Séminaire Spilf

Bon usage des Antibiotiques en consultation d'urgence

Biomarqueurs sanguins aux urgences: PCT ou CRP ?

Quel impact sur l'antibiothérapie

Pr Pierre HAUSFATER

Sorbonne-Université GRC-14 BIOSFAST
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SANTÉ SORBONNE UNIVERSITÉ

ASSISTANCE PUBLIQUE HÔPITAUX DE PARIS

Conflits d'intérêt

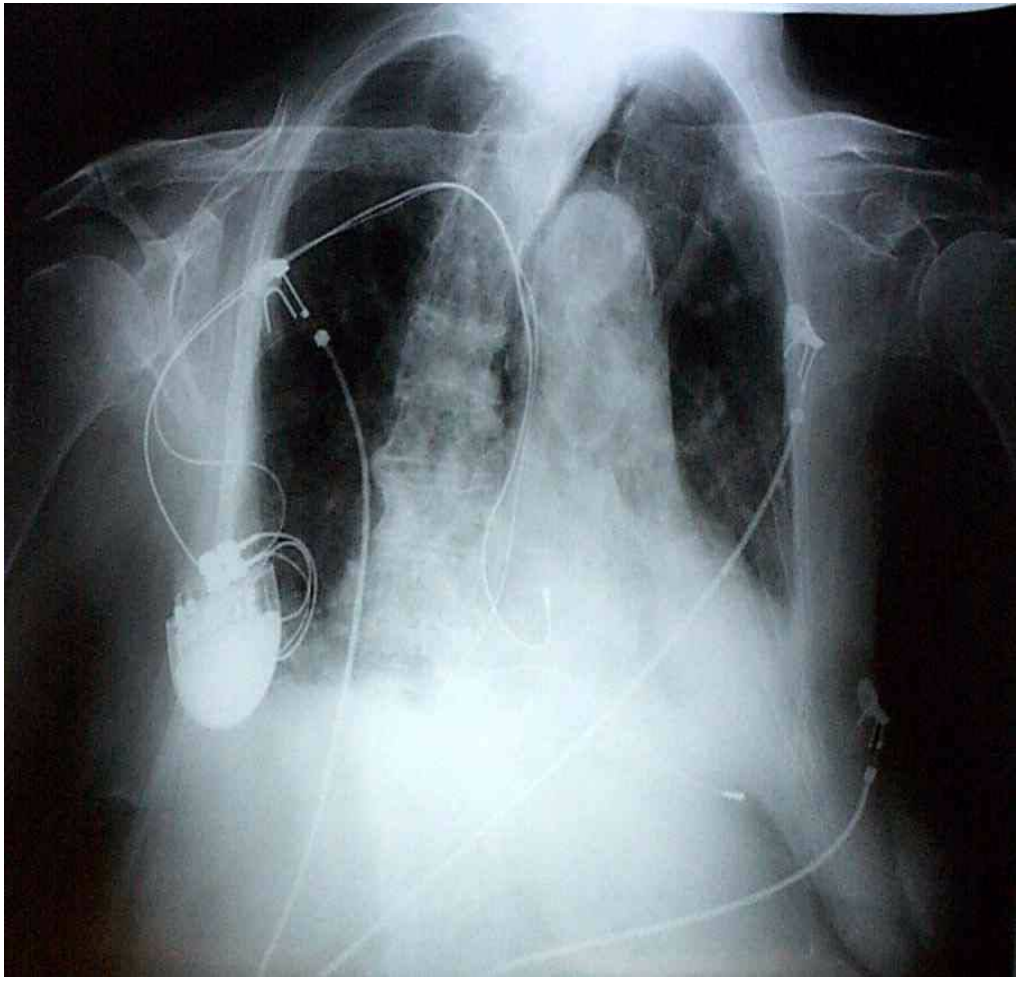
- Lectures honorarium
  - Thermo Fisher Scientific
  - Beckman Coulter
  - Abbott
  - bioMérieux
- Educational support honorarium
  - bioMérieux
- Clinical research grants
  - bioMérieux
  - Beckman Coulter

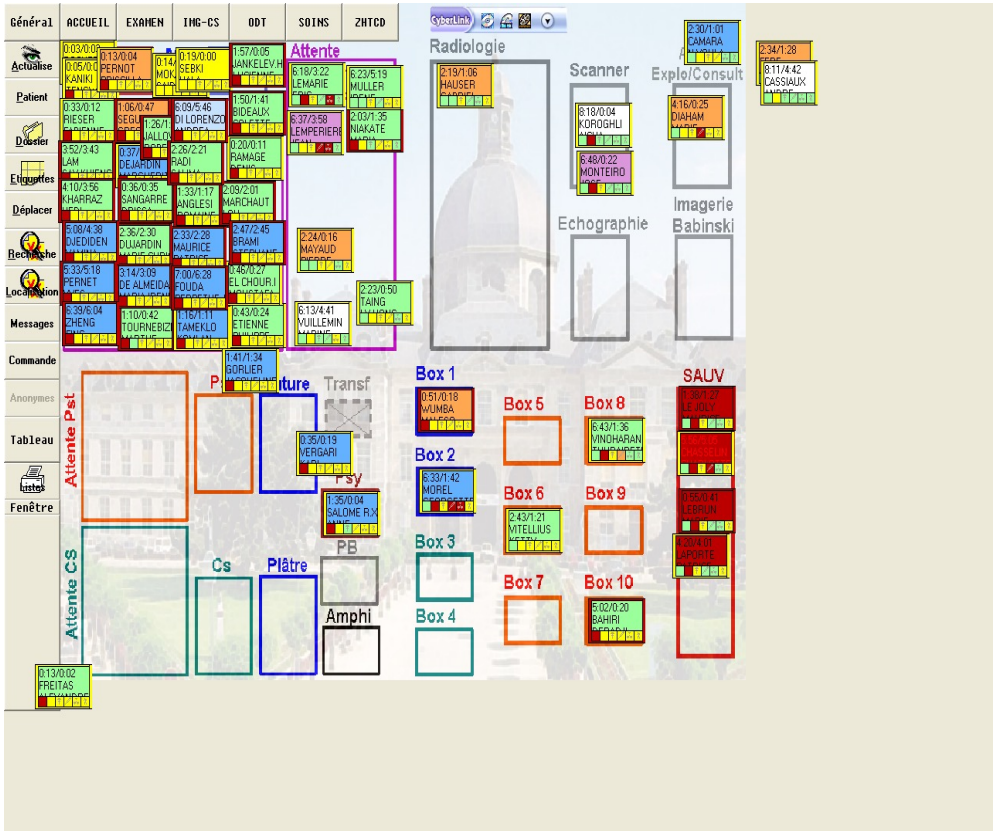
Le diagnostic positif d'infection

- **Isolement de l'agent pathogène** 
  - Rarement disponible en urgence
    - ECBU, liquides de ponction
  - « Jamais » dans les infections respiratoires 
- Faisceau d'arguments
  -  Fièvre (inconstante)
  -  Foyer infectieux clinique
  -  Syndrome de réponse inflammatoire systémique (SIRS)

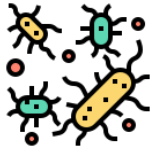
Quand la vie médicale est facile….

La vraie vie…




Général
ACCUEIL
EXAMEN
IMG-CS
ODT
SOINS
ZHTCD
Actualise
Patient
Dossier
Etiquettes
Déplacer
Recherche
Localisation
Messages
Commande
Anonymes
Tableau
Fenêtre
Attente
Attente Pst
Attente CS
Transf
PSY
Cs
Plâtre
PB
Amphi
Radiologie
Scanner
Echographie
Explo/Consult
Imagerie Babinski
Box 1
Box 2
Box 3
Box 4
Box 5
Box 6
Box 7
Box 8
Box 9
Box 10
SAUV

Si infection il y a….



- **Est-elle bactérienne ?** PAC, pyélonéphrite, sigmoïdite…..

- **Virale ?** IRB ++ (grippe, VRS, rhino/entérovirus, Sars-CoV2)

- **Nécessite-t-elle d'être traitée par ATB ?**
  (self-limited ou systémique)

In-hospital mortality associated with the misdiagnosis or unidentified site of infection

Critical Care (2019) 23:202

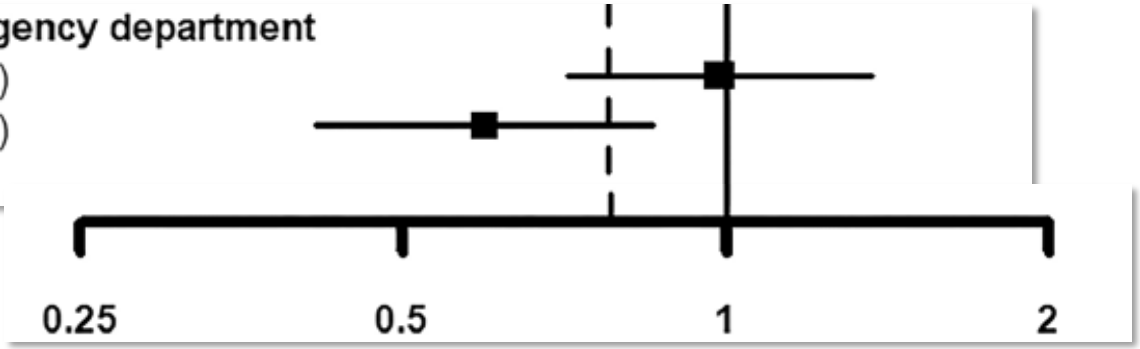
Toshikazu Abe[1,2,3*], Yasuharu Tokuda[4], Atsushi Shiraishi[5], Seitaro Fujishima[6], Toshihiko Mayumi[7], Takehiro Sugiyama[2,3,8,9], Gautam A. Deshpande[1], Yasukazu Shiino[10], Toru Hifumi[11], Yasuhiro Otomo[12], Kohji Okamoto[13], Joji Kotani[14], Yuichiro Sakamoto[15], Junichi Sasaki[16], Shin-ichiro Shiraishi[17], Kiyotsugu Takuma[18], Akiyoshi Hagiwara[19], Kazuma Yamakawa[20], Naoshi Takeyama[21], Satoshi Gando[22,23] and for the JAAM SPICE Study Group

Characteristics	Misdiagnosed or unidentified site of infection	Correctly diagnosed site of infection	*p* value
	113	861	
In-hospital mortality			
All	28 (24.8)	118 (13.7)	< 0.01
qSOFA ≥ 2 ($n = 385$)	16 (29.6)	69 (20.9)	0.15

Time-to-antibiotics and clinical outcomes in patients with sepsis and septic shock: a prospective nationwide multicenter cohort study

Im *et al. Critical Care* (2022) 26:19

Subgroup	OR for in-hospital mortality (95% CI)
Recognizing sepsis by physicians in the emergency department	
No (*n* = 1,858)	0.99 (0.72, 1.36)
Yes (*n* = 1,177)	0.60 (0.42, 0.86)
p-value	*0.05*



Les ATB çà sauve des vies….

Vraiment en traitant une bronchite, une grippe, ou une EABPCO….???

Il n’y a qu’à traiter toutes les suspicions d’infection aux urgences !

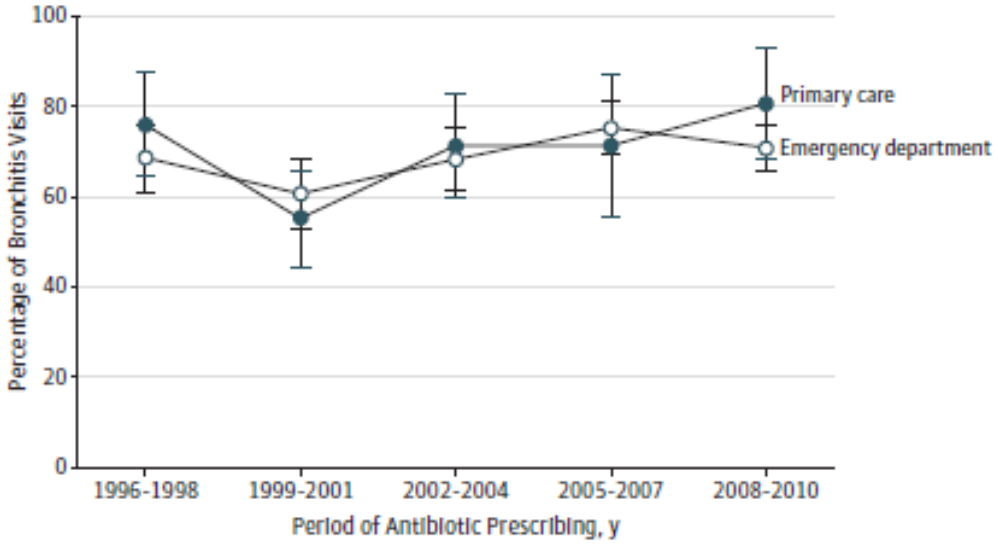
Letters

RESEARCH LETTER

Antibiotic Prescribing for Adults With Acute Bronchitis in the United States, 1996-2010

JAMA May 21, 2014 Volume 311, Number 19

Figure. Antibiotic Prescribing for Acute Bronchitis in the United States by Site of Care, 1996-2010



No. of sampled visits					
Primary care	168	167	185	217	234
Emergency department	293	401	499	462	527

Likelihood of Bacterial Infection in Patients Treated With Broad-Spectrum IV Antibiotics in the Emergency Department*

Critical Care Medicine November 2021 • Volume 49 • Number 11

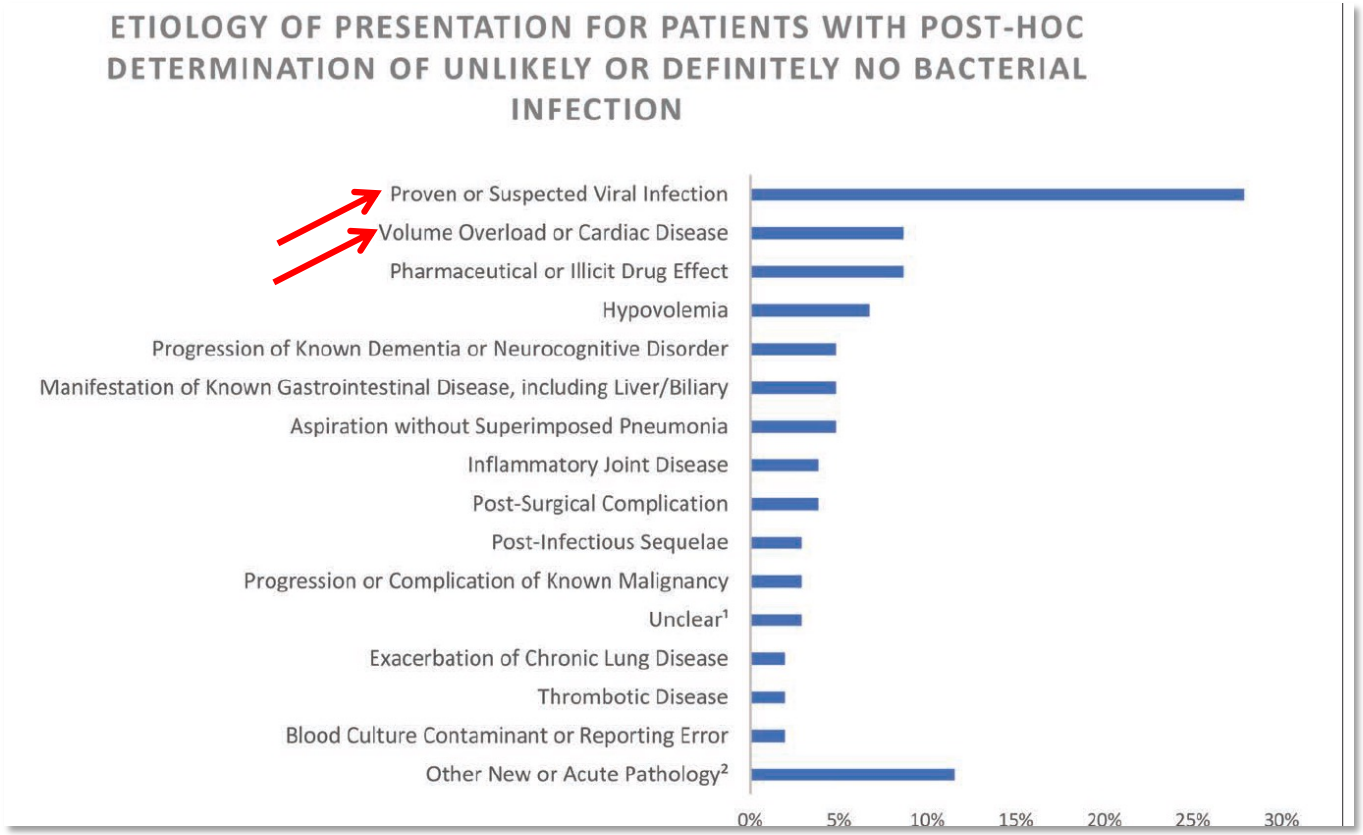
Claire N. Shappell, MD[1,2]
Michael Klompas, MD, MPH[1,3]
Aileen Ochoa, MPH[1]
Chanu Rhee, MD, MPH[1,3]
for the CDC Prevention Epicenters Program

- Etude rétrospective multicentrique

- 300 patients avec suspicion d'infection bacterienne sévère aux urgences
  - Defini par pvt d'Hc
  - Et administration d'au moins 1 dose IV d'ATB à large spectre

- 196 (65.3%) avaient une infection batérienne définie ou probable

- **104 (34.7%) n'avaient probablement ou définitivement pas d'IB**
  - 27.9% d'entre eux avaient une infection virale définie ou probable


ETIOLOGY OF PRESENTATION FOR PATIENTS WITH POST-HOC DETERMINATION OF UNLIKELY OR DEFINITELY NO BACTERIAL INFECTION
Proven or Suspected Viral Infection
Volume Overload or Cardiac Disease
Pharmaceutical or Illicit Drug Effect
Hypovolemia
Progression of Known Dementia or Neurocognitive Disorder
Manifestation of Known Gastrointestinal Disease, including Liver/Biliary
Aspiration without Superimposed Pneumonia
Inflammatory Joint Disease
Post-Surgical Complication
Post-Infectious Sequelae
Progression or Complication of Known Malignancy
Unclear[1]
Exacerbation of Chronic Lung Disease
Thrombotic Disease
Blood Culture Contaminant or Reporting Error
Other New or Acute Pathology[2]
0%
5%
10%
15%
20%
25%
30%

IRB et ATB

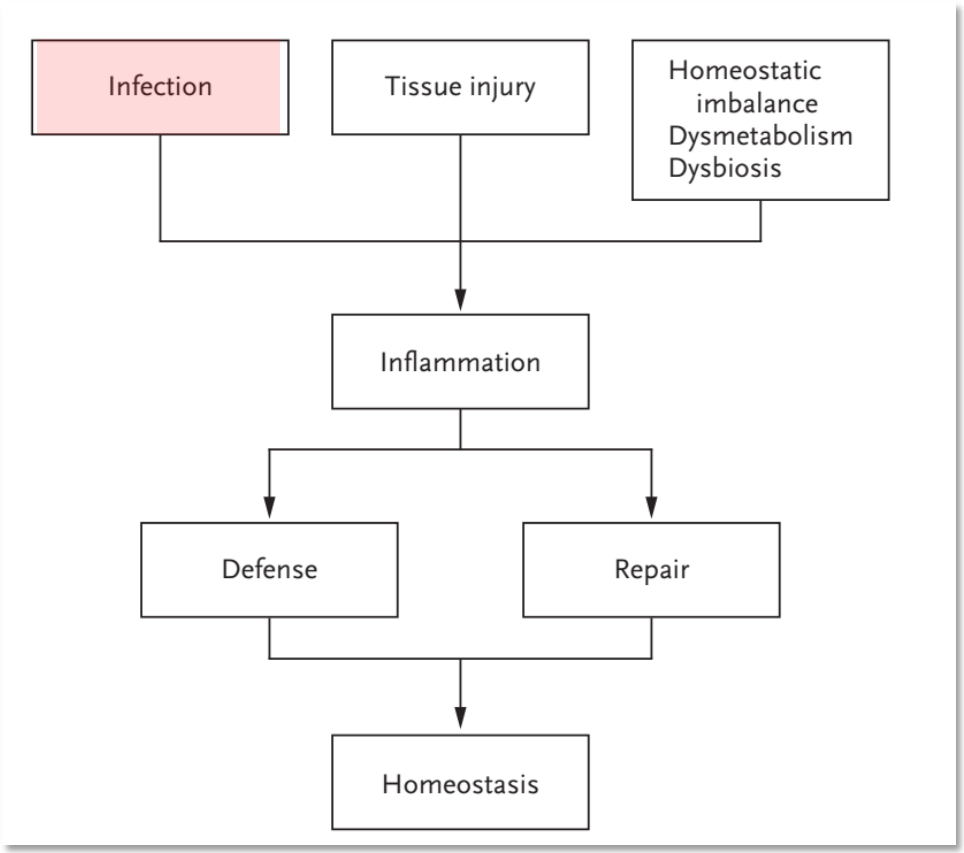
- IRB: 1st foyer infectieux chez l'homme
- 1st poste de consommation d' ATB
- ….sachant que 50% des IRB sont d'origine…virale
- Ou ne justifient pas d'ATB! (ex: bronchite)

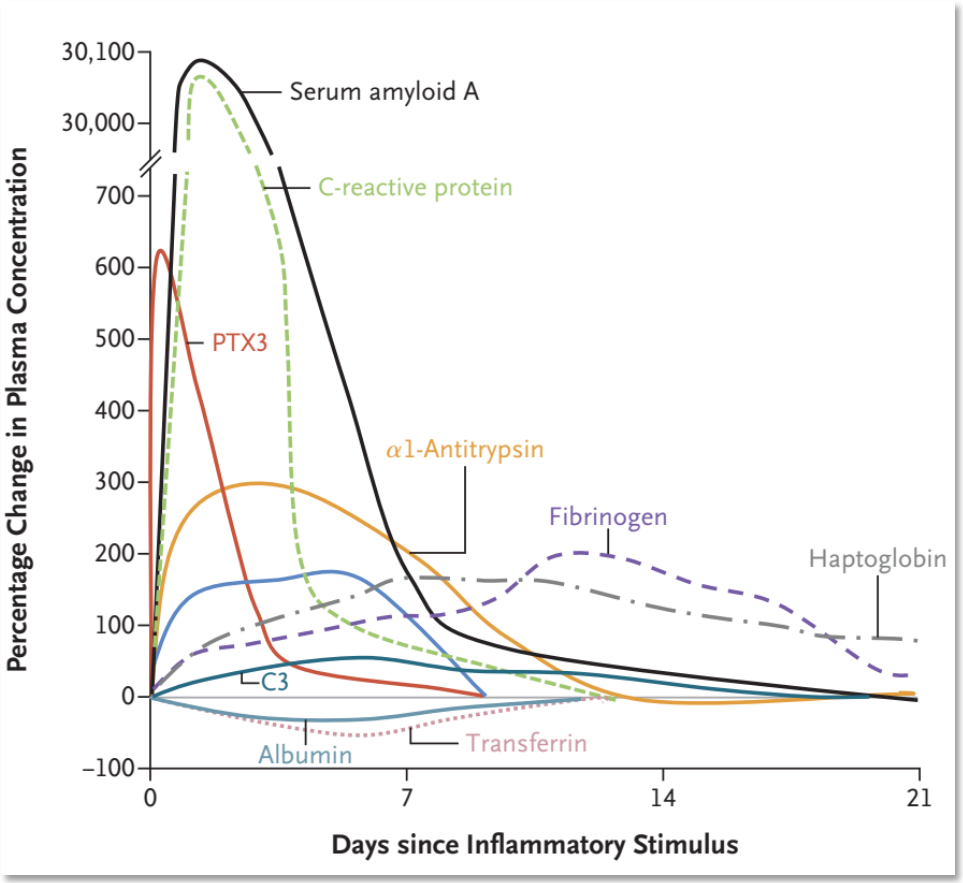
Sur quels signes cliniques suspecter une IRB ?

- toux
- crachats
- Fièvre
- Dyspnée
- Frissons
- Douleur thoracique
- Foyer localisé de crépitants
- ….

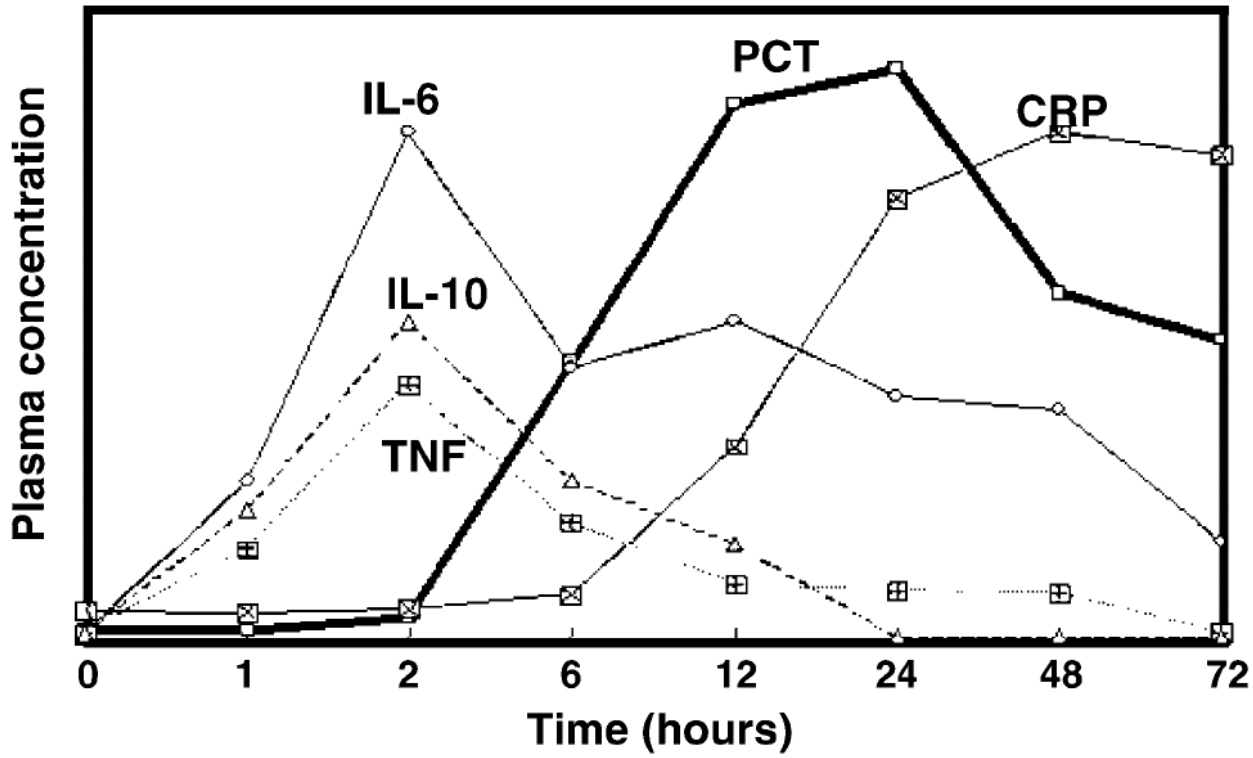

TEST
RESULTS

Les protéines de la phase aiguë de l'inflammation..
Ont une faible spécificité





N ENGL J MED 388;5 NEJM.ORG FEBRUARY 2, 2023



Experimental endotoxemia

(Monneret et al., Acta Paediatr 1997)

SEROLOGICAL REACTIONS IN PNEUMONIA WITH A NON-PROTEIN SOMATIC FRACTION OF PNEUMOCOCCUS*

By WILLIAM S. TILLETT, M.D., and THOMAS FRANCIS, Jr., M.D.

(*From the Hospital of The Rockefeller Institute for Medical Research*)

(Received for publication, June 26, 1930)

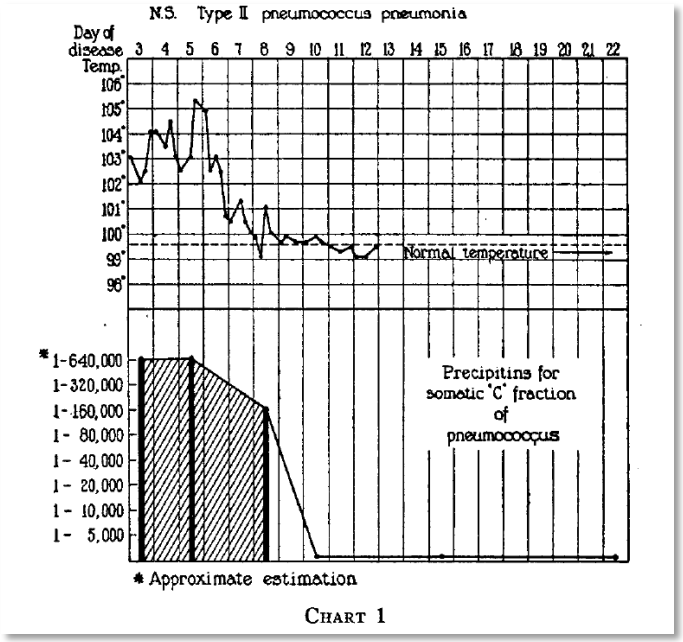


Chart 1

SUMMARY

1. Sera from individuals acutely ill with lobar pneumonia possess the capacity to precipitate in high titre a non-protein somatic fraction derived from pneumococci (Fraction C). Following crisis the reaction is no longer demonstrable.

C Réactive Protéine (CRP)

- Protéine de la phase aiguë de l'inflammation
  - Synthèse hépatique via IL-6, IL-1, TNF-alpha
  - Or, IL-6: cytokine pyrogène
  - Un patient fébrile aura exceptionnellement une CRP normale
- Paramètre très sensible (71-100%)
- Mais peu spécifique de l'infection bactérienne (66-85%)
  - Viroses
  - Période post-opératoire
  - Polytraumatisé
  - Maladies inflammatoires systémiques
  - Pancréatite, appendicite
- Peu d'études rigoureuses sur son réel apport diagnostique (et encore moins pronostique)
- Seuils décisionnels: 40-100 mg/l

B. Clyne and J. S. Olshaker The Journal of Emergency Medicine, Vol. 17, No. 6, pp. 1019–1025, 1999

Performance of a Bedside C-Reactive Protein Test in the Diagnosis of Community-Acquired Pneumonia in Adults with Acute Cough

Scott A. Flanders, MD, John Stein, MD, Guy Shochat, MD, Karen Sellers, RN, Miles Holland, Judith Maselli, MSPH, W. Lawrence Drew, MD, PhD, Art L. Reingold, MD, Ralph Gonzales, MD, MSPH

Am J Med. 2004;116:529–535.

- 173 patients (SAU et/ou cs MG)
- Exclusion comorbidités → CRP +
- 20 PAC (toux + infiltrat radio)

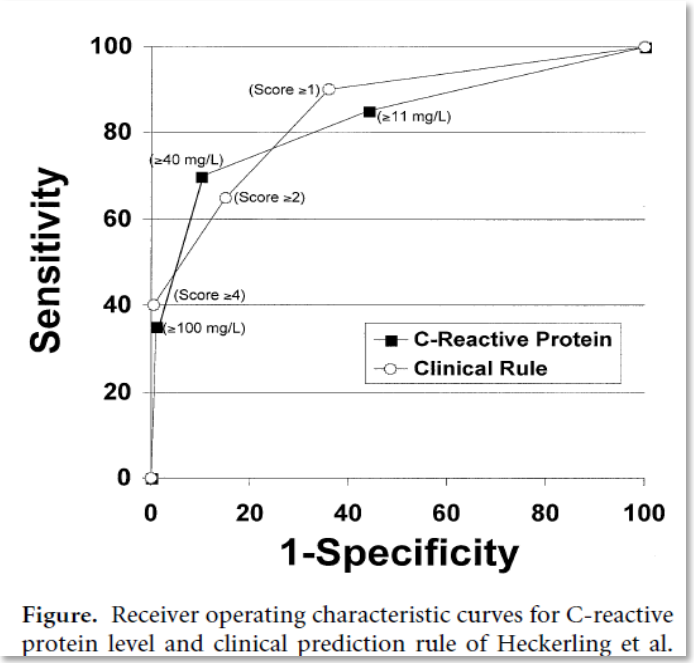


Figure. Receiver operating characteristic curves for C-reactive protein level and clinical prediction rule of Heckerling et al.

Table 3. Positive and Negative Likelihood Ratios for Various C-Reactive Protein Levels

C-Reactive Protein Level (mg/L)	With Pneumonia	Without Pneumonia	Positive Likelihood Ratio	Negative Likelihood Ratio
	Number (%)		(95% Confidence Interval)	
≥11	17 (85)	67 (45)	1.9 (1.5–2.4)	0.27 (0.10–0.79)
≥40	14 (70)	15 (10)	6.9 (4.0–12.1)	0.33 (0.17–0.65)
≥100	7 (35)	1 (0.7)	52 (7–400)	0.65 (0.47–0.90)

Accuracy of Biomarkers for the Diagnosis of Adult Community-acquired Pneumonia: A Meta-analysis

Mark H. Ebell, MD, MS, Michelle Bentivegna, MPH, Xinyan Cai, MPH, Cassie Hulme, MPH, and Maggie Kearney, MPH

ACADEMIC EMERGENCY MEDICINE 2020;27:195–206

CRP > leucocytes> PCT

AUC: 0,80 0,78 0,77

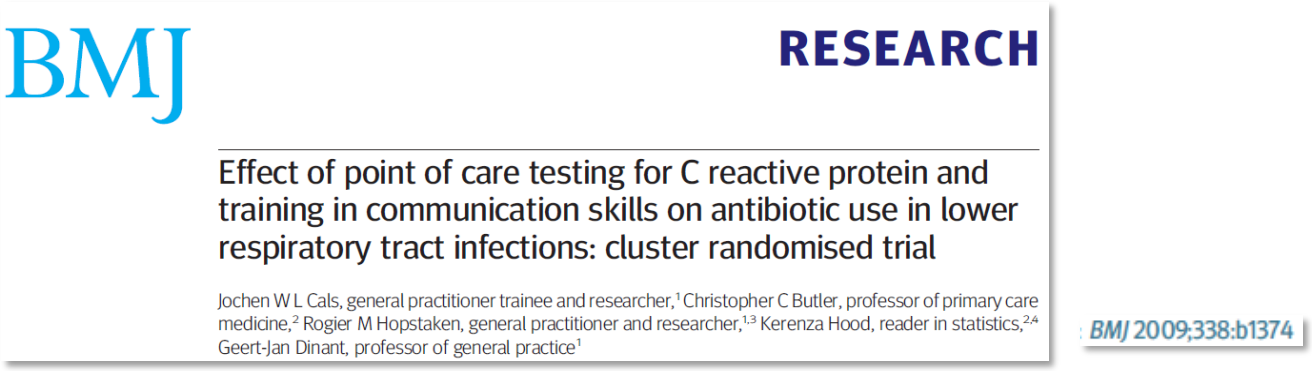
Diagnostic de PAC….. (le Sars-CoV2, le VRS, la grippe donnent des PAC….)

≠ diagnostic de PAC justifiant d'une antibiothérapie +++

Imagerie et diagnostic de PAC

« Apparition de plusieurs condensations parenchymateuses du segment postéro-basal du lobe inférieur droit et du segment postéro-basal et postéro-latérale du lobe inférieur gauche, d'allure infectieuse »

- « l'allure infectieuse » n'est pas un diagnostic
- Encore moins de son origine bactérienne
- Et surtout pas le gold standard pour



BMJ

RESEARCH

Effect of point of care testing for C reactive protein and training in communication skills on antibiotic use in lower respiratory tract infections: cluster randomised trial

Jochen W L Cals, general practitioner trainee and researcher,[1] Christopher C Butler, professor of primary care medicine,[2] Rogier M Hopstaken, general practitioner and researcher,[1,3] Kerenza Hood, reader in statistics,[2,4] Geert-Jan Dinant, professor of general practice[1]

BMJ 2009;338:b1374

- Essai clinique médecine ambulatoire
- Pays-Bas
- 430 suspicions d'IRB
- CRP point of care *versus:*
  - Formation approfondie en communication sur l'intérêt des ATB dans IRB
  - Groupe contrôle

Table 3 | Effects of interventions on antibiotic prescribing at index consultation and antibiotic prescribing and reconsultation during 28 days' follow-up

Variables	Intervention groups		Control groups		P value†	Intracluster coefficient
	No of patients	Percentage (crude 95% CI*)	No of patients	Percentage (crude 95% CI*)		
C reactive protein test:	n=227		n=204			
Antibiotics at index consultation	70	30.8 (21.8 to 39.8)	108	52.9 (43.0 to 62.8)	0.02	0.12
Antibiotics at days 1 to 28	102	44.9 (35.2 to 54.6)	119	58.3 (48.5 to 68.1)	<0.01	0.12
Reconsultation within 28 days	79	34.8 (28.3 to 41.3)	62	30.4 (23.8 to 37.0)	0.50	0.01
Communication skills training:	n=201		n=230			
Antibiotics at index consultation	55	27.4 (25.6 to 36.6)	123	53.5 (43.8 to 63.2)	<0.01	0.12
Antibiotics at days 1 to 28	76	37.8 (28.1 to 47.5)	145	63 (53.6 to 72.4)	<0.001	0.12
Reconsultation within 28 days	56	27.9 (21.4 to 34.4)	85	37.0 (30.4 to 43.6)	0.14	0.01

*Calculated and inflated for clustering by using standard deviation inflated by variance inflation factor.[53]
†Calculated from second order penalised quasi-likelihood multilevel logistic regression model adjusted for variance at general practitioner and practice level (random intercept at practice and general practitioner level). Models included both interventions and interaction term of interventions. See web extra for corresponding β coefficients.

BMJ Open

Cost-effectiveness and return-on-investment of C-reactive protein point-of-care testing in comparison with usual care to reduce antibiotic prescribing for lower respiratory tract infections in nursing homes: a cluster randomised trial

Tjarda M Boere ,[1] Mohamed El Alili,[2] Laura W van Buul,[1] Rogier M Hopstaken,[3,4] Theo J M Verheij,[5,6] Cees M P M Hertogh,[1,6] Maurits W van Tulder ,[7] Judith E Bosmans[2]

BMJ Open 2022;**12**:e055234

- 11 EHPAD/SSR aux Pays-Bas
- Patients suspects d'IRB
- CRP POC versus usual care
- Cluster randomisation/centre

Outcomes	POCT-guided care Mean (SE)	Usual care	Mean difference (95% CI)*
Avoided antibiotic prescription	0.47 (0.04)	0.18 (0.04)	0.30 (0.17 to 0.42)
Full recovery	0.86 (0.03)	0.91 (0.03)	–0.05 (–0.14 to 0.05)

Pas de consigne sur seuil de CRP….

C-Reactive Protein Testing to Guide Antibiotic Prescribing for COPD Exacerbations

Christopher C. Butler, F.Med.Sci., David Gillespie, Ph.D., Patrick White, M.D., Janine Bates, M.Phil., Rachel Lowe, Ph.D., Emma Thomas-Jones, Ph.D., Mandy Wootton, Ph.D., Kerenza Hood, Ph.D., Rhiannon Phillips, Ph.D., Hasse Melbye, Ph.D., Carl Llor, Ph.D., Jochen W.L. Cals, M.D., Ph.D., Gurudutt Naik, M.B., M.S., M.P.H., Nigel Kirby, M.A., Micaela Gal, D.Phil., Evgenia Riga, M.Sc., and Nick A. Francis, Ph.D.

N Engl J Med 2019;381:111-20.

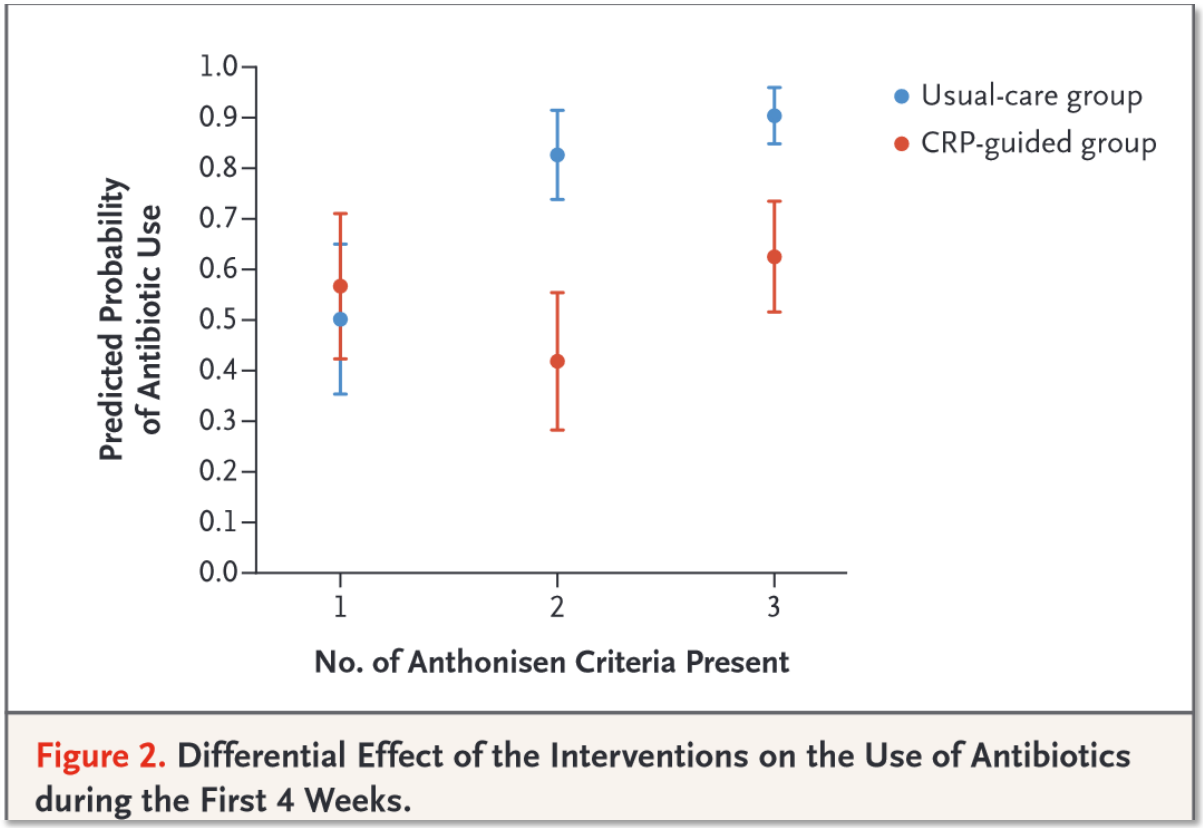


Figure 2. Differential Effect of the Interventions on the Use of Antibiotics during the First 4 Weeks.

- Médecine de ville
- EABPCO
- 653 pts
- CRP POCT vs usual care
  - **CRP<20 mg/L→ pas ATB**

Cochrane Database of Systematic Reviews, *2022*(10), Article CD010130

Cochrane Library

Trusted evidence.
Informed decisions.
Better health.

Cochrane Database of Systematic Reviews

[Intervention Review]

Biomarkers as point-of-care tests to guide prescription of antibiotics in people with acute respiratory infections in primary care

Siri Aas Smedemark[1,2], Rune Aabenhus[3], Carl Llor[4,5], Anders Fournaise[1,2,6,7], Ole Olsen[8], Karsten Juhl Jørgensen[9]

Can tests for inflammation help doctors decide whether to use antibiotics for airway infections?

Key messages

1. When a patient presents with symptoms of an airway infection at the doctor's office, the doctor's use of *C-reactive protein point-of-care tests* during the visit probably reduces the number of patients given an antibiotic prescription, without affecting patient recovery.

2. We do not know if *procalcitonin point-of-care tests* have an effect on antibiotic use or patient recovery.

What are the limitations of the evidence?

We are moderately confident in the evidence for a reduction in antibiotics use with C-reactive protein tests.

High serum procalcitonin concentrations in patients with sepsis and infection

MARCEL ASSICOT DOMINIQUE GENDREL HERVÉ CARSIN
JOSETTE RAYMOND JEAN GUILBAUD CLAUDE BOHUON

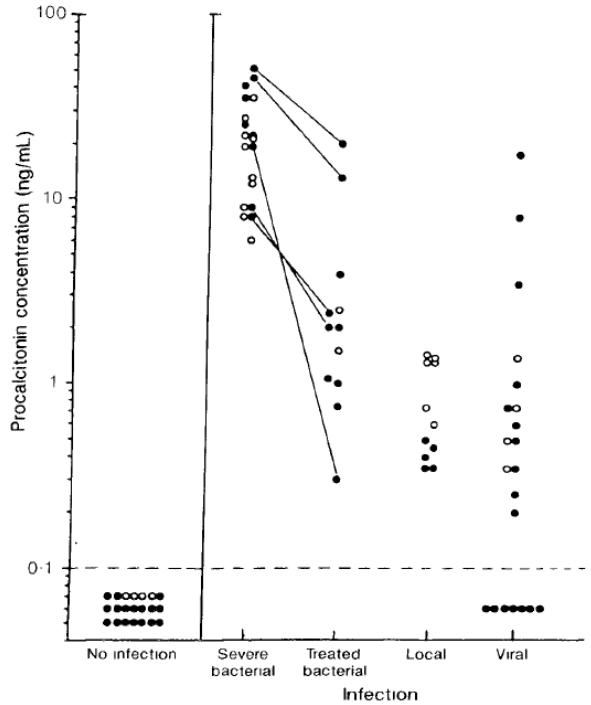


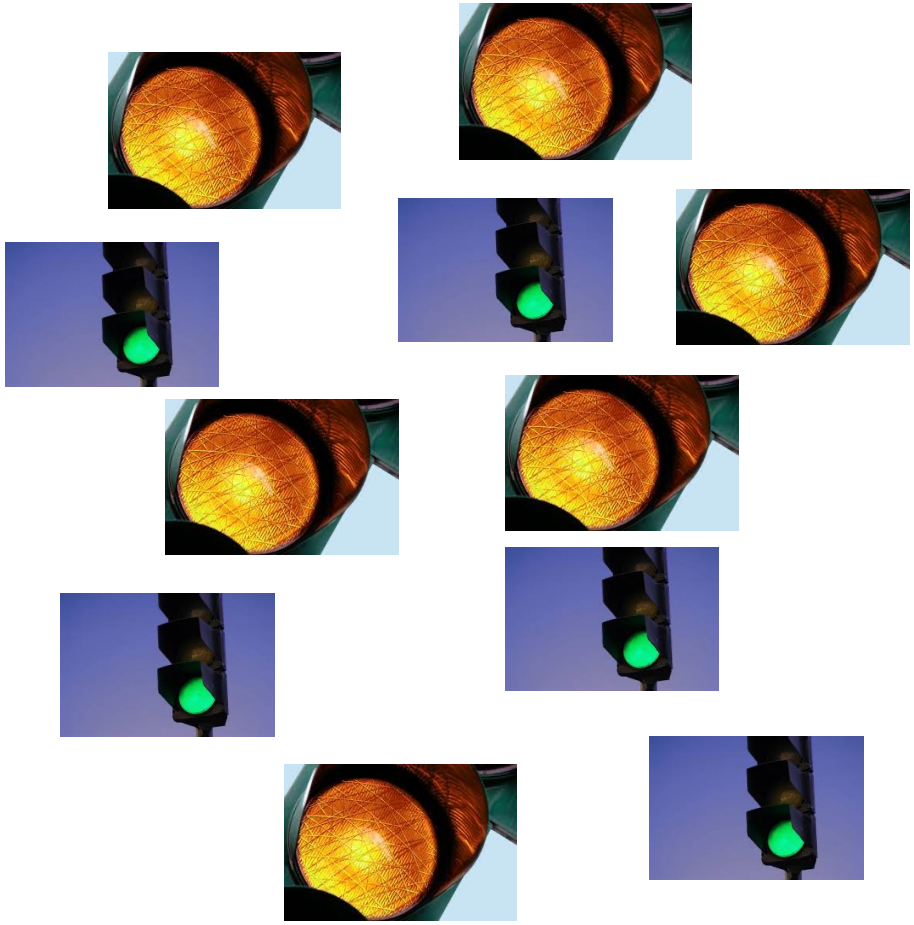
Fig 2—Serum procalcitonin concentrations in newborn infants (○) and older infants and children (●).

Lines join samples taken from patients before and after start of antibiotic treatment.

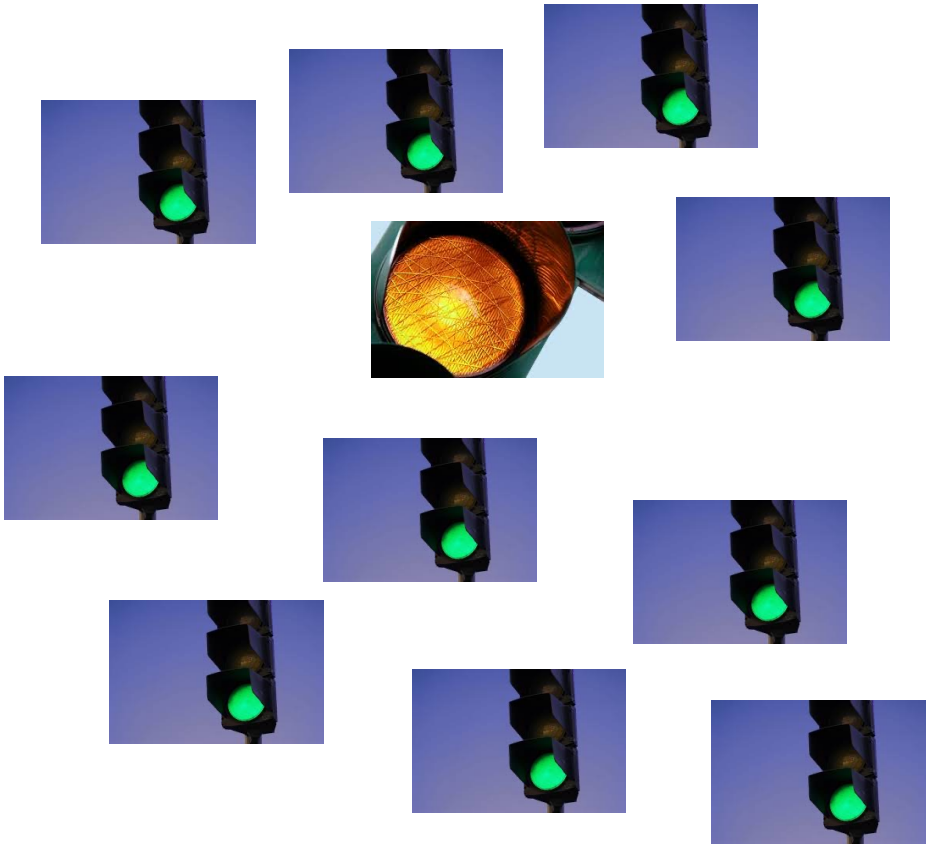
La procalcitonine, biomarqueur d'infection bactérienne

- PCT: pro-hormone de la calcitonine
- Sujets sains: < 0,1 µg/L
- [sérum/plasma] augmentent en cas d'infection bactérienne
- Infections virales et syndrome inflammatoires d'origine non infectieuses:
  PCT reste basse (≠ CRP)
- t½ vie: 24h
- [PCT] corrélées à la gravité
- Biomarqueur plus précoce que la CRP

CRP: SENS vs Spe



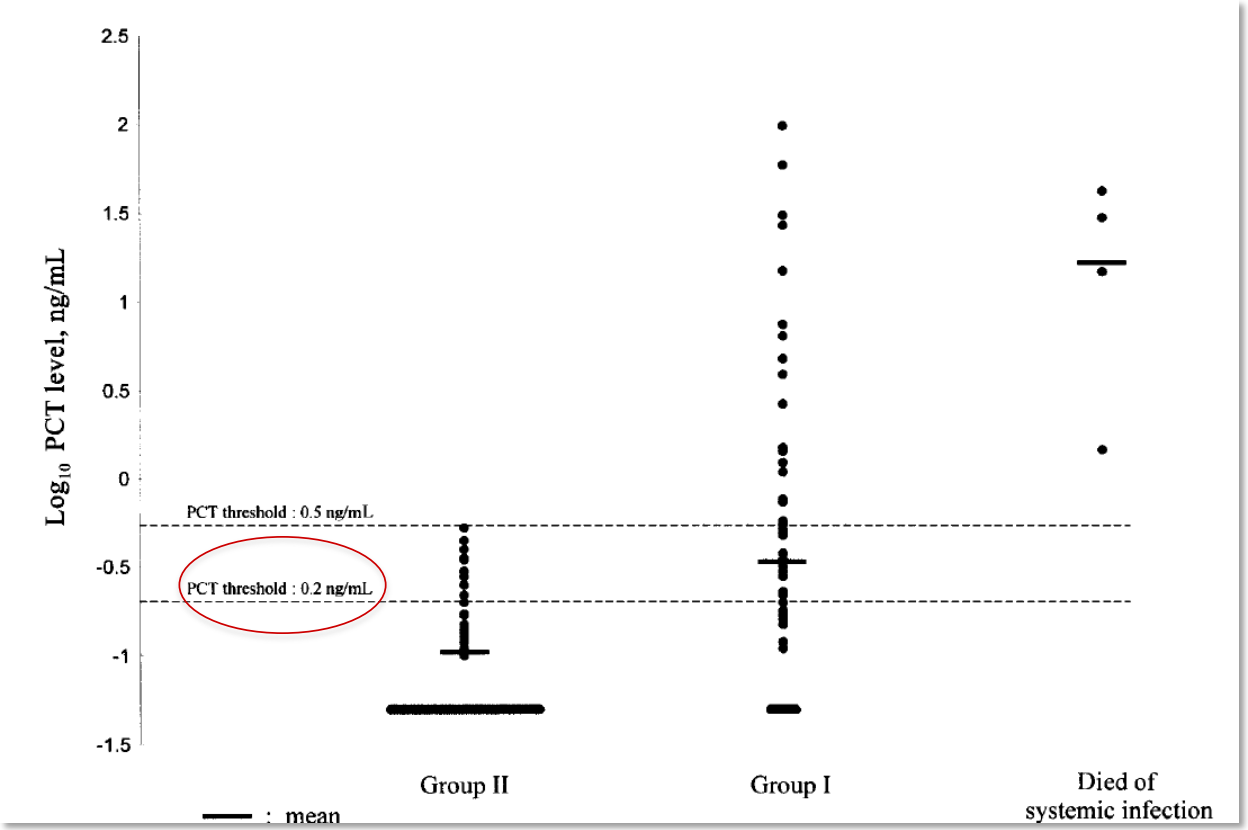
PCT: SPE vs Sens



Usefulness of Procalcitonin as a Marker of Systemic Infection in Emergency Department Patients: A Prospective Study

P. Hausfater,[1] S. Garric,[1] S. Ben Ayed,[2] M. Rosenheim,[3] M. Bernard,[2] and B. Riou[1]

Clinical Infectious Diseases 2002; 34:895–901



Research

Open Access

Serum procalcitonin measurement as diagnostic and prognostic marker in febrile adult patients presenting to the emergency department

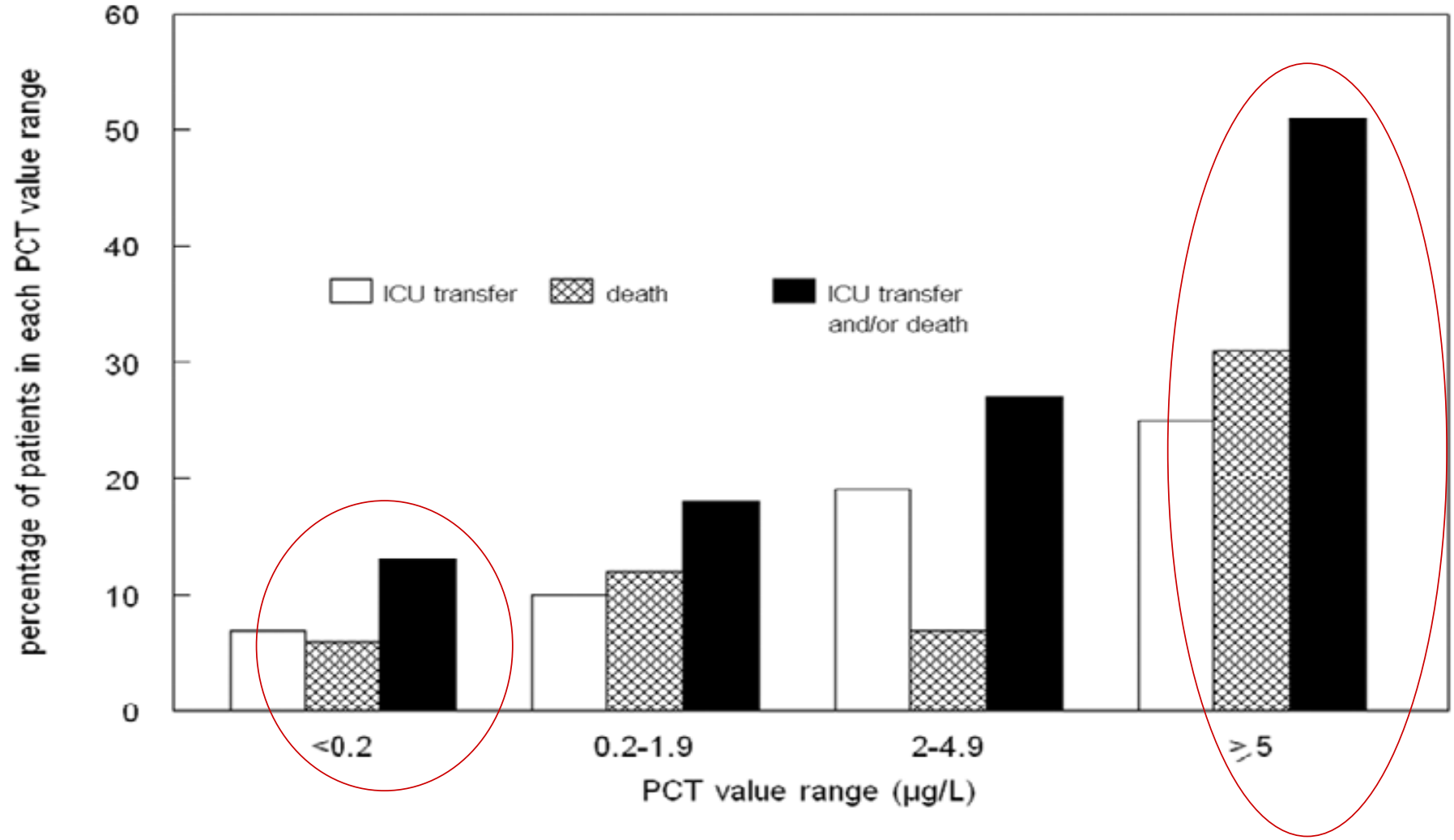
Pierre Hausfater[1], Gaëlle Juillien[1], Beatrice Madonna-Py[1], Julien Haroche[2], Maguy Bernard[3] and Bruno Riou[1]

Table 3

Comparison of patients with or without bacterial/parasitic infection (univariate analysis) and identification of variables predictive of bacterial/parasitic infection after stepwise logistic regression analysis (multivariate analysis)

Variable	Univariate analysis			Multivariate analysis	
	Nonbacterial/parasitic ($n = 76$)	Bacterial/parasitic ($n = 167$)	*P*	Odds ratio [95% CI]	*P*
Emergency physician diagnosis	70 (29%)	173 (71%)	< 0.001	7.54 [3.60–15.82]	< 0.001
Haemoglobin level (mg/l)	128 ± 19	125 ± 23	NS		
White blood cell count (/mm^3)	8060 ± 3777	11688 ± 8039	< 0.001		
Neutrophil leukocytes ≥ 7,500/mm^3	21 (28%)	88 (54%)	< 0.001	3.17 [1.52–6.62]	0.002
Platelet count (10^3/mm^3)	198 ± 90	204 ± 99	NS		
Creatinine (µmol/l)	97 ± 39	118 ± 97	NS		
PCT (µg/l)	0.7 ± 2.2	11.1 ± 39.0	< 0.001		
PCT ≥ 0.2 µg/l	31 (41%)	128 (77%)	< 0.001	4.54 [2.19–9.39]	< 0.001
CRP (mg/l)	39 ± 48	150 ± 128	< 0.001		
CRP ≥ 40 mg/l	28 (38%)	122 (76%)	< 0.001	3.67 [1.79–7.53]	< 0.001

Critical Care 2007, **11**:R60



Hausfater et al Critical Care 2007, **11**:R60

ARTICLES

Effect of procalcitonin-guided treatment on antibiotic use and outcome in lower respiratory tract infections: cluster-randomised, single-blinded intervention trial

Mirjam Christ-Crain, Daiana Jaccard-Stolz, Roland Bingisser, Mikael M Gencay, Peter R Huber, Michael Tamm, Beat Müller

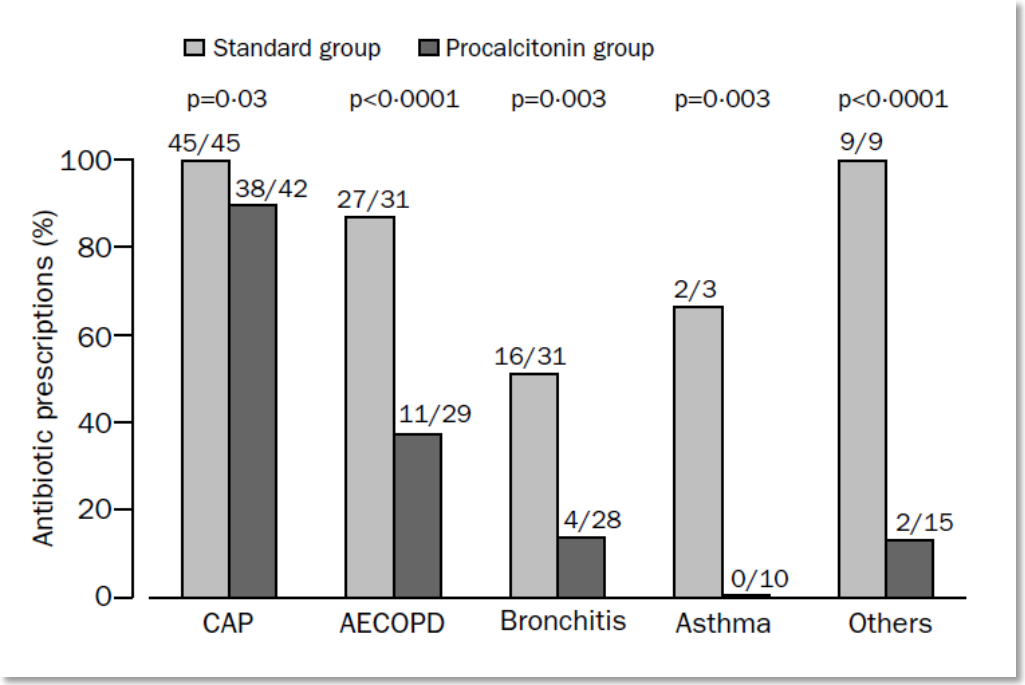
- 243 patients suspects d 'IRB aux urgences
  - 119 pts: prise en charge « standard »
  - 124 patients: traitement ATB guidé par résultat PCT:
    - PCT< 0,1: pas d 'ATB
    - PCT <0,25: pas d 'ATB recommandé
    - PCT > 0,25: ATB recommandés
    - Méthode dosage: Kryptor

Lancet 2004; 363: 600–07.

Effect of procalcitonin-guided treatment on antibiotic use and outcome in lower respiratory tract infections: cluster-randomised, single-blinded intervention trial

Mirjam Christ-Crain, Daiana Jaccard-Stolz, Roland Bingisser, Mikael M Gencay, Peter R Huber, Michael Tamm, Beat Müller

Lancet 2004; 363: 600–07.



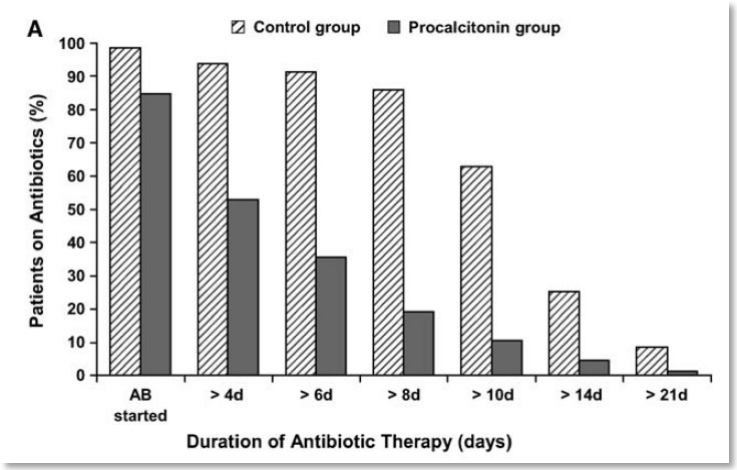
Seuil décisionnel PCT : 0.25 µg/L

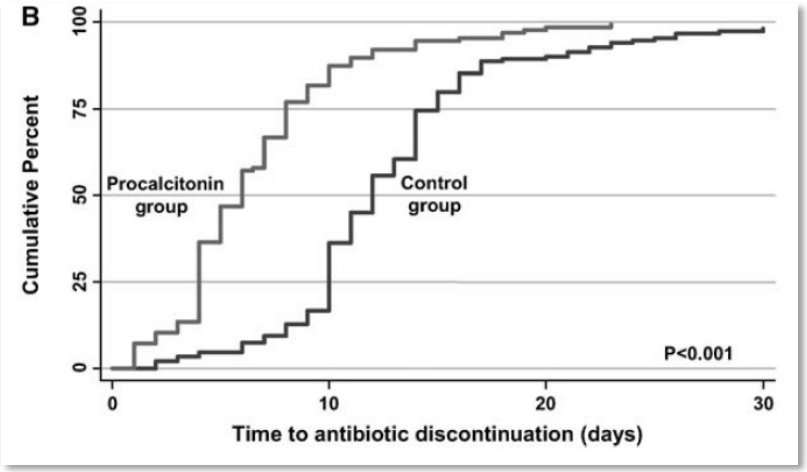
Procalcitonin Guidance of Antibiotic Therapy in Community-acquired Pneumonia

A Randomized Trial

Mirjam Christ-Crain, Daiana Stolz, Roland Bingisser, Christian Müller, David Miedinger, Peter R. Huber, Werner Zimmerli, Stephan Harbarth, Michael Tamm, and Beat Müller

Am J Respir Crit Care Med Vol 174. pp 84–93, 2006





Réduction de 65% de la durée de traitement ATB des PAC si guidé par la PCT

(13 versus 6 jours)

REVIEW ARTICLE

Procalcitonin Algorithms for Antibiotic Therapy Decisions

A Systematic Review of Randomized Controlled Trials and Recommendations for Clinical Algorithms

Philipp Schuetz, MD, MPH; Victor Chiappa, MD; Matthias Briel, MD, MSc; Jeffrey L. Greenwald, MD

Arch Intern Med. 2011;171(15):1322-1331

Source

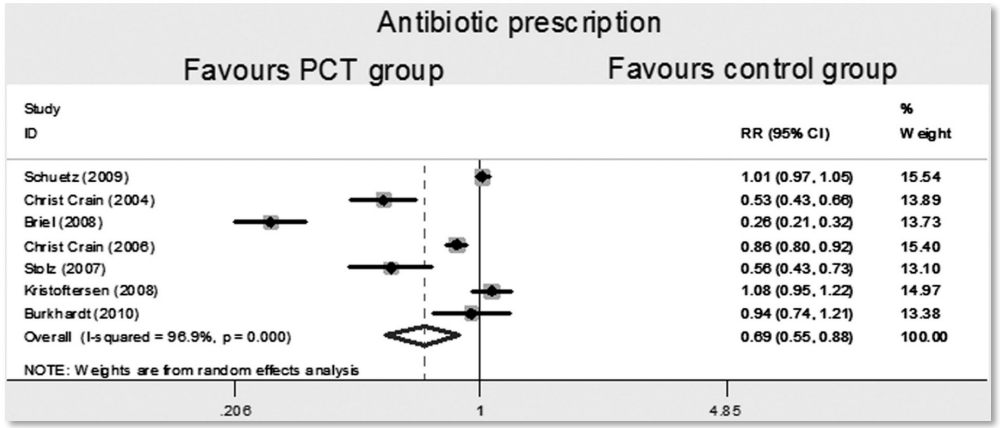
Briel et al,[14] 2008
Burkhardt et al,[21] 2010
Christ-Crain et al,[22] 2004
Christ-Crain et al,[23] 2006
Stolz et al,[24] 2007
Long et al,[25] 2009
Kristoffersen et al,[26] 2009
Schuetz et al,[15] 2009
Svoboda et al,[27] 2007
Nobre et al,[28] 2008
Stolz et al,[29] 2009
Hochreiter et al,[30] 2009
Schroeder et al,[31] 2009
Bouadma et al,[32] 2010

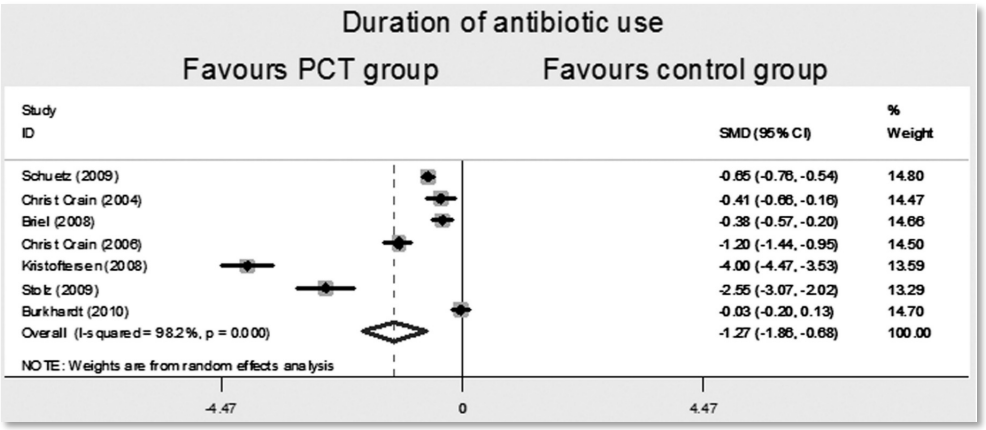
- *« Measurement of procalcitonin levels for antibiotic decisions in patients with respiratory tract infections and sepsis appears to reduce antibiotic exposure without worsening the mortality rate. »*

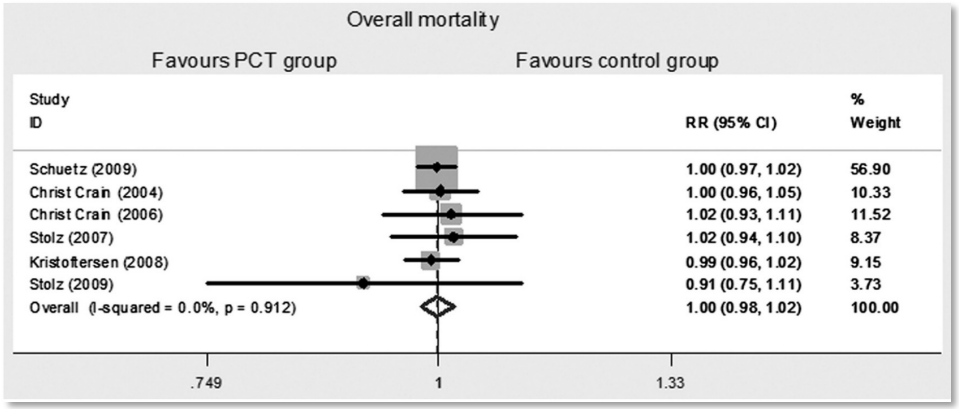
Meta-Analysis and Systematic Review of Procalcitonin-Guided Therapy in Respiratory Tract Infections[▽]

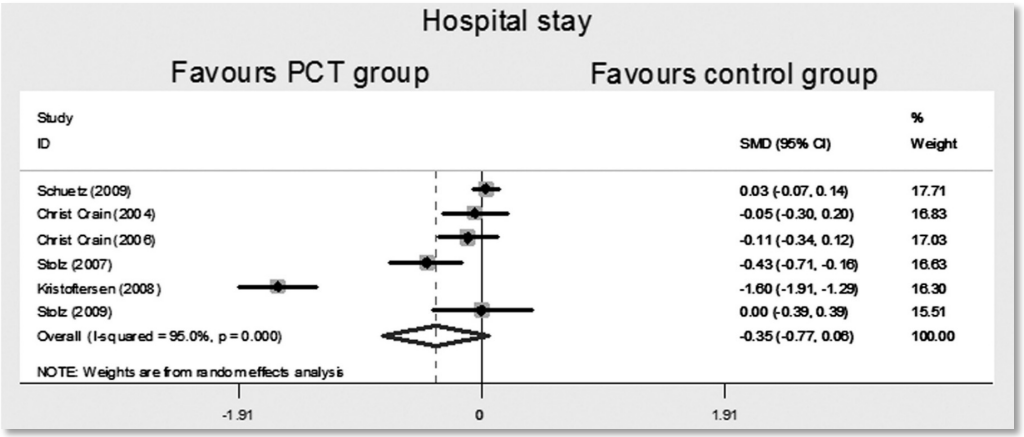
Hui Li,[1]† Yi-Feng Luo,[1]† Timothy S. Blackwell,[2] and Can-Mao Xie[1]*

ANTIMICROBIAL AGENTS AND CHEMOTHERAPY, Dec. 2011, p. 5900–5906









Et dans le COVID ??

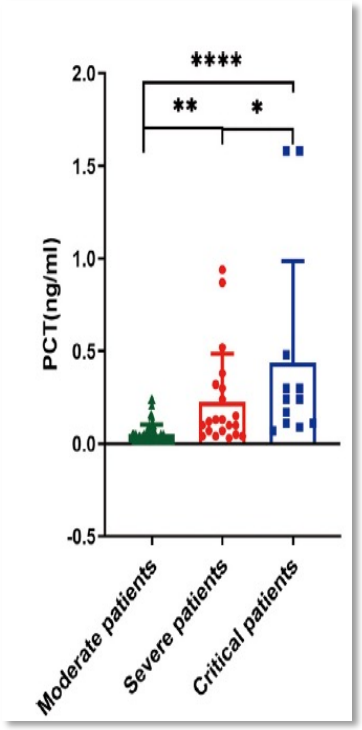
COVID19

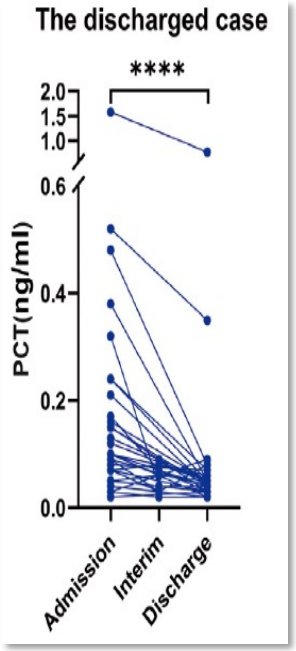
Short Communication

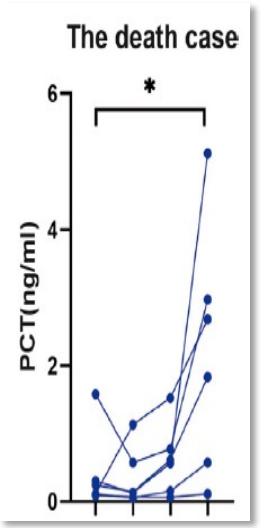
Procalcitonin levels in COVID-19 patients

Rui Hu[a,b,1], Chaofei Han[c,1], Shiyao Pei[a,b], Mingzhu Yin[a,b,*], Xiang Chen[a,b,*]

N=95







Int J Antimicrob Agents . 2020 Jun 10;106051. doi: 10.1016

COVID19

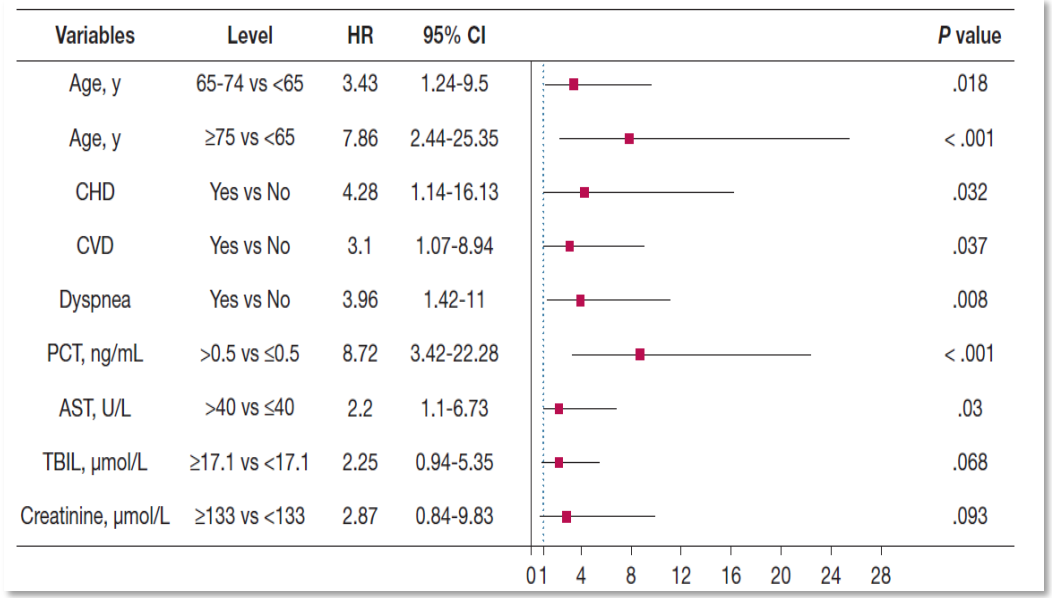
Risk Factors of Fatal Outcome in Hospitalized Subjects With Coronavirus Disease 2019 From a Nationwide Analysis in China

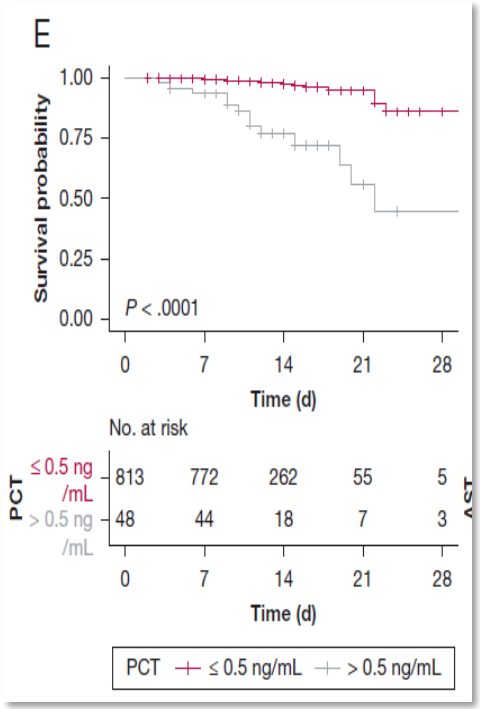
Ruchong Chen, MD; Wenhua Liang, MD; Mei Jiang, PhD; Weijie Guan, MD; Chen Zhan, MD; Tao Wang, MD;

N=1590

Chest. 2020 Apr 15;S0012-3692(20)30710-8. doi: 10.1016

Variables	Level	HR	95% CI	*P* value
Age, y	65-74 vs <65	3.43	1.24-9.5	.018
Age, y	≥75 vs <65	7.86	2.44-25.35	< .001
CHD	Yes vs No	4.28	1.14-16.13	.032
CVD	Yes vs No	3.1	1.07-8.94	.037
Dyspnea	Yes vs No	3.96	1.42-11	.008
PCT, ng/mL	>0.5 vs ≤0.5	8.72	3.42-22.28	< .001
AST, U/L	>40 vs ≤40	2.2	1.1-6.73	.03
TBIL, μmol/L	≥17.1 vs <17.1	2.25	0.94-5.35	.068
Creatinine, μmol/L	≥133 vs <133	2.87	0.84-9.83	.093





RESEARCH ARTICLE

Procalcitonin for clinical decisions on influenza-like illness in emergency department during influenza a(H1N1)2009 pandemic

P. Canavaggio[a], D. Boutolleau[b,c], H. Goulet[a], B. Riou[a,d] and P. Hausfater[a,d]

BIOMARKERS, 2016

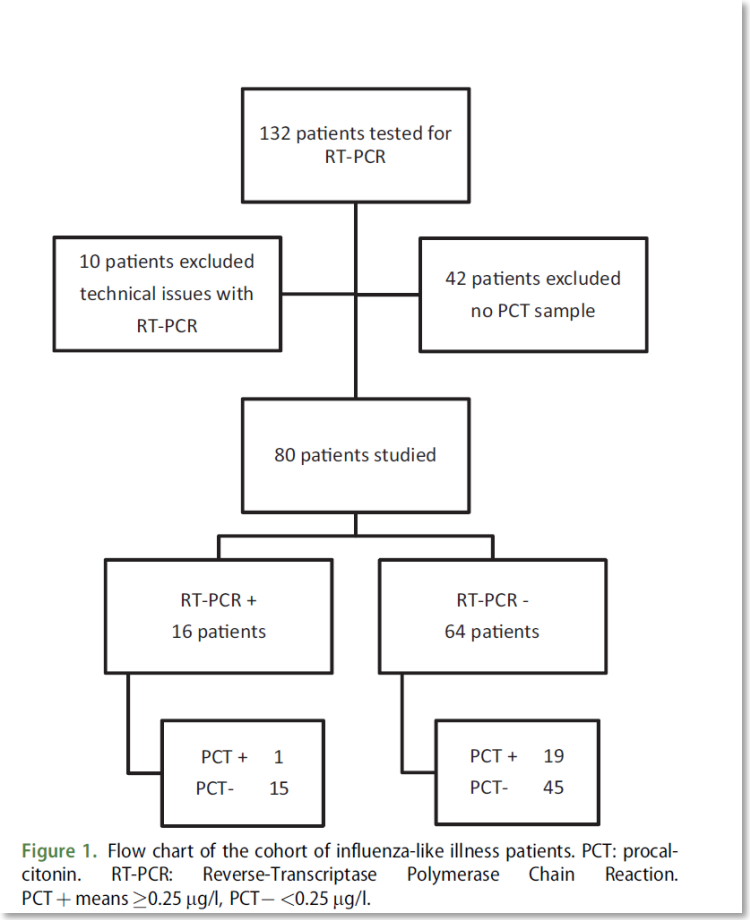


Figure 1. Flow chart of the cohort of influenza-like illness patients. PCT: procalcitonin. RT-PCR: Reverse-Transcriptase Polymerase Chain Reaction. PCT + means ≥0.25 µg/l, PCT− <0.25 µg/l.

" In the context of patients attending the ED for influenza-like illness
PCT <0.25 µg/L had:

sensitivity of 0.94
specificity 0.30
PPV 0.25
NPV 0.95
LR+ 1.33
LR- 0.21

For the diagnosis of influenza A(H1N1)2009"

Et à l'ère du diagnostic moléculaire syndromique ??
PCR multiplex

IRB
PAC exclues

Serum Procalcitonin Measurement and Viral Testing to Guide Antibiotic Use for Respiratory Infections in Hospitalized Adults: A Randomized Controlled Trial

Angela R. Branche,[1] Edward E. Walsh,[1,3] Roberto Vargas,[4] Barbara Hulbert,[4] Maria A. Formica,[3] Andrea Baran,[2] Derick R. Peterson,[2] and Ann R. Falsey[1,3]

JID 2015:212 (1 December)

Table 2. Comparison of Antibiotic Use Between the Intervention Group/Subgroups or Historical Controls and the Nonintervention Group

Characteristic	Intervention Group	Nonintervention Group	*P* Value
Subjects, no.	151	149	
Antibiotic use for ≤48 h	69 (46)	61 (41)	.42
Discharged receiving oral antibiotics	51 (35)[a]	64 (44)[b]	.09
Total antibiotic-days	3.0 (1.0–7.0)	4.0 (0.0–8.0)	.71

	Intervention Subgroup Adherent to Algorithm	Nonintervention Group	
Subjects, no.	96	149	
Antibiotic use for ≤48 h	63 (65)	61 (41)	.002
Discharged receiving oral antibiotics	19 (20)[c]	64 (45)[b]	.002
Total antibiotic-days	2.0 (0.0–3.0)	4.0 (0.0–8.0)	.004

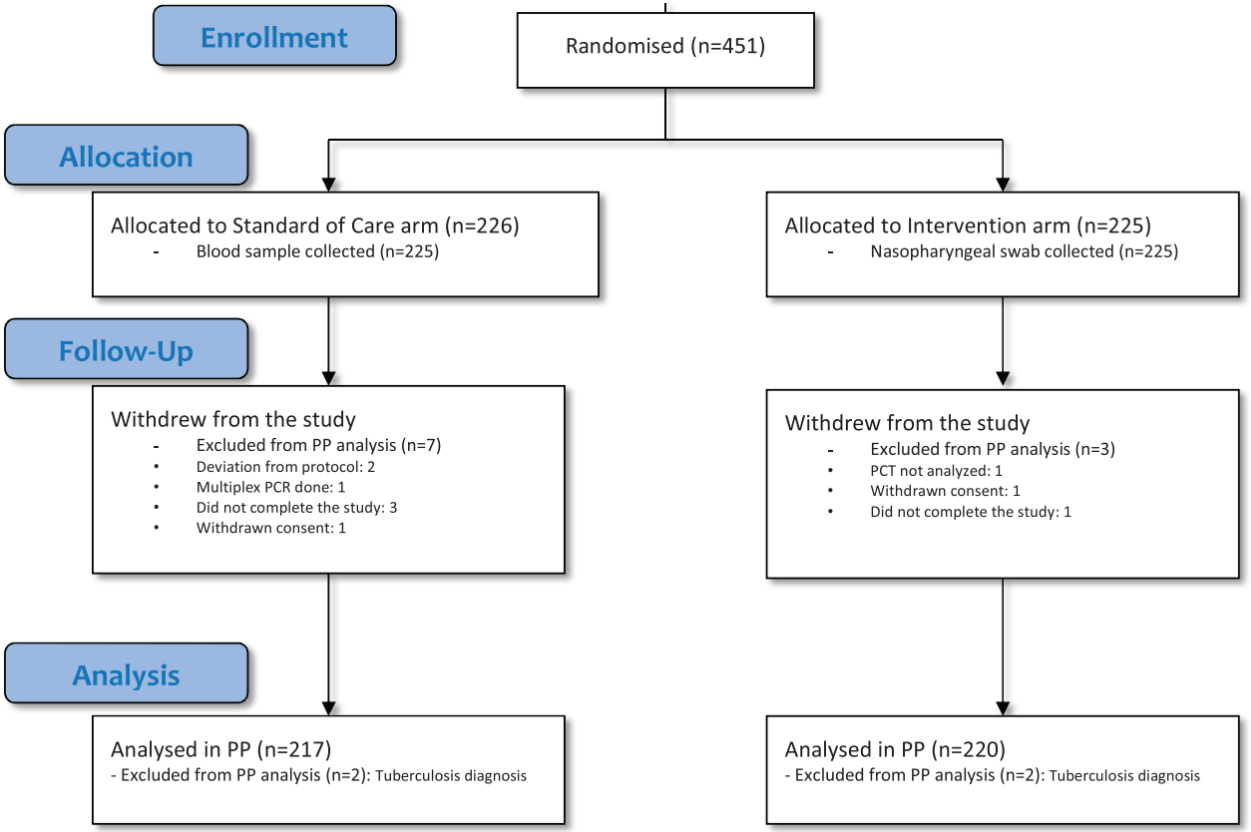
Original article

Point-of-care multiplex molecular diagnosis coupled with procalcitonin-guided algorithm for antibiotic stewardship in lower respiratory tract infection: a randomized controlled trial

Clinical Microbiology and Infection

Laetitia Velly [1, 2], Marta Cancella de Abreu [1, 2], David Boutolleau [3], Ilaria Cherubini [1], Enfel Houas [1], Alexandre Aurousseau [4], Pierre Hausfater [1, 2, *]

August 04, 2023 DOI: https://doi.org/10.1016/j.cmi.2023.07.031



Variable	Standard of care (n = 226)	Intervention (n = 225)	p
Primary outcome			
Number of days of antibiotic exposure prescribed during the 28 days follow-up			0.71[a]
Patients N	212	214	
Missing	14	11	
Mean (SD)	6.25 (6.99)	6.06 (7.00)	
(Min; Max)	(0.00; 28.00)	(0.00; 28.00)	
Median (Q1; Q3)	6.00 (0.00; 9.00)	5.00 (0.00; 9.00)	
Secondary outcomes			
Initiation of an antibiotic therapy in the first 28 days after inclusion			0.54 [b]
Yes	67 (31.3)	76 (34.1)	
Missing/NA	12	2	
Initiation of an antibiotic therapy outside ED			0.36 [b]
Yes	54 (25.2)	48 (21.5)	
Missing/NA	12	2	
Hospital Admission			0.80[b]
Yes	134 (59.3)	136 (60.4)	
Missing	0	0	
ICU admission			0.26[b]
Yes	23 (11.1)	16 (7.8)	
Missing/NA	18	20	
Length of stay in the ED for non-admitted patients (hours)			0.036 [a]
Mean (SD)	6.68 (2.69)	5.98 (2.13)	
(Min; Max)	(0.05; 18.85)	(0.88; 14.05)	
Median (Q1; Q3)	6.47 (4.98; 8.02)	5.68 (4.60; 7.07)	
Length of stay in hospital, included ICU (in days)			0.51 [a]
N	222	216	
Mean (SD)	7.8 (8.6)	7.1 (8.2)	
Median (Q1; Q3)	5.5 (0.0; 13.0)	4.0 (0.0; 11.0)	
Missing	4	9	
All-cause mortality (in the first 28 days after randomization)			0.54[a]
Yes	13 (6.0)	10 (4.7)	
Missing/NA	9	10	
PCT measurement (µg/L)			0.84[b]
N	212	222	
Mean (SD)	0.87 (3.43)	1.43 (6.67)	
Median (Q1; Q3)	0.12 (0.06; 0.45)	0.12 (0.06; 0.43)	
Missing	14	3	
Identification of at least one specific virus in the ED			
Yes	NA	112 (49.8)	

Cas clinique

Patient

Homme 78 ans
HTA cardiopathie isch.

Signes fonctionnels

Douleur thoracique depuis 48h
Toux crachats

Vital parameters

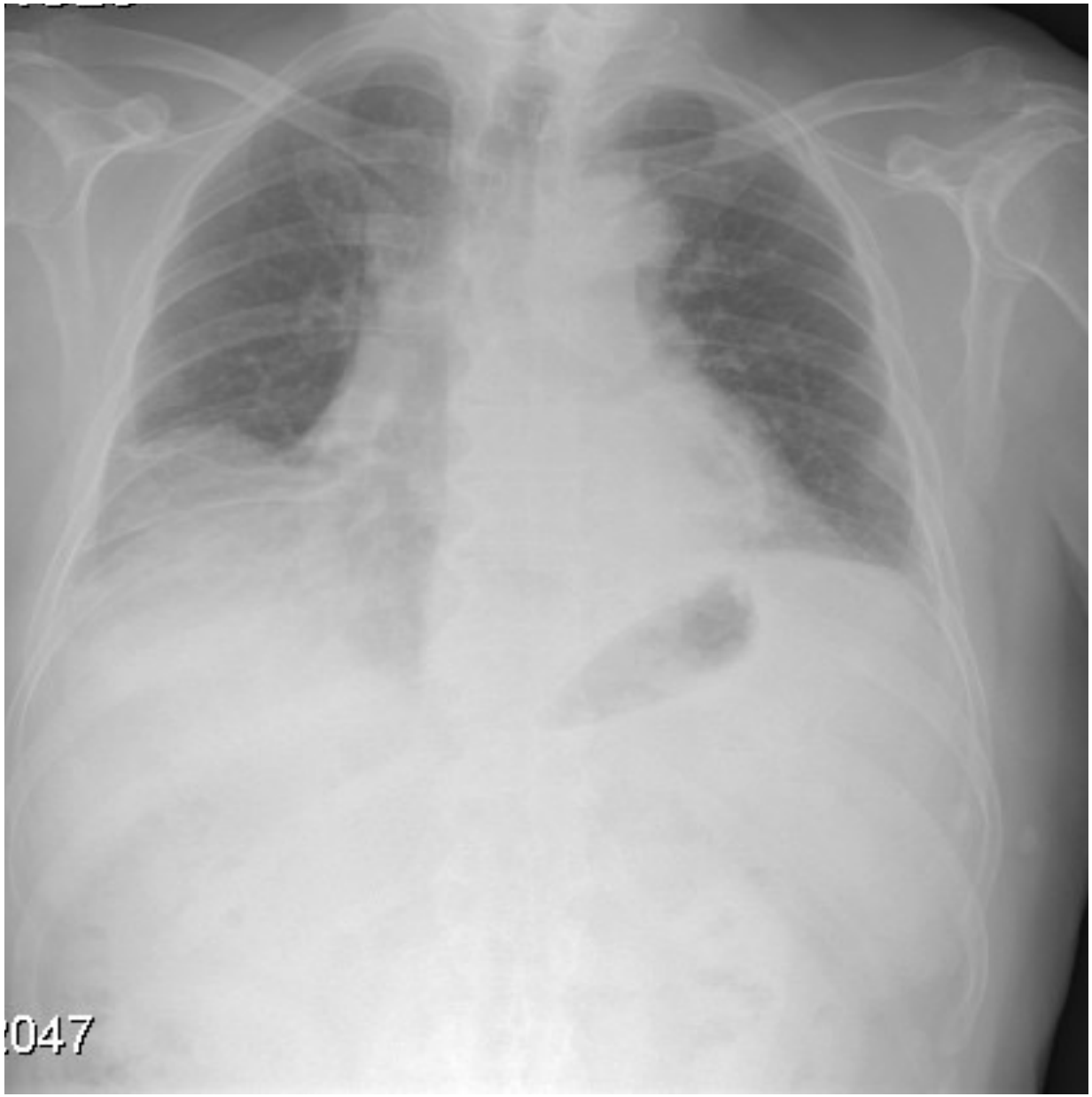
T 38°C PAS 123 mm Hg
Fc 66/mn SpO2: 94%

Biologie

Leuco 10.7 Giga/L PO2: 54 mmHg PCO2:32
Creat 120 µmol/L lactate 0.9 mmol/L
Tn: normale

Examen clinique

Crépitants des 2 bases prédominant à D


2047

Ce patient a:

- Un SIRS:
  - 38.1° C PaCO2: 32 mm Hg
- Des signes respiratoires
  - Toux crachats DT
- Une foyer radiologique
- Des signes auscultatoires en foyer
- Donc: une PAC
- Avec peut-être un sepsis :
  - IRA

Attitude thérapeutique ?

PCT: 0,11 µg/L

Embolie pulmonaire bilatérale

« Pneumonies » à PCT négative (<0,1-0,25)

- Cancer du poumon
- Tuberculose
- Embolie pulmonaire
- Pneumonie… virale

Cas clinique

Patient

Homme 56 ans
HTA dyslipidémie

Vital parameters

T 38 °C	PAS 123 mm Hg
Fc 86/mn	SpO2: 93% en AA
FR 16/mn	

Examen clinique

Pas de point d'appel, discrète raideur nuque

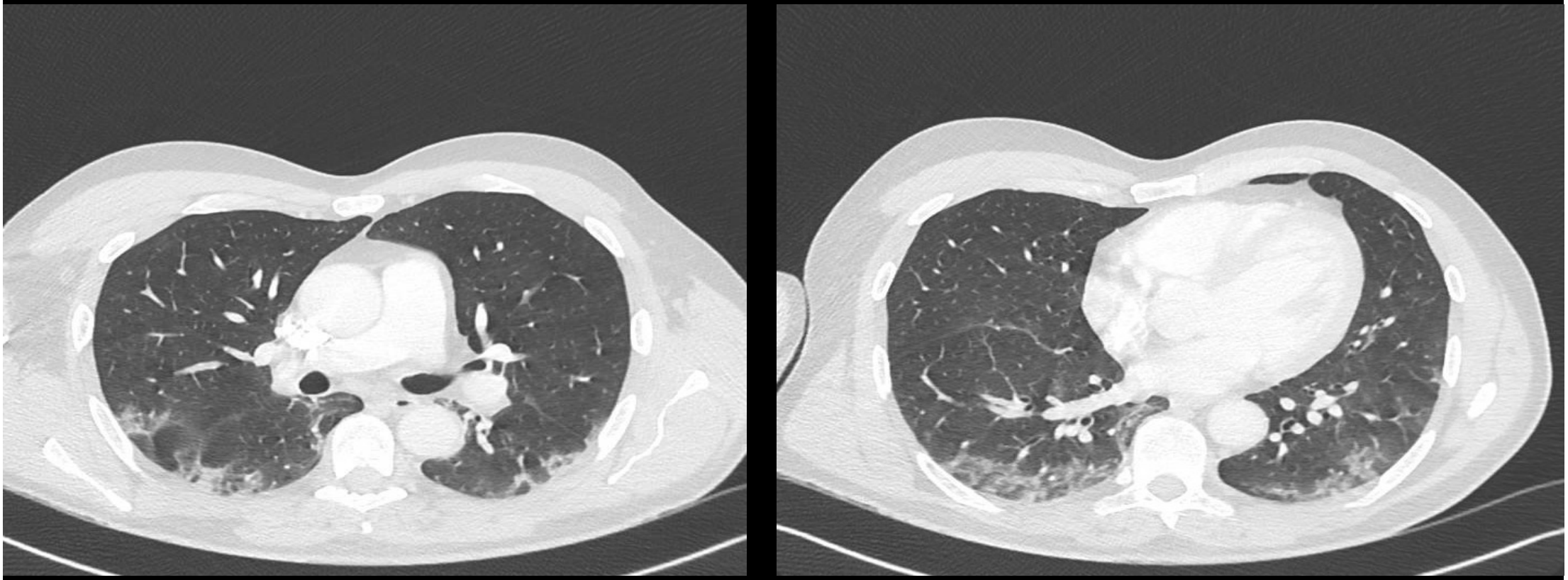
Signes fonctionnels

PCR Sars-CoV2 + le 08/3/21
(syndr pseudo-grippal banal)
J7: fièvre en plateau, toux sèche, AEG dyspnée

Biologie

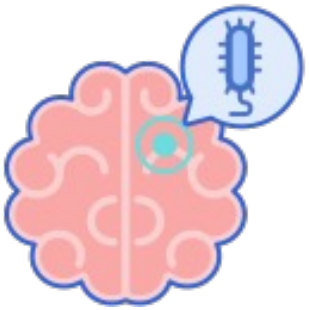
PO2 76 mmHg	PCO2 30 mm Hg
Lactate 2,1 mmol/l	NFS normale

PCT: 0,18 µg/l
CRP 70 mg/l



Pneumonie COVID avec atteinte de 25% du parenchyme pulmonaire Pas de foyer de condensation, pas d'EP

En en dehors des IRB ?



Diagnostic Accuracy of Procalcitonin in Bacterial Meningitis Versus Nonbacterial Meningitis

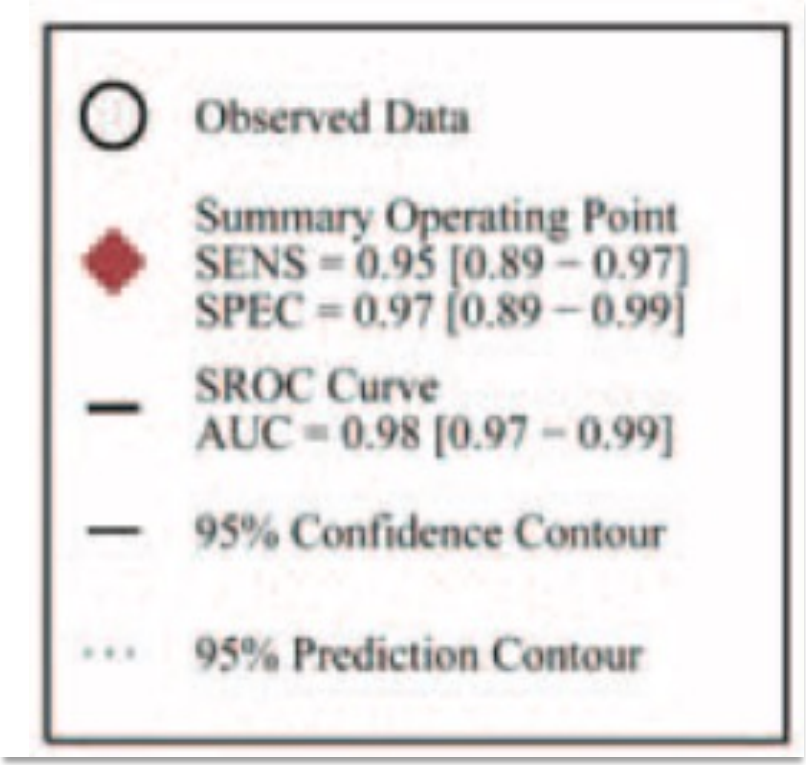
A Systematic Review and Meta-Analysis

Ting-Ting Wei, MM, Zhi-De Hu, MM, Bao-Dong Qin, MM, Ning Ma, MM, Qing-Qin Tang, MM, Li-Li Wang, MM, Lin Zhou, MD, PhD, and Ren-Qian Zhong, MD, PhD

Medicine • Volume 95, Number 11, March 2016

TABLE 4. Overall Diagnostic Characteristics Associated with Blood PCT and CSF PCT

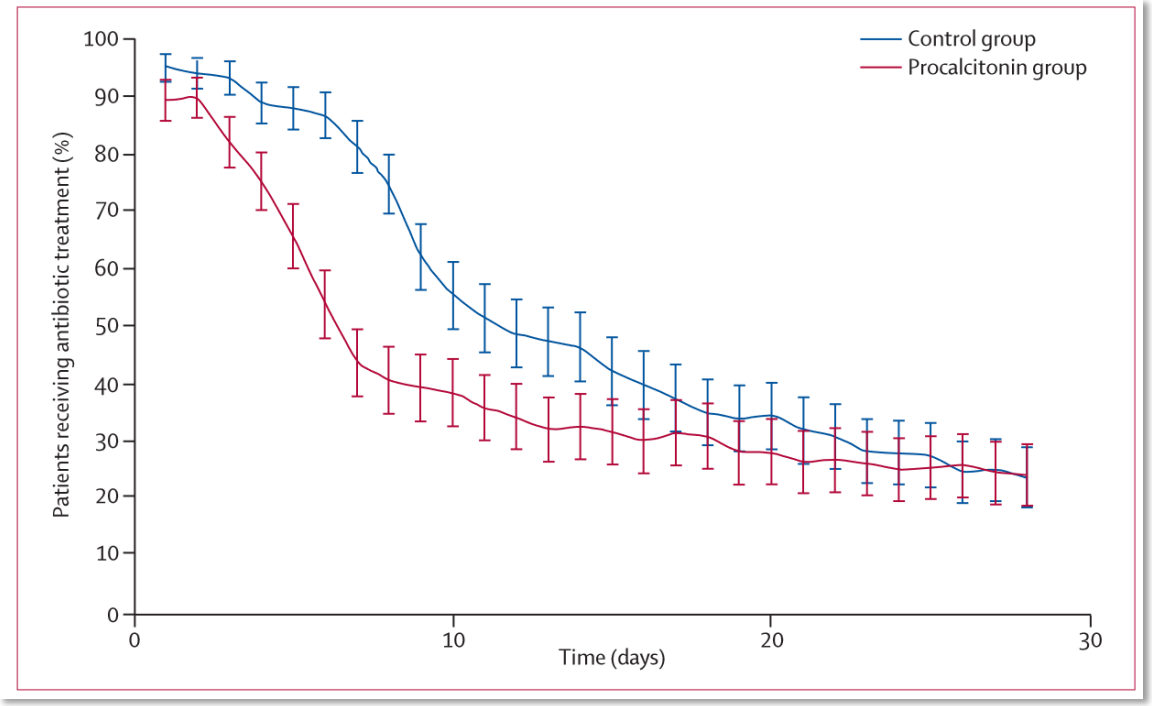
	Blood PCT
Number of studies	20
Bacterial/nonbacterial	609/1192
Area under the SROC curve (95% CI)	0.98 (0.97–0.99)
Sensitivity (95% CI)	0.95 (0.89–0.97)
Specificity (95% CI)	0.97 (0.89–0.99)
Positive likelihood ratio (95% CI)	31.7 (8.0–124.8)
Negative likelihood ratio (95% CI)	0.06 (0.03–0.11)
Diagnostic odds ratio (95% CI)	568 (103–3141)
Inconsistency (I^2) (95% CI)	0.96 (0.92–0.99)

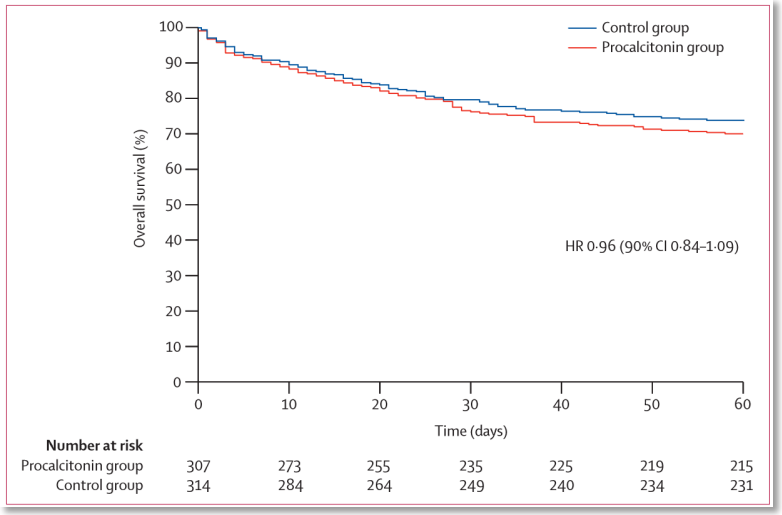


Use of procalcitonin to reduce patients' exposure to antibiotics in intensive care units (PRORATA trial): a multicentre randomised controlled trial

Lila Bouadma, Charles-Edouard Luyt, Florence Tubach, Christophe Cracco, Antonio Alvarez, Carole Schwebel, Frédérique Schortgen, Sigismond Lasocki, Benoît Veber, Monique Dehoux, Maguy Bernard, Blandine Pasquet, Bernard Régnier, Christian Brun-Buisson, Jean Chastre, Michel Wolff,* for the PRORATA trial group†*

Lancet 2010; 375: 463–74





Number of ATB-free survival days = 11.6±8.2 control *vs* 14.3±9.1 PCT, p<0.001

Efficacy and safety of procalcitonin guidance in reducing the duration of antibiotic treatment in critically ill patients: a randomised, controlled, open-label trial

Evelien de Jong, Jos A van Oers, Albertus Beishuizen, Piet Vos, Wytze J Vermeijden, Lenneke E Haas, Bert G Loef, Tom Dormans, Gertrude C van Melsen, Yvette C Kluiters, Hans Kemperman, Maarten J van den Elsen, Jeroen A Schouten, Jörn O Streefkerk, Hans G Krabbe, Hans Kieft, Georg H Kluge, Veerle C van Dam, Joost van Pelt, Laura Bormans, Martine Bokelman Otten, Auke C Reidinga, Henrik Endeman, Jos W Twisk, Ewoudt M W van de Garde, Anne Marie G A de Smet, Jozef Kesecioglu, Armand R Girbes, Maarten W Nijsten, Dylan W de Lange

Lancet Infect Dis 2016; 16: 819–27

"The study protocol advised to stop ATB if procalcitonin concentration had decreased by 80% or more of its peak value or when it reached a value of 0.5 µg/L or lower »

	Procalcitonin-guided group (n=761)	Standard-of-care group (n=785)	Between-group absolute difference in means (95% CI)	p value
Antibiotic consumption (days)				
Daily defined doses in first 28 days	7·5 (4·0 to 12·8)	9·3 (5·0 to 16·5)	2·69 (1·26 to 4·12)	<0·0001
Duration of treatment	5·0 (3·0 to 9·0)	7·0 (4·0 to 11·0)	1·22 (0·65 to 1·78)	<0·0001
Antibiotic-free days in first 28 days	7·0 (0·0 to 14·5)	5·0 (0 to 13·0)	1·31 (0·52 to 2·09)	0·0016
Mortality (%)				
28-day mortality	149 (19·6%)	196 (25·0%)	5·4% (1·2 to 9·5)	0·0122
1-year mortality	265 (34·8%)	321 (40·9%)	6·1% (1·2 to 10·9)	0·0158
Adverse events				
Reinfection	38 (5·0)	23 (2·9)	−2·1% (−4·1 to -0·1)	0·0492
Repeated course of antibiotics	175 (23·0)	173 (22·0)	−1·0% (−5·1 to 3·2)	0·67
Time (days) between stop and reinstitution of antibiotics	4·0 (2·0 to 8·0)	4·0 (2·0 to 8·0)	−0·22 (−1·31 to 0·88)	0·96
Costs				
Total cumulative costs of antibiotics	€150 082	€181 263	NA	NA
Median cumulative costs antibiotics per patient	€107 (51 to 229)	€129 (66 to 273)	€33·6 (2·5 to 64·8)	0·0006
Length of stay (days)				
On the intensive care unit	8·5 (5·0 to 17·0)	9·0 (4·0 to 17·0)	−0·21 (−0·92 to 1·60)	0·56
In hospital	22·0 (13·0 to 39·3)	22·0 (12·0 to 40·0)	0·39 (−2·69 to 3·46)	0·77

Data are median (IQR), n (%), or mean (95% CI). Between-group absolute differences were calculated using the mean values, percentage differences, and 95% CIs. NA=not applicable.

Table 2: **Primary and secondary outcome measures**

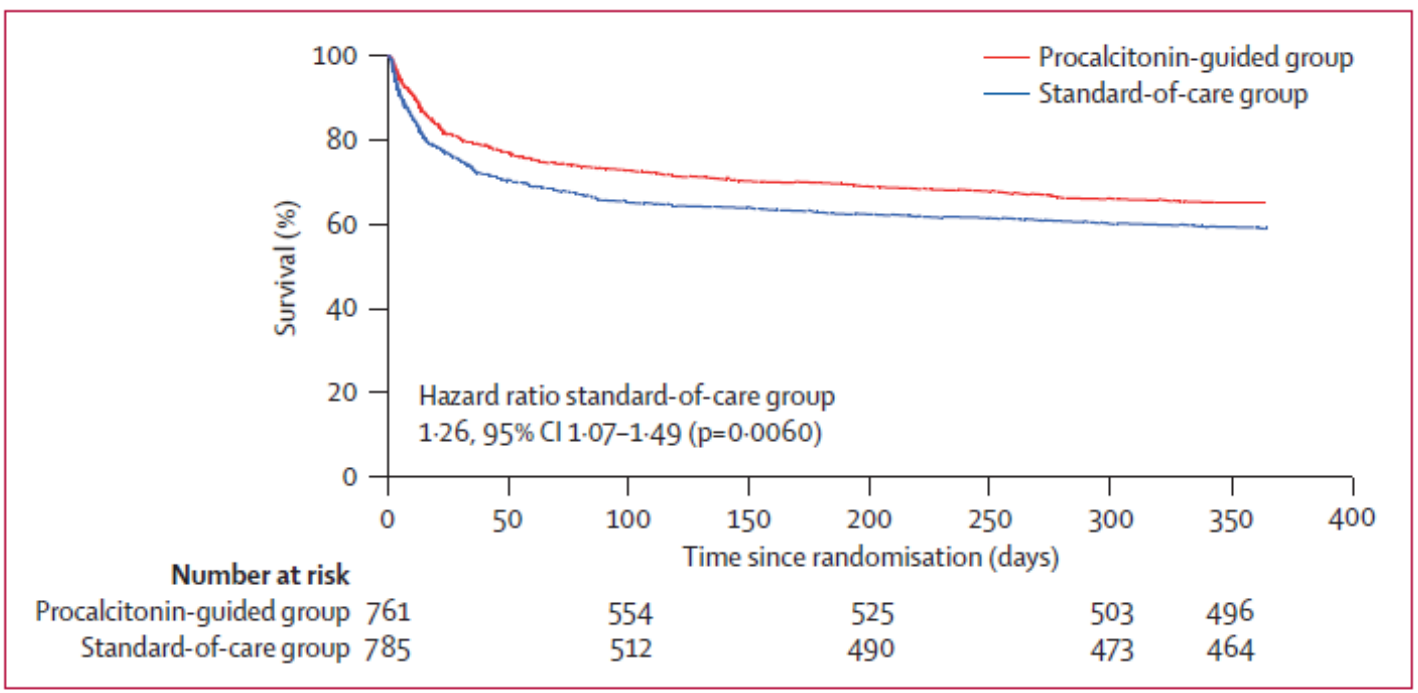


Figure 2: **Kaplan-Meier plot for probability of survival from random assignment to day 365, in the modified intention-to-treat population**

Biomarqueurs et Urgences et ATB

- **PCT**
  - **Suspicion d'infection respiratoire basse** (0.1-0.25 µg/L)
    - Contrôle à H12 si probabilité pré-test élevée et T0 >0.1
  - **Suspicion de sepsis sans point d'appel** (0.25-0.5 µg/L)
  - **Stratification pronostique d'un état septique** (5 µg/L)
  - **Fièvre du voyageur sans point d'appel**
    - PCT +: palu, salmonellose…
    - PCR-: arboviroses (Dengue, Chikungunya, Zika….)
  - **Durée antibiothérapie:**
    - IRB ++, SAU et services de médecine ++
    - USI
- **CRP**
  - Douleur abdominale
  - Erysipèle vs eczéma/dermite ocre