



Règle de décision clinique pour éliminer le diagnostic de méningite bactérienne chez l'adulte aux urgences: étude diagnostique rétrospective et multicentrique

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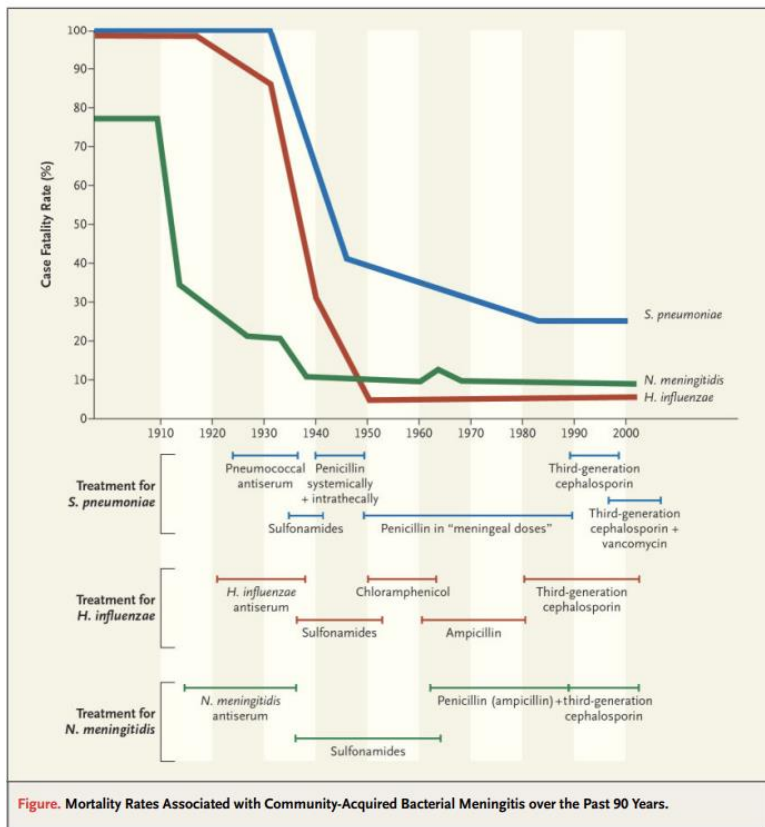
Hôpital Lariboisière
Fernand-Widal
AP-HP



Déclaration d'intérêt de 2014 à 2024

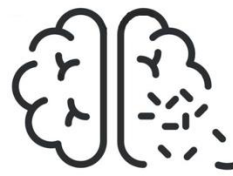
- Intérêts financiers : aucun
- Liens durables ou permanents : aucun
- Interventions ponctuelles : aucun
- Intérêts indirects : aucun

La méningite bactérienne aiguë : quels enjeux ?



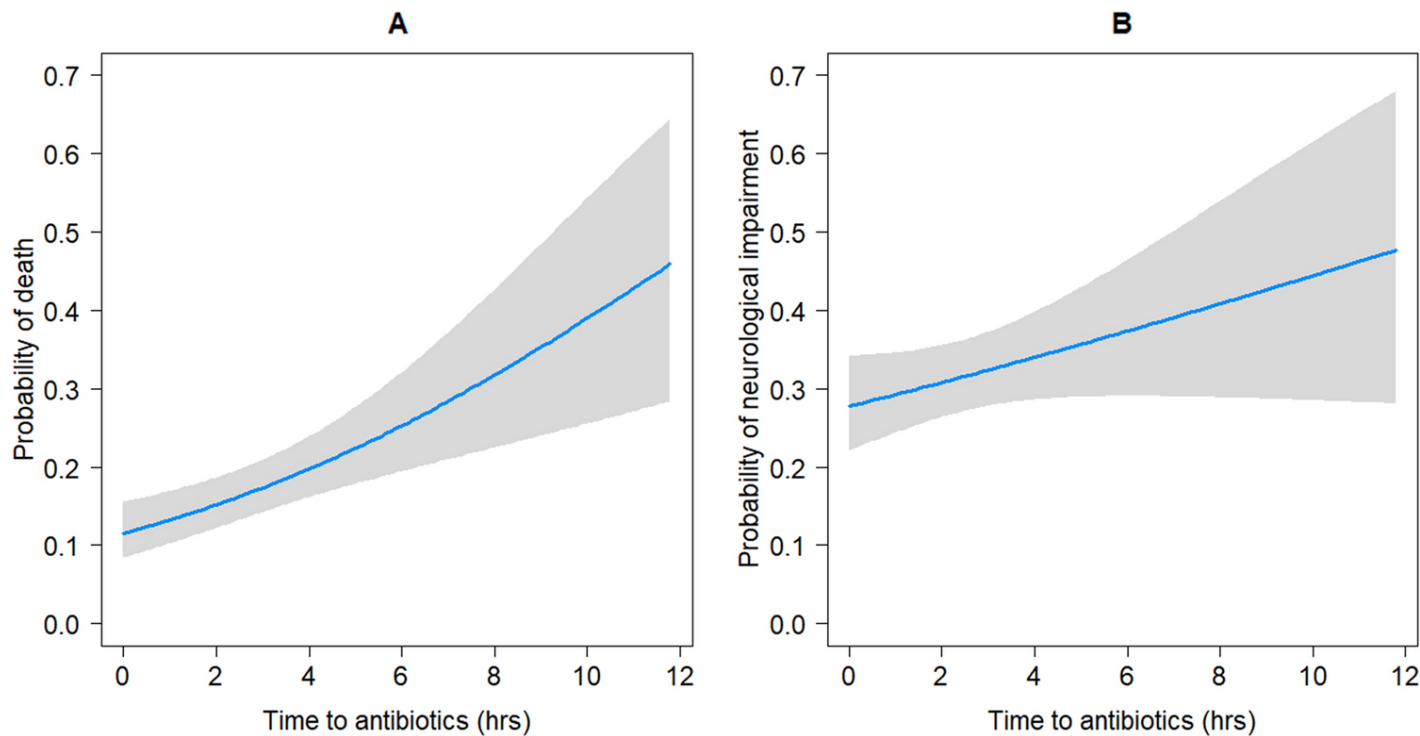
Mortalité toujours élevée

10-30%



Séquelles neuro-fonctionnelles fréquentes

La méningite bactérienne aiguë : quels enjeux ?

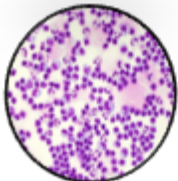


Pas seulement une urgence thérapeutique...

Tableau clinique typique



Triade méningée



Pléïocytose à PNN

Biochimie intrathécale typique

Identification examen direct

En pratique clinique

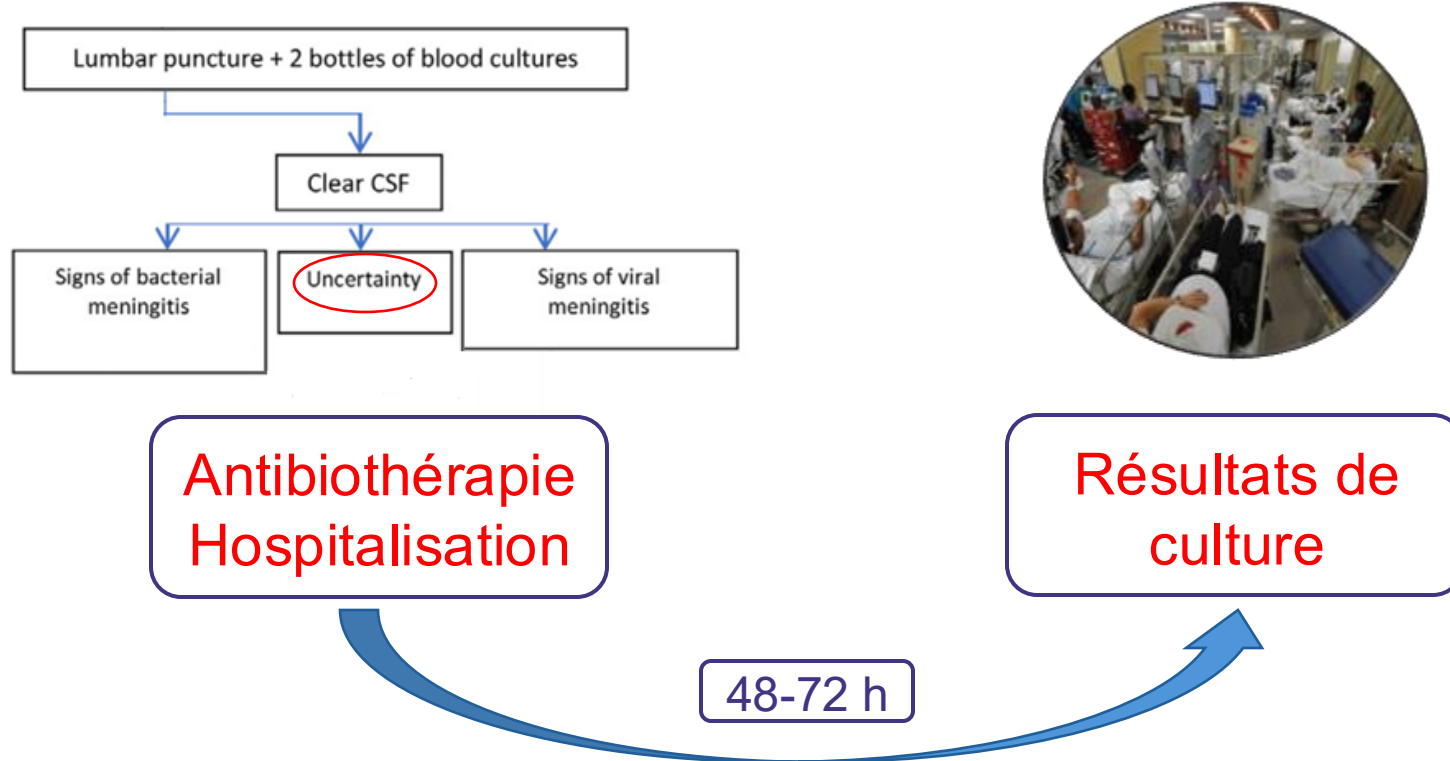
Peu sensible

Lymphocytaire/panachée
Absence

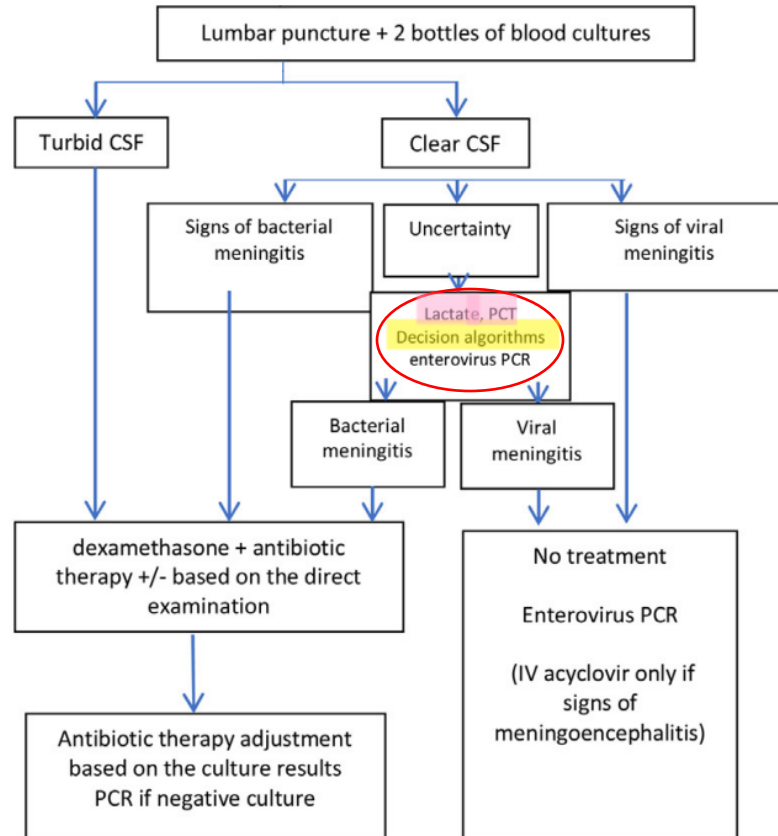
Variabilité des seuils
Fréquemment non contributifs

Microorganisme dépendant
Inoculum dépendant
Antibiothérapie préalable ?

Une phase initiale fréquemment incertaine



Comment s'orienter rapidement ?



Règles de décision clinique

Score	Population	Items	Studies/level of evidence	Lowest reported sensitivity	Lowest reported specificity
Boyer [46]	Children	Score including temperature, rash, neurologic impairment/seizures or altered mental status, CSF protein, glucose and CSF WBC count, PMN count. <i>If >5 points = bacterial meningitis, 3-4 = unclear, <3 = no bacterial meningitis</i>	5/2	89%	88%
Oostenbrink [47]	Children	Score including duration of complaints, vomiting, meningeal irritation, cyanosis, petechiae or ecchymosis, disturbed consciousness, CRP, CSF PMN count, CSF to blood glucose ratio. <i>If score is <8.5: low risk of bacterial meningitis</i>	5/2	79%	50%
Bacterial Meningitis Score [48]	Children	Item list including CSF Gram stain, CSF protein, peripheral absolute neutrophil count, seizures before or at admission, CSF absolute neutrophil count. <i>If all items are absent low risk of meningitis</i>	8/2	96%	44%
Bonsu [49]	Children	Formula including CSF WBC count, CSF protein concentration and age. <i>If score is <0.1: low risk of bacterial meningitis</i>	4/2	92%	28%
Hoen [50]	All ages, except neonates	Formula including CSF PMN count, CSF protein, blood glucose and blood WBC count. <i>If score is <0.1: low risk of bacterial meningitis</i>	6/2	77%	70%
Freedman	Children	Item list including patient's age, blood WBC count, peripheral band count, CSF glucose concentration, CSF/serum glucose ratio, CSF protein concentration, and positive CSF Gram staining. <i>If all items are absent low risk of meningitis</i>	3/2	98.7%	12%
Meningitest	All ages, except neonates	Item list including WBC, CSF WBC, CSF PMN, CSF protein, and glucose CSF/blood ratio. <i>If all items are absent low risk of meningitis</i>	2/2	79%	51%
Spanos [51]	All ages, except neonates	Formula including age, time of year, glucose ratio, and total CSF PMN count. <i>Probability of meningitis calculated by nomogram</i>	6/2	89%	55%
Tokuda	Adults	Item list including disturbed consciousness, CSF gram stain, neutrophil count and percentage. <i>If all items are absent low risk of meningitis</i>	2/2	88%	88%
De Cauwer	Children	Item list including CRP, CSF neutrophil count, CSF protein and CSF glucose concentration. <i>If all items are absent low risk of meningitis</i>	2/2	99%	40%
Schmidt	All ages, except neonates	Item list including CSF WBC, CSF protein and CSF lactate. <i>If all items are absent low risk of meningitis</i>	2/2	59%	100%

CRP, C-reactive protein; CSF, cerebrospinal fluid; PMN, polymorphonuclear cells; WBC, white blood cells.

Bacterial Meningitis Score

- Développé en 2002 par Nigrovic
- Score d'élimination, sécuritaire

Comitialité récente ou à la prise en charge (1)

Présence de bactéries à l'examen direct (2)

Décompte PNN sang $\geq 10\,000/\text{mm}^3$ (1)

Décompte PNN LCR $\geq 1000/\text{mm}^3$ (1)

Protéïnorachie $\geq 0,8\text{ g/L}$ (1)

Absence de tous les critères → Risque de méningite bactérienne $< 0,01\%$

Rationnel et objectifs

Incertitude diagnostique fréquente

Orientation rapide et précise conditionnant le pronostic

Performances intéressantes du BMS dans les populations pédiatriques

→ **Le BMS est-il performant dans les populations adultes ?**

Objectifs :

1. Déterminer la performance du BMS = 0 chez l'adulte pour exclure une méningite bactérienne
2. Déterminer la VPN du BMS enrichi par le lactate intrathécal

Méthodes

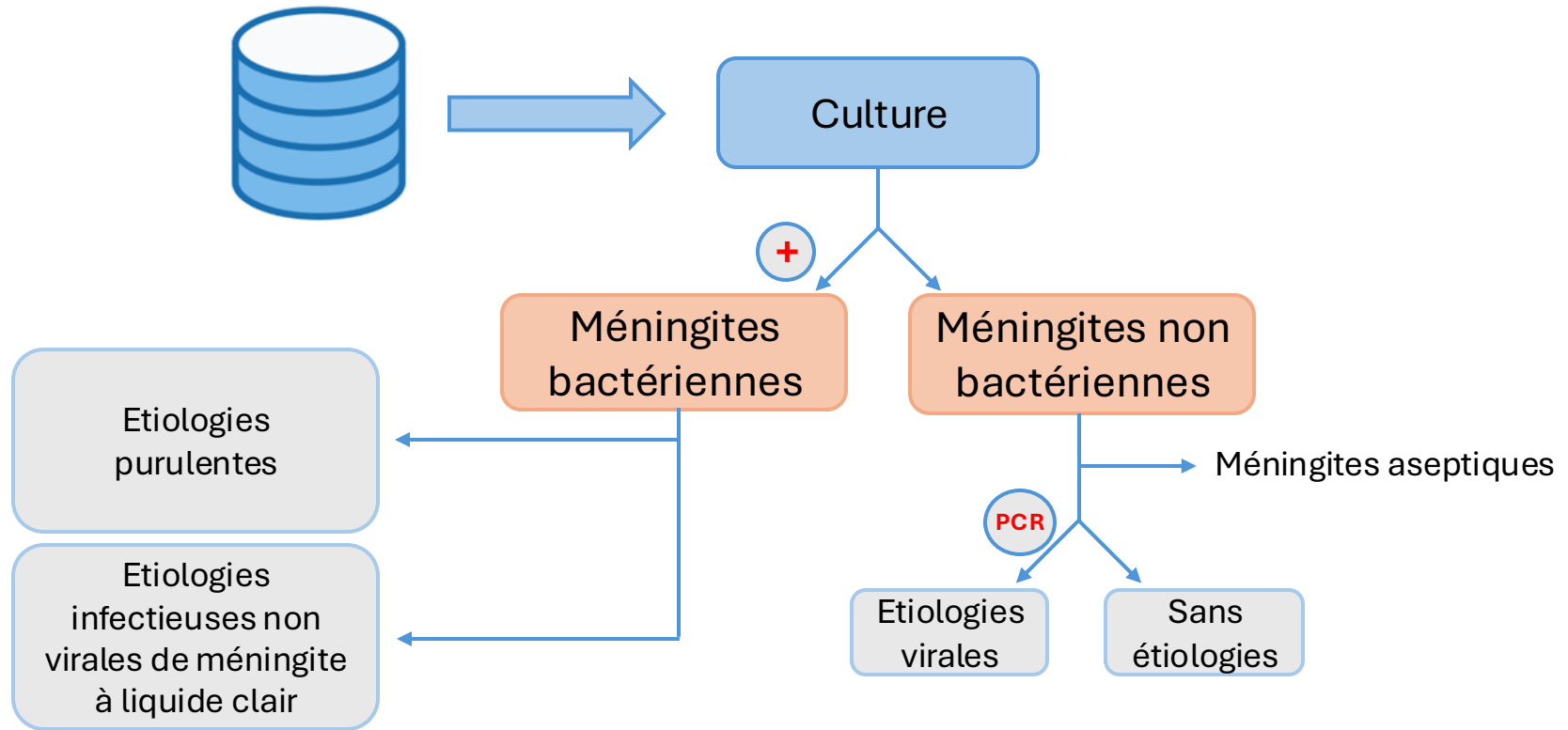
Etude multicentrique, rétrospective et observationnelle

Population adulte, immunocompétente, aux urgences

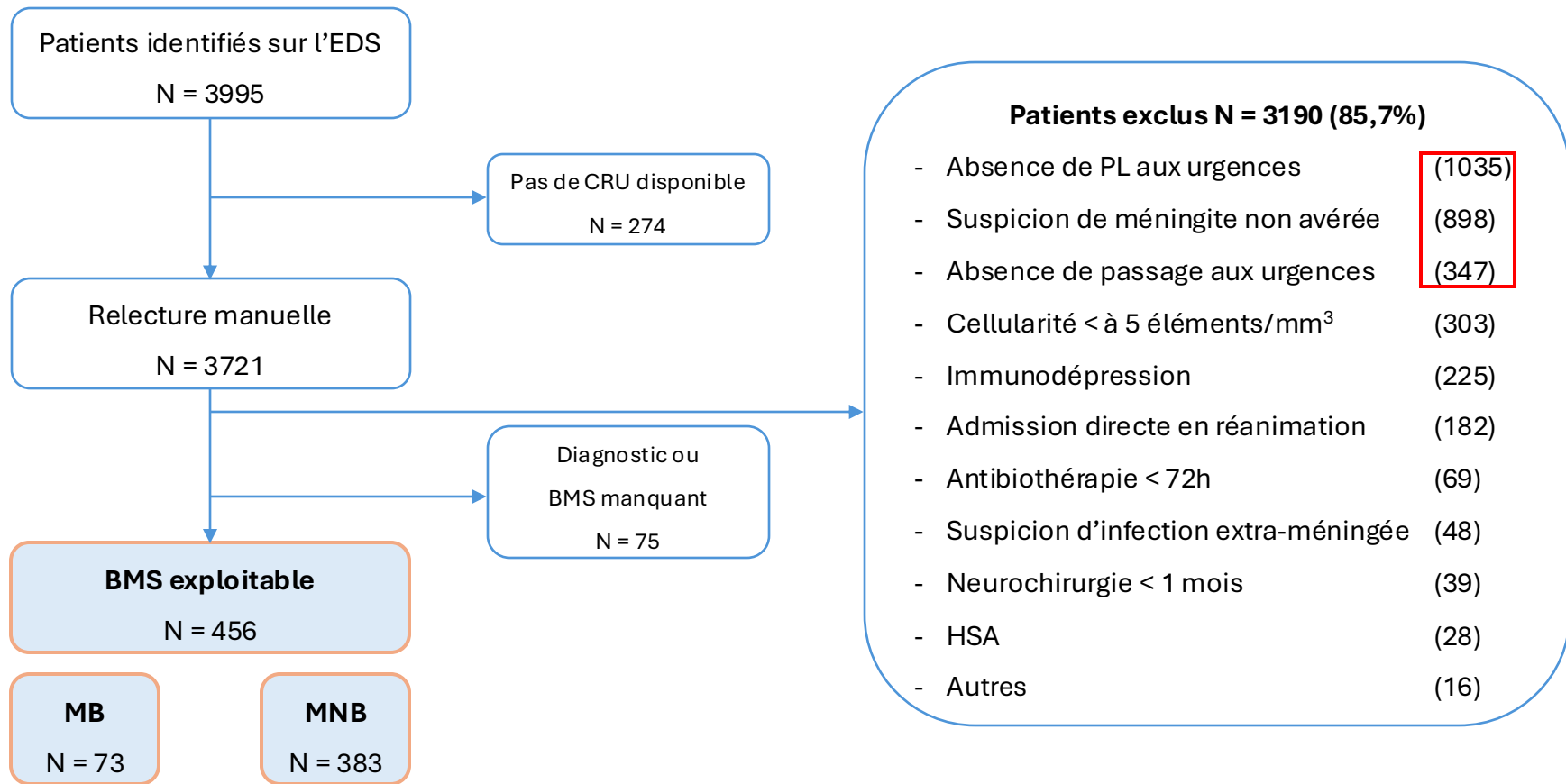
Suspicion de méningite infectieuse avec réalisation d'une ponction lombaire



Classification des méningites



Résultats – diagramme de flux



Résultats – population de l'étude

Variable <i>n</i> (%)		Bacterial Meningitis (N=73)	Aseptic Meningitis (N=383)	Difference (95% C.I.)
Demographics				
	73	383		
	Median age (years) [Q1; Q3]	54.0 [45.0; 64.0]	36.0 [29.0; 50.0]	18.0 (14.5; 23.0)
	Male sex	36 (49.3 %)	171 (44.7 %)	4.7% (-7.6%; 16.9%)
Symptoms				
	73	383		
	Fever (>38.5° C)	67 (91.8 %)	161 (42.0 %)	49.7% (39.8%; 56.2%)
	Headache	62 (84.9 %)	329 (85.9 %)	-1.0% (-11.3%; 6.5%)
	Stiffness	33 (45.2 %)	131 (34.2 %)	11.0% (-0.9%; 23.3%)
	Triad of symptoms	29 (39.7 %)	66 (17.2 %)	22.5% (11.3%; 34.5%)
BMS predictive factors				
	73	383		
	Clinical sign of convulsions in the ED	4 (5.5 %)	9 (2.4 %)	3.1% (-0.9%; 11.0%)
	73	375		
	Presence of bacteria in direct microscopic examination of CSF	49 (67.1 %)	0 (0.0%)	67.1% (55.8%; 76.8%)
	68	378		
	CSF Neutrophil count > 1000 cells/μL	41 (60.3 %)	3 (0.8 %)	59.5% (47.5%; 70.3%)
	68	382		
	Proteinorrachia > 80 mg/dL	63 (92.7 %)	140 (36.7 %)	56.0% (46.0%; 62.3%)
	66	365		
	Blood Neutrophil count > 10.000 cells/μL	54 (81.8 %)	40 (11.0 %)	70.9% (59.3%; 78.8%)
Biological Results median [Q1; Q3]				
	15	75		
	Intrathecal lactate (mmol/L)	13.9 [8.0; 18.5]	2.17 [1.78; 2.71]	-11.73 (-16.6; -6.2)
	29	99		
	Blood PCT (μg/L)	5.49 [0.5; 17.0]	0.06 [0.04; 0.1]	-5.43 (-16.6; -1.4)
	32	190		
	Blood CRP (mg/L)	246.5 [130.8; 333.7]	6.0 [3.0; 20.2]	-240.5 (-290.0; -151.0)

Résultats – documentation microbiologique

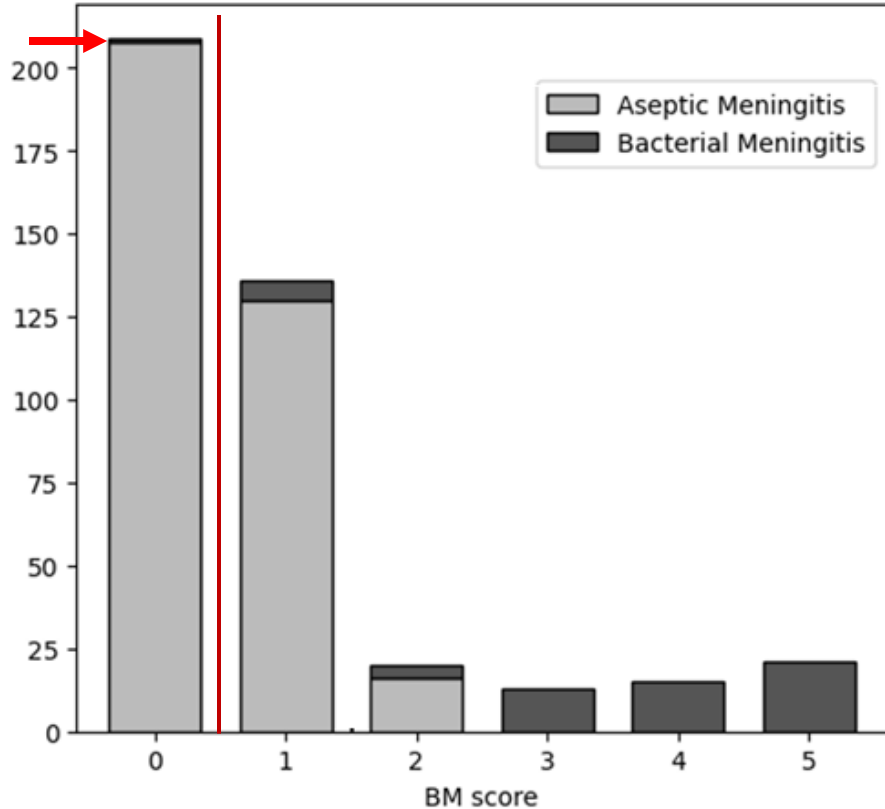
Bacterial meningitis (N=73)

Streptococcus pneumoniae	35 (47.9 %)
Neisseria meningitidis	10 (13.7 %)
Mycobacterium tuberculosis	6 (8.2 %)
Staphylococcus aureus	5 (6.8 %)
Haemophilus influenzae	3 (4.1 %)
Listeria monocytogenes	3 (4.1 %)
Escherichia coli	2 (2.7 %)
Aspergillus terreus	1 (1.4 %)
Fusobacterium nucleatum	1 (1.4 %)
Klebsiella pneumoniae	1 (1.4 %)
Moraxella osloensis	1 (1.4 %)
Pasteurella multocida	1 (1.4 %)
Rickettsia typhi	1 (1.4 %)
Streptococcus dysgalactiae	1 (1.4 %)
Streptococcus salivarius	1 (1.4 %)
Toxoplasma gondii	1 (1.4 %)

Viral Meningitis (N=146) *

Enterovirus	58 (39.7 %)
Herpes Simplex Virus-2	42 (28.8 %)
Varicella Zoster Virus	39 (26.7 %)
Herpes Simplex Virus-1	2 (1.4 %)
Epstein-Barr Virus	1 (0.7 %)
Human Herpesvirus 6	1 (0.7 %)
Herpes Simplex Virus (untyped)	1 (0.7 %)
Hepatitis E Virus	1 (0.7 %)
Toscana Phlebovirus	1 (0.7 %)

Résultats – BMS = 0



VPN: 99,5% (IC95% : 97,4-100)

1 faux négatif → *M. tuberculosis*

Résultats – performance du BMS

Fig. 3a: Original BMS (N = 414)

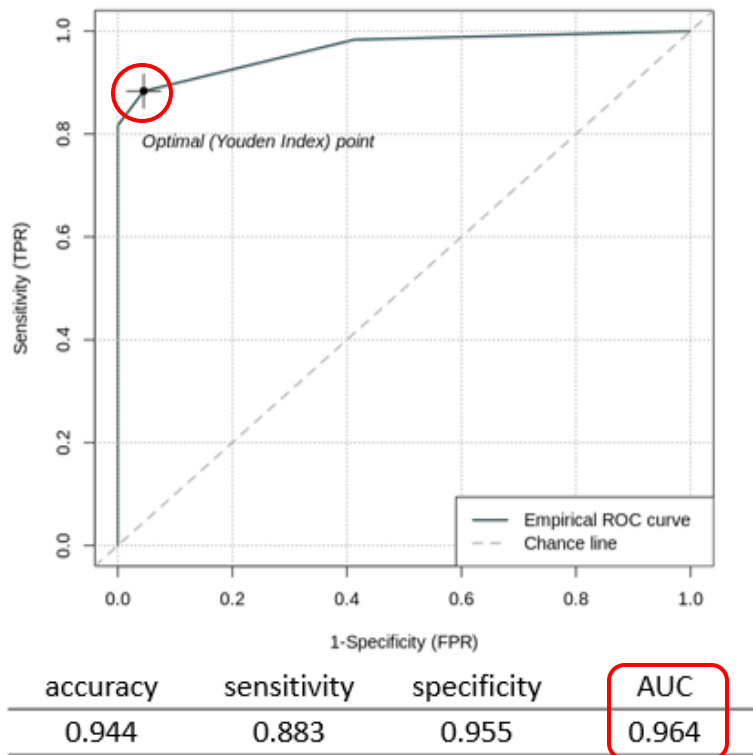
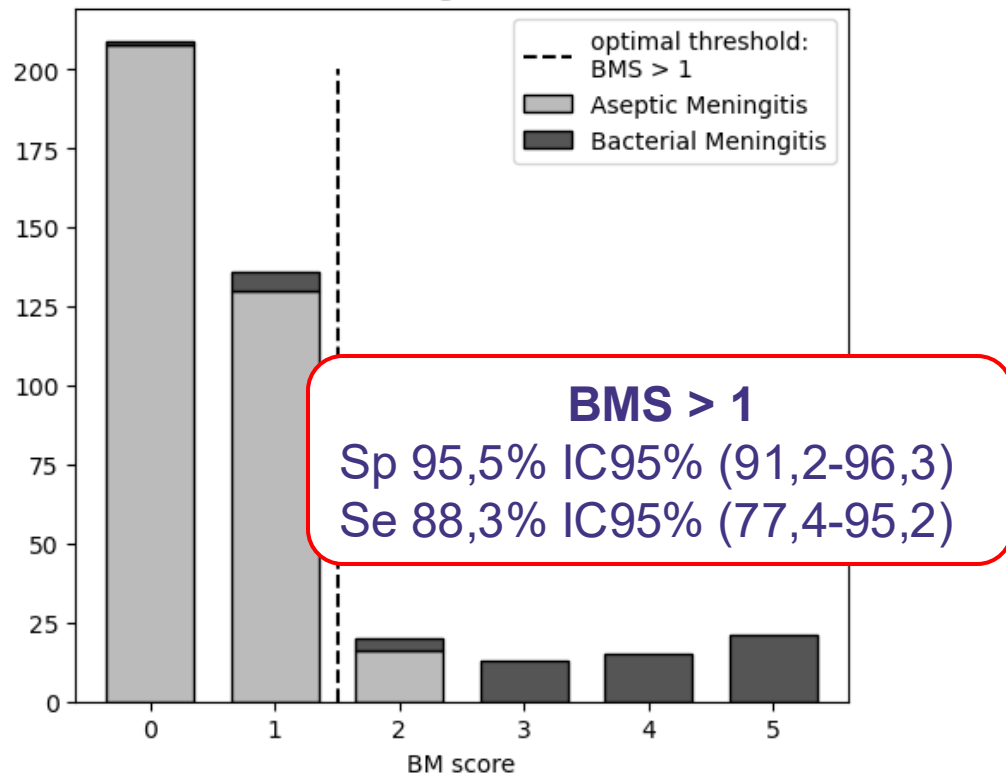


Fig. 2a



Résultats – performance du BMS-lactate

Fig. 3b: BMS with lactate (N = 84)

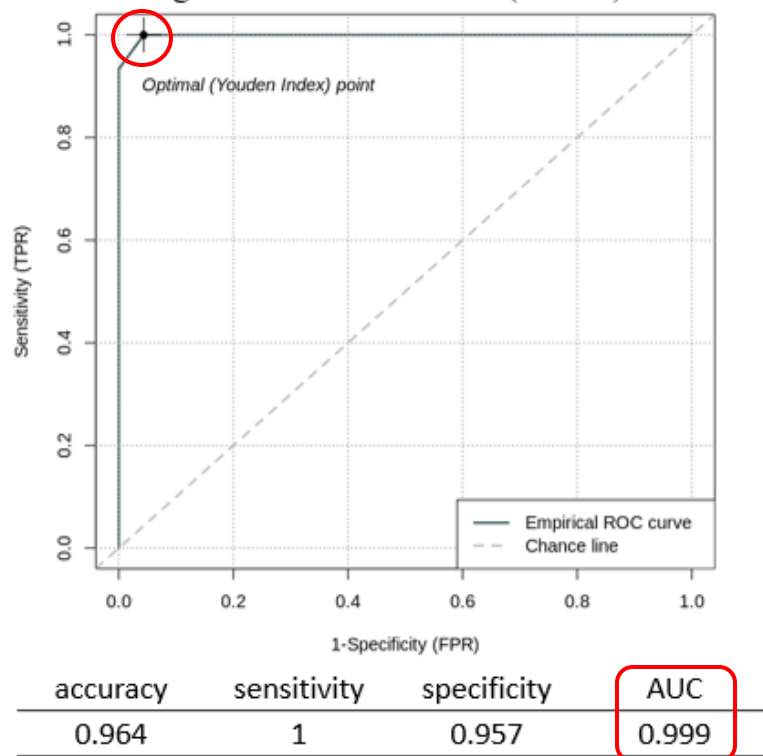
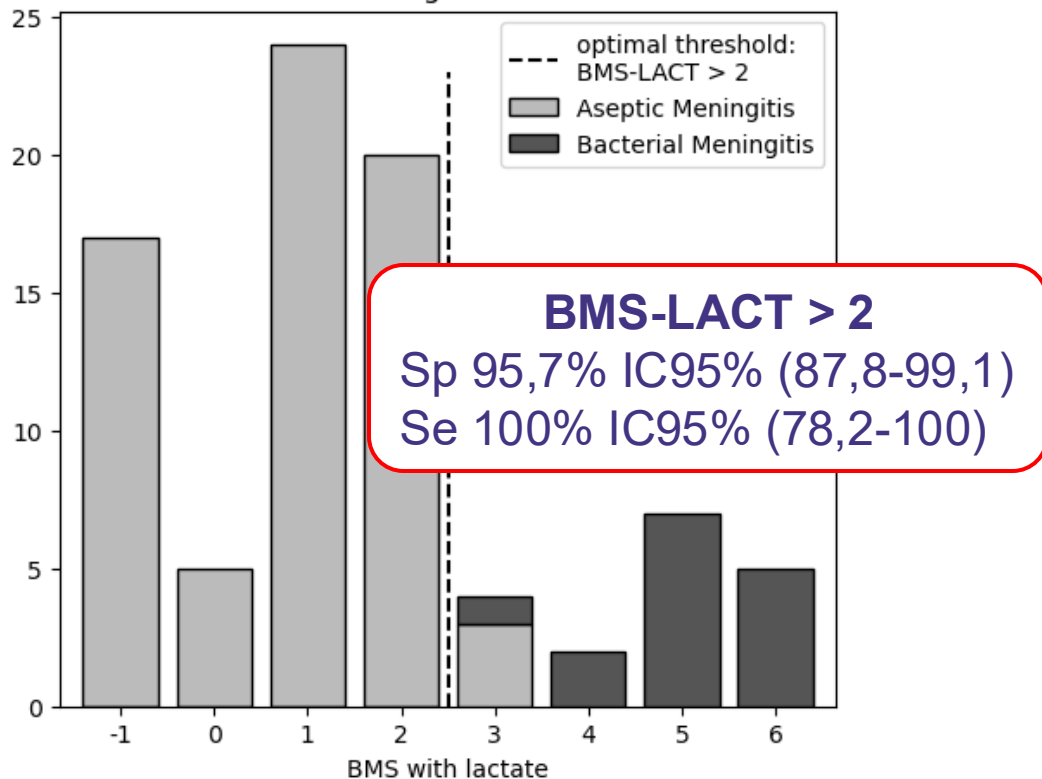


Fig. 2b



Conclusion

Le BMS semble être un score applicable à une population immunocompétente adulte pour éliminer le diagnostic de méningite bactérienne aigüe communautaire

Notre étude suggère une amélioration de la performance du score par l'adjonction du lactate intrathécal

Perspectives ... et fondamentaux

Nécessité de

Evaluation et
Evaluation

American Journal of Emergency Medicine (2007) 25, 179–184



The
American Journal of
Emergency Medicine
www.elsevier.com/locate/ajem

Diagnostics

Accuracy of the cerebrospinal fluid results to differentiate bacterial from non bacterial meningitis, in case of negative gram-stained smear

Patrick Ray MD^{a,*}, Ghislaine Badarou-Accosi MD^a, Alain Viallon MD^b,
David Boutoille MD^c, Martine Arthaud MD^d, David Trystram MD^e, Bruno Riou MD, PhD^a

ue ?
?

Table 3 Comparison of the efficiency of the emergency physician and various biological results

	Sensitivity	Specificity	PPV	NPV	PLR	NLR	Accuracy
Emergency physician	0.89	0.77	0.31	0.96	3.86	0.14	0.79
CSF leukocyte count	0.50*	0.94	0.53	0.94	8.33*	0.53	0.71
% CSF leukocyte	0.78	0.75	0.30	0.96	3.12	0.29	0.71
CSF/blood glucose ratio	0.33*	0.42*	0.07	0.82	0.57*	1.60*	0.11*
CSF protein	0.63*	0.94	0.58	0.96	10.50*	0.39	0.75
Serum CRP	0.78	0.74	0.28	0.96	3.00	0.30	0.75
Serum PCT	0.87	1.00*	1.00*	0.99	>100*	0.23	0.99*

PPV indicates positive predictive value; NPV, negative predictive value; PLR, positive likelihood ratio; NLR, negative likelihood ratio.

* $P < .05$ vs emergency physician; the threshold value for each variable was determined by the ROC curve (Table 4).

Merci pour votre attention

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