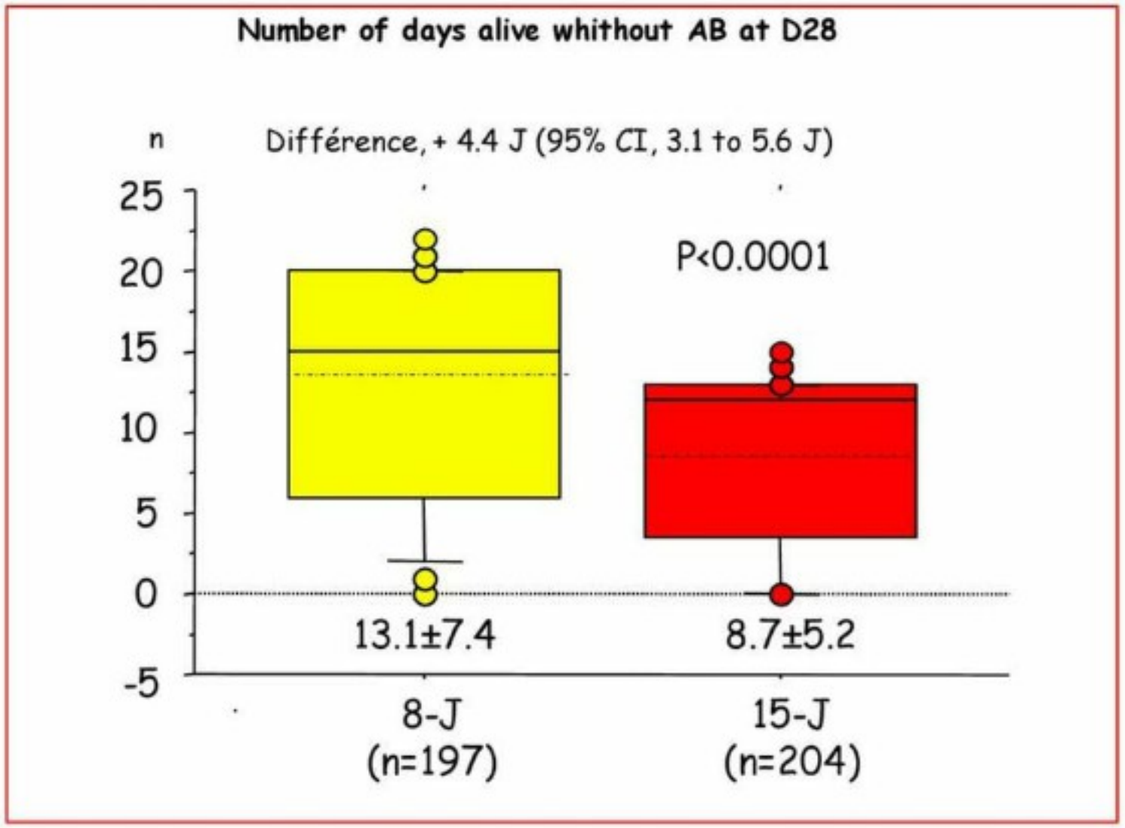
GRADE 1-, ACCORD FORT

Comparison of 8 vs 15 days of antibiotic therapy for ventilator-associated pneumonia in adults: a randomized trial

Chastre J, Wolff M, Fagon JY, Chevret S, Thomas F, Wermert D, Clementi E, Gonzalez J, Jusserand D, Asfar P, Perrin D, Fieux F, Aubas S; PneumA Trial Group

JAMA
2003

Mentimeter



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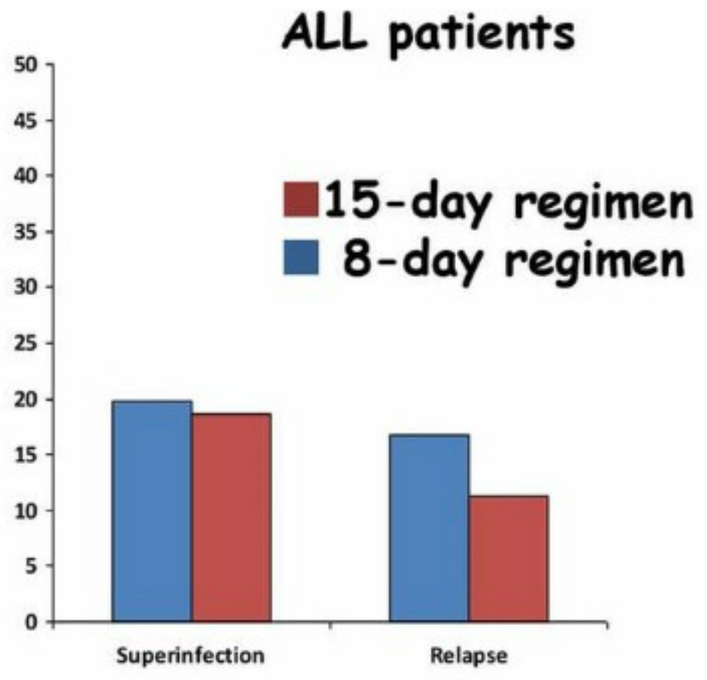
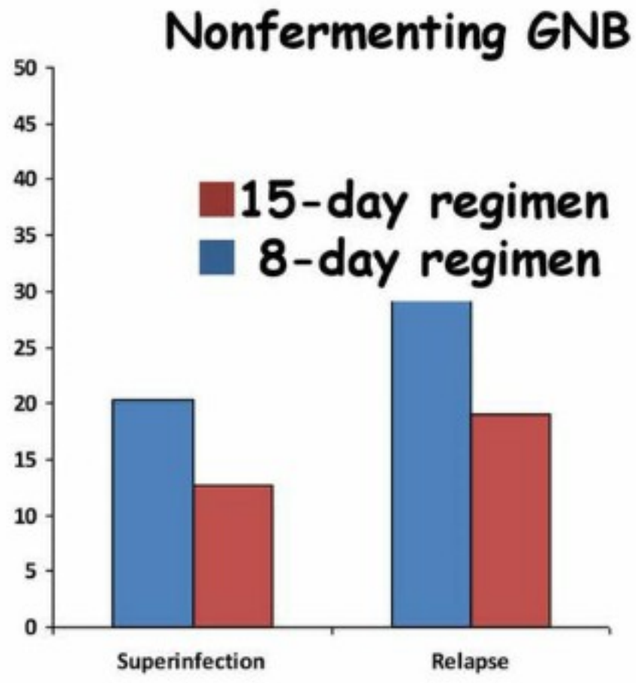
Mentimeter

Pulmonary infections reccurence





Length of therapy

XXI. Should Patients With VAP Receive 7 Days or 8–15 Days of Antibiotic Therapy?

Recommendation

1. For patients with VAP, **we recommend a 7-day** course of antimicrobial therapy rather than a longer duration

(strong recommendation, moderate-quality evidence).

XXII. What Is the Optimal Duration of Antibiotic Therapy for HAP (Non-VAP)?

Recommendation

1. For patients with HAP, **we recommend a 7-day** course of antimicrobial therapy

(strong recommendation, very low-quality evidence).

Question#4: In patients with HAP/VAP can duration of antimicrobial therapy be shortened to 7-10 days for certain populations, as compared to 14 days, without increasing rates of relapsing infections or decreasing clinical cure?

Recommendations

We suggest using a 7 to 8 day course of antibiotic therapy in patients with ventilator-associated pneumonia (VAP) and no immunodeficiency, cystic fibrosis, empyema, lung abscess, cavitation or necrotizing pneumonia, and a good clinical response to therapy

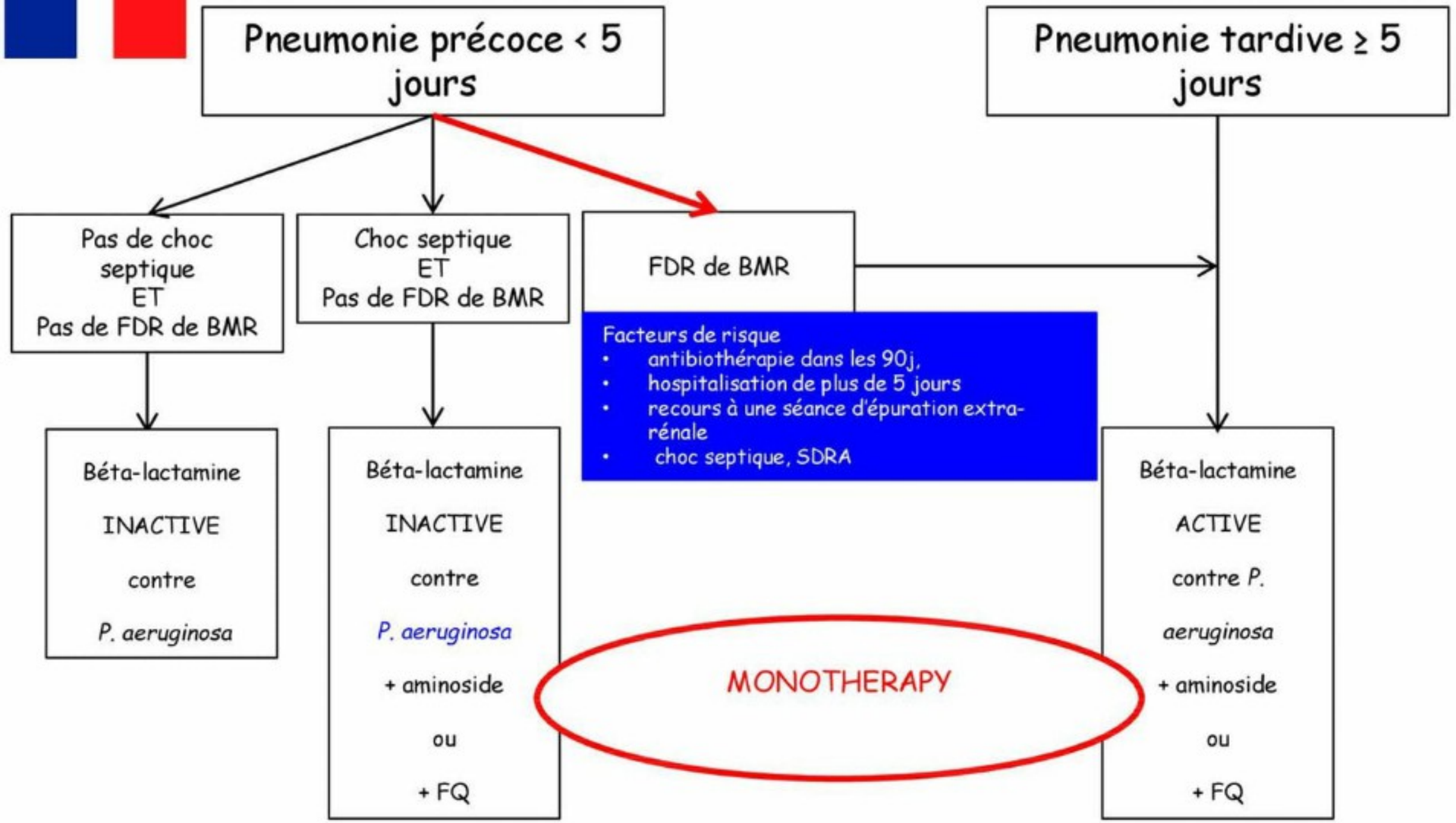
(Weak recommendation, moderate quality of evidence)

R3.5 -We recommend not prolonging for more than 7 days the AB treatment for HAP including for nonfermenting GNB, outside of certain situations (immunosuppression, empyema, necrotising or abscessed pneumonia).

GRADE 1-, STRONG AGREEMENT

Schémas thérapeutiques

Mentimeter



R3.3 – The experts suggest not using empirically and systematically an active antibiotic against methicillin-resistant *Staphylococcus aureus* in the treatment of HAP.

AVIS D'EXPERTS, STRONG AGREEMENT

Empirical therapy for HAP/VAP

Mentimeter

Cover S aureus, PA and other GNB

- High rate of MRSA (10-20%) or not known
- RF for MRSA*

Yes → LNZ OR VAN

- High rate of MDR (> 10%) or not known
- RF for MDR*

Yes → COMBINATION
anti-pseudomonal AB
Avoid AG/ Avoid Coli

No → MONO

COMBINATION → Single agent based on culture results

Risk factors for MDR VAP Prior IV antibiotic use within 90 d Septic shock at time of VAP ARDS preceding VAP Five or more days of hospitalization prior to the occurrence of VAP Acute renal failure replacement therapy prior to VAP onset
Risk factors for MDR HAP Prior IV antibiotic use within 90 d

Empirical therapy for HAP/VAP

Mentimeter

HAP/VAP: assessment risk for MDR pathogens and mortality

Low MDR pathogen risk and low mortality risk defined as ≤ 15% chance of dying

High MDR pathogen risk and/or high mortality risk defined as > 15%mortality risk

Consider MRSA risk (≥ 25%)

No septic shock

Septic shock

Antibiotic monotherapy: ertapenem, ceftriaxone, cefotaxime, moxifloxacin, or levofloxacin

Single Gram-negative agent (if active for > 90% gram GNB in the ICU)

Dual Gram-pseudomonas coverage

Single agent based on culture results

Low MDR pathogen risk

- No septic shock
- No previous AB use
- No recent prolonged hospital stay (> 5 days of hospitalization)
- No previous colonization with MDR
- Hospital settings with a low rate of MDR pathogens (≤ 25%)

TAKE HOME MESSAGES

- PREVENTION MULTIMODALE
- Importance d'un diagnostic clinico-radio-bactériologique
- Rôle clé de la documentation bactériologique
- Abandon scores et biomarqueurs pour diagnostic
- Traitement par monothérapie en l'absence de gravité

Any questions for the presenter?

Mentimeter

0