

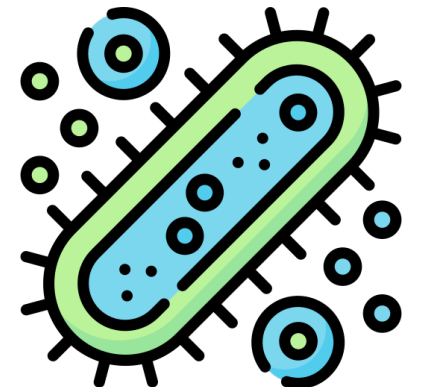


Réduire les examens biologiques dans le diagnostic et le suivi des infections

Journée Régionale de Pathologie Infectieuse

07/10/2025

Nicolas Lauwerier



Des hémocultures en excès et mal réalisées

Table 3 Appropriateness of blood cultures and antimicrobial therapy

Characteristics	Number of patients/total number	Percentage [95% CI]
Very/fairly appropriate indication for blood culture		
Bacterial (aerobic and anaerobic)	238/260	91 [87–95]
Fungal	77/103	75 [65–83]
Number of bacterial blood cultures		
1	72/260	28 [22–33]
2–4	118/260	45 [39–52]
≥5	70/260	27 [22–33]
Volume of blood per bottle for adult patients ^b		
≥10 mL	121/919	13 [11–15]
8–9 mL	201/919	22 [19–25]
<8 mL	597/919	65 [62–68]

Vitrat-Hincky, *Eur J Clin Microbiol Infect Dis*, 2011



- Moins de 10% des hémocultures sont positives et 50% d'entre-elles sont dues à des contaminations
- Ces contaminations sont sources d'antibiothérapie inadaptées, de tests biologiques et d'imageries non nécessaires, de retrait inutile de cathéter et d'allongement de la durée d'hospitalisation.
- Impact financier important pour le système de soin

Favre, *JCM*, 2022



Blood Culture Utilization in the Hospital Setting: a Call for Diagnostic Stewardship

Bénéfice de la ponction unique

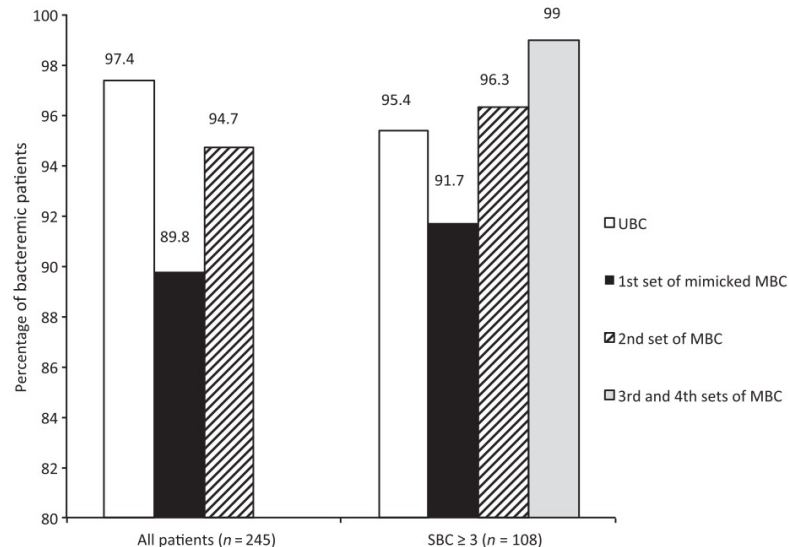


FIG. 3. Percentages of patients with bacteraemic episodes by the unique blood culture (UBC) and the multiple blood cultures (MBC) methods. Data are shown for all patients ($n = 245$) and for patients with ≥ 3 sets of blood cultures ($n = 108$) and according to the number of blood cultures performed. SBC, set of blood cultures.

Efficacité comparable
Moins de contaminant
Confort patient
Gain de temps
Moins de retard à antibiothérapie



Unique blood culture for diagnosis of bloodstream infections in emergency departments: a prospective multicentre study

S. Dargère¹, J.-J. Parienti^{2,3}, E. Roupie⁴, P.-E. Gancel⁴, E. Wief⁵, N. Smaiti⁵, C. Loiez⁶, L.-M. Joly⁷, L. Lemée⁸, M. Pestel-Caron⁸, D. du Cheyron⁹, R. Verdon¹, R. Leclercq^{3,10}, V. Cattoir^{3,10} and UBC study group^a

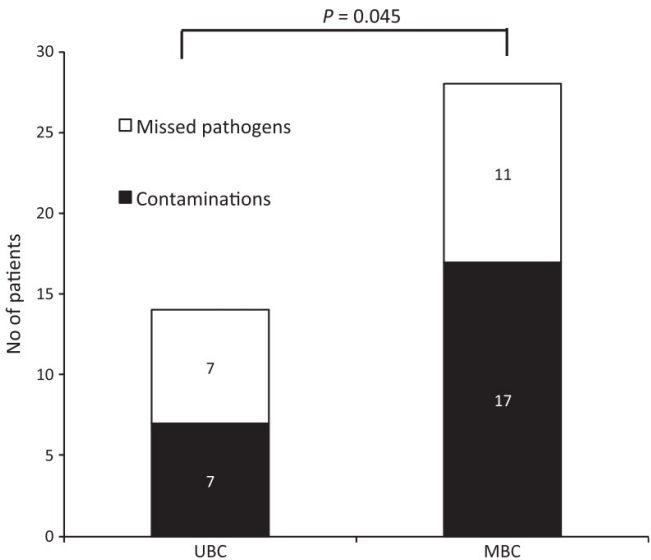


FIG. 4. Comparison of the technique of unique blood cultures (UBC) with that of multiple blood cultures (MBC) for patients with contaminations (white bars) and missed pathogens (black bars).

Dargère, CMI, 2014

Clinical Infectious Diseases

MAJOR ARTICLE

Single- versus multiple-sampling strategy for blood cultures in the diagnosis of infective endocarditis: the prospective multicenter uniendo study



Quelle b n fice des h mocultures prolong es ?

194 patients avec une endocardite et h mocultures positives
Un seul cas rattrap  par h moculture prolong e au-del  de 5 jours (*Cutibacterium acnes*)
Pas de gain en cas d'antibioth rapie pr alable

Fihman, J. Clin. Med. 2021

TABLE 1. HACEK bacteria isolated from routine blood culture by study site

Study site(s)	Total no. of positive blood cultures	HACEK bacteria isolated (no. of cultures)	Time to detection in days (no. of cultures)
ARUP	2,301	<i>Haemophilus parainfluenzae</i> (1)	4
DUMC	48,921 ^a	<i>Eikenella corrodens</i> (3)	1, 3 (2)
		<i>Kingella kingae</i> (1)	2
		<i>Haemophilus</i> spp. (5)	2 (5)
		<i>Haemophilus aphrophilus</i> (1)	2
		<i>Haemophilus haemolyticus</i> (1)	3
		<i>Haemophilus parainfluenzae</i> (15)	2 (7), 3 (6), 7 (2)
JHH	6,519	<i>Actinobacillus actinomycetemcomitans</i> (1)	5
		<i>Eikenella corrodens</i> (1)	4
		<i>Cardiobacterium hominis</i> (2)	3 (2)
		<i>Haemophilus parainfluenzae</i> (3)	3, 4, 5
RWI	1,462 ^b	<i>Haemophilus parainfluenzae</i> (1)	4
All	59,203	All (35)	3 ^c

^a Includes April 1992 to June 2004.

^b Includes January 2003 to December 2003 only.

^c Value represents median and mean.

Petti, JCM, 2006

Co t
Contamination
Pas de b n fice diagnostique

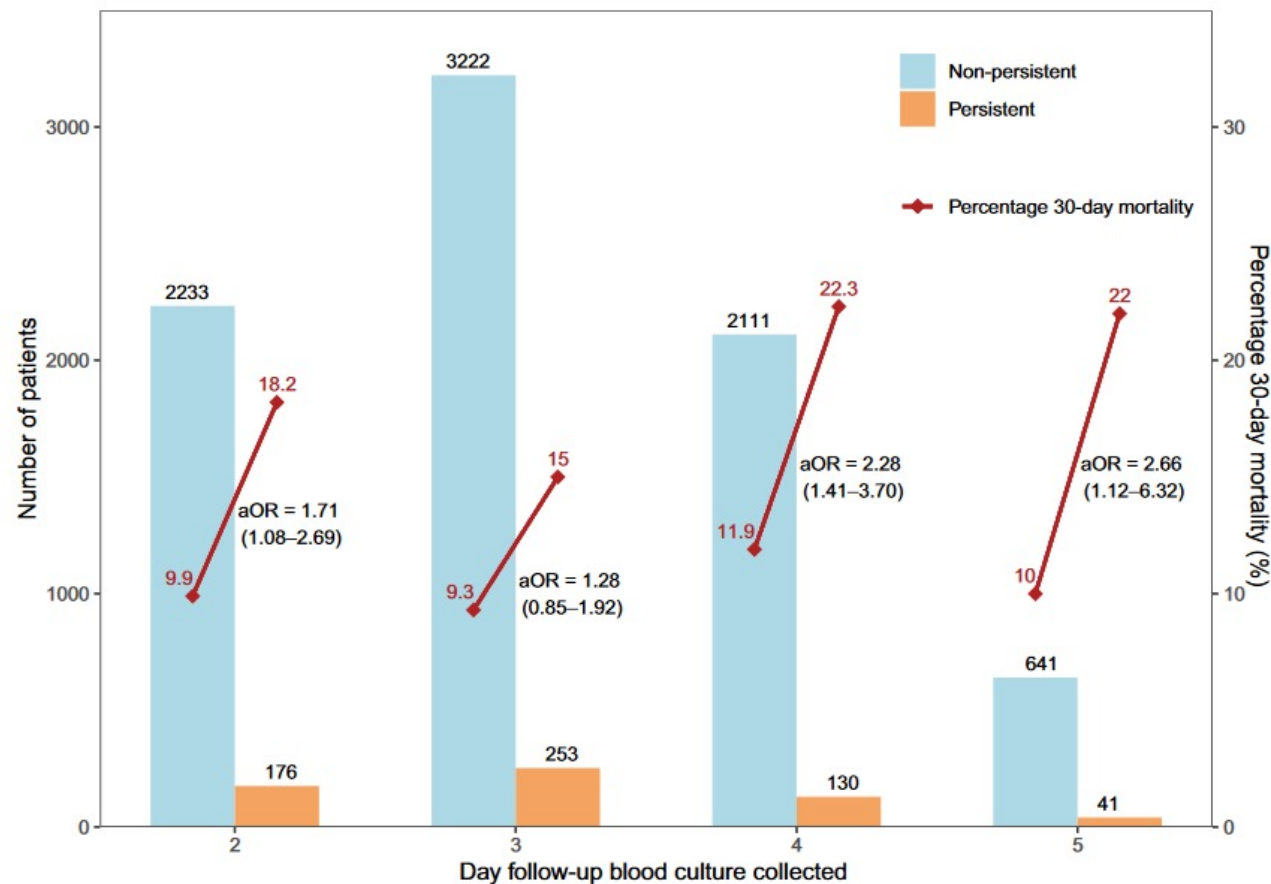


Attention aux endocardites   *Cutibacterium acnes*:

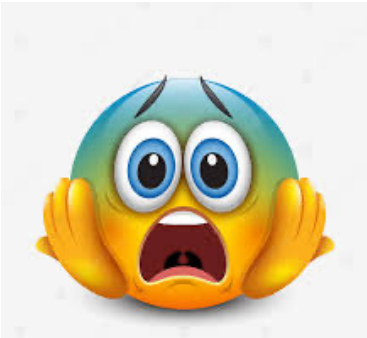
- D lai m dian de positiv t  des h mocultures : 7 jours
- 25% de positiv t  dans les 5 jours

Heinen, JAMA, 2023

Suivi des hémocultures et bactériémie à BGN



Ong, J Antimicrob Chemother, 2024



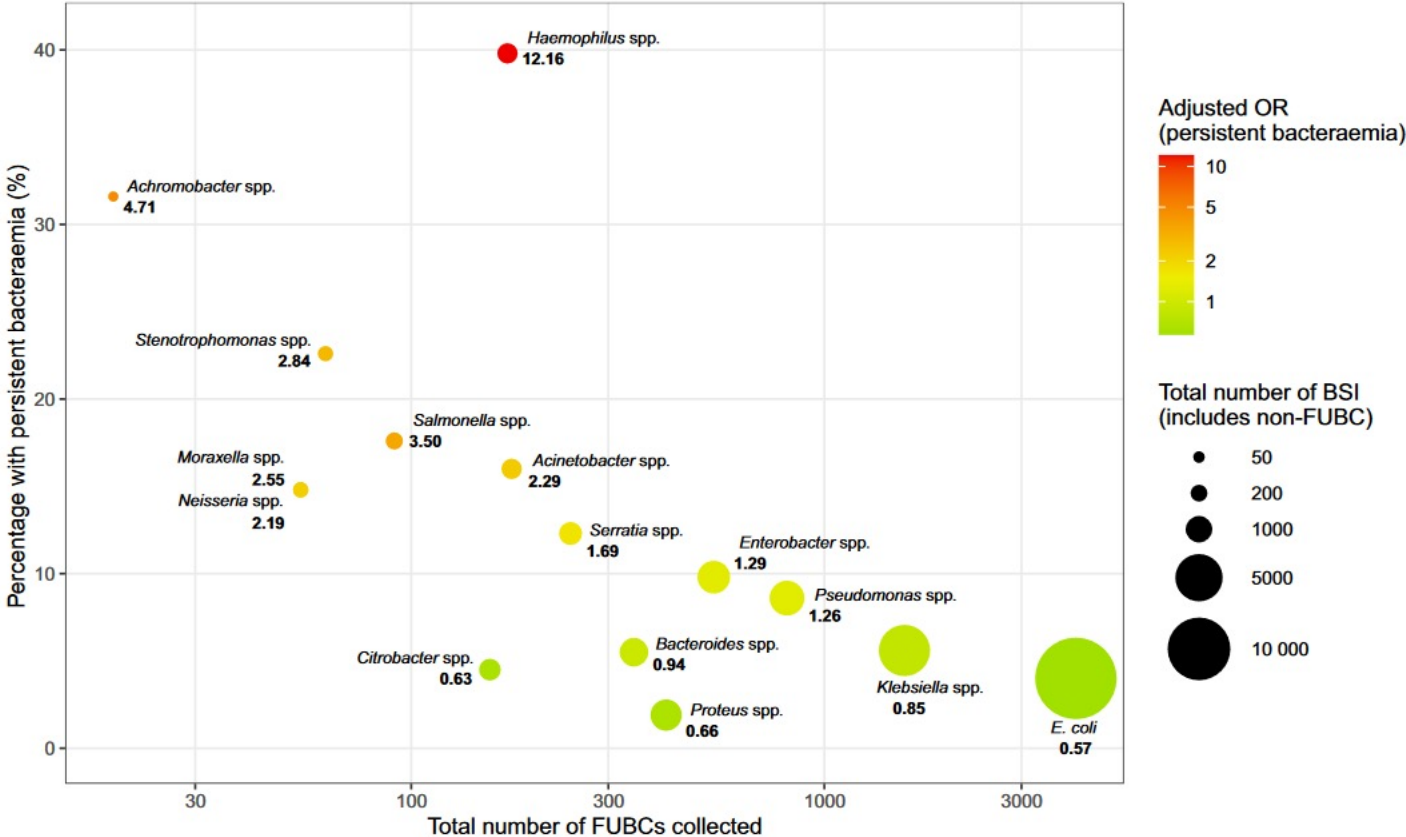
Evènement rare (7 %)



Qui fait une bactériémie persistante à BGN ?

Table 2. Multivariable logistic regression model for variables associated with persistent bacteraemia

Variable	Adjusted OR	95% CI	P value
Age (per 10-year increase in age)	0.93	0.88–0.97	0.0020
Female sex	1.02	0.85–1.21	0.85
Charlson’s comorbidity index			0.37
No previous hospitalization ^a	Ref	Ref	
0	1.18	0.90–1.56	
1	0.89	0.63–1.27	
2+	1.10	0.86–1.41	
Immunosuppression ^b	1.03	0.79–1.35	0.80
Presence of permanent catheter	1.62	1.27–2.06	0.0001
Presence of cardiac device	0.85	0.57–1.26	0.42
Organism subgroup			<0.0001
Enterobacterales	Ref	Ref	
Anaerobes	0.95	0.60–1.52	
Non-fermenters	1.99	1.54–2.57	
Others	7.96	5.96–10.63	
Multiple	0.75	0.44–1.27	
Polymicrobial infection	1.31	0.83–2.07	0.25
Multi-drug resistant organism ^c	1.51	1.14–2.00	0.0038
Nosocomial infection ^d	1.32	1.05–1.65	0.016
Infection source			0.0003
Urinary tract	Ref	Ref	
Respiratory	1.53	1.17–2.01	
Intra-abdominal	0.89	0.66–1.21	
Skin and soft tissue	1.44	1.03–2.03	
Other/multiple	0.90	0.71–1.14	
ICU admission	1.52	1.21–1.91	0.0004



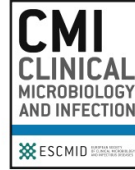
Un suivi ciblé des bactériémie à BGN



Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Clinical Microbiology and Infection

journal homepage: www.clinicalmicrobiologyandinfection.com



Original article

Follow-up blood cultures do not reduce mortality in hospitalized patients with Gram-negative bloodstream infection: a retrospective population-wide cohort study

Large cohorte multicentrique (34 000 patients)
Allonge la durée d'hospitalisation en ajusté (11 VS 7 jours)

Ong, CMI, 2024



Inutile pour les bactériémies simples

A discuter selon facteur de risque de bactériémie persistante:

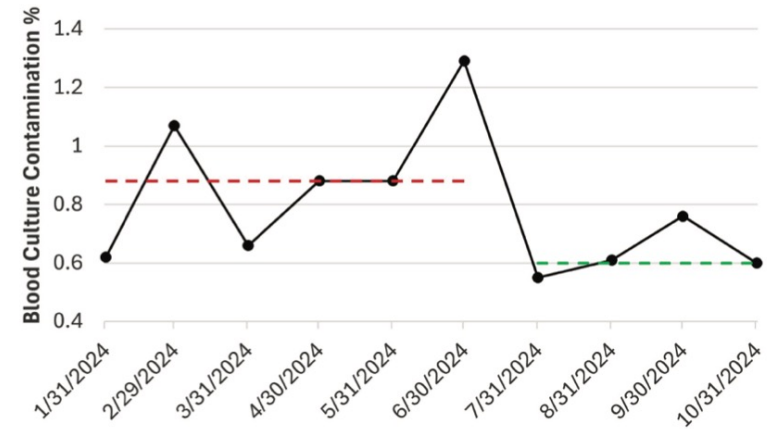
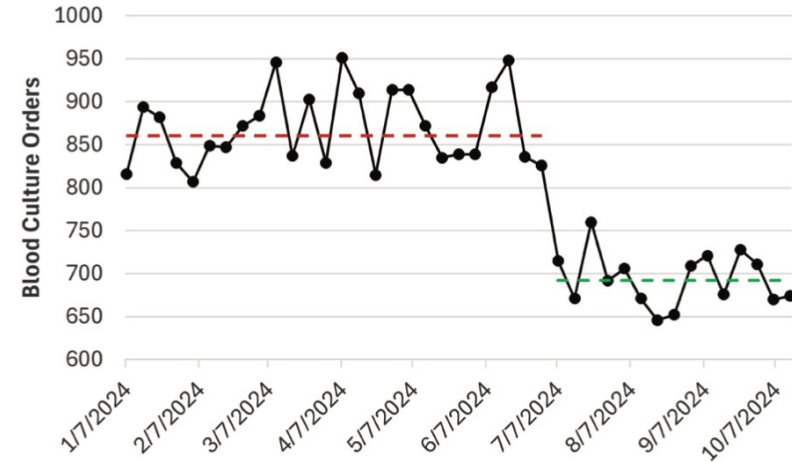
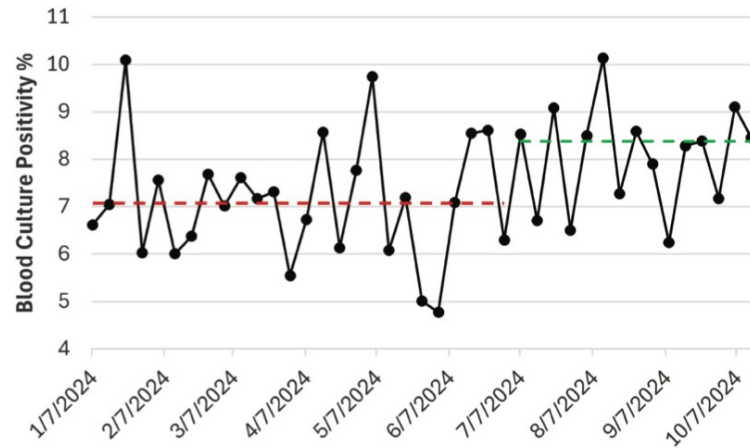
- Cathéter laissé en place
- Source non contrôlée (Abscesses)
- Microbiologie (Résistance, HACCEK, Non fermentant, Salmonellose)
- Evolution défavorable
- Infection grave (soins intensifs)

Réduction des hémocultures à l'hôpital

Intervention simple:

- Information de la pénurie et des bonnes pratiques de prélèvement
- Blocage de prescription dans les 72h suivant la réalisation de 40 ml d'hémoculture

Hudson, JCM, 2025



Le fardeau des *ECBU* inapproprié

- Bactériurie asymptomatique traitée de façon inappropriée dans 50 à 80 % des cas.
- Crainte des cliniciens de ne pas traiter une infection source de morbi-mortalité
- Méconnaissance de certains médecins

Table 3. Multivariable Model of Patient Factors Associated With Treatment of Asymptomatic Bacteriuria (N = 2773)

Variable	No.	Odds Ratio (95% CI) ^a	P Value ^b
Patient characteristics			
Age (per 10-y increase)		1.10 (1.02-1.18)	.01
Dementia	560	1.57 (1.15-2.13)	.004
Incontinence	593	1.81 (1.36-2.41)	<.001
Acutely altered mental status	470	1.93 (1.23-3.04)	.004
Laboratory tests			
Urine culture with <i>Escherichia coli</i>	1372	1.42 (1.12-1.79)	.003
Peripheral leukocytosis ^c	967	1.55 (1.21-2.00)	<.001
Bacteriuria ≥100 000 CFU	2211	2.30 (1.83-2.91)	<.001
Positive urinalysis ^d	2486	2.83 (2.05-3.93)	<.001

Petty, JAMA, 2019

Antibiothérapie inadaptée
Résistance bactérienne
Clostridium difficile
Allongement de l'hospitalisation
Coût



Bactériurie asymptomatique: faible risque de bactériémie



Original Investigation | Infectious Diseases

Bacteremia From a Presumed Urinary Source in Hospitalized Adults With Asymptomatic Bacteriuria

Sonali D. Advani, MBBS, MPH; David Ratz, MS; Jennifer K. Horowitz, MA; Lindsay A. Petty, MD; Mohamad G. Fakih, MD, MPH; Kenneth Schmader, MD; Lona Mody, MD, MSc; Tawny Czilok, MHI, RN; Anurag N. Malani, MD; Scott A. Flanders, MD; Tejal N. Gandhi, MD; Valerie M. Vaughn, MD, MSc

- Cohorte rétrospective de 11 590 patients avec bactériurie asymptomatique
- Seulement 1,4% de bactériémie associée

Figure. Bacteremia From a Presumed Urinary Source Among Hospitalized Patients With Bacteriuria and Altered Mental Status With or Without Dementia

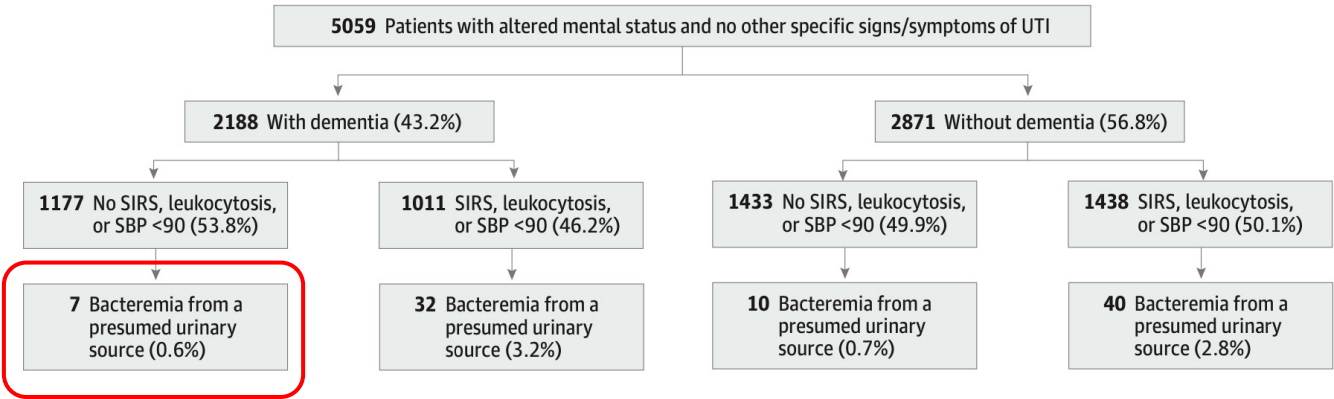


Table 3. Receipt of Empiric Antibiotic Therapy in Patients With Asymptomatic Bacteriuria, Stratified by 2% Risk for Bacteremia From a Presumed Urinary Source

	Estimated risk of bacteremia, % (No.)	
Receipt of antibiotics	<2% (n = 9092)	≥2% (n = 1947)
Received on day of or day after urine culture obtained	69.5% (6323)	89.4% (1741)
Did not receive on day of or day after urine culture	30.5% (2769)	10.6% (206)

Bactériurie asymptomatique et transplantation rénale

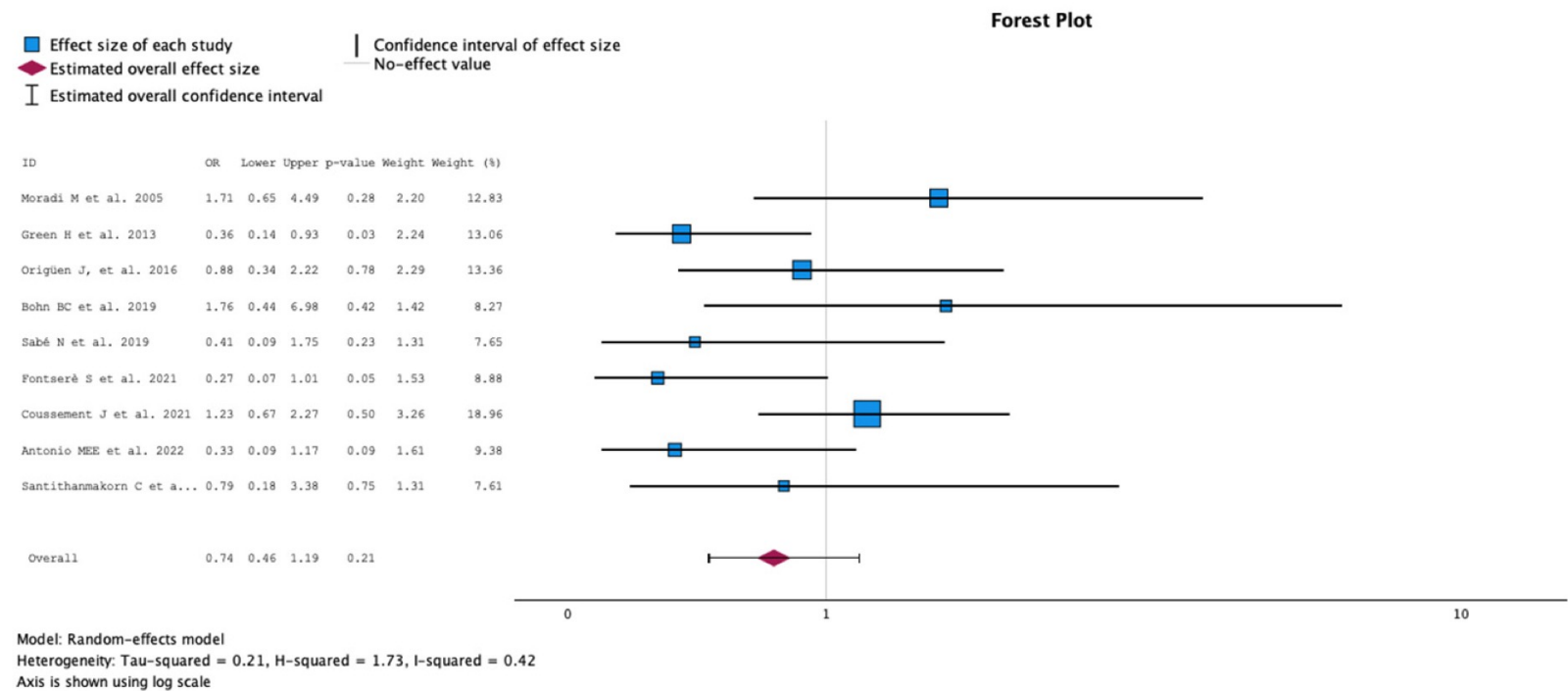


Figure 2. Analysis of the comparison of the no-treatment groups versus the antibiotics groups in the outcome rate of symptomatic urinary tract infections [10,12–18,20].

Réduire la culture des urines par l'analyse urinaire

Table 2. Single-Parameter Negative Predictive Values With 95% Confidence Intervals by Age and Sex

Sex and Age Group	NPV (95% CI)				
	≥ Trace LE	≥1+ LE	≥5 WBCs/hpf	≥10 WBCs/hpf	Nitrite Positive
Female <65 y (n = 872)	0.93 (.90–.96)	0.92 (.89–.95)	0.91 (.88–.95)	0.90 (.86–.93)	0.84 (.81–.87)
Female ≥65 y (n = 1149)	0.90 (.87–.94)	0.89 (.85–.92)	0.92 (.89–.95)	0.87 (.84–.90)	0.81 (.78–.84)
Male <65 y (n = 604)	0.98 (.97–1.00)	0.98 (.97–1.00)	0.97 (.95–.99)	0.97 (.95–.98)	0.92 (.90–.95)
Male ≥65 y (n = 767)	0.98 (.96–.99)	0.97 (.96–.99)	1.00 (.99–1.00)	0.98 (.96–.99)	0.88 (.85–.90)

Abbreviations: CI, confidence interval; hpf, high-power field; LE, leukocyte esterase; NPV, negative predictive value; WBC, white blood cell.

Advani, CID, 2024

Infection urinaire : signes cliniques et culture $\geq 10^5$
Leucocyturie + Nitrite : VPN 95 %
Réduction de 45% des cultures chez des patients sans
infection urinaire
Trou de 5% surtout pour femme de plus de 65 ans

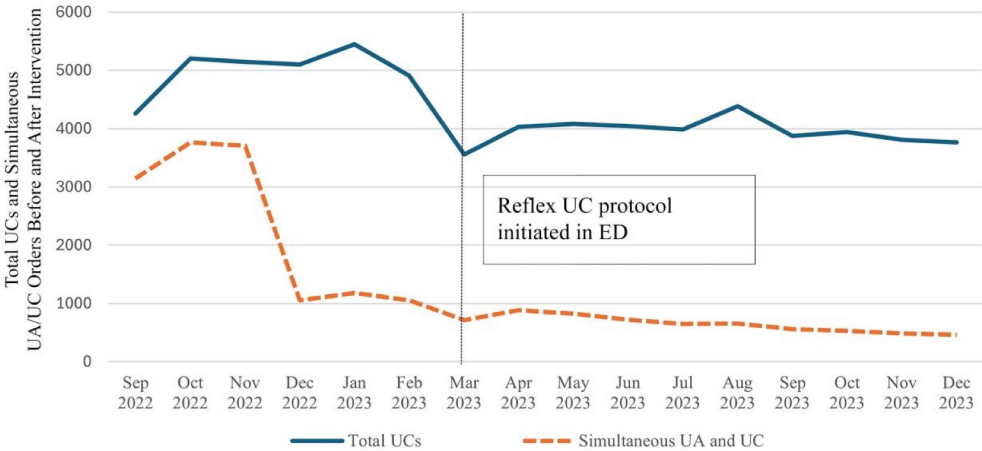


Figure 2. Total numbers of urine cultures (UCs; solid line) and simultaneous orders for urinalysis (UA) and UCs (dashed line) from September 2022 to December 2023. Reflex UC protocol was initiated in the emergency department (ED) in March 2023. In the 9 months after initiation of the reflex UC protocol, the overall average of monthly UCs processed in the microbiology laboratory decreased by 20.3% (from 5011 UCs per month before to 3991 after intervention).

CRP: Excès et mauvaise compréhension



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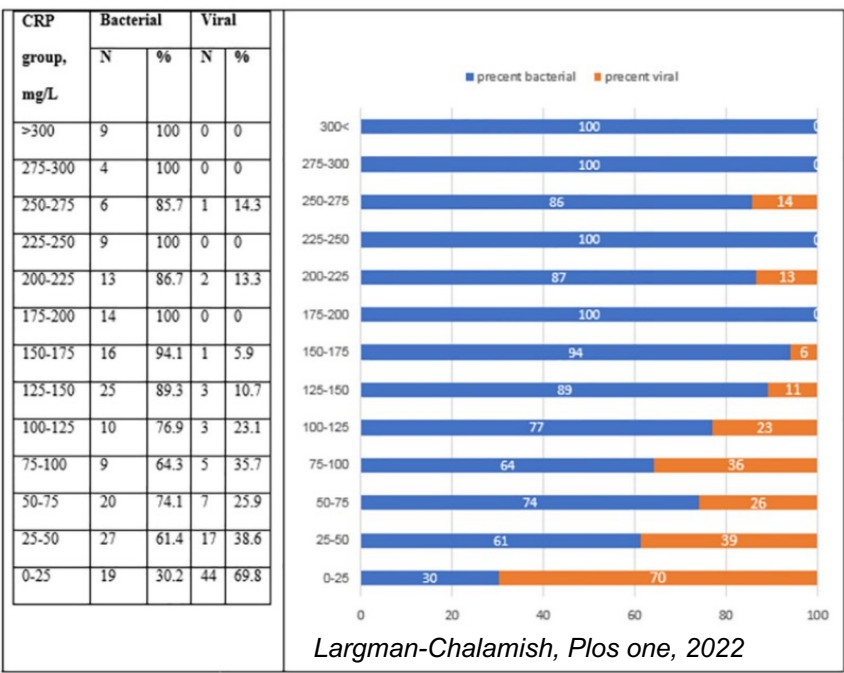
journal homepage: www.clinicalmicrobiologyandinfection.com



Commentary

Revisiting diagnostics: erythrocyte sedimentation rate and C-reactive protein: it is time to stop the zombie tests

Brad Spellberg^{1,*}, Travis B. Nielsen^{2,3}, Matthew C. Phillips^{4,5}, Bassam Ghanem⁶, Tom Boyles⁷, Boris Jegorović^{8,9}, Brent Footer¹⁰, Jordan K. Mah¹¹, Anthony Lieu¹², Jake Scott¹³, Noah Wald-Dickler¹, Todd C. Lee¹⁴, Emily G. McDonald^{15,16}



- Sensible (71-100%) mais non spécifique (66-85%) des infections bactériennes
- Situation évidente d'infection bactérienne
- Piège de la cinétique
- Infection chronique avec CRP négative
- Situation évidente de cause non infectieuse d'élévation de la CRP
- Intérêt pronostique ? Intérêt au suivi ?

Povoa, Intensive Care Med, 2023



Fig 3. The ratio between bacterial (blue) and viral (orange color) infections in each range of CRP values.

CRP et impact sur la prescription antibiotique

Infection respiratoire:

- Clinique difficile
- Radiologie difficile d'accès et d'interprétation
- Peu de microbiologie
- Infection bactérienne grave

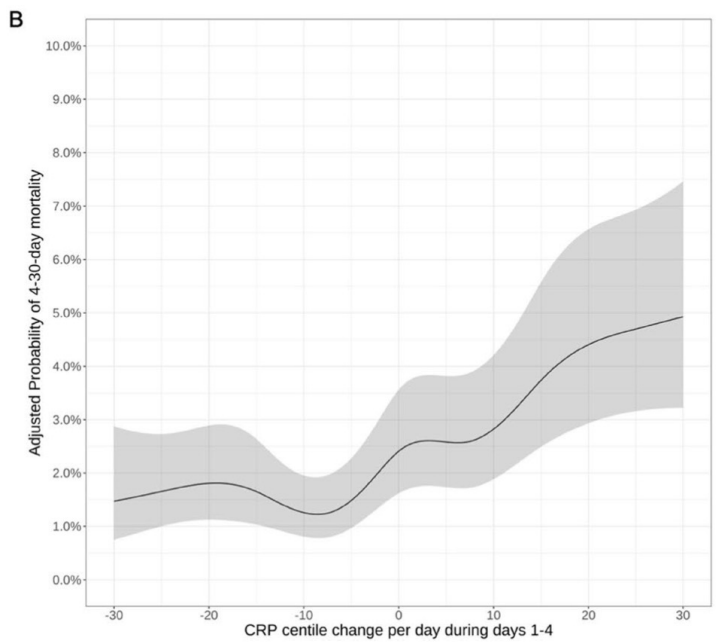
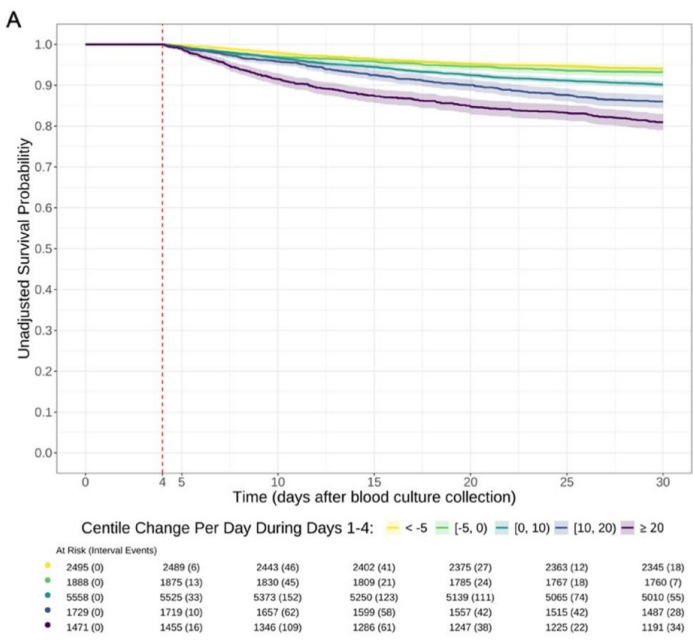
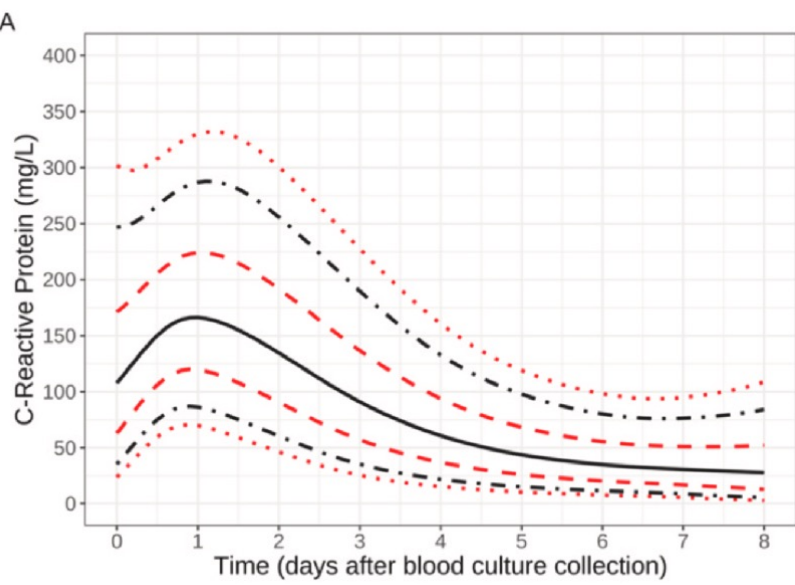


Antibiothérapie inadaptée



Point-of-care biomarker for infection compared with standard of care for guiding antibiotic therapy in acute respiratory infections						
Patient or population: people with acute respiratory infections						
Settings: primary care						
Intervention: point-of-care biomarker (C-reactive protein) test						
Comparison: standard care						
Outcomes	Illustrative comparative risks* (95% CI)		Effect (95% CI)	No. of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
	Standard care	C-reactive protein				
Number of participants given an antibiotic prescription at index consultation	516 per 1000	397 per 1000 (356 to 444)	RR 0.77 (0.69 to 0.86)	10218 (12 RCTs)	⊕⊕⊕⊕ Moderate ^a	
Number of participants given an antibiotic prescription within 28 days follow-up	664 per 1000	538 per 1000 (505 to 571)	RR 0.81 (0.76 to 0.86)	5091 (7 RCTs)	⊕⊕⊕⊕ High	
Clinical recovery within 7 days follow-up	567 per 1000	584 per 1000 (545 to 636)	RR 1.03 (0.96 to 1.12)	3104 (4 RCTs)	⊕⊕⊕⊕ Moderate ^b	Defined as number of participants at least substantially improved at 7 days follow-up
Mortality within 28 days follow-up	1 per 1000	0 per 1000 (0 to 2)	RR 0.53 (0.10 to 2.92)	7737 (9 RCTs)	⊕⊕⊕⊕ Low ^c	3 studies reported 5 events. 6 studies had no events. 3 studies did not report on death.

CRP et suivi des infections aiguës (bactériémies)



Gu, BMC, 2025



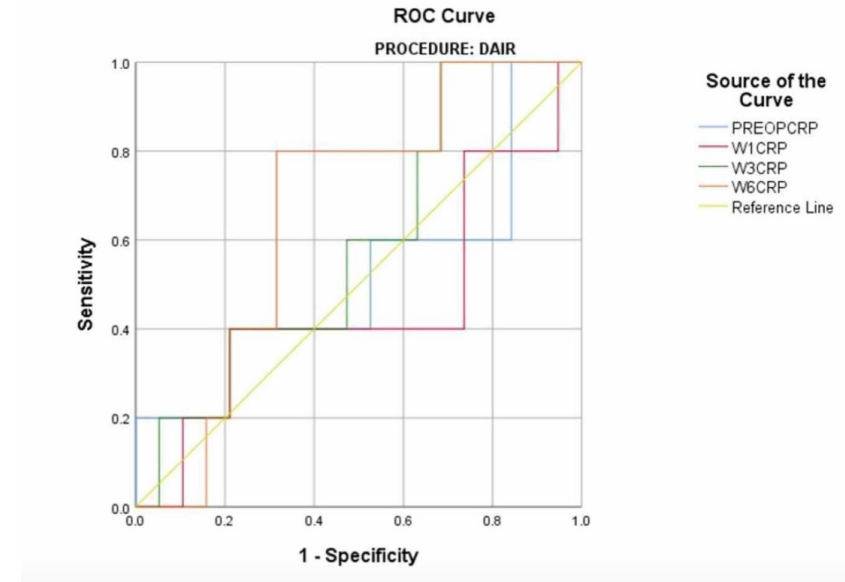
Baisse de la CRP à J4 associée à une réponse clinique, bactériologique et une meilleur survie
Performance diagnostique médiocre car chevauchement

CRP et suivi des infections chroniques (PJI, EI)

Serial C-reactive Protein Monitoring in Prosthetic Joint Infection: A Powerful Predictor or Potentially Pointless?

Rafia Ghani ¹, Jonathan Hutt ², Philip Mitchell ², Luke Granger ², Nemandra A. Sandiford ²

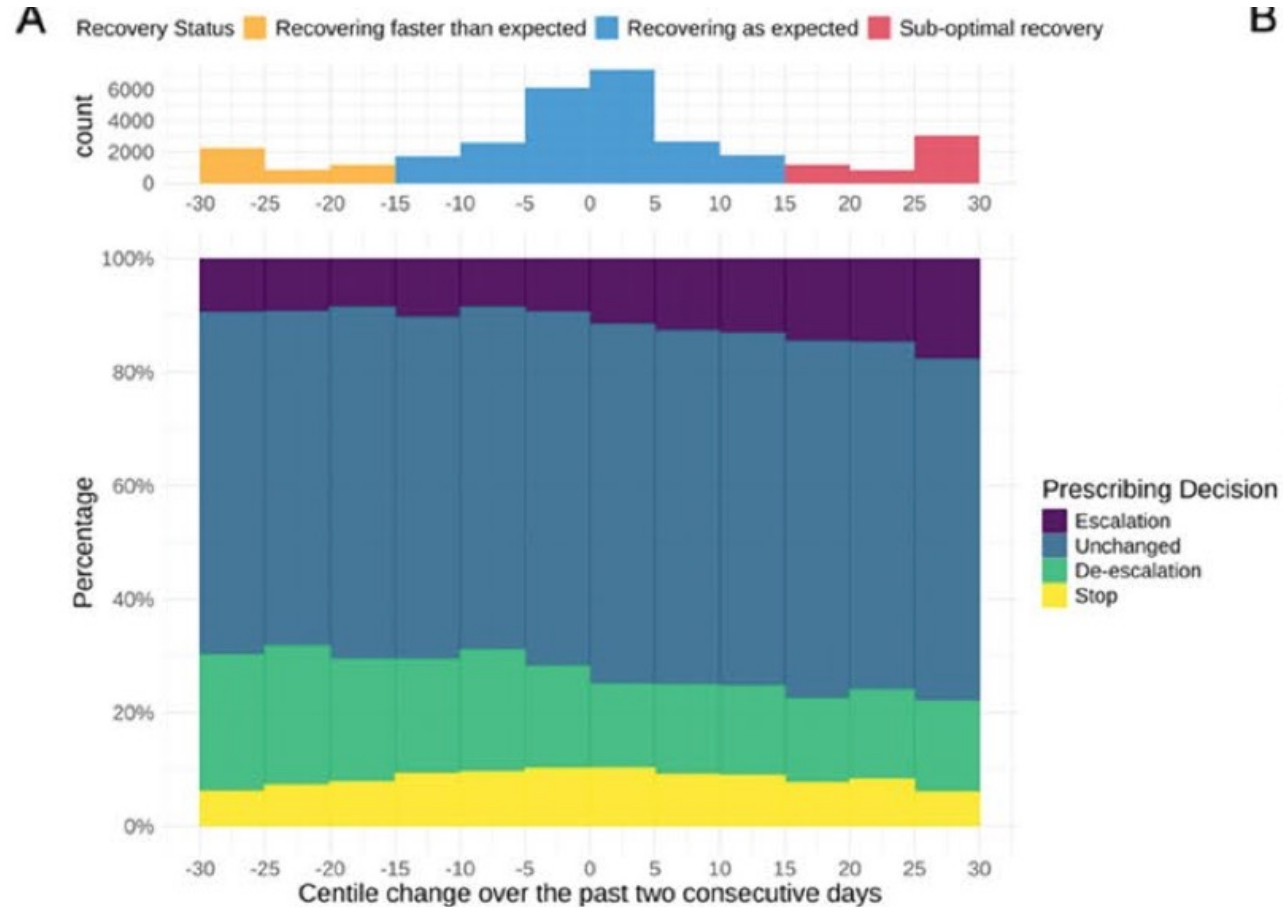
¹. Orthopaedics, Russells Hall Hospital, Dudley, GBR ². Orthopaedics, St. George's University Hospital, London, GBR



- La persistance d'une CRP élevée est associée à l'échec et la mortalité dans les infections chroniques
- Mais performances diagnostiques médiocres
- Critère d'alerte mais risque d'examens complémentaires, hospitalisations, antibiothérapies, anxiété



Suivi de CRP et antibiothérapie



L'évolution de la CRP est associée aux modifications d'antibiotiques:

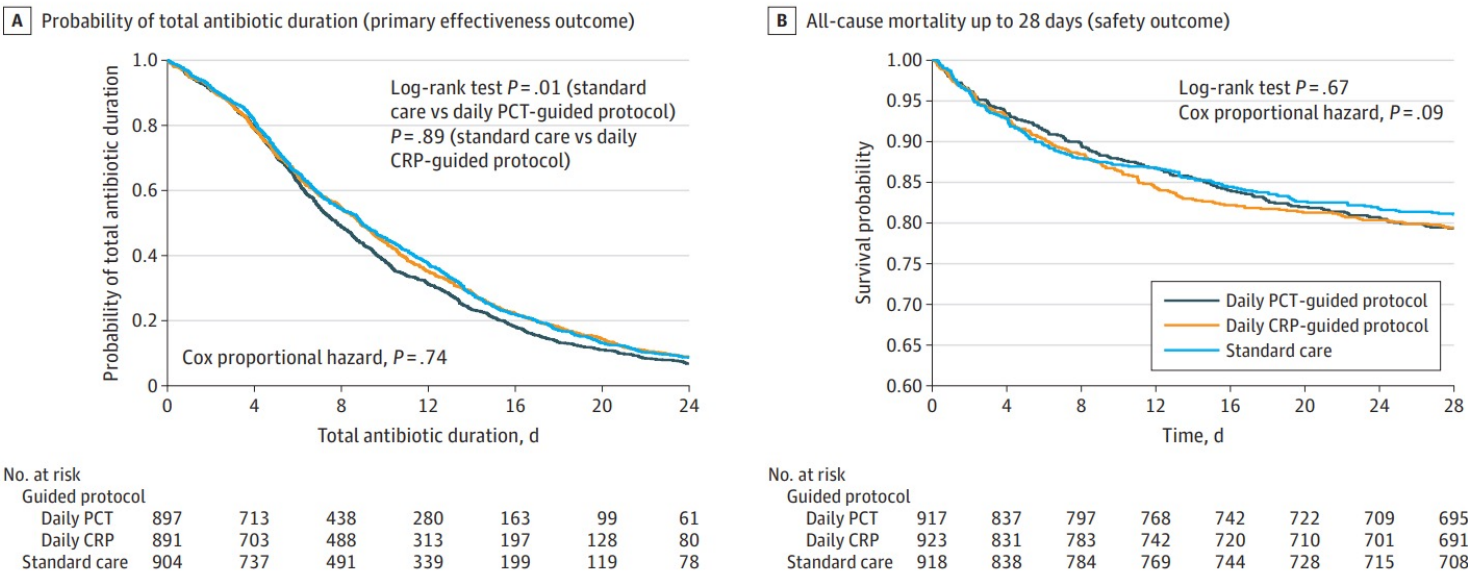
- De-escalade si baisse CRP
- Escalade si hausse CRP
- Mais peu de changement dans la grande majorité des cas



Suivi de CRP et arrêt de l'antibiothérapie

CRP protocol	Advice for PCT and CRP protocols
Standard care + daily <u>serum</u> CRP measurement until antibiotic discontinuation	Written advice delivered daily by local research team to treating clinician until antibiotic discontinuation
CRP < 25mg/l	"Protocol STRONGLY supports stopping antibiotics"
CRP fall by 50% from baseline	"Protocol suggests stopping antibiotics"

Figure 3. Kaplan-Meier Curves for Probability of Antibiotic Duration and Mortality to 28 Days



The medians of the total antibiotic treatment duration up to 28 days for each of the 3 groups are 7.8 (IQR, 4.5-13.6) days for the daily procalcitonin (PCT)-guided protocol, 8.9 (IQR, 4.5-14.9) days for the daily C-reactive protein (CRP)-guided protocol, and 9.0 (IQR, 4.7-14.6) days for standard care.

Dark, JAMA, 2025

Dans le groupe CRP:

- Pas de diminution de la durée de l'antibiothérapie
- Non infériorité non démontrée sur mortalité



Synthèse

Hémocultures:

- Optimisation du prélèvement (Ponction unique, pas de paires isolée, volume)
- Arrêt des hémocultures prolongées (hors suspicion de *Cutibacterium acnes* ?)
- Pas de suivi systématique des bactériémies à BGN
- Protocole de bon usage à développer (blocage des prescriptions)

ECBU:

- Peu de bactériémie en lien avec la bactériurie
- Ne pas traiter les bactériuries asymptomatiques en transplantation rénale
- Utilisation de la BU et de la cytologie urinaire pour réduire les cultures

CRP:

- Mauvaise performance diagnostique
- Intérêt au bon usage antibiotique dans les infections respiratoires ?
- CRP à J4 pour évaluer l'évolution dans les infections aiguës
- Associée à mauvaise évolution dans infections chroniques mais utilisation difficile
- Ne permet pas l'arrêt de l'antibiothérapie

Merci pour votre attention

