# Trachéobronchite acquise sous ventilation mécanique

SAAD NSEIR

CHU DE LILLE, UNIVERSITE DE LILLE

# Liens d'intérêt

- MSD: comité d'experts

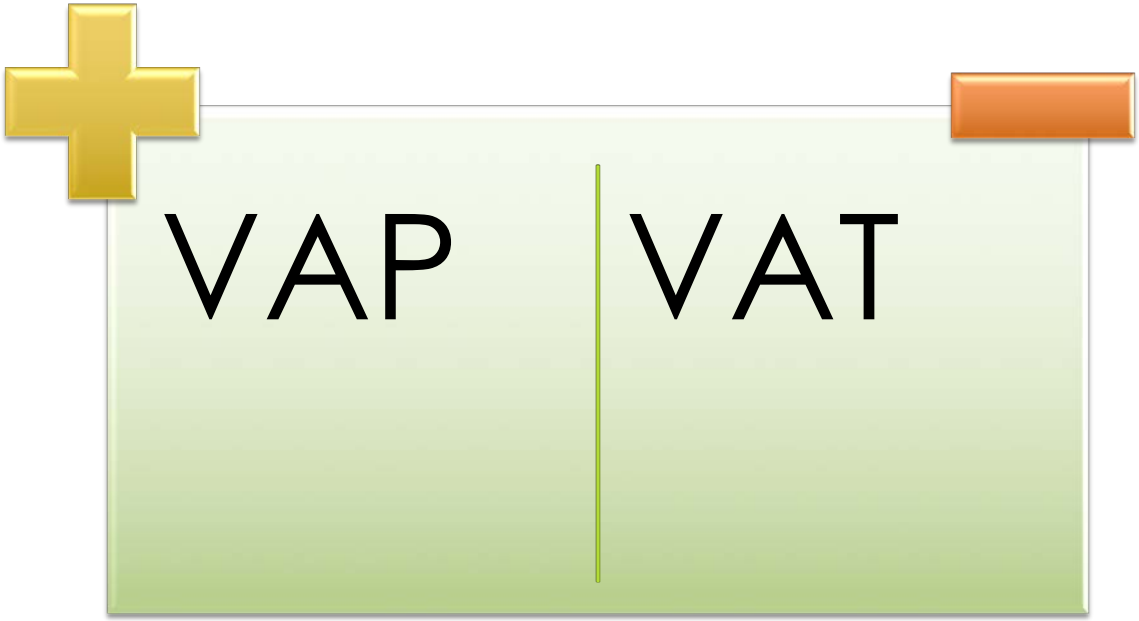
# Incidence

| 1st author/year of publication | Incidence n (%) | Population |
|---|---|---|
| Nseir/2002 | 201 (10) | Mixed |
| Hortal/2010 | 7 (10) | CVS |
| Ninan/2010 | 21 (16) | Respir stepdown unit |
| Dallas/2011 | 28 (1.4) | Mixed |
| Craven/2013 | 21 (11) | Mixed |
| Karvouniaris/2014 | 42 (18) | Mixed |

# Définition

- 2 / 3 criteria:
  - -Purulent secretions
  - -Fever >38° C without other cause
  - -Leucocytosis ≥ 10000 /µL or leucopnia ≤ 1500 /µL
- TA≥ $10^5$ cfu/mL or BAL ≥ $10^4$ cfu/mL
- **No new infiltrate on chest Xray**

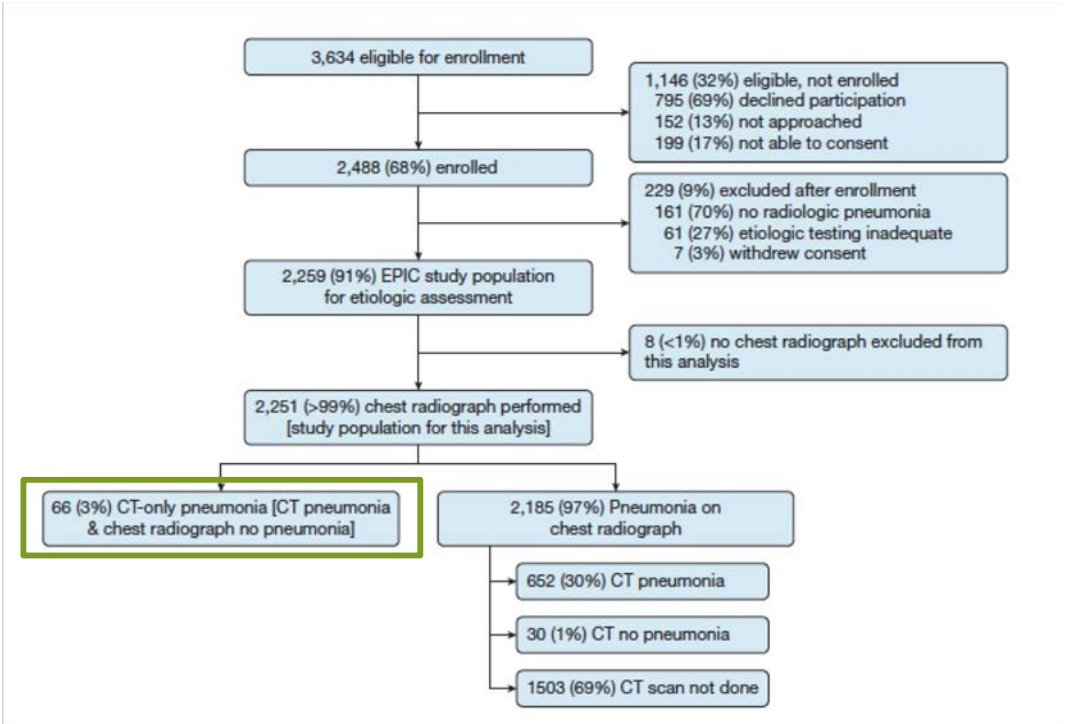
# Nouvel infiltrat radiologique



# Community-Acquired Pneumonia Visualized on CT Scans but Not Chest Radiographs

## Pathogens, Severity, and Clinical Outcomes

Upchurch CP, Chest 2018



# Scanner thoracique pour diagnostiquer un nouvel infiltrat?

- Scan à l'admission pour tous les patients?
  - Transport du patient de réanimation: risque vital
  - Transport du patient de réanimation: facteur de risque de PAVM: changement de circuit, position allongée..
  - Coût/bénéfice?

# Fibroscopie bronchique pour s'afranchir du nouvel infiltrat?

- LBA positif ($10^4$ cfu/mL) = PAVM?
  - LBA positif chez des patients sous VM prolongée sans signes cliniques ou radiologiques de PAVM

Baram D, *Chest* 2005

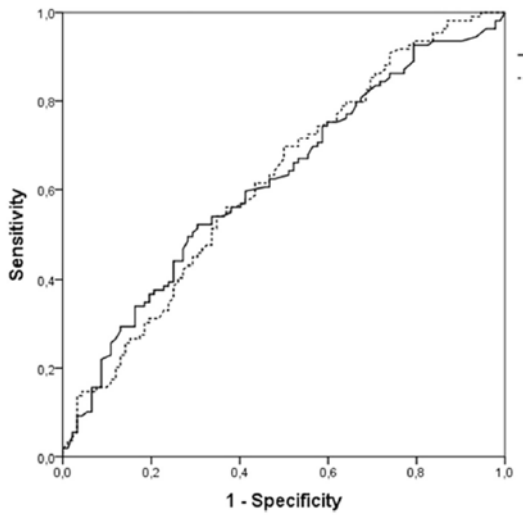
- Fibroscopie bronchique examen invasif = complications possibles

Nayci A, *Crit Care Med* 2008

# C-reactive protein and procalcitonin profile in ventilator-associated lower respiratory infections

Coelho L, J Crit Care 2018

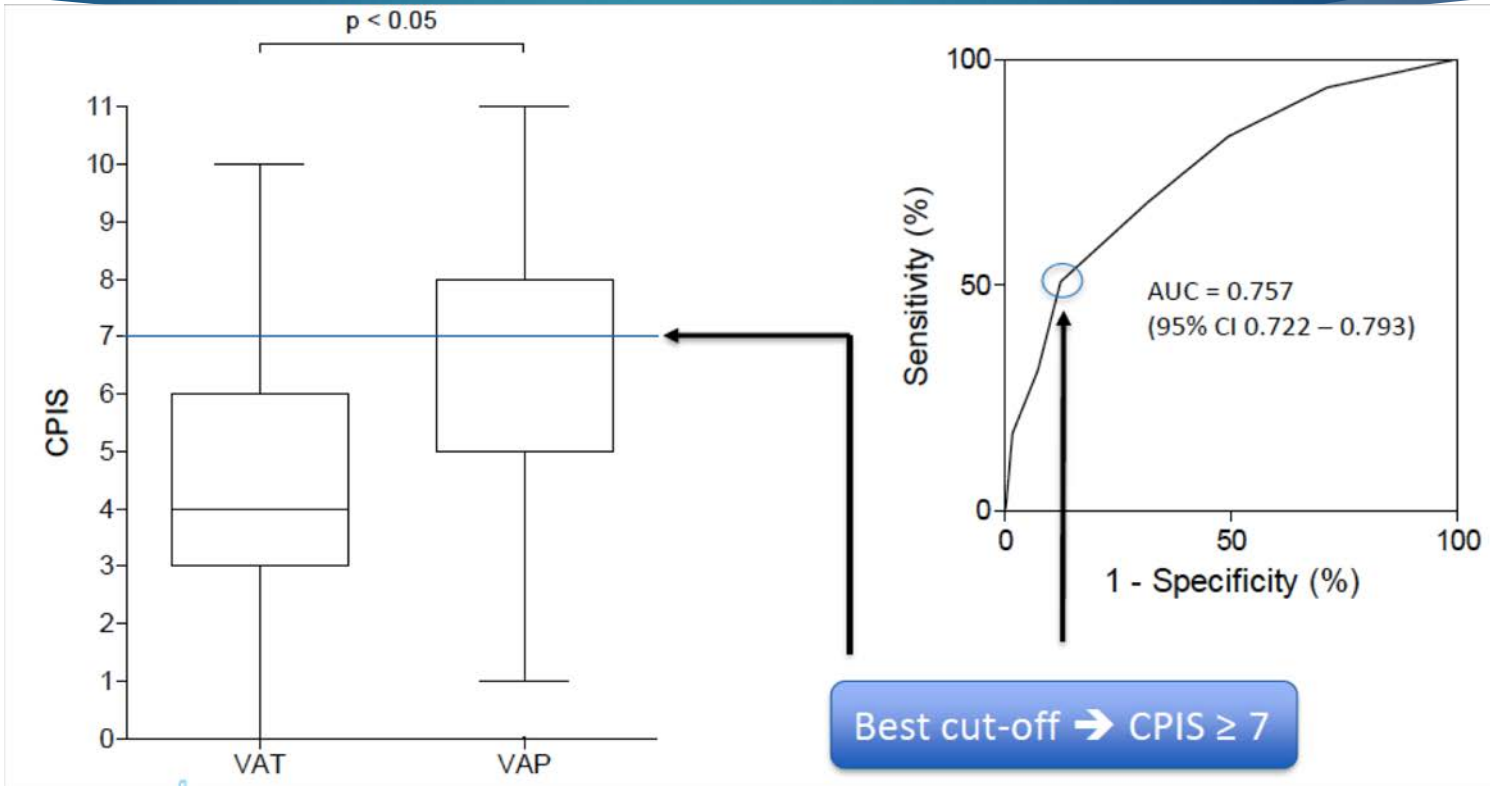
| | VAT n = 207 | VAP n = 197 | p |
|---|---|---|---|
| CRP, med, mg/dl | 18 | 14 | 0.001 |
| PCT, med, ng/l | 0.64 | 2.1 | <0.001 |




CRP 0.6 (95% CI 0.54–0.65)
PCT 0.63 (95% CI 0.57–0.70)

# Accuracy of the Clinical Pulmonary Infection Score to differentiate Ventilator-Associated Tracheobronchitis from Ventilator-Associated Pneumonia: A retrospective analysis from the TAVeM study

Gaudet A, ESICM 2018



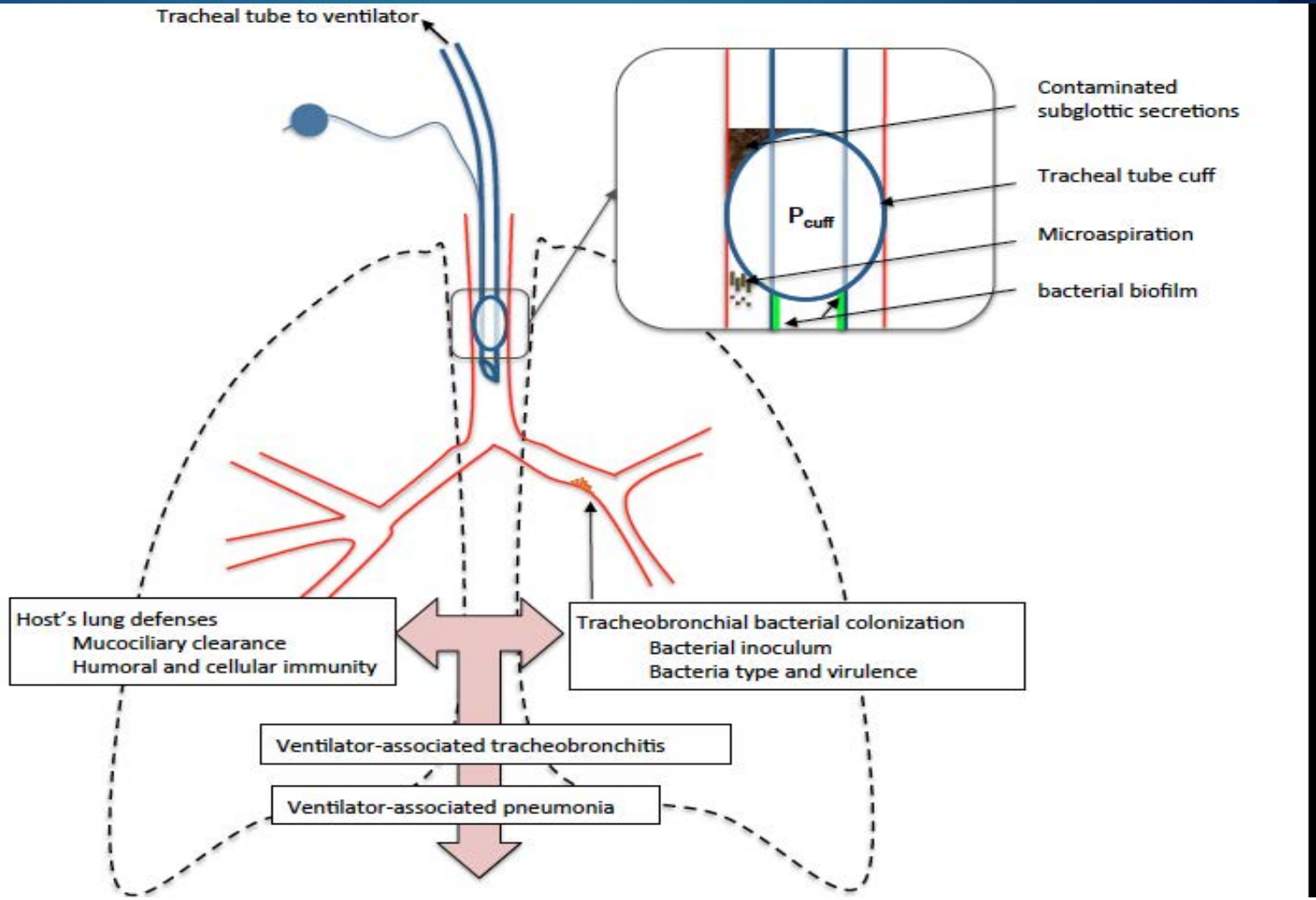

Best cut-off ➔ CPIS ≥ 7

## Accuracy of the Clinical Pulmonary Infection Score to differentiate Ventilator-Associated Tracheobronchitis from Ventilator-Associated Pneumonia: A retrospective analysis from the TAVeM study

Gaudet A, ESICM 2018

| CPIS | Se | Sp | PPV | NPV | LR+ | LR- | Youden |
|---|---|---|---|---|---|---|---|
| ≥ 4 | 0.94 | 0.29 | 0.60 | 0.80 | 1.32 | 0.22 | 0.23 |
| ≥ 5 | 0.83 | 0.51 | 0.66 | 0.72 | 1.68 | 0.34 | 0.34 |
| ≥ 6 | 0.68 | 0.69 | 0.71 | 0.65 | 2.17 | 0.46 | 0.37 |
| **≥ 7** | **0.51** | **0.88** | **0.83** | **0.61** | **4.13** | **0.56** | **0.38** |
| ≥ 8 | 0.31 | 0.93 | 0.83 | 0.54 | 4.31 | 0.74 | 0.24 |
| ≥ 9 | 0.17 | 0.98 | 0.93 | 0.51 | 10.86 | 0.84 | 0.16 |

# Physiopathologie



Tracheobronchial colonization

VAT

VAP

# VAT et morbimortalité

- Inflammation des voies respiratoires inférieures et augmentation du volume des sécrétions
  - Prolongation durée VM
  - Difficultés de sevrage
  - Echec d'extubation Epstein SK. *ICM* 2002
- Incidence élevée de PAVM: 9-32%

Nseir S et al. *ERJ* 2002, Dallas J et al. *Chest* 2011

# VAT et morbimortalité

Nseir S, *Eur Respir J* 2002

1889 patients receiving IMV>48h

| | Medical patients | | | Surgical patients | | |
|---|---|---|---|---|---|---|
| | VAT | | | VAT | | |
| | Yes n=165 | No n=1490 | p | Yes n=36 | No n=198 | p |
| MV duration | 26±17 | 8±7 | <0.001 | 32±31 | 13±12 | <0.001 |
| Length of ICU stay | 33±20 | 12±19 | <0.001 | 39±31 | 18±15 | <0.001 |
| Mortality | 64 (38) | 479 (32) | 0.051 | 20 (55) | 112 (56) | >0.999 |

# Ventilator-Associated Tracheobronchitis Increases the Length of Intensive Care Unit Stay

Karvouniaris M; *ICHE* 2014

- 236 patients, 42 TAVM, 7 PAVM

| Variable | VAT ($n$ = 35 | VAP ($n$ = 78) | No ventilator-associated respiratory infection ($n$ = 123) |
|---|---|---|---|
| ICU mortality[a], no. (%) of patients | 10 (28.6) | 28 (35.9) | 20 (16.3) |
| ICU stay[b], days | 21 (15–36) | 30.5 (16.75–45.25) | 11 (5.75–26) |
| Hospital mortality[c], no. (%) of patients | 15 (42.9) | 40 (51.3) | 36 (29.3) |
| Hospital stay[d], days | 38 (23–50) | 40.5 (26.2–55) | 23 (12–44) |
| Mechanical ventilation days[e] | 16 (12–28) | 27 (15.7–43.5) | 8 (4–23) |
| Mechanical ventilation–free days[f] | 2 (1.09–2.91) | 4.83 (3–6.67) | 5.88 (3.54–8.22) |
| Antibiotic-free days | 1.5 (0–2) | 3 (0–5.25) | 1 (0–5) |
| Tracheostomy, no. (%) of patients | 21 (60) | 52 (66.6) | 63 (51.5) |

# Incidence and diagnosis of ventilator-associated tracheobronchitis in the intensive care unit: an international online survey

Rodriguez A, *Crit Care* 2014

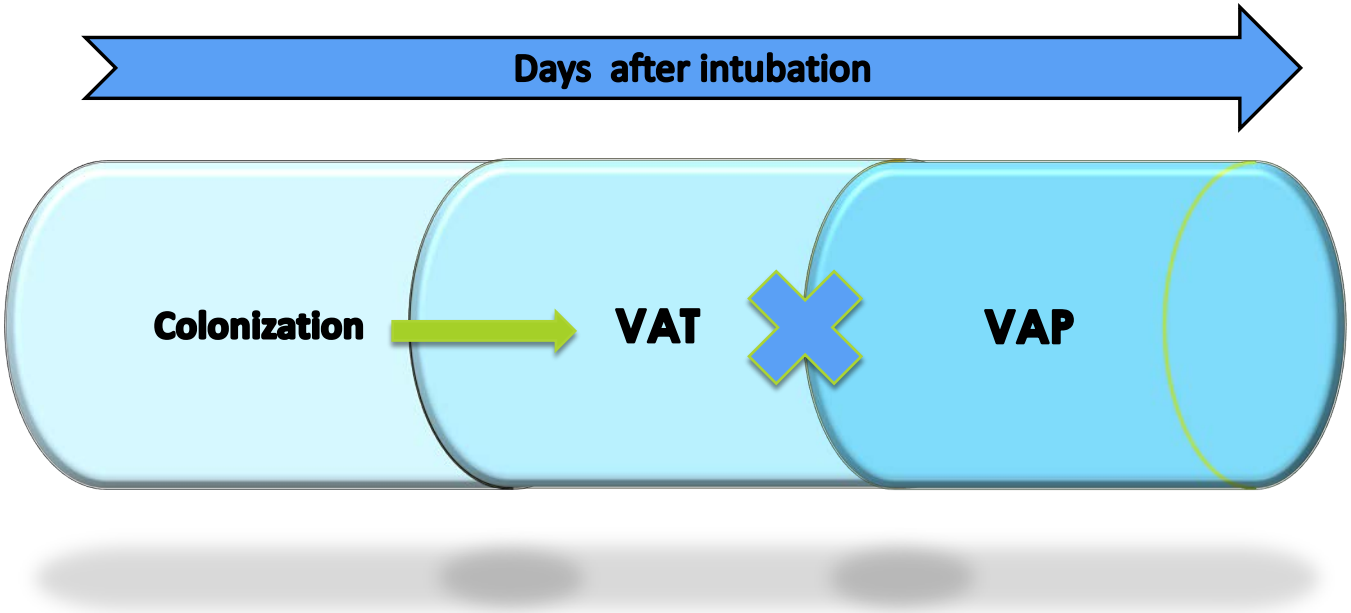
- 288 services, 16 pays, 51% Amérique du sud, 49% Europe (Espagne, France et Portugal)

La moitié des médecins ont déclaré traiter systématiquement une TAVM

# Doit-on traiter les TAVM?

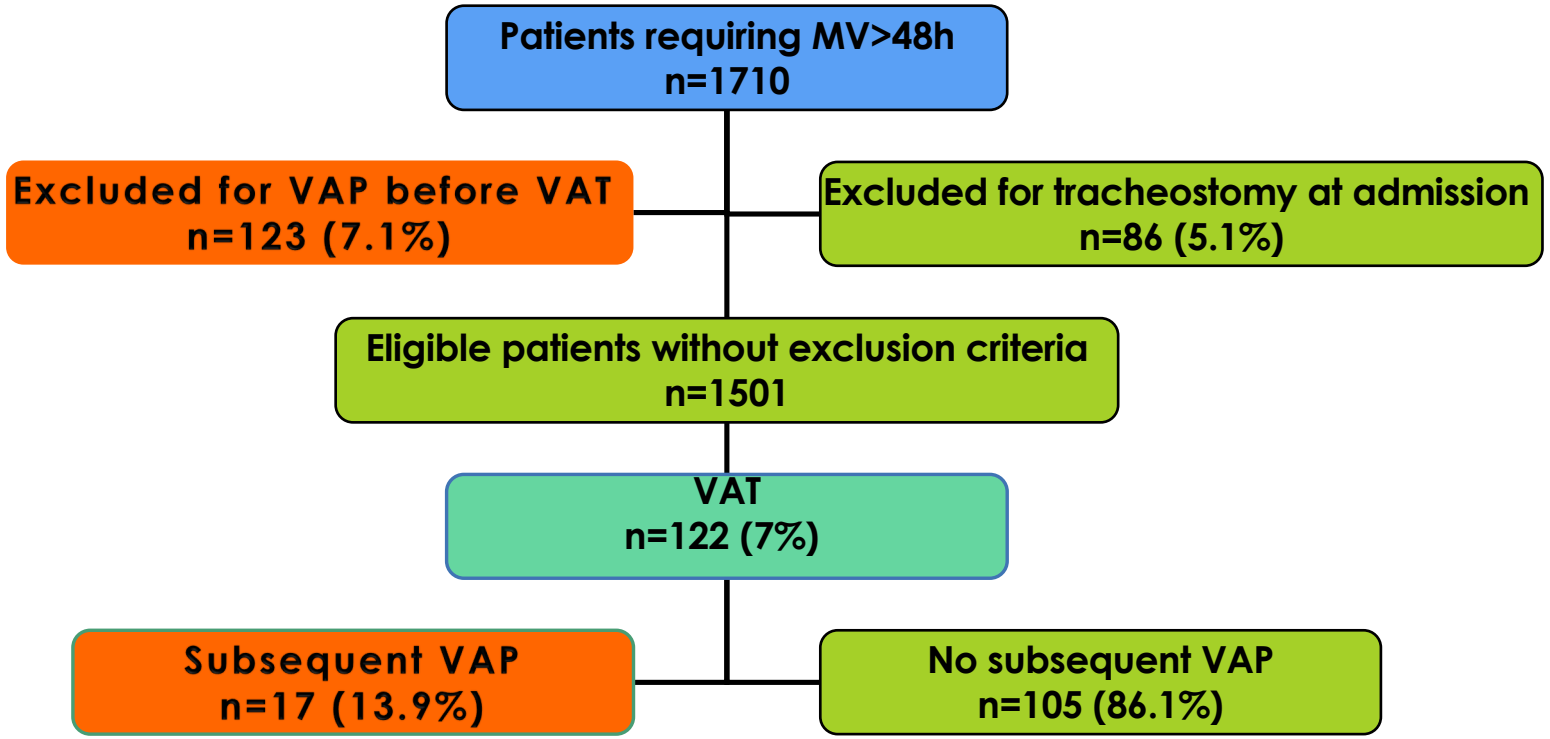
1. Prolonge la durée de VM
2. Facteur de risque de PAVM

# Prévenir la transition vers une PAVM?



# Impact of appropriate antimicrobial treatment on transition from ventilator-associated tracheobronchitis to ventilator-associated pneumonia

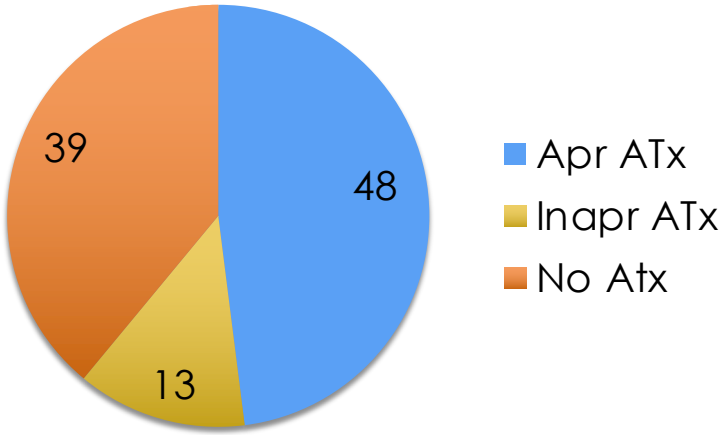
Nseir S, Crit Care 2014



# Impact of appropriate antimicrobial treatment on transition from ventilator-associated tracheobronchitis to ventilator-associated pneumonia

Nseir S, Crit Care 2014

- *P. aeruginosa* (30%), *S. aureus* (18%) et *A. baumannii* (10%)
- ATB appropriée: réduction du risque de transition de la TAVM vers la PAVM (OR [95% CI] 0.12 [0.02-0.59], P = 0.009
- Nombre des patients à traiter pour prévenir un épisode de PAVM : 5



# Traitement

Palmer L, *Crit Care Med* 2008

- Etude monocentrique RC
- ATB inhalée (gentamicine et/ou vancomycine) vs. SSI pendant 14 j ou jusqu'à l'extubation
- ATB systémique à la discrétion des médecins

# Traitement

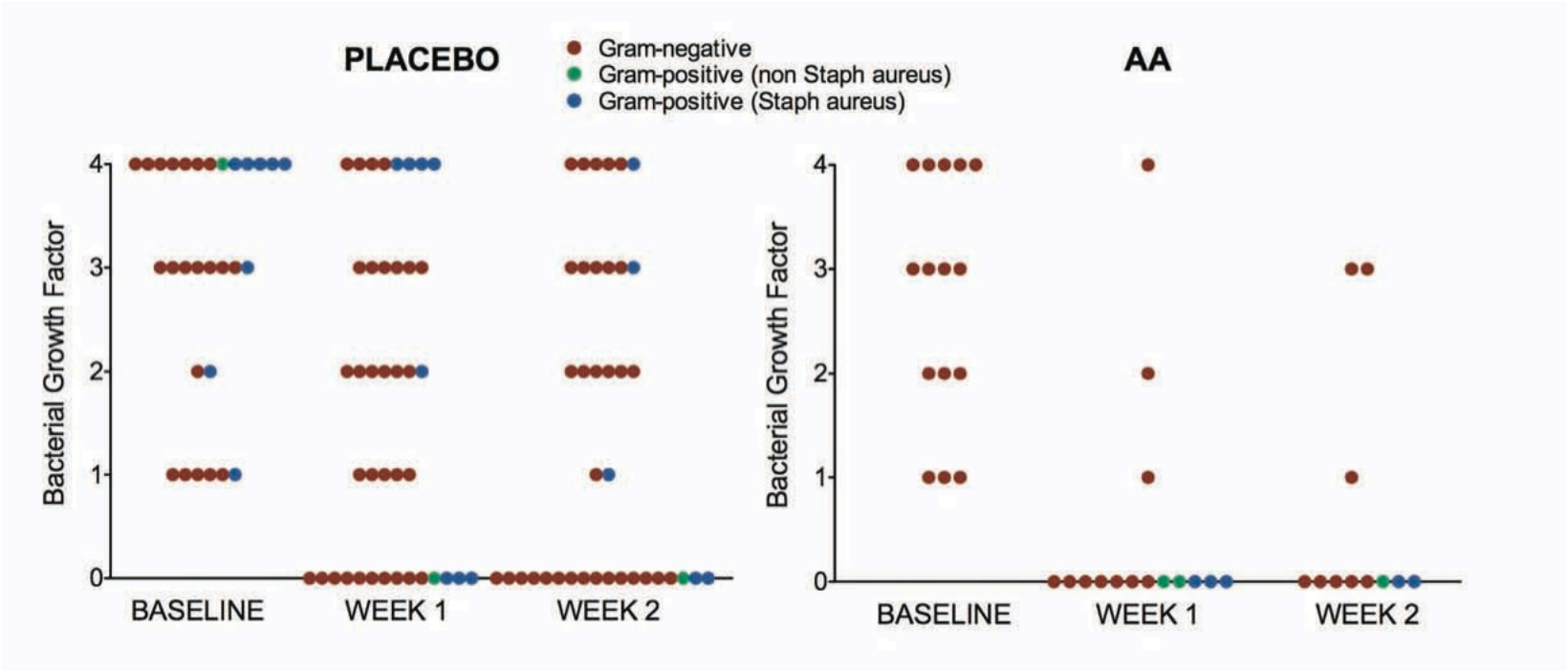
Palmer L, *Crit Care Med* 2008

| | Aerosolized ATx | | p |
|---|---|---|---|
| | Yes (n=19) | No (n=24) | |
| Subsequent VAP, % | 35.7 | 78.6 | 0.006* |
| MDR, % | 0 | 16.6 | 0.005 |
| MV free days | 10 (26) | 0 (27) | 0.069 |
| Weaning, % | 63 | 37 | 0.051 |
| Weaning (survivors), % | 80 | 45 | 0.046 |
| Mortality, % | 21.1 | 16.7 | 0.990 |

*ajusted for age

# Traitement

Palmer L, *Crit Care Med* 2008



# Traitement

Palmer L, *Crit Care Med* 2008

Limites:

- Petit effectif, monocentrique
- Définition TAVM aspécifique
- TAVM sans PAVM: 11 patients

# Traitement

Nseir S *Crit Care* 2008

- Etude RC multicentrique
- TAVM sans PAVM antérieure ou concomitante
- ATB iv (basée sur la culture de l'ECBT) vs pas d'ATB pendant 8j
- Exclusion: immunodépression
- Analyse intermédiaire planifiée: ≠ significative de mortalité

# Traitement

Nseir S, *Crit Care* 2008

- 58 patients, caractéristiques patients similaires
- *P. aeruginosa* 32%

| | ATx | | |
|---|---|---|---|
| | Yes (n=22) | No (n=36) | p |
| MV duration | 29±17 | 26±15 | 0.816 |
| MV free days | 12 (8, 24) | 2 (0, 6) | <0.001 |
| ICU length of stay | 40±2 3 | 36±21 | 0.558 |
| VAP | 3 (13) | 17 (47) | 0.011 |
| Mortality | 4 (18) | 17 (47) | 0.047 |
| MDR | 9 (40) | 13 (36) | 0.784 |

# Traitement

Nseir S, *Crit Care* 2008

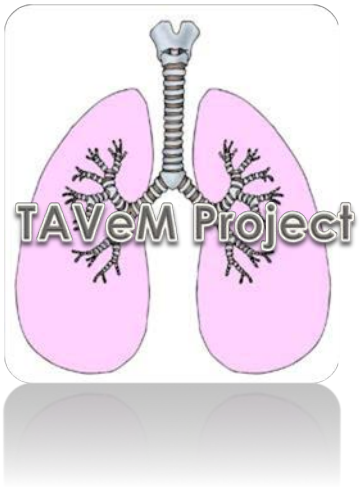
Limites:

- Petit effectif
- Pas d'aveugle
- Arrêtée précocement
- ATB non standardisée

# *International Multicenter Study of Ventilator Associated Tracheobronchitis (TAVeM)*

*ClinicalTrials.gov Identifier: NCT01791530*

- **Prospective observationnelle**
- **114 services, 8 pays, 3 mois**
- **Eligibles:**
  - **Adultes**
  - **VM>48h**
- **Exclusion:**
  - **Trachéotomie à l'admission**
  - **Réadmission**



# Incidence and prognosis of ventilator-associated tracheobronchitis (TAVeM): a multicentre, prospective, observational study

*Ignacio Martin-Loeches, Pedro Povoa, Alejandro Rodríguez, Daniel Curcio, David Suarez, Jean-Paul Mira, Maria Lourdes Cordero, Raphaël Lepecq, Christophe Girault, Carlos Candeias, Philippe Seguin, Carolina Paulino, Jonathan Messika, Alejandro G Castro, Jordi Valles, Luis Coelho, Ligia Rabello, Thiago Lisboa, Daniel Collins, Antonio Torres, Jorge Salluh, Saad Nseir, on behalf of the TAVeM study**

*Lancet Respir Med* 2015

Published Online
October 13, 2015

- **VAT**
  - **No new infiltrate on chest Xray**
  - 2 / 3 criteria:

    -Purulent secretions

    -Fever >38° C without other cause

    --Leucocytosis ≥ 10000 /µL or leucopnia ≤ 1500 /µL
  - TA≥ $10^5$ cfu/mL or BAL ≥ $10^4$ cfu/mL

- **VAP**
  - **New infiltrate on chest Xray**
  - 2 / 3 criteria:

    -Purulent secretions

    -Fever >38° C or hypothermia ≤ 36°

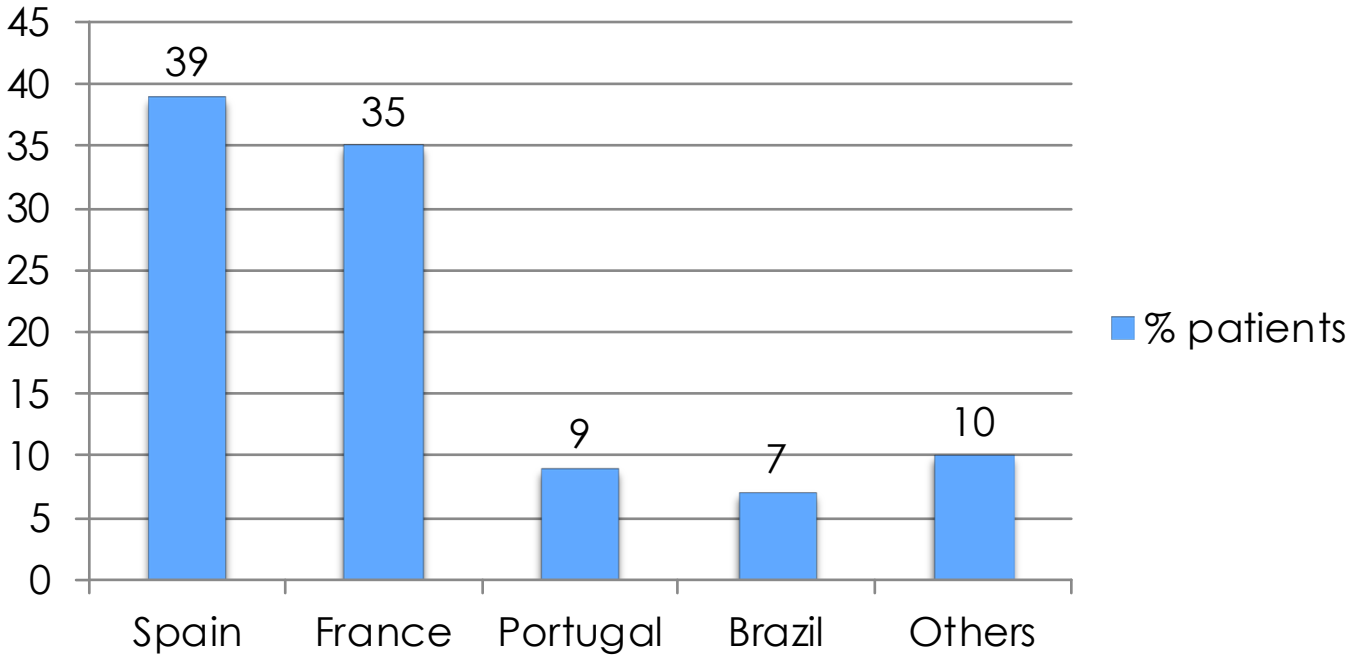
    --Leucocytosis ≥ 10000 /µL or leucopnia ≤ 1500 /µL
  - TA≥ $10^5$ cfu/mL or BAL ≥ $10^4$ cfu/mL

# Incidence and prognosis of ventilator-associated tracheobronchitis (TAVeM): a multicentre, prospective, observational study

*Ignacio Martin-Loeches, Pedro Povoa, Alejandro Rodríguez, Daniel Curcio, David Suarez, Jean-Paul Mira, Maria Lourdes Cordero, Raphaël Lepec Christophe Girault, Carlos Candeias, Philippe Seguin, Carolina Paulino, Jonathan Messika, Alejandro G Castro, Jordi Valles, Luis Coelho, Ligia Rabello, Thiago Lisboa, Daniel Collins, Antonio Torres, Jorge Salluh, Saad Nseir, on behalf of the TAVeM study**

*Lancet Respir Med* 2015
Published Online
October 13, 2015

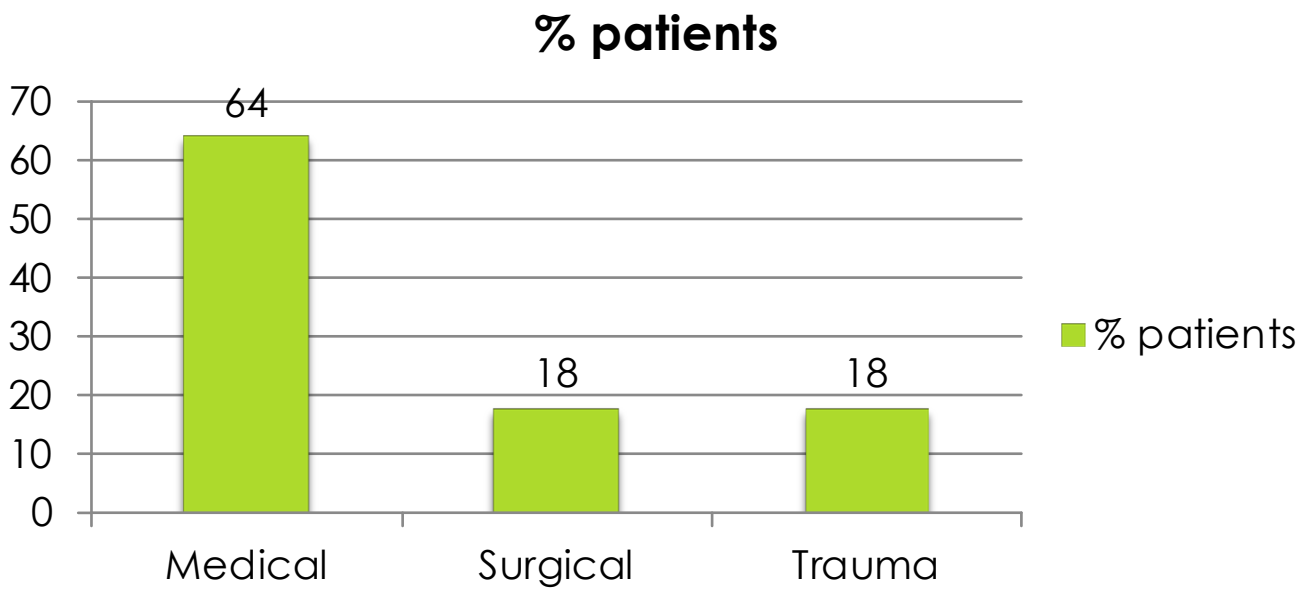
2960 patients



# Incidence and prognosis of ventilator-associated tracheobronchitis (TAVeM): a multicentre, prospective, observational study

Lancet Respir Med 2015
Published Online
October 13, 2015

*Ignacio Martin-Loeches, Pedro Povoa, Alejandro Rodríguez, Daniel Curcio, David Suarez, Jean-Paul Mira, Maria Lourdes Cordero, Raphaël Lepecq, Christophe Girault, Carlos Candeias, Philippe Seguin, Carolina Paulino, Jonathan Messika, Alejandro G Castro, Jordi Valles, Luis Coelho, Ligia Rabello, Thiago Lisboa, Daniel Collins, Antonio Torres, Jorge Salluh, Saad Nseir, on behalf of the TAVeM study**

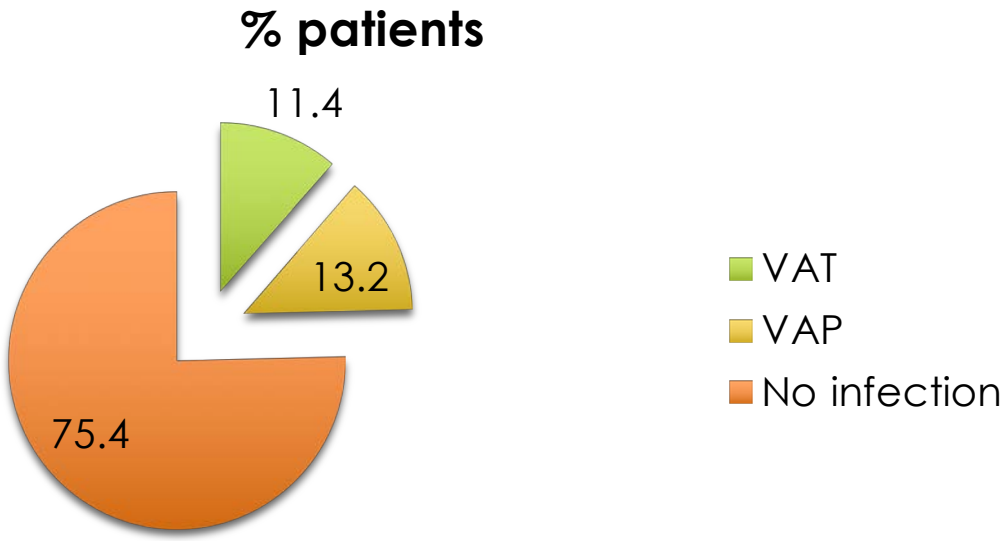


# Incidence and prognosis of ventilator-associated tracheobronchitis (TAVeM): a multicentre, prospective, observational study

*Ignacio Martin-Loeches, Pedro Povoa, Alejandro Rodríguez, Daniel Curcio, David Suarez, Jean-Paul Mira, Maria Lourdes Cordero, Raphaël Lepecq, Christophe Girault, Carlos Candeias, Philippe Seguin, Carolina Paulino, Jonathan Messika, Alejandro G Castro, Jordi Valles, Luis Coelho, Ligia Rabello, Thiago Lisboa, Daniel Collins, Antonio Torres, Jorge Salluh, Saad Nseir, on behalf of the TAVeM study**

*Lancet Respir Med* 2015

Published Online October 13, 2015



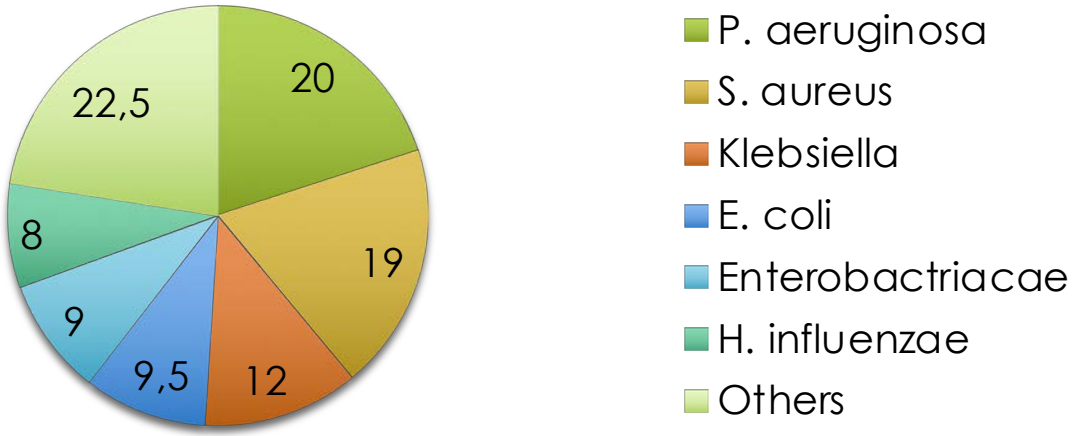
# Incidence and prognosis of ventilator-associated tracheobronchitis (TAVeM): a multicentre, prospective, observational study

*Lancet Respir Med* 2015
Published Online
October 13, 2015

*Ignacio Martin-Loeches, Pedro Povoa, Alejandro Rodríguez, Daniel Curcio, David Suarez, Jean-Paul Mira, Maria Lourdes Cordero, Raphaël Lepecq, Christophe Girault, Carlos Candeias, Philippe Seguin, Carolina Paulino, Jonathan Messika, Alejandro G Castro, Jordi Valles, Luis Coelho, Ligia Rabello, Thiago Lisboa, Daniel Collins, Antonio Torres, Jorge Salluh, Saad Nseir, on behalf of the TAVeM study**

- Polymicrobial 15%
- MDR 50%

## % Bacteria

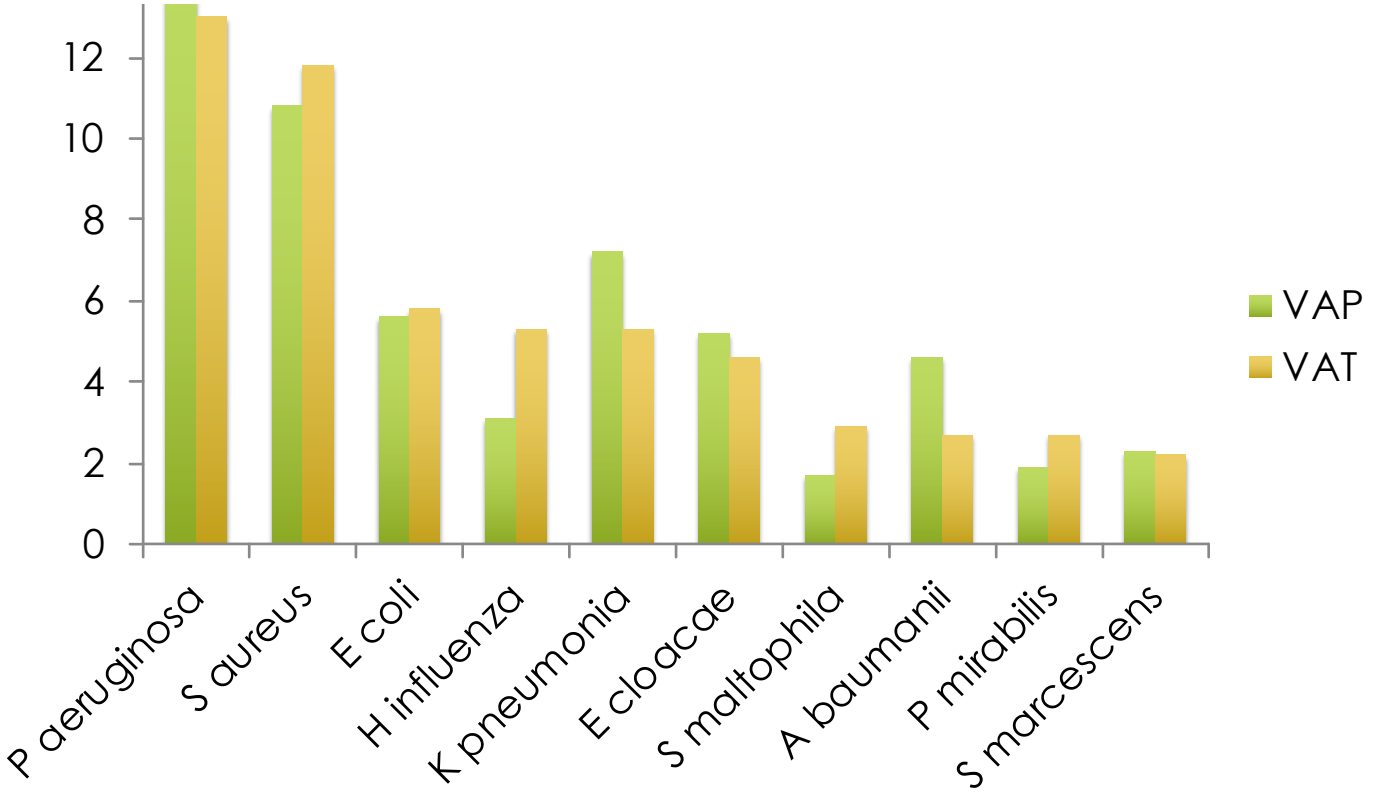


# Incidence and prognosis of ventilator-associated tracheobronchitis (TAVeM): a multicentre, prospective, observational study

*Lancet Respir Med* 2015

Published Online
October 13, 2015

*Ignacio Martin-Loeches, Pedro Povoa, Alejandro Rodríguez, Daniel Curcio, David Suarez, Jean-Paul Mira, Maria Lourdes Cordero, Raphaël Lepecq, Christophe Girault, Carlos Candeias, Philippe Seguin, Carolina Paulino, Jonathan Messika, Alejandro G Castro, Jordi Valles, Luis Coelho, Ligia Rabello, Thiago Lisboa, Daniel Collins, Antonio Torres, Jorge Salluh, Saad Nseir, on behalf of the TAVeM study**



# Incidence and prognosis of ventilator-associated tracheobronchitis (TAVeM): a multicentre, prospective, observational study

*Ignacio Martin-Loeches, Pedro Povoa, Alejandro Rodríguez, Daniel Curcio, David Suarez, Jean-Paul Mira, Maria Lourdes Cordero, Raphaël Lepecq, Christophe Girault, Carlos Candeias, Philippe Seguin, Carolina Paulino, Jonathan Messika, Alejandro G Castro, Jordi Valles, Luis Coelho, Ligia Rabello, Thiago Lisboa, Daniel Collins, Antonio Torres, Jorge Salluh, Saad Nseir, on behalf of the TAVeM study**

*Lancet Respir Med* 2015

Published Online October 13, 2015

| | VAT n = 338 | VAP n = 393 | p |
|---|---|---|---|
| MV duration before inf, mean±SD | 8.7 ± 8.3 | 7 ± 6.9 | NS |
| CPIS, mean±SD | 4.6 ± 1.8 | 6.4 ± 1.0 | <0.001 |
| SOFAmax | 6.4 ± 4.6 | 8.4 ± 6.4 | <0.001 |
| TA, % | 87 | 69 | <0.001 |
| BAL, % | 4 | 16 | <0.001 |

# Incidence and prognosis of ventilator-associated tracheobronchitis (TAVeM): a multicentre, prospective, observational study

Lancet Respir Med 2015
Published Online
October 13, 2015

Ignacio Martin-Loeches, Pedro Povoa, Alejandro Rodríguez, Daniel Curcio, David Suarez, Jean-Paul Mira, Maria Lourdes Cordero, Raphaël Lepecq, Christophe Girault, Carlos Candeias, Philippe Seguin, Carolina Paulino, Jonathan Messika, Alejandro G Castro, Jordi Valles, Luis Coelho, Ligia Rabello, Thiago Lisboa, Daniel Collins, Antonio Torres, Jorge Salluh, Saad Nseir, on behalf of the TAVeM study*

| | VAT | VAP | No infection | P |
|---|---|---|---|---|
| | n = 338 | n = 393 | n = 2229 | |
| MV duration | 13 (8, 20) | 13 (8, 20) | 7 (4, 7) | 0.001 |
| Length of ICU stay | 21 (15, 33) | 22 (13, 36) | 12 (8, 20) | 0.001 |
| ICU mortality | 29 | 40 | 30 | 0.001 |

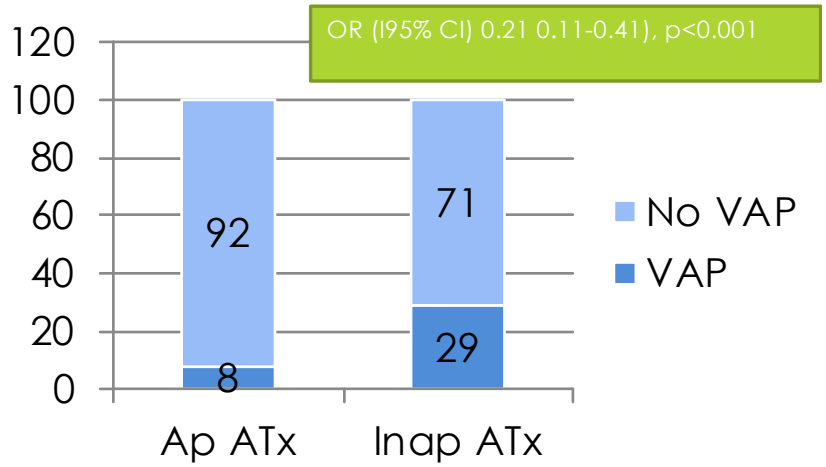
Median ($25^{th}$, $75^{th}$ quartiles) or %

# Incidence and prognosis of ventilator-associated tracheobronchitis (TAVeM): a multicentre, prospective, observational study

*Lancet Respir Med* 2015
Published Online
October 13, 2015

*Ignacio Martin-Loeches, Pedro Povoa, Alejandro Rodríguez, Daniel Curcio, David Suarez, Jean-Paul Mira, Maria Lourdes Cordero, Raphaël Lepecq, Christophe Girault, Carlos Candeias, Philippe Seguin, Carolina Paulino, Jonathan Messika, Alejandro G Castro, Jordi Valles, Luis Coelho, Ligia Rabello, Thiago Lisboa, Daniel Collins, Antonio Torres, Jorge Salluh, Saad Nseir, on behalf of the TAVeM study**

- VAP subsequent to VAT: 12.2%
- 292 (86%) of VAT patients received ATx, including 250 (74%) appropriate ATx



# Incidence and prognosis of ventilator-associated tracheobronchitis (TAVeM): a multicentre, prospective, observational study

Lancet Respir Med 2015
Published Online
October 13, 2015

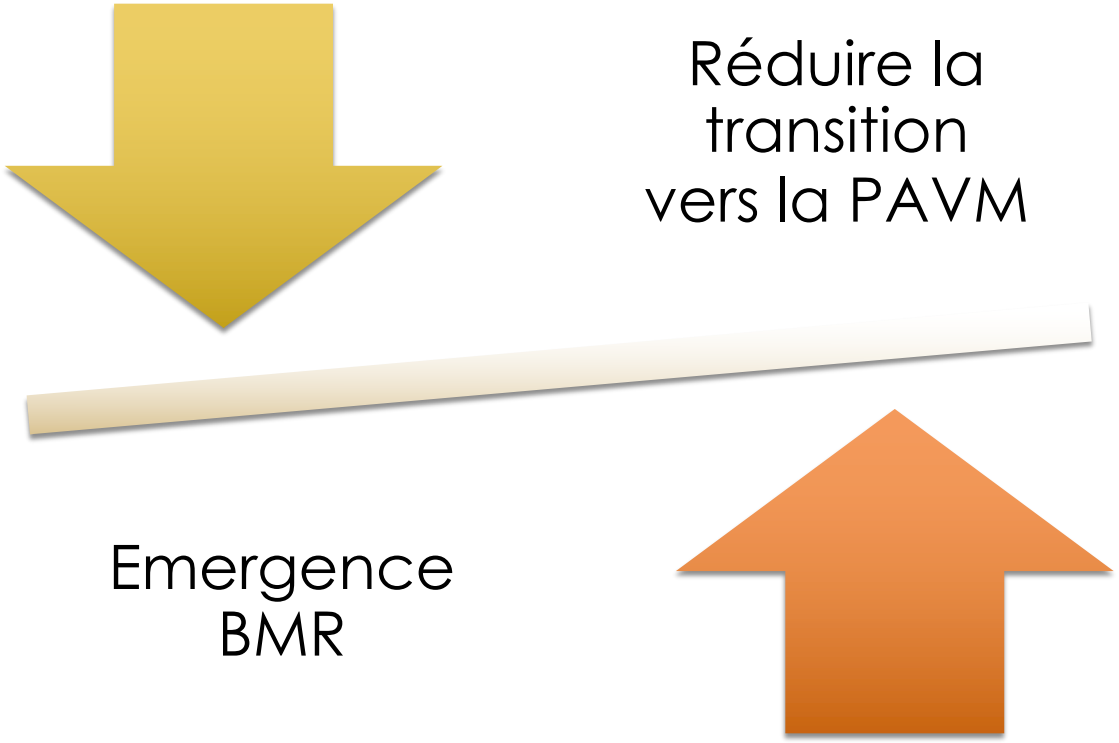
*Ignacio Martin-Loeches, Pedro Povoa, Alejandro Rodríguez, Daniel Curcio, David Suarez, Jean-Paul Mira, Maria Lourdes Cordero, Raphaël Lepecq, Christophe Girault, Carlos Candeias, Philippe Seguin, Carolina Paulino, Jonathan Messika, Alejandro G Castro, Jordi Valles, Luis Coelho, Ligia Rabello, Thiago Lisboa, Daniel Collins, Antonio Torres, Jorge Salluh, Saad Nseir, on behalf of the TAVeM study**

| | Adjusted OR (95% CI) for associated mortality risk | p value |
|---|---|---|
| Age (per year) | 1·04 (1·01–1·06) | <0·0001 |
| SAPS II (per point) | 1·02 (1·01–1·04) | 0·01 |
| Appropriate antibiotic (yes *vs* no) | 0·63 (0·42–0·83) | 0·02 |
| MDR (yes *vs* no) | 1·41 (1·28–2·23) | 0·02 |
| Transition of VAT to VAP (yes *vs* no) | 2·12 (1·05–5·02) | 0·04 |
| VAT (yes *vs* no) | 0·74 (0·45–3·42) | 0·56 |
| VAP (yes *vs* no) | 2·23 (1·62–3·34) | 0·001 |

Data are for patients with ventilator-associated pneumonia and ventilator-associated tracheobronchitis. OR=odds ratio. SAPS II=Simplified Acute Physiology Score. MDR=multidrug-resistant isolates. VAT=ventilator-associated tracheobronchitis. VAP=ventilator-associated pneumonia.

***Table 4:*** **Assessment of mortality risk in the intensive care unit**

# Antibiothérapie pour la TAVM

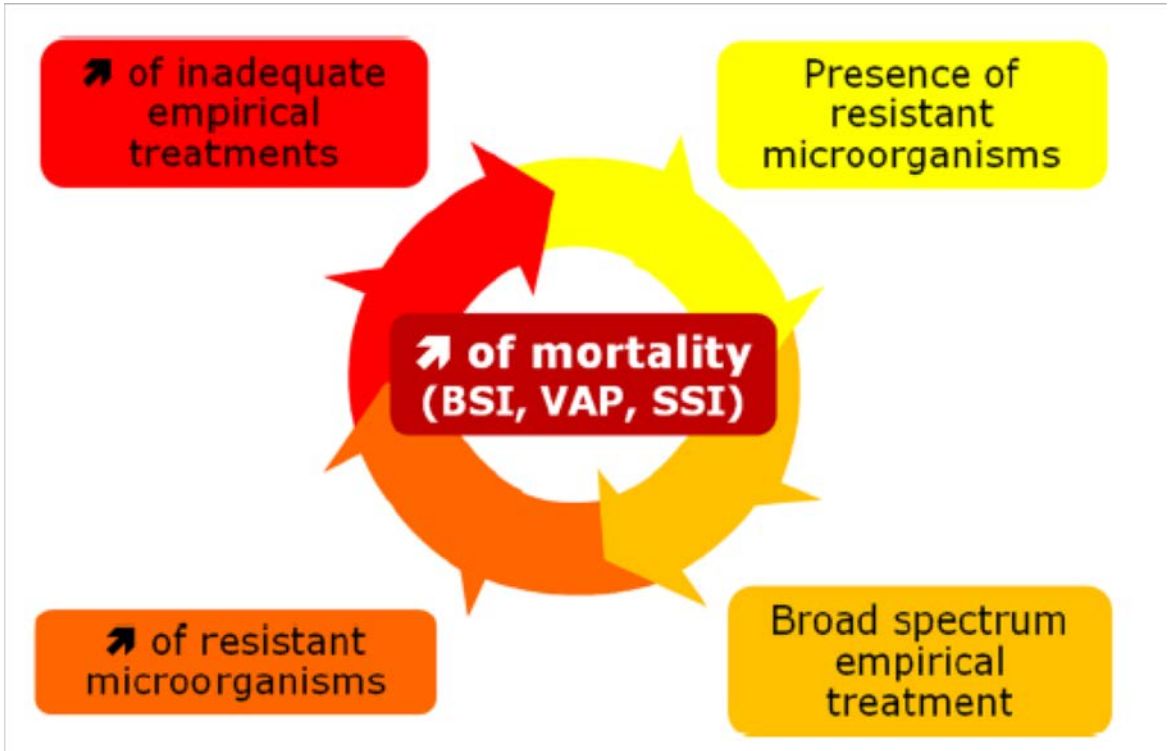


Intensive Care Med
DOI 10.1007/s00134-015-3719-z

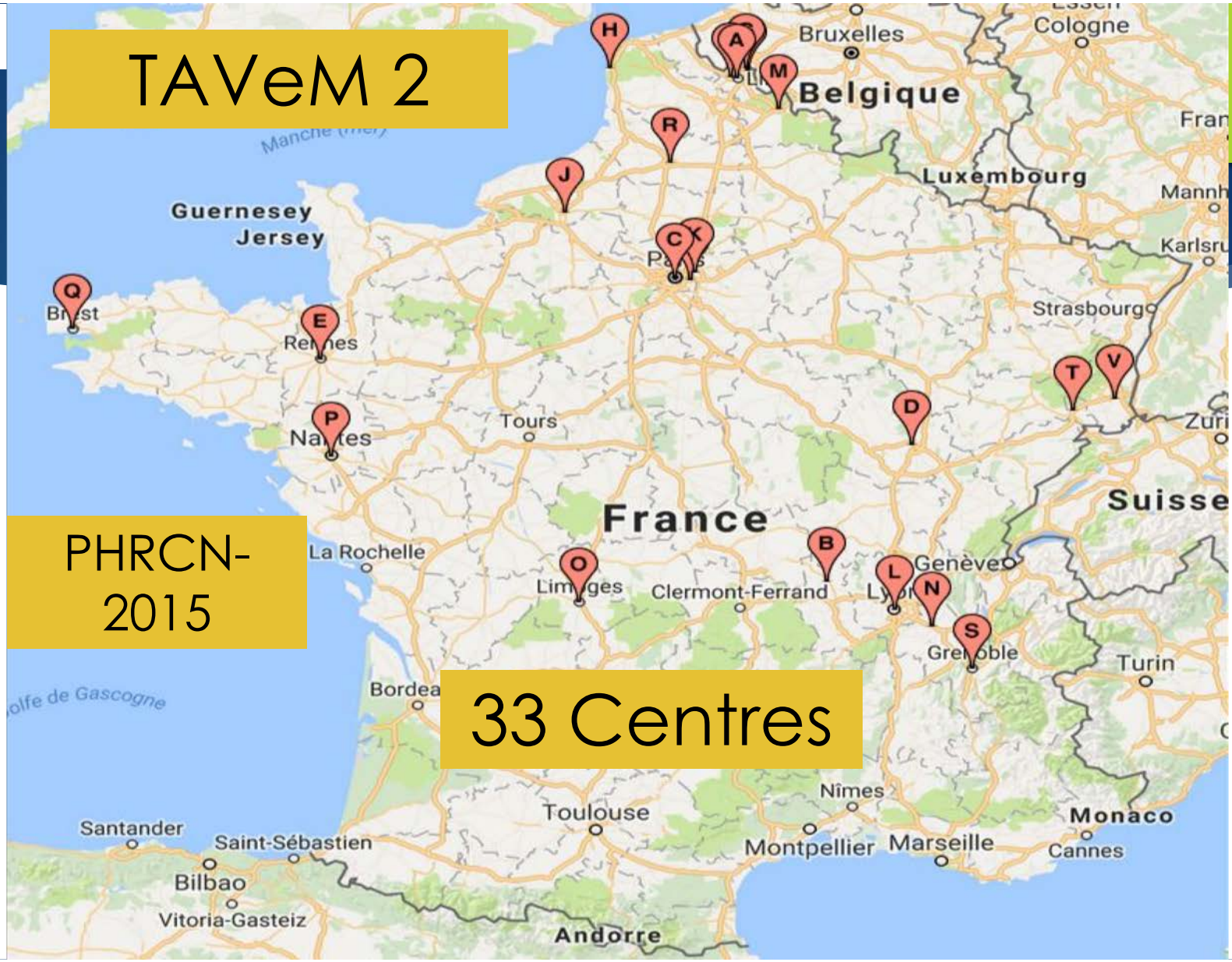
REVIEW

Matteo Bassetti
Jan J. De Waele
Philippe Eggimann
Josè Garnacho-Montero
Gunnar Kahlmeter
Francesco Menichetti
David P. Nicolau
Jose Arturo Paiva
Mario Tumbarello
Tobias Welte
Mark Wilcox
Jean Ralph Zahar
Garyphallia Poulakou

# Preventive and therapeutic strategies in critically ill patients with highly resistant bacteria



# TAVeM 2


PHRCN-2015
33 Centres
Bruxelles
Cologne
Belgique
Luxembourg
Guernesey
Jersey
Strasbourg
Tours
France
La Rochelle
Clermont-Ferrand
Genève
Turin
Suisse
Bordeaux
Toulouse
Nîmes
Montpellier
Marseille
Monaco
Cannes
Santander
Saint-Sébastien
Bilbao
Vitoria-Gasteiz
Andorre
Golfe de Gascogne
H
A
M
R
J
C
Q
E
P
D
T
V
O
B
L
N
S

# TAVeM 2

**Hypothèse**

ATB de courte durée permettrait de réduire la transition de la TAVM vers la PAVM

Randomisée (1:1:1) contrôlée double aveugle: 0, 3 ou 7 j d'ATB systémique

315 patients, 33 services de Réa en France

Financement: PHRC 2015

# Conclusion

- TAVM fréquente
- Diagnostic difficile
- Associée à une prolongation de la durée de VM et d'hosp
- ATB bénéfique?
- Durée ATB?
- ATB inhalée?