Choc septique : Diagnostic et points-clé de prise en charge

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Il est 2 heures du matin…

Vous êtes appelé par votre collègue urgentiste au sujet de M. M., 56 ans, en raison d'une hypotension persistante.

Son principal antécédent est une maladie lithiasique urinaire. Il présente des infections urinaires à répétition et est porteur de sondes JJ depuis trois ans.

Il se plaint depuis trois jours de douleurs lombaires gauches, accompagnées d'asthénie. Il frissonne depuis cet après-midi. Il a pris de lui-même de l'Augmentin et des AINS.

Les constantes sont les suivantes :

- GCS : 13
- Pression artérielle systolique : 70 mmHg
- Fréquence cardiaque : 110 bpm

Épidémiologie

Concernant l'épidémiologie du sepsis

A. 30% des patients de réanimation présente un sepsis à leur admission en réanimation
B. Le taux de mortalité lié au choc septique est de 40%
C. L'incidence du choc septique augmente depuis ces 20 dernières années
D. Le taux de mortalité lié au sepsis baisse de 2% par an
E. Plus de 50 % sortant vivant d'un séjour en réanimation pour sepsis ou choc septique présente un syndrome post réanimation

Concernant l'épidémiologie du sepsis

A. **30% des patients de réanimation présente un sepsis à leur admission en réanimation [1]**
B. **Le taux de mortalité lié au choc septique est de 40% [2-4]**
C. **L'incidence du choc septique augmente depuis ces 20 dernières années [2-4]**
D. **Le taux de mortalité lié au sepsis baisse de 2% par an [2-4]**
E. **Plus de 50 % sortant vivant d'un séjour en réanimation pour sepsis ou choc septique présente un syndrome post réanimation[5]**

1. Vincent, LRM, 2014; 2. Fleischmann, ICM, 2020; 3. Dupuis, AIC, 2020; 4. Rhee, JAMA, 2017, 5. Prescott, JAMA, 2018

Épidémiologie

Global, regional, and national sepsis incidence and mortality, 1990–2017: analysis for the Global Burden of Disease Study

Kristina E Rudd, Sarah Charlotte Johnson, Kareha M Agesa, Katya Anne Shackelford, Derrick Tsoi, Daniel Rhodes Kievlan, Danny V Colombara, Kevin S Ikuta, Niranjan Kissoon, Simon Finfer, Carolin Fleischmann-Struzek, Flavia R Machado, Konrad K Reinhart, Kathryn Rowan, Christopher W Seymour, R Scott Watson, T Eoin West, Fatima Marinho, Simon I Hay, Rafael Lozano, Alan D Lopez, Derek C Angus, Christopher J L Murray, Mohsen Naghavi

Global burden of Disease (GBD) Study

Institute for Health Metrics and Evaluation (IHME)

« **Global burden of sepsis** » en 2017

- 🌍 **Nombre estimé de nouveaux cas de sepsis :**

48,9 millions (IC *95 % : 38,9 – 62,9 millions)*

- 📊 **Incidence mondiale du sepsis :**

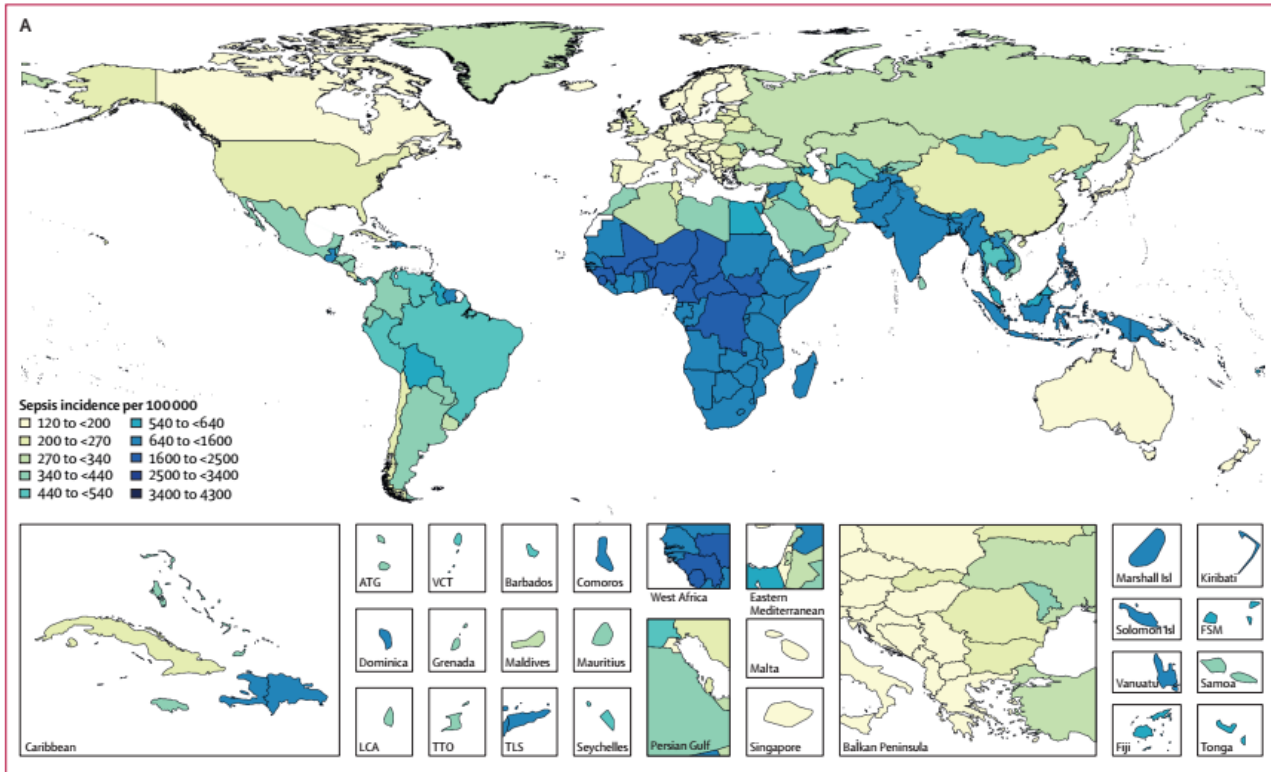
677,5 cas pour 100 000 habitants *(IC 95 % : 535,7 – 876,1)*

- 📉 **Baisse de l'incidence (standardisée selon l'âge) entre 1990 et 2017 :** –37,0 %*(IC 95 % : 11,8 – 54,5)*

Rudd, Lancet, 2020

Incidence hétérogène à travers le monde

- Incidence sepsis plus important dans les “low- and middle-income countries (LMICs)” (sub-Saharan Africa, Oceania, south Asia, east Asia, and southeast Asia).
- Causes:
  - Accès limités aux soins, retard de diagnostic et prise en charge,
  - Une prévalence plus élevée de maladies infectieuses
  - Le vieillissement des populations
  - Augmentation du taux de chirurgies invasives
  - Émergence de bactéries multirésistantes



Rudd, Lancet, 2020

Global burden of Disease (GBD) Study

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Mortalité liée au sepsis en 2017

- 🩸 **Décès liés au sepsis :**

11,0 millions *(IC 95 % : 10,1 – 12,0)*

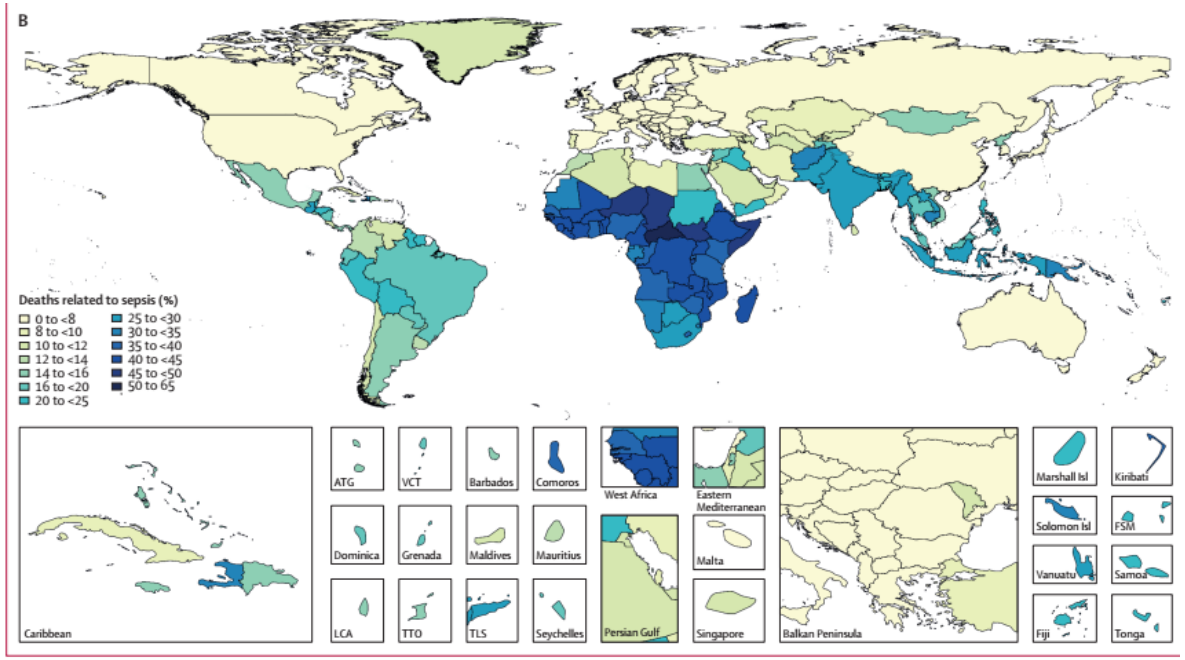
→ soit **19,7 %** de l'ensemble des décès mondiaux *(IC 95 % : 18,2 – 21,4)*

- 📉 **Diminution de la mortalité (standardisée selon l'âge) entre 1990 et 2017 :**

–52,8 % *(IC 95 % : 47,7 – 57,5)*

- 🌍 **Régions les plus touchées :**

Afrique subsaharienne, Océanie, Asie du Sud, Asie de l'Est et Asie du Sud-Est



Rudd, Lancet, 2020

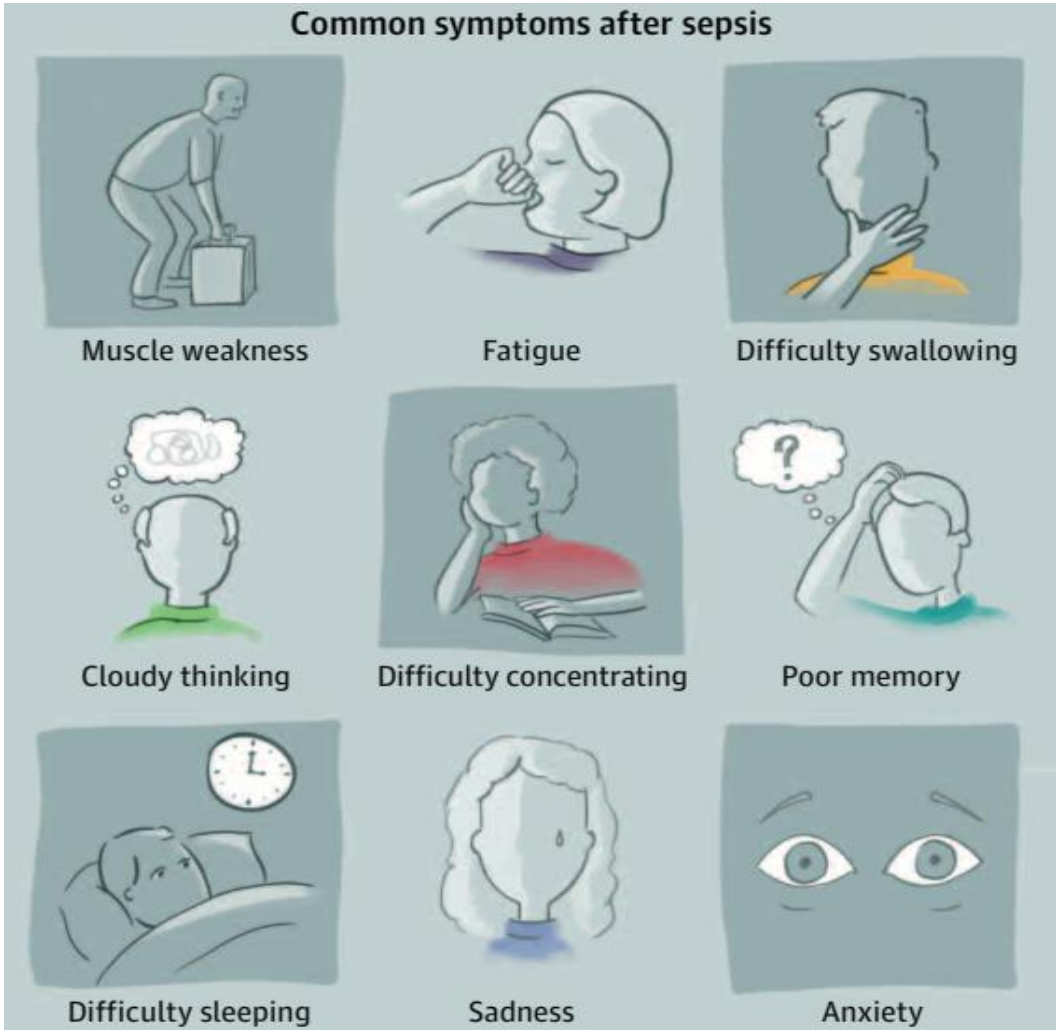
Et les séquelles à long terme?

JAMA | Review

Enhancing Recovery From Sepsis
A Review

Hallie C. Prescott, MD, MSc; Derek C. Angus, MD, MPH

- Jusqu'à 50% des survivants du sepsis vont présenter un syndrome post sepsis = syndrome post reanimation = persistence de séquelles physiques, cognitives ou psychologiques.
- Les survivants présentent:
  - Plus de plaintes fonctionnelles
  - Plus de comorbidités
  - Une perte d'autonomie
  - Plus de recours aux soins



Prescott – JAMA - 2018

Dépistage du sepsis

Quels sont les arguments pour un choc septique.

A. Un score **qSOFA ≥ 2** suggère un risque élevé de sepsis.
B. Un score **SOFA ≥ 2** définit un **choc septique**
C. La présence d'une **hypotension réfractaire au remplissage** définit un **choc septique**.
D. Un **lactate > 2 mmol/L** est un critère de gravité nécessaire à la définition du choc septique.
E. Un **choc septique réfractaire** se définit par la nécessité d'une **dose de noradrénaline > 0,5 à 1 µg/kg/min**, malgré un remplissage adéquat.

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Une histoire qui dure depuis 30 ans

Intensive Care Med (2003) 29:530–538
DOI 10.1007/s00134-003-1662-x

EXPERT PANEL

Mitchell M. Levy
Mitchell P. Fink
John C. Marshall
Edward Abraham
Derek Angus
Deborah Cook
Jonathan Cohen
Steven M. Opal
Jean-Louis Vincent
Graham Ramsay
for the International Sepsis
Definitions Conference

2001 SCCM/ESICM/ACCP/ATS/SIS International Sepsis Definitions Conference

accp/sccm consensus conference

Definitions for Sepsis and Organ Failure and Guidelines for the Use of Innovative Therapies in Sepsis

THE ACCP/SCCM CONSENSUS CONFERENCE COMMITTEE:
Roger C. Bone, M.D., F.C.C.P., Chairman
Robert A. Balk, M.D., F.C.C.P.
Frank B. Cerra, M.D.
R. Phillip Dellinger, M.D., F.C.C.P.
Alan M. Fein, M.D., F.C.C.P.
William A. Knaus, M.D.
Roland M. H. Schein, M.D.
William J. Sibbald, M.D., F.C.C.P.

2016

Sepsis - 3

2001

Sepsis - 2

1991

Sepsis - 1

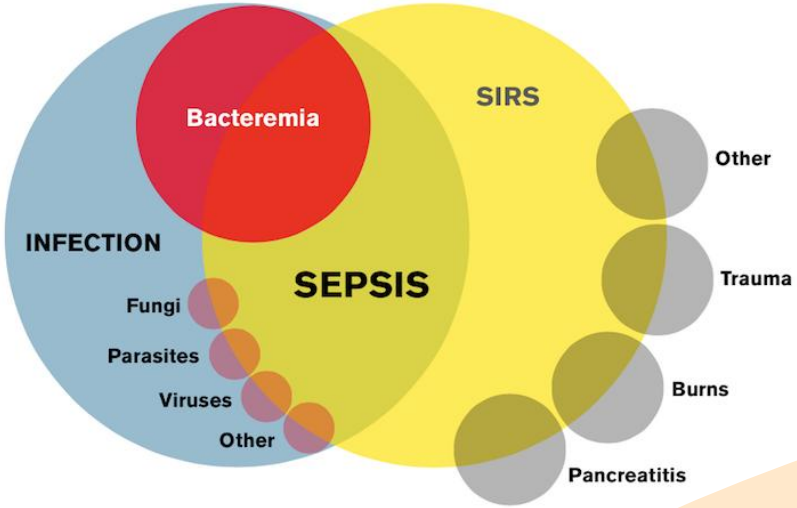
Special Communication | CARING FOR THE CRITICALLY ILL PATIENT

The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis-3)

Mervyn Singer, MD, FRCP; Clifford S. Deutschman, MD, MS; Christopher Warren Seymour, MD, MSc; Manu Shankar-Hari, MSc, MD, FFICM; Djillali Annane, MD, PhD; Michael Bauer, MD; Rinaldo Bellomo, MD; Gordon R. Bernard, MD; Jean-Daniel Chiche, MD, PhD; Craig M. Coopersmith, MD; Richard S. Hotchkiss, MD; Mitchell M. Levy, MD; John C. Marshall, MD; Greg S. Martin, MD, MSc; Steven M. Opal, MD; Gordon D. Rubenfeld, MD, MS; Tom van der Poll, MD, PhD; Jean-Louis Vincent, MD, PhD; Derek C. Angus, MD, MPH

Définitions

SEPSIS – 1.0



Bone, Chest, 1992

Table 1—*Definitions*

Infection = microbial phenomenon characterized by an inflammatory response to the presence of microorganisms or the invasion of normally sterile host tissue by those organisms.

Bacteremia = the presence of viable bacteria in the blood.

Systemic inflammatory response syndrome (SIRS) = the systemic inflammatory response to a variety of severe clinical insults. The response is manifested by two or more of the following conditions: (1) temperature >38°C or <36°C; (2) heart rate >90 beats per minute; (3) respiratory rate >20 breaths per minute or $PaCO_2$ <32 mm Hg; and (4) white blood cell count >12,000/cu mm, <4,000/cu mm, or >10% immature (band) forms

Sepsis = the systemic response to infection, manifested by two or more of the following conditions as a result of infection: (1) temperature >38°C or <36°C; (2) heart rate >90 beats per minute; (3) respiratory rate >20 breaths per minute or $PaCO_2$ <32 mm Hg; and white blood cell count >12,000/cu mm, <4,000/cu mm, or >10% immature (band) forms.

Severe sepsis = sepsis associated with organ dysfunction, hypoperfusion, or hypotension. Hypoperfusion and perfusion abnormalities may include, but are not limited to lactic acidosis, oliguria, or an acute alteration in mental status.

Septic shock = sepsis-induced with hypotension despite adequate fluid resuscitation along with the presence of perfusion abnormalities that may include, but are not limited to, lactic acidosis, oliguria, or an acute alteration in mental status. Patients who are receiving inotropic or vasopressor agents may not be hypotensive at the time that perfusion abnormalities are measured.

Sepsis-induced hypotension = a systolic blood pressure <90 mm Hg or a reduction of ≥40 mm Hg from baseline in the absence of other causes for hypotension.

Multiple organ dysfunction syndrome (MODS) = presence of altered organ function in an acutely ill patient such that homeostasis cannot be maintained without intervention.

Définitions

SEPSIS – 2.0

Sepsis = Infection +

Sepsis sévère = Sepsis +

Choc septique = Sepsis sévère +

La gravité du sepsis est définie par l'existence de dysfonctions d'organe associées.

Levy, ICM, 2003

Paramètres généraux

- Température > 38,3 ou < 36 °C
- Tachycardie > 90 bpm ou > 2 DS au-delà de la valeur normale haute pour l'âge
- Tachypnée
- Altération de l'état de conscience
- Œdèmes ou balance hydrique positive (> 20 mL/kg de poids corporel sur 24 h)
- Hyperglycémie > 1,2 g/L (6,7 mmol/L) en l'absence de diabète

SIRS

Paramètres inflammatoires

- Hyperleucocytose > 12 G/L ou leucopénie 10 % de formes immatures
- CRP (C-*reactive protein*) > 2 DS au-delà de la valeur normale haute
- Procalcitonine > 2 DS au-delà de la valeur normale haute

Paramètres hémodynamiques

- Hypotension artérielle (PAS 40 mmHg ou > 2 DS au-dessous de la valeur normale basse pour l'âge ; PAM < 70 mmHg)
- Élévation de la saturation en O_2 du sang veineux mêlé (SvO_2 > 70 %)
- Augmentation de l'index cardiaque (> 3,5 L/min/m^2)

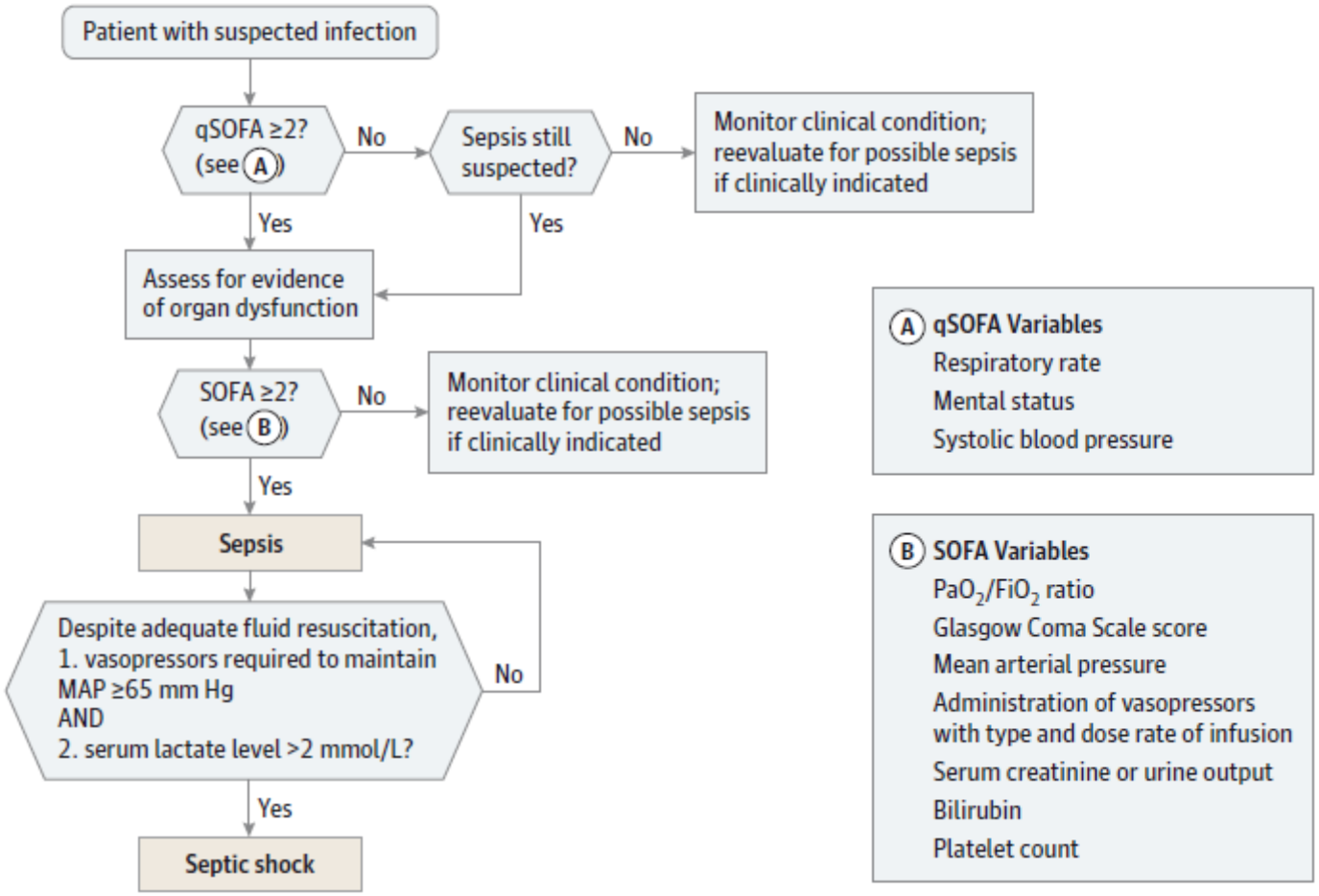
Dysfonctions d'organe

- Hypoxémie artérielle (PaO_2/FiO_2 < 300)
- Oligurie aiguë < 0,5 mL/kg/h ou < 45 mL/h pendant au moins 2 h
- Augmentation du taux de créatinine > 5 mg/L (> 44 µmol/L)
- Anomalies de la coagulation (INR > 1,5 ; TCA > 60 s)
- Iléus paralytique (absence de bruits hydro-aériques)
- Thrombocytopénie < 100 000/mm^3
- Hyperbilirubinémie > 40 mg/L (68 µmol/L)

→ de la perfusion tissulaire avec
- Hyperlactatémie ou
- augmentation du temps de recoloration cutanée ou
- présence de marbrures

→Hypotension réfractaire au remplissage vasculaire

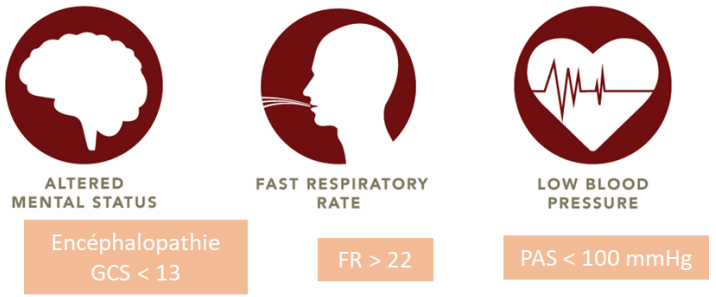
SEPSIS – 3.0



La défaillance d'organe est au premier plan pour identifier les patients avec une « infection pathologique »

Sepsis
→ Réponse anormale de l'hôte à l'infection
→ Infection aboutissant à une défaillance d'organe

Choc septique → sepsis + dysfonction métabolique + défaillance hémodynamique



Singer et al. – JAMA, 2016

Définitions

A Comparison of the Quick-SOFA and Systemic Inflammatory Response Syndrome Criteria for the Diagnosis of Sepsis and Prediction of Mortality

A Systematic Review and Meta-Analysis

Rodrigo Serafim, MD; José Andrade Gomes, MD; Jorge Salluh, MD, PhD; and Pedro Póvoa, MD, PhD

CHEST

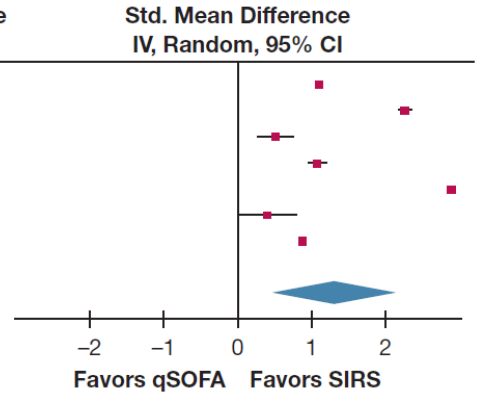
CHEST 2018; 153(3):646-655

- **SIRS prédit le sepsis**
- **qSOFA est associé au pronostic**

SEPSIS

Study or Subgroup	SIRS Mean	SIRS SD	SIRS Total	qSOFA Mean	qSOFA SD	qSOFA Total	Weight	Std. Mean Difference IV, Random, 95% CI
Churpek, 2017	0.88	0.45	30,677	0.38	0.45	30,677	14.4%	1.11 (1.09 to 1.13)
Donnelly, 2017	0.54	0.02	2,593	0.12	0.26	2,593	14.3%	2.28 (2.21 to 2.35)
Dorsett, 2017	0.39	0.5	152	0.16	0.38	152	14.2%	0.52 (0.29 to 0.75)
Freund, 2017	0.74	0.45	879	0.25	0.45	879	14.3%	1.09 (0.99 to 1.19)
Raith, 2017	0.86	0.11	184,875	0.54	0.11	184,875	14.4%	2.91 (2.90 to 2.92)
Siddiqui, 2017	0.62	0.47	58	0.42	0.51	58	14.0%	0.41 (0.04 to 0.77)
Williams, 2017	0.47	0.48	8,871	0.1	0.34	8,871	14.4%	0.89 (0.86 to 0.92)
Total (95% CI)			**228,105**			**228,105**	**100.0%**	**1.32 (0.40 to 2.24)**

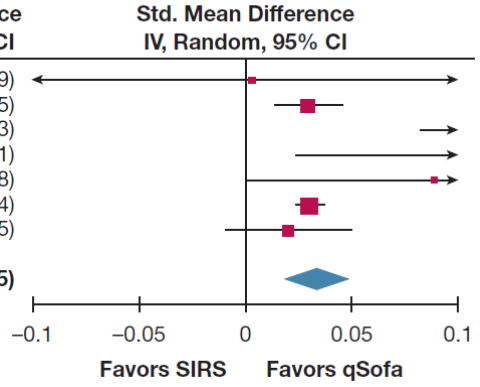
Heterogeneity: $Tau^2 = 1.53$; $Chi^2 = 43948.08$, df = 6 ($P < .00001$); $I^2 = 100\%$
Test for overall effect: Z = 2.81 ($P = .005$)



MORTALITY

Study or Subgroup	qSOFA Mean	qSOFA SD	qSOFA Total	SIRS Mean	SIRS SD	SIRS Total	Weight	Std. Mean Difference IV, Random, 95% CI
April, 2017	0.66	2.61	214	0.65	2.61	214	0.7%	0.00 (−0.19 to 0.19)
Churpek, 2017	0.69	1.34	30,677	0.65	1.34	30,677	31.9%	0.03 (0.01 to 0.05)
Finkelsztein, 2017	0.74	0.47	152	0.59	0.5	152	0.5%	0.31 (0.08 to 0.53)
Freund, 2017	0.8	1.59	879	0.65	0.83	879	2.8%	0.12 (0.02 to 0.21)
Park, 2017	0.733	1.54	1,009	0.599	1.46	1,009	3.2%	0.09 (0.00 to 0.18)
Raith, 2017	0.607	0.88	184,875	0.58	0.88	184,875	42.6%	0.03 (0.02 to 0.04)
Williams, 2017	0.73	0.48	8,871	0.72	0.48	8,871	18.3%	0.02 (−0.01 to 0.05)
Total (95% CI)			**226,677**			**226,677**	**100.0%**	**0.03 (0.02 to 0.05)**

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 11.39$, df = 6 ($P = .08$); $I^2 = 47\%$
Test for overall effect: Z = 4.12 ($P < .0001$)



Définitions

Epidemiology of Quick Sequential Organ Failure Assessment Criteria in Undifferentiated Patients and Association With Suspected Infection and Sepsis

Vijay Anand, DO; Zilu Zhang, MS; Sameer S. Kadri, MD; Michael Klompas, MD, MPH; and Chanu Rhee, MD, MPH; for the CDC Prevention Epicenters Program

CHEST

CHEST 2019; 156(2):289-297

qSOFA only a prognostic score

- 1,004,347 hospitalized patients, **271,500 (27.0%) were qSOFA-positive**
- **qSOFA-positive patients** were older (median age, 65 vs 58 years), required ICU admission more often (28.5% vs 6.5%), and had **higher mortality** (6.7% vs 0.8%)
- **Sensitivities of qSOFA for suspected infection** and sepsis were **41.3% (95% CI, 41.1%-41.5%)** and 62.8% (95% CI, 62.4%-63.1%), respectively
- **AUC-ROC for prognosis of qSOFA was higher for patients WITHOUT infections**

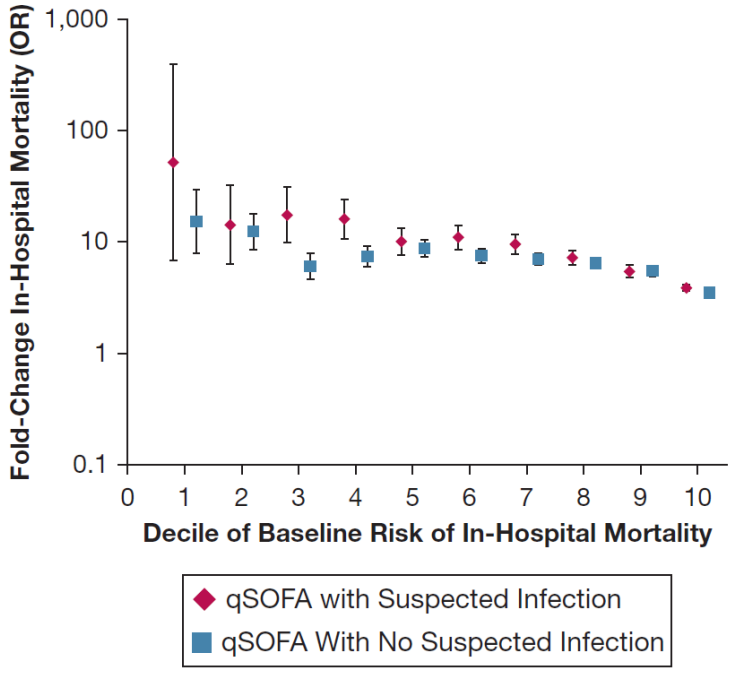


Figure 2 – *Fold change in rate of in-hospital mortality by deciles of baseline risk of death for ≥ 2 qSOFA criteria vs < 2 qSOFA criteria in patients with and without suspected infection on admission. The x axis*

Définitions

SCREENING FOR PATIENTS WITH SEPSIS AND SEPTIC SHOCK

1 For hospitals and health systems, we **recommend** using a performance improvement programme for sepsis, including sepsis screening for acutely ill, high-risk patients and standard operating procedures for treatment.

MODERATE — Screening

VERY LOW — Standard operating procedures

2016 STATEMENT

★ ★ ★

*"We **recommend** that hospitals and hospital systems have a performance improvement programme for sepsis including sepsis screening for acutely ill, high risk patients."*

MODERATE — 2 We **recommend against** using qSOFA compared to SIRS, NEWS, or MEWS as a single screening tool for sepsis or septic shock.

VERY LOW — 3 For adults suspected of having sepsis, we **suggest** measuring blood lactate.

Définitions

Choc septique réfractaire

- Pas de définition dans SEPSIS 3.0
- Grande hétérogénéité des définitions
- Le plus souvent:
  - noradrénaline ≥ 1 µg/kg/min
  - Et/ou 2ème ligne agent vasopresseur (vasopressine, angiotensine II …)

Antonucci, JCC, 2023

J Crit Care 75 (2023) 154258

Contents lists available at ScienceDirect

Journal of Critical Care

journal homepage: www.journals.elsevier.com/journal-of-critical-care

Refractory septic shock and alternative wordings: A systematic review of literature

Elio Antonucci [a], Tania Polo [a], Manuela Giovini [a], Massimo Girardis [b], Ignacio Martin-Loeches [c],

Shock Definitions & Reported Norepinephrine Dosages.

Authors	Shock Definition	Norepinephrine Dosage (µg/kg/min)
Martin et al. (2015) [4]	Sepsis with the need for vasopressor administration	Maximum: 0.79 ± 1.03 µg/kg/min
Albanese et al. (2005) [10]	Septic shock with hemodynamic instability and two or more organ dysfunctions	Maximum: 1.7 ± 0.9 µg/kg/min
Auchet et al. (2017) [16]	Septic shock with the need for HDV (NE dose ≥1 µg/kg/min for ≥1 h)	Maximum: 3.28 ± 2.41 µg/kg/min
O'Brien et al. (2002) [14]	Septic shock and high CO with the need for high-dose norepinephrine infusion	Mean: 0.59 µg/kg/min
Tsuneyoshi et al. (2001) [15]	Septic shock and persistent hypotension, with the need for NE with or without infusions of other catecholamines	Maximum: 0.3 µg/kg/min
Dunser et al. (2003) [11]	Vasodilatory shock with and without sepsis, with the need for NE infusions exceeding 0.5 µg/kg/min	Mean: 0.84 ± 0.41 µg/kg/min
Lauzier et al. (2006) [12]	Septic shock with the need for vasopressors for <12 h before randomization	Mean: 0.20 (0.17–0.46) µg/kg/min
Leone et al. (2004) [13]	Hemodynamic instability with the need for HDV	Maximum: 3.8 ± 1.3 µg/kg/min

Abbreviations: *NE* norepinephrine, *CO* cardiac output, *HDV* high-dose of vasopressors.

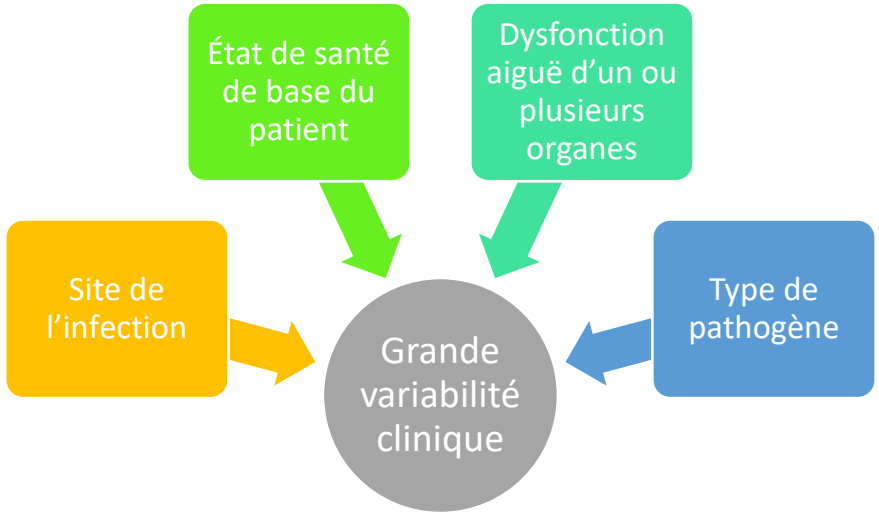
Quels examens complémentaires allez vous demander à ce stade de la prise en charge

A. Procalcitonine
B. CRP
C. Ionogramme sanguin, urée créatinine
D. NFS plaquette
E. Bilan hépatique
F. Gaz du sang, lactate
G. Scanner abdominal
H. Hémocultures
I. ECBU

Quels examens complémentaires allez vous demander à ce stade de la prise en charge

A. **Procalcitonine**
B. CRP
C. **Ionogramme sanguin, urée créatinine**
D. **NFS plaquette**
E. **Bilan hépatique**
F. **Gaz du sang, lactate**
G. **Scanner abdominal**
H. **Hémocultures**
I. **ECBU**

Diagnostic



signes généraux d'infection

- Fièvre ou hypothermie, malaise

Signes spécifiques au site infectieux

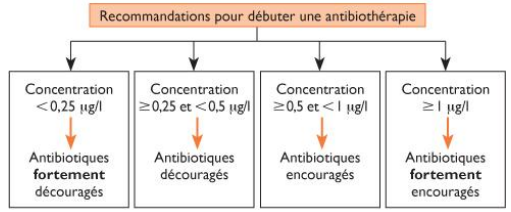
- Toux, dysurie, érythème

Signes de dysfonction aiguë d'organe

- Confusion, oligurie, dyspnée

Reconnaissance précoce pouvant être difficile

- qSOFA
- SIRS
- Biomarqueurs (CRP – PCT)



Bouadma, Lancet, 2010

Identifier site et cause de l'infection

- Respiratoire
- Abdominale
- Voies urinaires
- Peau
- Cathéters

Évaluer la fonction des organes et la perfusion

- SOFA
- Lactate

	Score				
System	0	1	2	3	4
Respiration					
Pao_2/Fio_2, mm Hg (kPa)	≥400 (53.3)	<400 (53.3)	<300 (40)	<200 (26.7) with respiratory support	<100 (13.3) with respiratory support
Coagulation					
Platelets, $\times 10^3/\mu L$	≥150	<150	<100	<50	<20
Liver					
Bilirubin, mg/dL (µmol/L)	<1.2 (20)	1.2-1.9 (20-32)	2.0-5.9 (33-101)	6.0-11.9 (102-204)	>12.0 (204)
Cardiovascular	MAP ≥70 mm Hg	MAP <70 mm Hg	Dopamine <5 or dobutamine (any dose)[b]	Dopamine 5.1-15 or epinephrine ≤0.1 or norepinephrine ≤0.1[b]	Dopamine >15 or epinephrine >0.1 or norepinephrine >0.1[b]
Central nervous system					
Glasgow Coma Scale score[c]	15	13-14	10-12	6-9	<6
Renal					
Creatinine, mg/dL (µmol/L)	<1.2 (110)	1.2-1.9 (110-170)	2.0-3.4 (171-299)	3.5-4.9 (300-440)	>5.0 (440)
Urine output, mL/d				<500	<200

Diagnostic

Surviving Sepsis Campaign

Biomarkers to Start Antibiotics

Recommendation
16. For adults with suspected sepsis or septic shock, we **suggest against** using procalcitonin plus clinical evaluation to decide when to start antimicrobials, as compared to clinical evaluation alone.
Weak recommendation, very low quality of evidence.

Diagnostic

- Au mieux sur identification du germe ou à défaut sur une forte suspicion clinique
- Sites d'infection
  - Pulmonaire (40 à 60 % des cas),
  - Abdomen (15 à 30 %),
  - Système génito-urinaire (15 à 30 %),
  - Sang,
  - Peau ou les tissus mous.
- Un agent pathogène est identifié dans environ 60 à 70 % des cas.
  - Antibiothérapie préalable
  - Techniques de prélèvement inadéquates
  - Anomalies pré-analytiques
- Germes en cause: bactérie avec gram positif ou Gram négatif, suivie par une infection fongique ou virale.

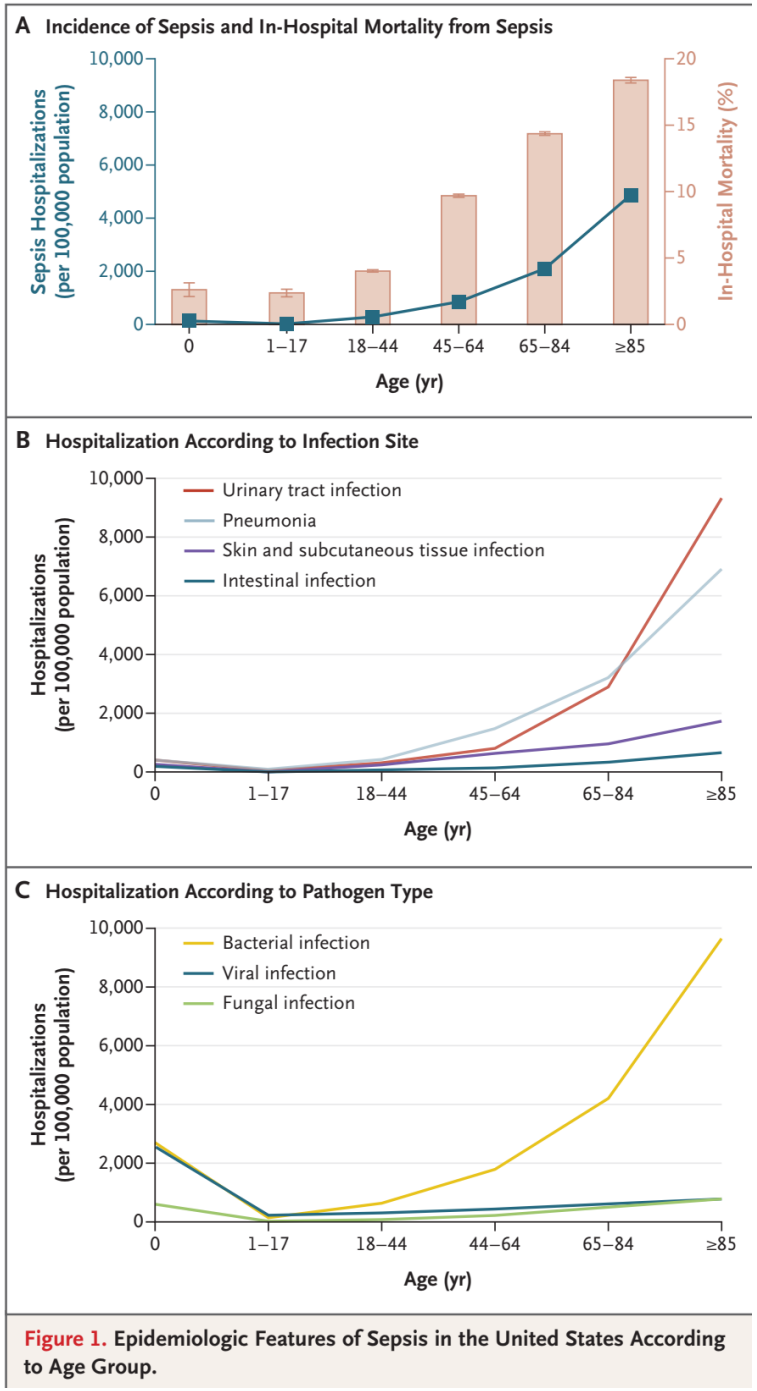
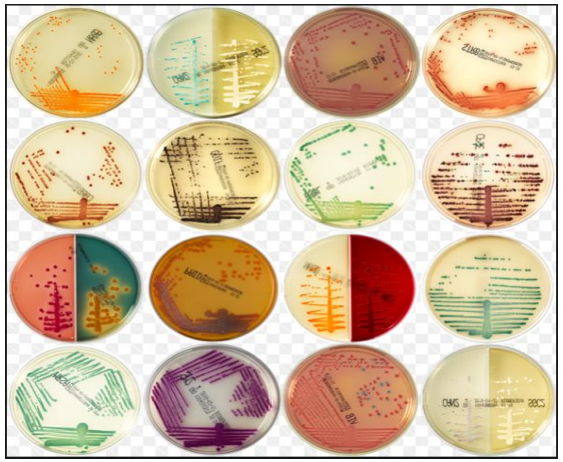


Figure 1. Epidemiologic Features of Sepsis in the United States According to Age Group.

Meyer , NEJM, 2024

Techniques

- Gold standard
  - culture microbiologique
  - puis antibiogramme (48H00)

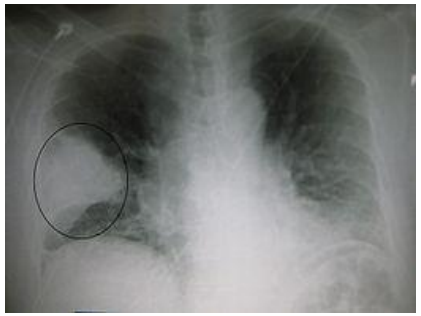


- PCR (Polymerase Chain Reaction)
  - Grippe
  - PCR multiplex spécifiques d'organe

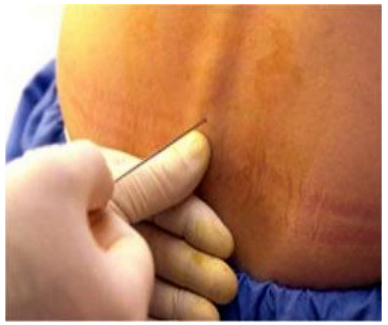
ePlex® Respiratory Pathogen Panel
- influenza viruses A–H1, A-H1N1, A-H3, and B;
- respiratory syncytial viruses [RSV] A and B;
- parainfluenza viruses [PIV] types 1, 2, 3, and 4;
- human metapneumovirus [hMPV];
- rhinovirus and/or enterovirus; coronaviruses 229E, HKU1, NL63, OC43, and MERS;
- adenovirus, and
- bocavirus) and
- four bacteria (*Bordetella pertussis, Chlamydophila pneumoniae, Legionella pneumophila,* and *Mycoplasma pneumoniae*).

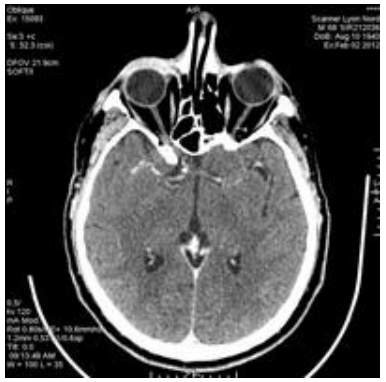
En pratique

Pour tous → PCT et hémocultures
Radiographie thoracique

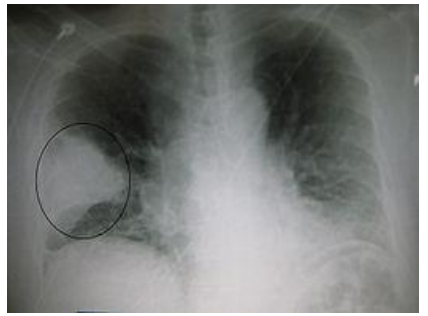


Neuro

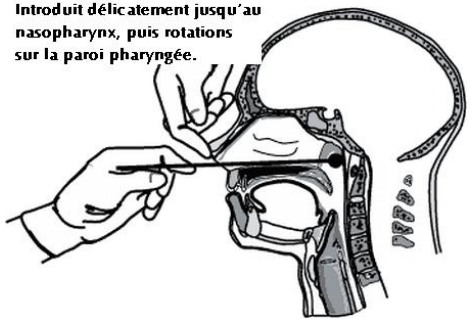




Pneumopathie

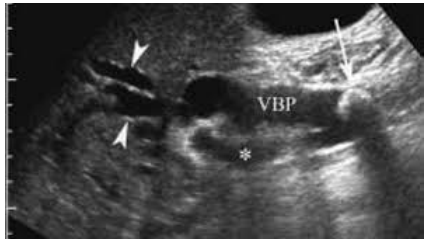


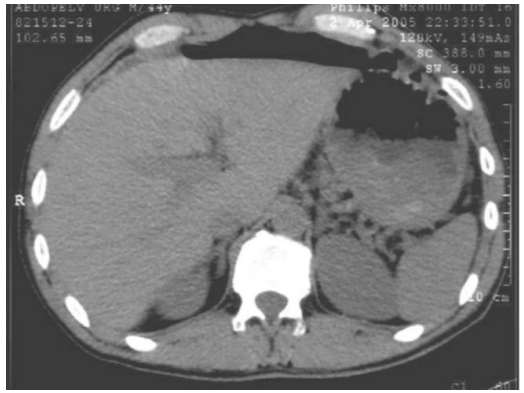
Ecouvillon Viroclut (vert)
Introduit délicatement jusqu'au nasopharynx, puis rotations sur la paroi pharyngée.



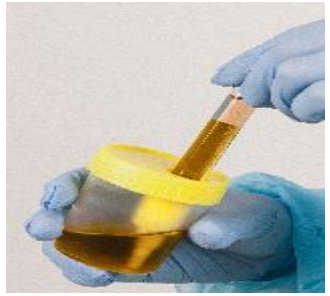
ECBC + Ag U L et P

Abdomen

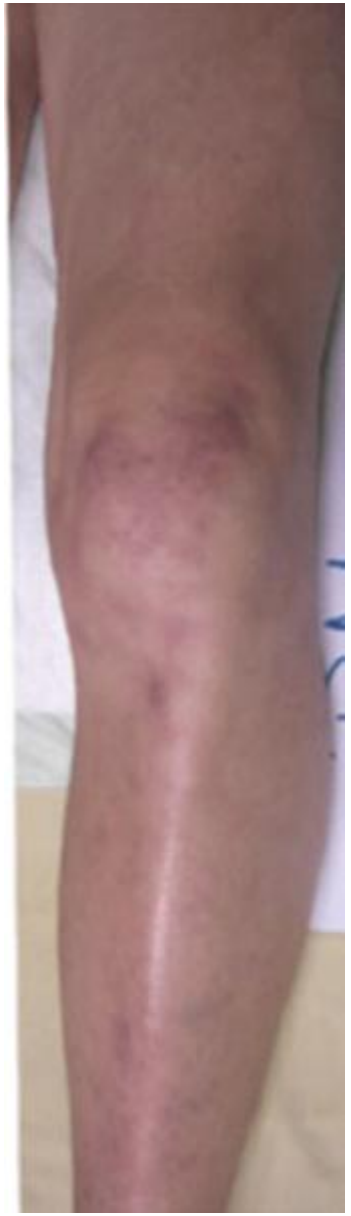




Urines



- Le patient a finalement reçu aux urgences 1000 mL de sérum physiologique.
- Sa Pam reste à 60 mmHg, FC 110 bpm, sat 98% en AA.
- Gaz du sang: pH=7.25; PaCO2 = 28 mmHg; HCO3-= 13 mmol/L; lactate 10 mmol/L.
- Pq 110 G/L; Hb 12.7 g/dL; GB 15 G/L; créat 350 µmol/L; bili 10 µmol/L; TP 70%; Fg 2.5 G/L.



Prise en charge du choc septique

Surviving sepsis campaign 2021

Quels sont les premiers éléments de votre prise en charge?

A. Admission en soins intensifs
B. Mise en place d'un **cathéter artériel**.
C. Objectif hémodynamique : **PAM ≥ 70 mmHg**
D. Introduction de la **noradrénaline**, **après mise en place d'une voie veineuse centrale**.
E. Antibiothérapie probabiliste à large spectre débutée sans délai, après hémocultures, sans attendre les résultats microbiologiques.

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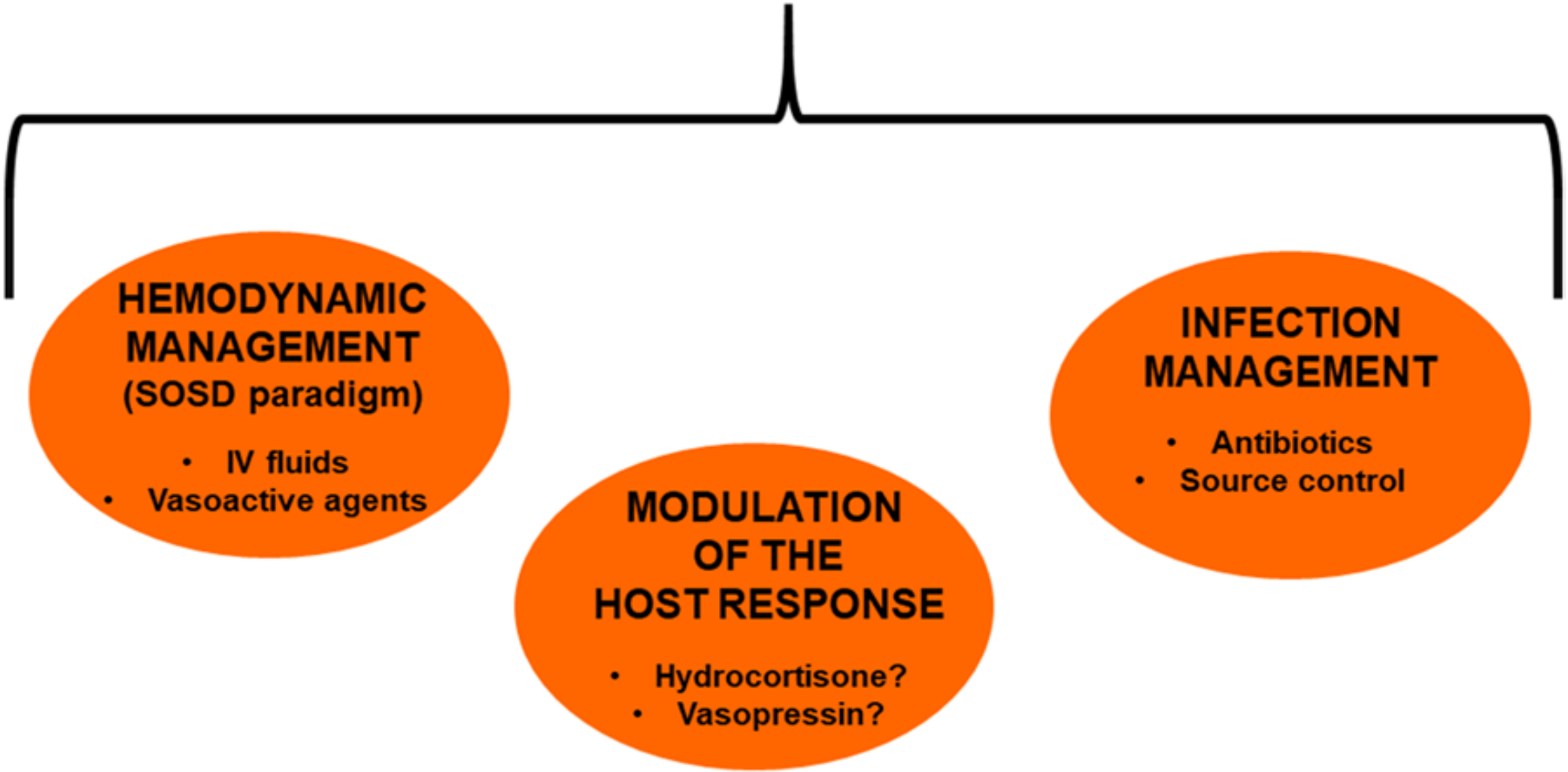
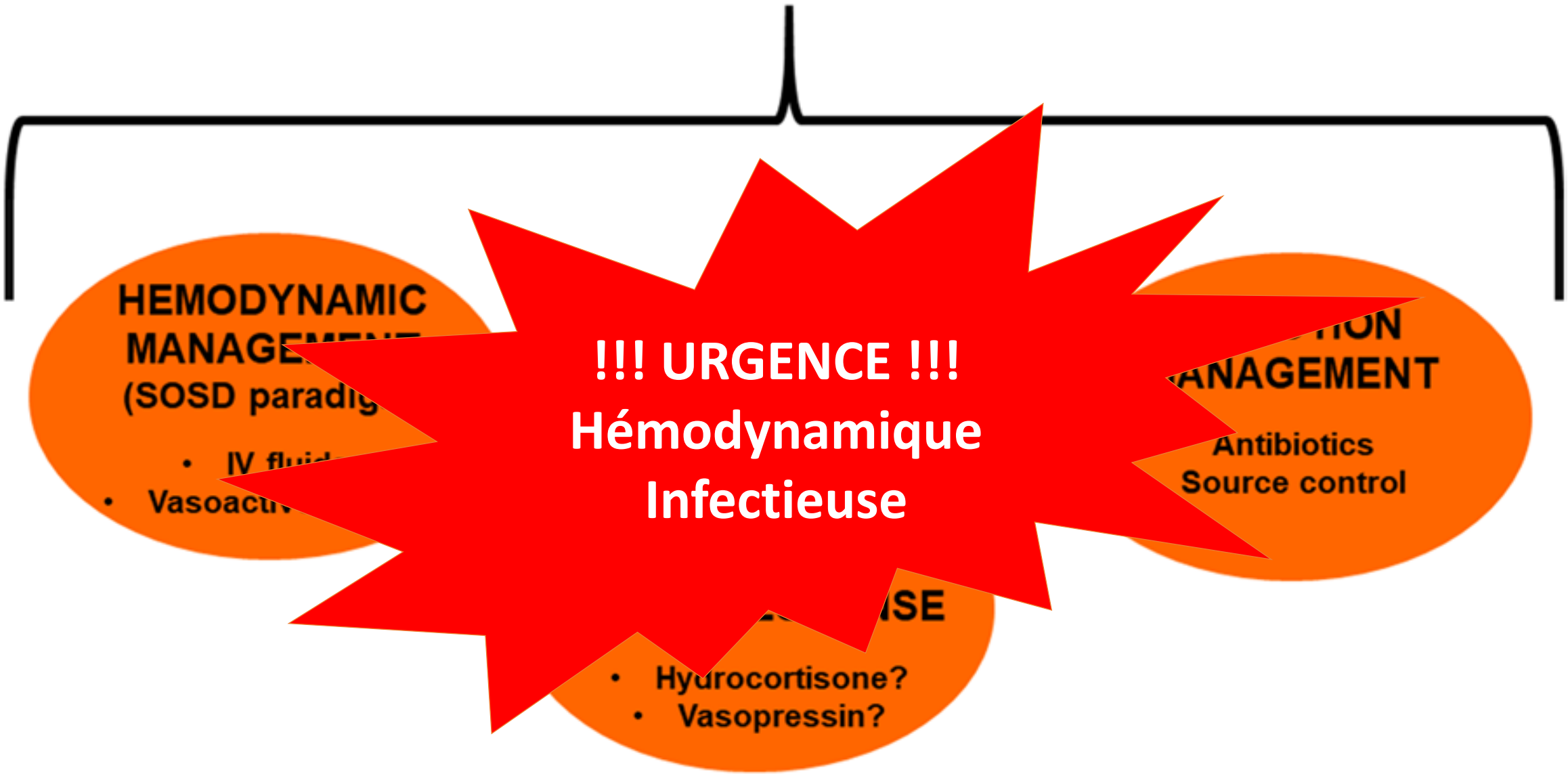
SEPSIS MANAGEMENT



Vincent, ICM, 2018

SEPSIS MANAGEMENT



Vincent, ICM, 2018

Protocoles de prise en charge

- **AGIR VITE**

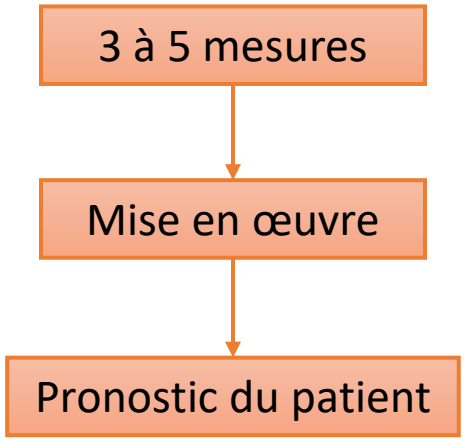
→détection, prélèvements, traitements

→Pour restaurer hémodynamique

→Pour contrôler la source

→Protocoliser les soins +++

→Avec une médecine plus « personnalisée »



Orientation précoce du patient

- Appel rapide du réanimateur
- Prise en charge au déchocage si sepsis confirmé= défaillance d'organe
- Transfert en réanimation, USI

- Fait partie des déterminants du pronostic

Quels objectifs de Pam ?

MODERATE

9 For adults with septic shock on vasopressors, we **recommend** an initial target mean arterial pressure (MAP) of 65 mm Hg over higher MAP targets.

Evans L et al. 2021 ICM
SSC Guideline 2021

Objectif de PAM ≥ 65 mmHg …

Une hypotension profonde et prolongée augmente la mortalité

Seuils variables dans la littérature entre 60 et 85 mmHg

Varpula et al. 2005 ICM *(65 mmHg); Dünser et al. 2009 ICM (60-75 mmHg); Dunser et al. 2009 Crit Care; Vincent et al. 2018 AIC; Maheshwari et al. 2018 ICM*

Quel objectif de perfusion?
Quel seuil!!!

Asfar et al. 2014 NEJM - *SEPSIS-PAM*
N=776 65±14 ans
Pas de différence entre 65-70 et 80-85 mmHg
MAIS:
cible haute favorise la FA
Cible haute diminue le risque d'insuffisance rénale chez les hypertendus chroniques

Lamontagne et al. JAMA 2020 – 65 trial
N=2600 >65 ans (75±7 ans)
Pas de différence entre hypoTA permissive (60-65) et SoC
DC90 41.0% (perm.) vs 43.8%(soC), RR 0.93; 95% CI, 0.85-1.03).
Après ajustement (post hoc): RR=0.82 (95% CI, 0.68 to 0.98). (en faveur Pam plus basse)

Endo et al. ICM 2025 – OPTPRESS
N=518 >65 ans (75±7 ans) choc septique
Surrisque décès pour PAM haute (80-85 mmHg) vs SOC (PAM 65-70)
By 90 days after randomisation, 101 patients (39.3%) in the high-target group and 74 (28.6%) in the control group had died from any cause (risk difference = 10.7; 95% confidence interval, 2.6–18.9).

VERY LOW

44 For adults with septic shock, we **suggest** starting vasopressors peripherally to restore mean arterial pressure rather than delaying initiation until a central venous access is secured.

ORIGINAL RESEARCH

Safety of peripheral administration of vasopressor medications: A systematic review

David H TIAN,[1] Claire SMYTH,[1] Gerben KEIJZERS,[2,3,4] Stephen PJ MACDONALD,[5,6] Sandra PEAKE,[7,8,9] Andrew UDY[8,10] and Anthony DELANEY[1,8,11,12]

EMA Emergency Medicine Australasia

Emergency Medicine Australasia (2020) **32**, 220–227

	Number of infusions	Dilution	Effective dose/mL	Duration (h)	Extravasation
Noradrenaline					
Cardenas-Garcia[10]	506	8–16 mg in 250 mL N/S	32–64 μg/mL	49 ± 22	16 (2.3%)
Lewis[18]	146	4 mg in 250 mL N/S	16 μg/mL	11.2 ± 15‡	4 (2.7%)
Medlej[11]	50	8 mg in 250 mL D5W	32 μg/mL	16.9 ± 18.9‡	2 (4.0%)

VASOPRESSEURS?

- Revue systématique
- 7 études/ 1382 patients
- Durée moyenne de perfusion 22 heures
- Extravasation 3.4% 95% CI 2.5-4.7%
- Aucune complication grave (nécroses, ischémies)

EMA Emergency Medicine Australasia

Emergency Medicine Australasia (2020) **32**, 210–219 doi: 10.1111/1742-6723.13394

Initiation of vasopressor infusions via peripheral *versus* central access in patients with early septic shock: A retrospective cohort study

Anthony DELANEY,[1,2,3] Mark FINNIS,[3,4] Rinaldo BELLOMO,[3,5] Andrew UDY,[3,6] Daryl JONES,[3,5] Gerben KEIJZERS,[7,8,9] Stephen MACDONALD[10,11] and Sandra PEAKE[3,12]

- Analyse post hoc de ARISE 937 patients
- 389 (42%) Vasopresseurs d'abord en périphérie vs 548 (58%) après abord central

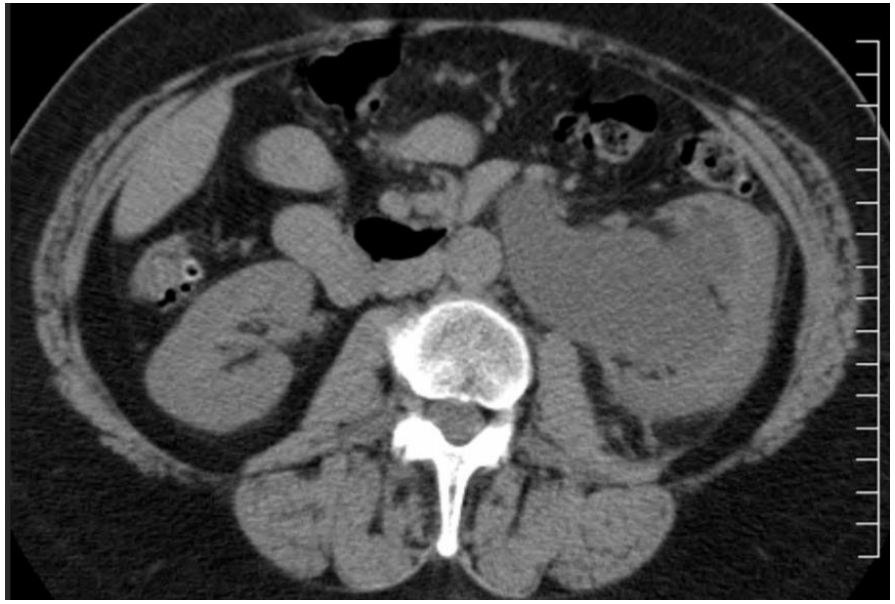
Mortalité (ajustée)	**RR=1.26 (0.95-1.67; p=0.11)**
Arrivée aux SAU-Antibiotiques	PV: 55 min vs CVC 71.5 min, p<0.001
Arrivée au SAU-Vasopresseurs	PV 2.4 h vs CVC 4.9 h, p<0.001

Prise en charge initiale aux urgences :

- **Remplissage vasculaire** par 2 L de **Ringer lactate**.
- **Introduction de la noradrénaline** en périphérie (VVP), à visée de soutien vasopresseur.
- **Antibiothérapie probabiliste à large spectre** initiée en urgence.
- Admission en soins intensifs

État clinique post-prise en charge initiale :

- **PAM à 65 mmHg** sous **noradrénaline 0,5 µg/kg/min**.
- Lactatémie à 5 mmol/L, pH à 7.36; PaCO2 à 28 mmHg.
- Absence de défaillance **respiratoire**, **neurologique** et **hépatique**.
- Présence d'une **insuffisance rénale aiguë** :
  - **Créatininémie** à 350 µmol/L.
  - **Oligurie** persistante.
- **Thrombopénie modérée** avec **plaquettes à 100 G/L**.



Vous réévaluez votre patient qui vient d'arriver en réanimation. Quels sont les éléments qui vous rassurent?

A. Le taux de lactate est à 5 mmol/L
B. Le pH est à 7.36
C. Un temps de recoloration cutané est à 4 secondes
D. Les marbrures sont toujours présentes mais n'ont pas augmentées
E. La Pam est contrôlée sous 0.5 µg/kg/min de noradrénaline

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Quels objectifs de perfusion ?

Evans L et al. 2021 ICM
SSC Guideline 2021

!! MODERATE

9 For adults with septic shock on vasopressors, we **recommend** an initial target mean arterial pressure (MAP) of 65 mm Hg over higher MAP targets.

! LOW

7 For adults with sepsis or septic shock, we **suggest** guiding resuscitation to decrease serum lactate in patients with elevated lactate level, over not using serum lactate.

NEW !

! LOW

8 For adults with septic shock, we **suggest** using capillary refill time to guide resuscitation as an adjunct to other measures of perfusion.

Baisse du lactate

LOW

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LOW

8 For adults with septic shock, we **suggest** using capillary refill time to guide resuscitation as an adjunct to other measures of perfusion.

Early Goal-Directed and Lactate-Guided Therapy in Adult Patients With Severe Sepsis and Septic Shock: A Meta-Analysis of Randomized Controlled Trials

Mortality benefit associated with lactate-guided resuscitation

Effect of a Resuscitation Strategy Targeting Peripheral Perfusion Status vs Serum Lactate Levels on 28-Day Mortality Among Patients With Septic Shock: The ANDROMEDA-SHOCK Randomized Clinical Trial

34.9% vs. 43.4% mortality, *P* = 0.06

Gu WJ, Zhang Z, Bakker J. Early lactate clearance-guided therapy in patients with sepsis: a meta-analysis with trial sequential analysis of randomized controlled trials. *Intensive Care Med.* 2015 Oct;41(10):1862-1863.

Ding XF, Yang ZY, Xu Z, et al. Early goal-directed and lactate-guided therapy in adult patients with severe sepsis and septic shock: a meta-analysis of randomized controlled trials. *J Transl Med.* 2018 Nov 29;16(1):331.

Hernandez G, Ospina-Tascon GA, Damiani LP, et al. Effect of a resuscitation strategy targeting peripheral perfusion status vs serum lactate levels on 28-day mortality among patients with septic shock: the ANDROMEDA-SHOCK randomized clinical trial. *JAMA.* 2019 Feb 19;321(7):654-664.

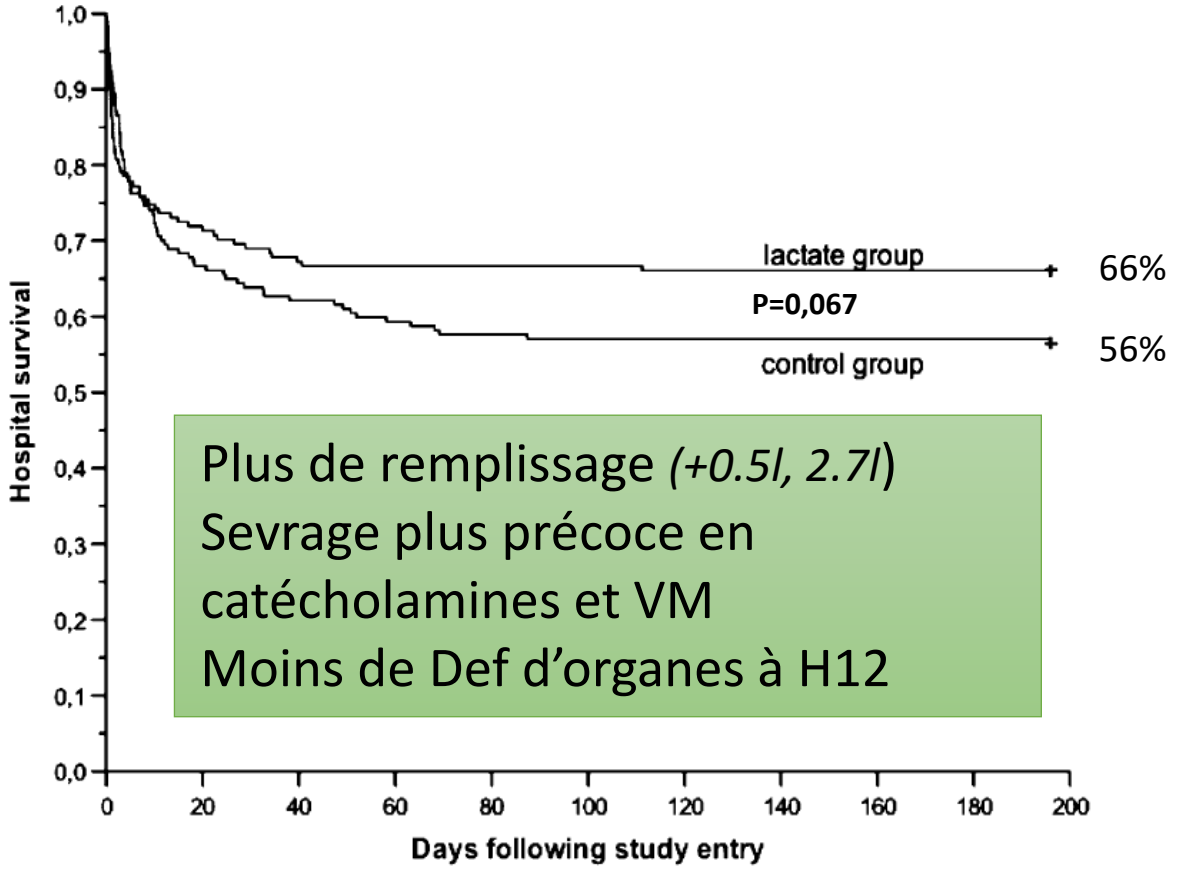
Early Lactate-Guided Therapy in Intensive Care Unit Patients

RCT multicentrique Hollande
348 patients Réanimation
2006 - 2008

Inclusion
ICU
Lactate≥3mmol/L

Intervention « open label »

Objectif ↓ ≥20% lactate /2h
Vs
Réanimation sans lactate
(excepté celui d'entrée)
Pendant 8 heures



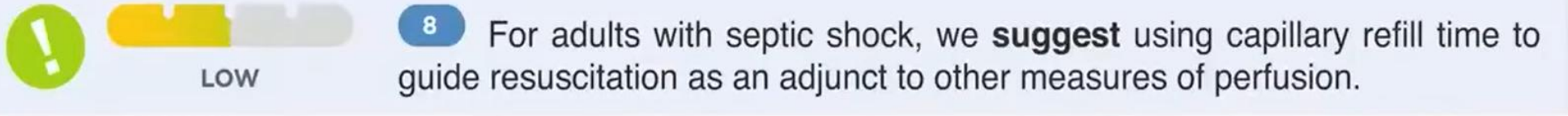
Plus de remplissage *(+0.5l, 2.7l)*
Sevrage plus précoce en catécholamines et VM
Moins de Def d'organes à H12

Après ajustement / facteurs de risque prédéfinis de mortalité

HR 0,61 (IC 95% 0,43 – 0,87 ; p=0,006)

Jansen et al. Am J Respir Crit Care Med. 2010 Sep 15;182(6):752-61

Temps de recoloration cutanée



Temps de recoloration cutanée

LOW

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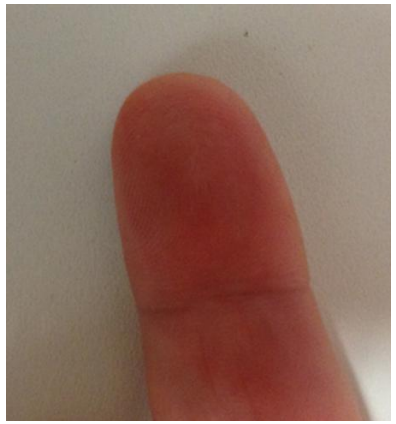
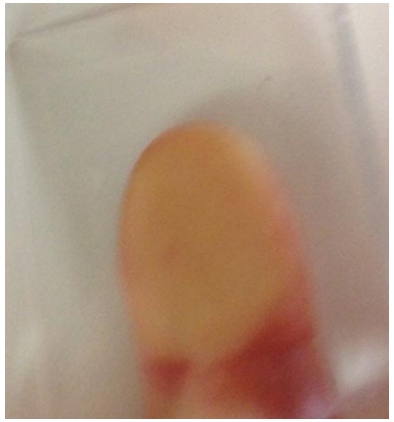


Vitropression
Pulpe de l'index
10 secondes



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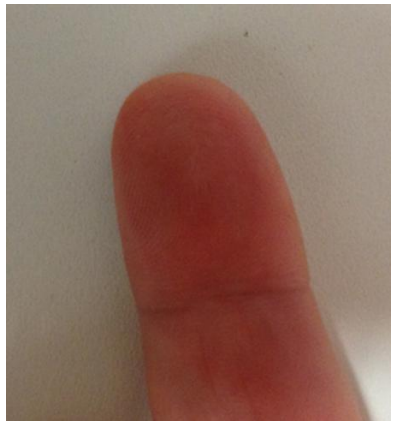

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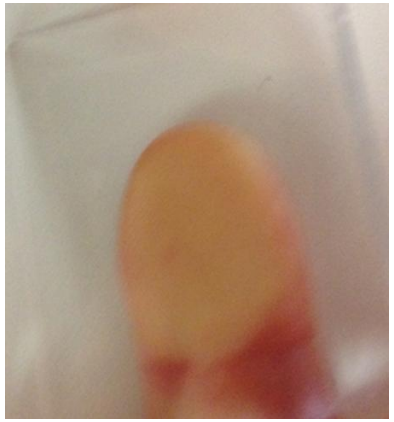
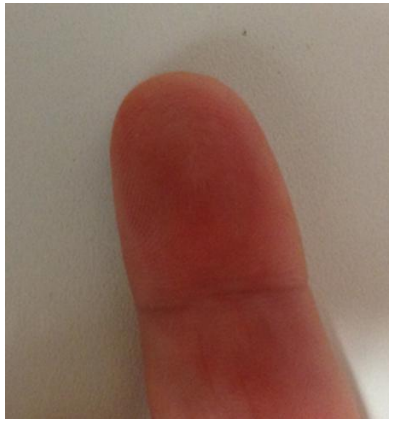


TRC normal
< 3 sec



Research

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Effect of a Resuscitation Strategy Targeting Peripheral Perfusion Status vs Serum Lactate Levels on 28-Day Mortality Among Patients With Septic Shock

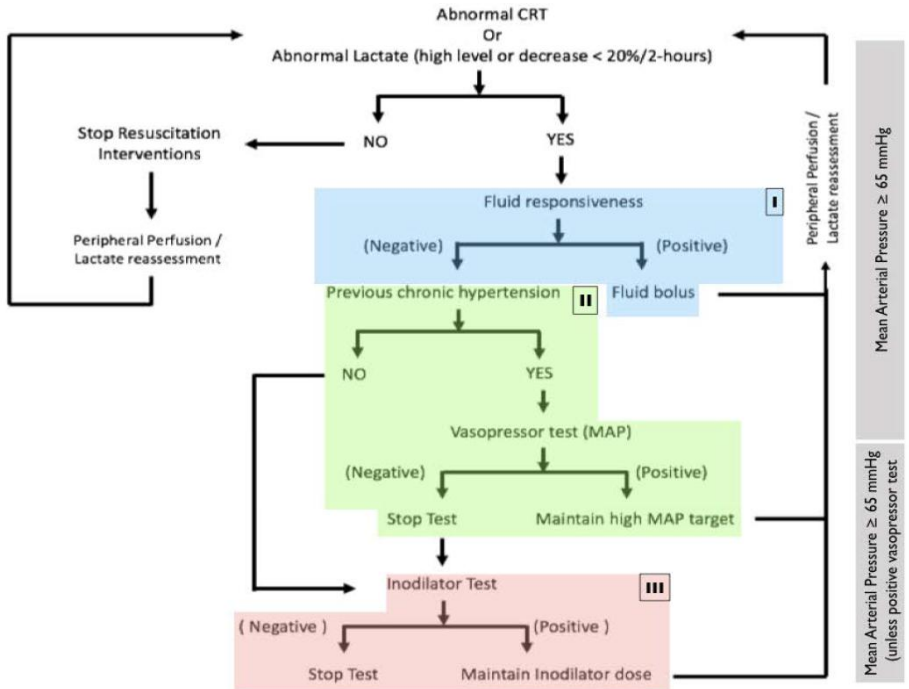
The ANDROMEDA-SHOCK Randomized Clinical Trial

Glenn Hernández, MD, PhD; Gustavo A. Ospina-Tascón, MD, PhD; Lucas Petri Damiani, MSc; Elisa Estenssoro, MD; Arnaldo Dubin, MD, PhD; Javier Hurtado, MD; Gilberto Friedman, MD, PhD; Ricardo Castro, MD, MPH; Leyla Alegría, RN, MSc; Jean-Louis Teboul, MD, PhD; Maurizio Cecconi, MD, FFICM; Giorgio Ferri, MD; Manuel Jibaja, MD; Ronald Pairumani, MD; Paula Fernández, MD; Diego Barahona, MD; Vladimir Granda-Luna, MD, PhD; Alexandre Biasi Cavalcanti, MD, PhD; Jan Bakker, MD, PhD; for the ANDROMEDA-SHOCK Investigators and the Latin America Intensive Care Network (LIVEN)

- Lactate level/2h

vs

- CRT/30 mn for 8 hours



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Vladimir Granda-Luna, MD, PhD; Al
ANDROMEDA-SHOCK Investigators

- Lactate level/2h

vs

- CRT/30 mn for 8 hours

Outcome	Peripheral Perfusion-Targeted Resuscitation (n = 212)	Lactate Level-Targeted Resuscitation (n = 212)	Unadjusted Absolute Difference (95% CI)	Adjusted Relative Measure (95% CI)	*P* Value
Primary Outcome					
Death within 28 d, No. (%)	74 (34.9)	92 (43.4)	−8.5 (−18.2 to 1.2)[b]	HR, 0.75 (0.55 to 1.02)[a]	.06[a]
Secondary Outcomes					
Death within 90 d, No. (%)	87 (41.0)	99 (46.7)	−5.7 (−15.6 to 4.2)[b]	HR, 0.82 (0.61 to 1.09)[a]	.17[a]
Mechanical ventilation–free days within 28 d, mean (SD)[c]	14.6 (12.1)	12.7 (12.2)	1.9 (−0.6 to 4.3)		.14
Renal replacement therapy–free days within 28 d, mean (SD)[c]	18.5 (12.1)	16.9 (12.1)	1.7 (−1.5 to 4.8)		.31
Vasopressor-free days within 28 d, mean (SD)[c]	16.7 (12.0)	15.1 (12.3)	1.6 (−0.7 to 3.9)		.18
SOFA at 72 h, No.[d]	165	166			.045
Mean (SD)	5.6 (4.3)	6.6 (4.7)	−1.00 (−1.97 to −0.02)		
ICU length of stay, mean (SD), d[e]	9.1 (9.8)	9.0 (9.6)	0.1 (−1.7 to 2.0)		.91
Hospital length of stay, mean (SD), d[f]	22.9 (28.8)	18.3 (19.0)	4.6 (0.0 to 9.1)		.05
Exploratory Outcomes					
Amount of resuscitation fluids within the first 8 h, No.	206	209			
Mean (SD), mL	2359 (1344)	2767 (1749)	−408 (−705 to −110)		.01

JAMA. 2019;321(7):654-664.

Research

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Effect of a Resuscitation Strategy Targeting Peripheral Perfusion Status vs Serum Lactate Levels on 28-Day Mortality Among Patients With Septic Shock

The ANDROMEDA-SHOCK Randomized Clinical Trial

Glenn Hernández, MD, PhD; Gustavo A. Ospina-Tascón, MD, PhD; Lucas Petri Damiani, MSc; Elisa Estenssoro, MD; Arnaldo Dubin, MD, PhD; Javier Hurtado, MD; Gilberto Friedman, MD, PhD; Ricardo Castro, MD, MPH; Leyla Alegría, RN, MSc; Jean-Louis Teboul, MD, PhD; Maurizio Cecconi, MD, FFICM; Giorgio Ferri, MD; Manuel Jibaja, MD; Ronald Pairuma; Vladimir Granda-Luna, MD, PhD; Al; ANDROMEDA-SHOCK Investigators

- Lactate level/2h

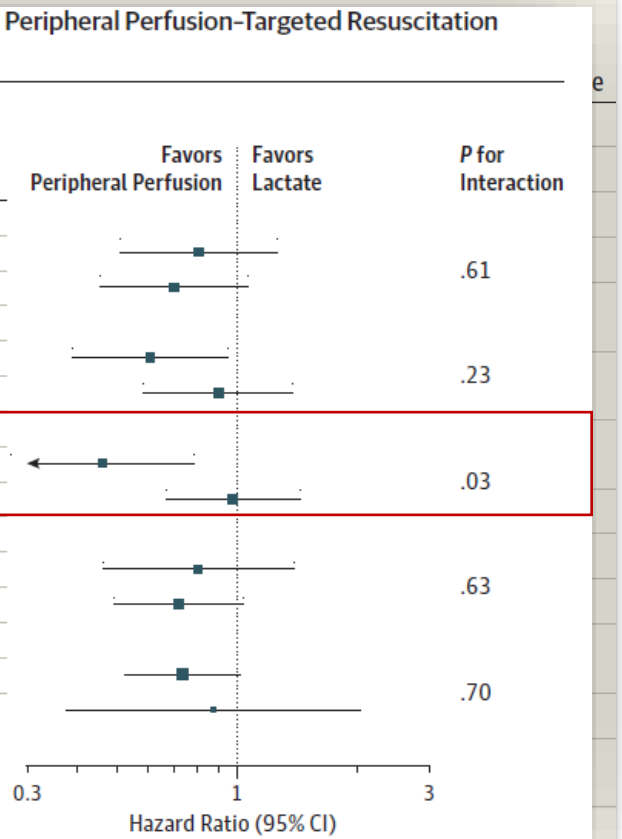
vs

- CRT/30 mn for 8 hours

Peripheral Lactate

Figure 3. Risk of Death Within 28 Days in the Prespecified Subgroups Among Patients Treated With Peripheral Perfusion–Targeted Resuscitation vs Lactate Level–Targeted Resuscitation

Subgroup	No. of Events/Total (%): Peripheral Perfusion–Targeted Resuscitation	No. of Events/Total (%): Lactate Level–Targeted Resuscitation	Hazard Ratio (95% CI)	*P* for Interaction
Baseline lactate, mmol/L				
>4	37/85 (43.5)	41/88 (46.6)	0.82 (0.52-1.28)	.61
≤4	37/127 (29.1)	51/124 (41.1)	0.70 (0.46-1.07)	
APACHE II				
<25	32/130 (24.6)	49/135 (36.3)	0.61 (0.39-0.96)	.23
≥25	42/82 (51.2)	43/77 (55.8)	0.90 (0.59-1.38)	
SOFA				
<10	21/103 (20.4)	42/107 (39.3)	0.46 (0.27-0.78)	.03
≥10	53/109 (48.6)	50/105 (47.6)	0.98 (0.67-1.45)	
Confirmed source of infection				
No	25/61 (41)	26/59 (44.1)	0.84 (0.48-1.45)	.63
Yes	49/151 (32.5)	66/153 (43.1)	0.71 (0.49-1.03)	
Lactate decrease from admission to baseline measurement, %				
≤10	64/181 (35.4)	80/171 (46.8)	0.73 (0.53-1.02)	.70
>10	10/31 (32.3)	12/41 (29.3)	0.87 (0.38-2.04)	



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- Lactate level/2h

vs

- CRT/30 mn for 8 hours

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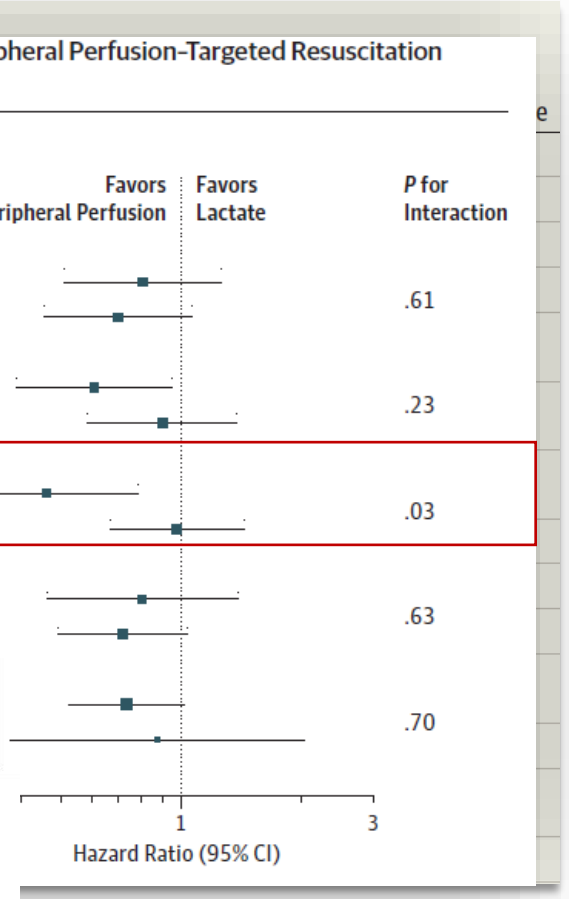

Table 2. Landmark Sepsis Clinical Trials since 2015.*

Trial or Trials	Patients	Intervention and Control	Outcome	Interpretation and Lessons Learned
ANDROMEDA-SHOCK[70,71]	424 Patients with septic shock and lactate level ≥2.0 mmol/liter at 28 sites in Argentina, Chile, Colombia, Ecuador, and Uruguay	Capillary refill normalization vs. lactate normalization	28-Day mortality, 34.9% vs. 43.4% (P=0.06)	Capillary refill–guided resuscitation was associated with better outcomes than lactate normalization. In practice, both methods can be used.

JAMA. 2019;321(7):654-664.

Intensive Care Med (2011) 37:801–807
DOI 10.1007/s00134-011-2163-y

ORIGINAL

H. Ait-Oufella
S. Lemoinne
P. Y. Boelle
A. Galbois
J. L. Baudel
J. Lemant
J. Joffre
D. Margetis
B. Guidet
E. Maury
G. Offenstadt

Mottling score predicts survival in septic sh

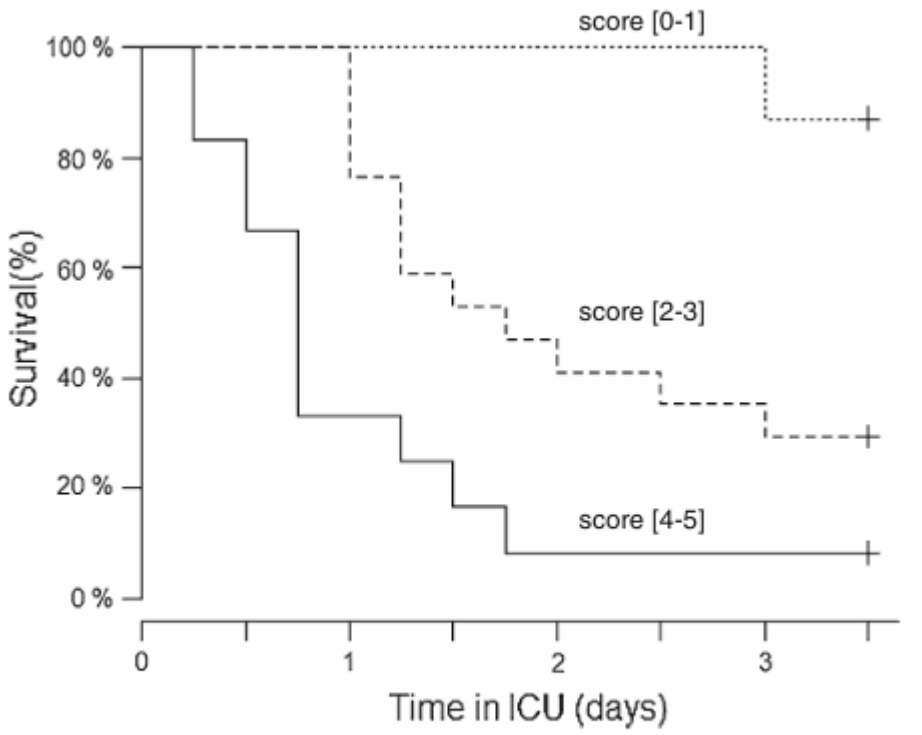

Fig. 2 Kaplan-Meier survival estimates according to the H6 mottling score. Larger mottling scores were associated with earlier death ($p < 0.0001$)

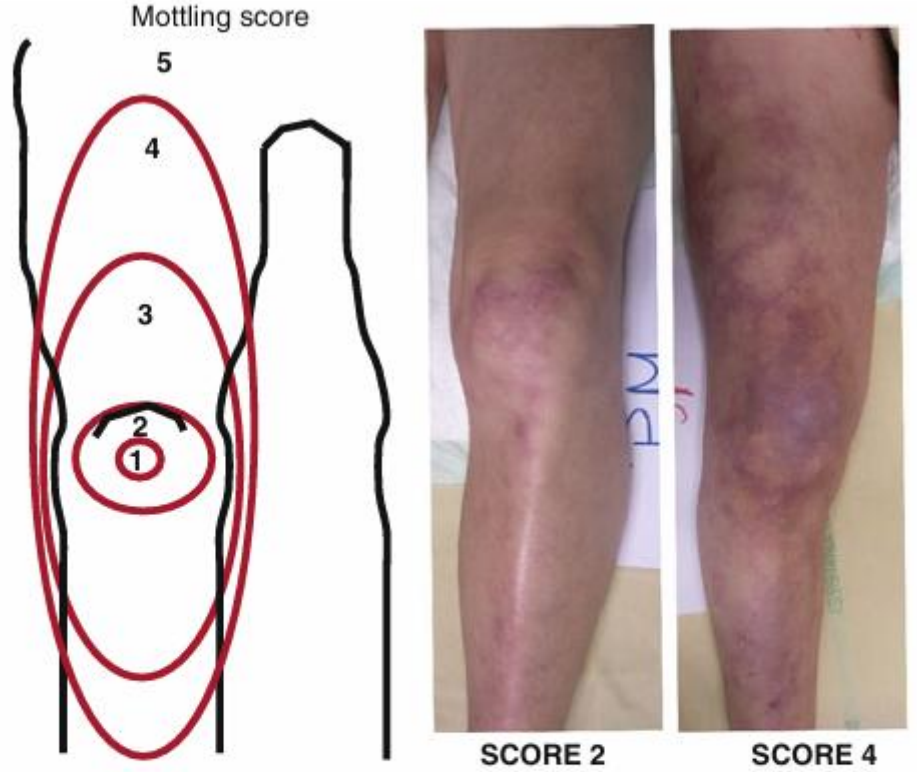

Fig. 1 *Left*: the mottling score is based on a mottling area extension on the legs. Score 0 indicates no mottling; score 1, a modest mottling area (coin size) localized to the center of the knee; score 2, a moderate mottling area that does not exceed the superior edge of the kneecap; score 3, a mild mottling area that does not exceed the middle thigh; score 4, a severe mottling area that does not go beyond the fold of the groin; score 5, an extremely severe mottling area that goes beyond the fold of the groin. *Right*: Examples of the mottling score

Depuis une heure en soins intensifs, malgré encore 1.5 L de remplissage par Ringer Lactate, vous arrivez à peine à obtenir une Pam > 65 mmHg avec une noradrénaline à 0.75 µg/kg/min.

Quel est alors la suite de votre prise en charge

A. Introduction de vasopressine
B. Vous poursuivez le remplissage avec du ringer lactate
C. Drainage urinaire en urgence
D. Administration d'hémisuccinate d'hydrocortisone
E. Mise en place d'une voie veineuse centrale

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Quel est alors la suite de votre prise en charge

A. **Introduction de vasopressine**
B. **Vous poursuivez le remplissage avec du ringer lactate**
C. **Drainage urinaire en urgence**
D. **Administration d'hémisuccinate d'hydrocortisone**
E. **Mise en place d'une voie veineuse centrale**

Quelle expansion volémique?

LOW

5 For patients with sepsis induced hypoperfusion or septic shock we **suggest** that at least 30 mL/kg of intravenous (IV) crystalloid fluid should be given within the first 3 hours of resuscitation.

Earlier SSC guidelines (2004, 2008, 2012) recommended EGDT.
Based on PROMISE, PROCESS, and ARISE, this was simplified to 30 mL/kg in 2016.
There are no trials testing fluid volume.

PRISM meta-analysis fluid pre-randomization		
	EGDT	Usual Care
Median	27.5 ml/kg	27.7ml/hr

2016 STATEMENT

*"We **recommend** that in the initial resuscitation from sepsis-induced hypoperfusion, at least 30ml/kg of intravenous crystalloid fluid be given within the first 3 hours."*

Multicenter Implementation of a Treatment Bundle for Patients With Sepsis and Intermediate Lactate Values

Mortality decline was mediated by increased fluid and decreased mortality among patients with history of heart failure and/or kidney disease.

PRISM Investigators, Rowan KM, Angus DC, et al. Early, goal-directed therapy for septic shock: a patient-level meta-analysis. *N Engl J Med.* 2017 Jun 8;376(23):2223-2234.
Liu VX, Morehouse JW, Marelich GP, et al. Multicenter implementation of a treatment bundle for patients with sepsis and intermediate lactate values. *Am J Respir Crit Care Med.* 2016 Jun 1;193(11):1264-1270.

Table 2. Landmark Sepsis Clinical Trials since 2015.*

Trial or Trials	Patients	Intervention and Control	Outcome	Interpretation and Lessons Learned
ARISE,[57] ProCESS,[58] and ProMISe[59]	ARISE: 1600 patients with septic shock at 51 sites in Australia and New Zealand ProCESS: 1341 patients with septic shock at 31 U.S. sites ProMISe: 1260 patients with septic shock at 56 U.K. sites	ARISE: EGDT vs. usual care ProCESS: EGDT vs. protocol-based "standard" therapy vs. usual care ProMISe: EGDT vs. usual care	ARISE: 90-day mortality, 18.6% vs. 18.8% (P=0.90) ProCESS: 60-day in-hospital mortality, 21.8% vs. 18.2% vs. 18.9% (P=0.83) ProMISe: 90-day mortality, 29.5% vs. 29.2% (P=0.90)	These trials showed that outcomes were similar with EGDT and usual care. Patients in these trials were less sick than those in the Rivers et al. trial (e.g., baseline $ScvO_2$ 70% vs. 49%).[60] However, there was no indication of benefit with EGDT across any subgroups examined in a meta-analysis of data from individual patients, including more severely ill patients.[61] Although these trials suggest that EGDT and usual care yield equivalent outcomes, EGDT is more labor-intensive, and standard care has evolved away from it.

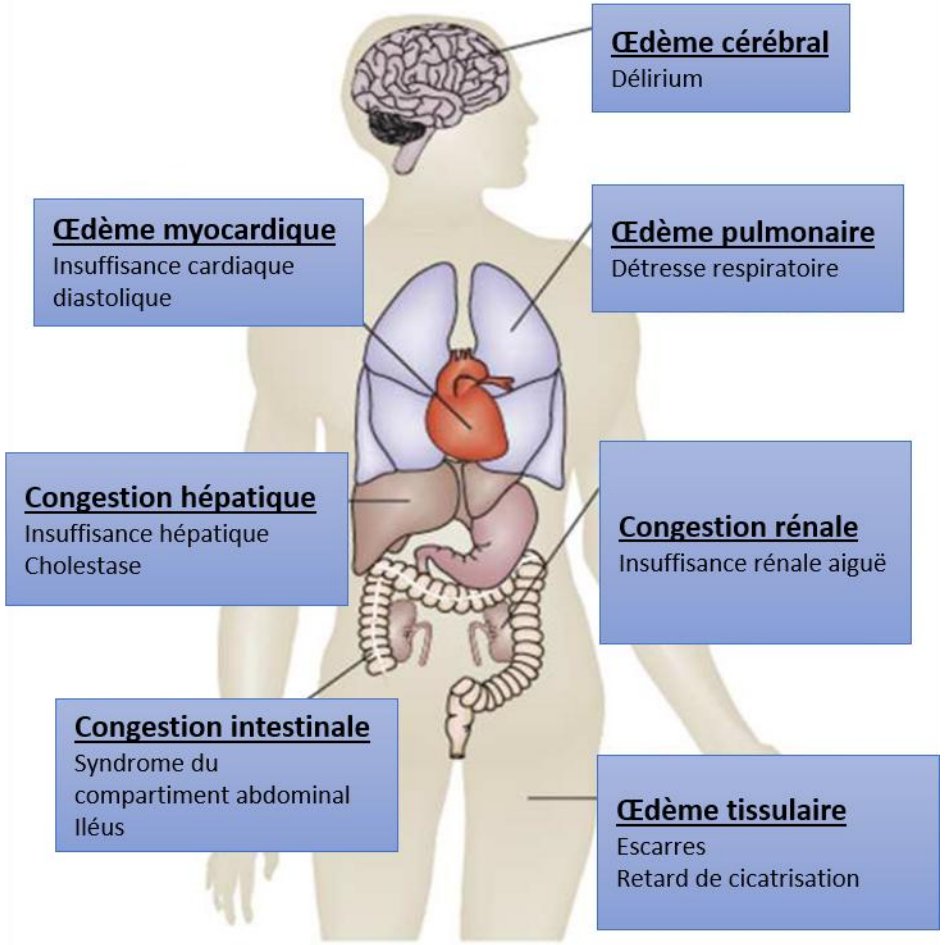
Balance bénéfice/risque du remplissage

Bénéfices

- ↗ du DC et du TaO2
- Éviter les défaillances d'organes

Risques

- Congestion
- Défaillances d'organes



Prowle, Nature Reviews Nephrology, 2010

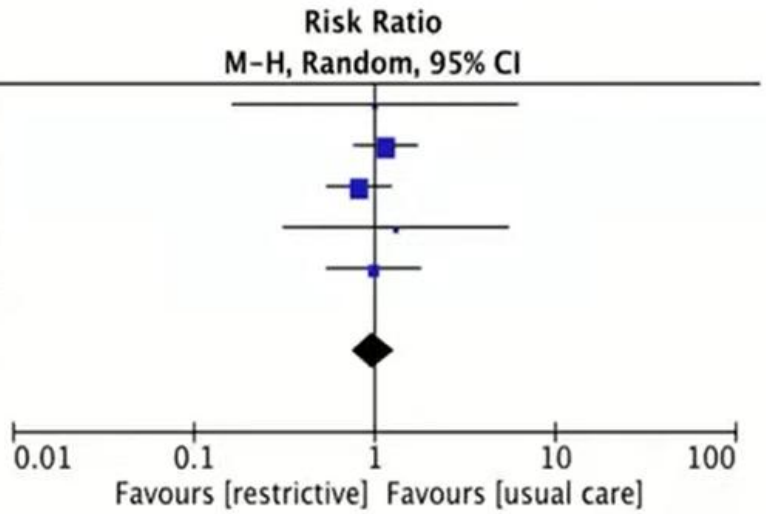
45 There is insufficient evidence to make a recommendation on the use of restrictive versus liberal fluid strategies in the first 24 hours of resuscitation in patients with sepsis and septic shock who still have signs of hypoperfusion and volume depletion after the initial resuscitation.

5 pilot RCTs: no signal, wide heterogeneity in definitions of conservative vs. liberal fluid approach.

Study or Subgroup	Restrictive Events	Restrictive Total	Usual care Events	Usual care Total	Weight	Risk Ratio M-H, Random, 95% CI
BALANCE	2	15	2	15	2.0%	1.00 [0.16, 6.20]
Chen 2015	23	41	20	41	38.9%	1.15 [0.76, 1.74]
CLASSIC	25	75	31	76	38.0%	0.82 [0.54, 1.24]
REFRESH	4	50	3	49	3.2%	1.31 [0.31, 5.54]
RIFTS	15	55	15	54	18.0%	0.98 [0.53, 1.81]
Total (95% CI)		**236**		**235**	**100.0%**	**0.98 [0.76, 1.27]**
Total events	69		71			

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 1.45$, df = 4 (P = 0.83); $I^2 = 0\%$

Test for overall effect: Z = 0.13 (P = 0.90)



Semler MW, Janz DR, Casey JD, Self WH, Rice TW. Conservative fluid management after sepsis resuscitation: a pilot randomized trial. *J Intensive Care Med*. 2020 Dec;35(12):1374-1382.
Chen C, Kollef MH. Targeted fluid minimization following initial resuscitation in septic shock: a pilot study. *Chest*. 2015 Dec;148(6):1462-1469.
Hjortrup PB, Haase N, Bundgaard H, et al; CLASSIC Trial Group; Scandinavian Critical Care Trials Group. Restricting volumes of resuscitation fluid in adults with septic shock after initial management: the CLASSIC randomised, parallel-group, multicentre feasibility trial. *Intensive Care Med*. 2016 Nov;42(11):1695-1705.
Macdonald SPJ, Keijzers G, Taylor DM, et al; REFRESH trial investigators. Restricted fluid resuscitation in suspected sepsis associated hypotension (REFRESH): a pilot randomised controlled trial. *Intensive Care Med*. 2018 Dec;44(12):2070-2078.
Corl KA, Prodromou M, Merchant RC, et al. The Restrictive IV Fluid Trial in Severe Sepsis and Septic Shock (RIFTS): a randomized pilot study. *Crit Care Med*. 2019 Jul;47(7):951-959.

Table 2. Landmark Sepsis Clinical Trials since 2015.*

Trial or Trials	Patients	Intervention and Control	Outcome	Interpretation and Lessons Learned
CLASSIC[74] and CLOVERS[75]	CLASSIC: 1554 patients with septic shock at 31 sites in Europe CLOVERS: 1563 patients with sepsis-induced hypotension	CLASSIC: fluid-restrictive resuscitation vs. usual care CLOVERS: fluid-restrictive vs. fluid-liberal resuscitation	CLASSIC: 90-day mortality, 42.3% vs. 42.1% (P=0.46) CLOVERS: 90-day mortality, 14.0% vs. 14.9%; estimated difference, −0.9 percentage points; 95% CI, −4.4 to 2.6 (P=0.61)	Fluid-restrictive and fluid-liberal resuscitation yielded similar outcomes in the overall trial populations, which suggests that more personalized approaches may be needed. Nearly all patients received ≥30 ml of fluids per kilogram, so these trials provide no data on the safety of limiting resuscitation to <30 ml/kg.

* ADRENAL denotes Adjunctive Corticosteroid Treatment in Critically Ill Patients with Septic Shock, APROCCHSS Activated Protein C and Corticosteroids for Human Septic Shock, ARISE Australasian Resuscitation in Sepsis Evaluation, BaSICS Balanced Solution versus Saline in Intensive Care Study, CLASSIC Conservative versus Liberal Approach to Fluid Therapy of Septic Shock in Intensive Care, CLOVERS Crystalloid Liberal or Vasopressors Early Resuscitation in Sepsis, EGDT early goal-directed therapy, FRESH Fluid Response Evaluation in Sepsis Hypotension and Shock, IV intravenous, JVP jugular venous pressure, PHANTASi Prehospital Antibiotics Against Sepsis Trial, ProCESS Protocolized Care for Early Septic Shock, ProMISe Protocolised Management in Sepsis, $ScvO_2$ central venous oxygen saturation, SMART Isotonic Solutions and Major Adverse Renal Events Trial, and SSSP-2 Simplified Severe Sepsis Protocol 2.

JAMA Network | Open 2018

Invited Commentary | Emergency Medicine

Toward a More Nuanced Approach to the Early Administration of Intravenous Fluids in Patients With Sepsis

Chanu Rhee, MD, MPH; Andre C. Kalil, MD, MPH

- Bayesian analysis of 37 EGDT studies (20 000 patients) suggested that the mortality benefit in the EGDT solely explained by earlier administration of appropriate antibiotics, rather than intravenous fluids or any of the protocol's hemodynamic targets. Kalil et al – *Crit Care Med. 2017;45(4):607-614*
- Time to IV 30 ml/kg bolus fluids is not related to mortality during mandated emergency care for sepsis
  Seymour et al - *NEJM. 2017;376(23):2235-2244*
- In a large US database of 35,135 patients a low volume resuscitation (1–4.99 L) improves prognosis but, in patients receiving high volume resuscitation (5 to ≥ 9 L), the mortality increases by 2.3% (95% CI 2.0, 2.5%; *p = 0.0003) for each additional liter.* *Marik et al* - Intensive Care Med 2017; 43:625–632
- A multicenter analysis (SEP-1) suggested that failing on the 3-hour antibiotic measure was associated with higher mortality, while failing the treatment bundle on any other component (including the 30-mL/kg fluid requirement) was not. Rhee C et al - *Crit Care Med. 2018;46(10):1585-1591*
- Positive fluid balance and weight gain are associated with a poorer outcome in sepsis
  Sakr Y- *Crit Care Med. 2017;45(3):386-394.*
  Andrews B (RCT). *JAMA. 2017;318(13):1233-1240.*
  Gros A - Crit Care Med. 2018 Oct;46(10):e981-e987

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LOW

33 For adults with sepsis or septic shock, we **suggest** using balanced crystalloids instead of normal saline for resuscitation.

Balanced Crystalloids Versus Saline in Sepsis: A Secondary Analysis of the SMART Clinical Trial

Sepsis subgroup from SMART:
26.3% vs. 31.2% mortality
aOR 0.74 (0.59, 0.93)

Effect of Intravenous Fluid Treatment With a Balanced Solution vs 0.9% Saline Solution on Mortality in Critically Ill Patients: The BaSICS Randomized Clinical Trial

Sepsis subgroup:
46.7% vs. 49.0% mortality
aOR 0.93 (0.82, 1.06)

Interpretation and Lessons Learned

These trials showed that resuscitation with balanced solutions is associated with better outcomes than resuscitation with normal saline, particularly among patients with sepsis and when used from the onset of resuscitation.

Smart trial – Semple – NEJM 2018; BASICS RCT – Zampieri – JAMA 2021

36 For adults with sepsis and septic shock, we **suggest against** using gelatin for resuscitation.

2016 STATEMENT

*"We **suggest** using crystalloids over gelatins when resuscitating patients with sepsis or septic shock."*

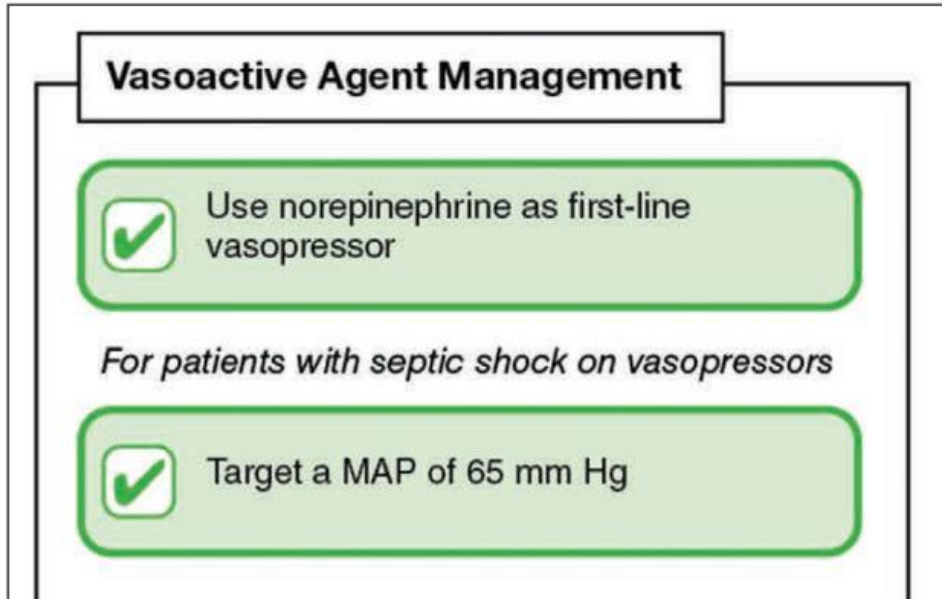
Surviving Sepsis Campaign

Amines et autres traitements cardiovasculaires

1. Si persistance hypotension malgré remplissage → amines vasopressives.
2. Noradrénaline +++ → ↗ PA, ainsi que des débits régionaux, sans augmentation de la FC.
3. Objectifs de Pam ≥ 65 mmHg; plus haut chez les patients hypertendus??[1]
   Introduction précoce
4. Si échec noradrénaline
   1. Ajout de Vasopressine (0,03 unité/minute)[2] ,
   Quand NaD > 0.25 – 0.5 µg/kg/min
5. Dobutamine est l'inotrope recommandé en première intention.
   1. Indication non clairement définie
   2. SSC: si dysfonction cardiaque
   3. 2.5 à 5 µg/kg/min

1. Asfar, NEJM, 2014; 2. Russel, NEJM, 2008

Vasoactive Agent Management



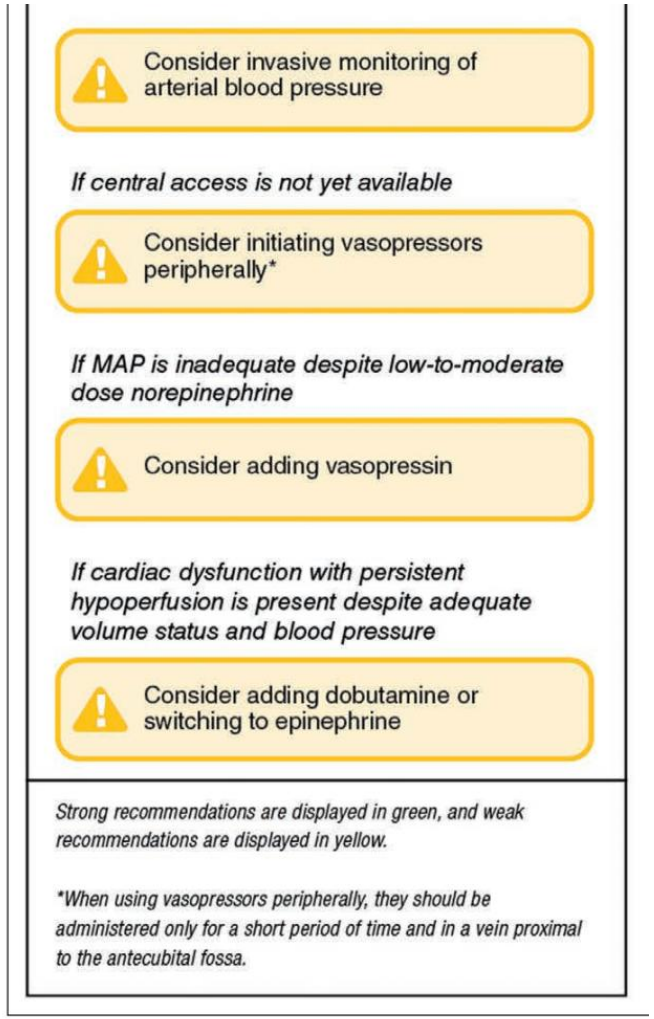


Figure 2. Summary of vasoactive agents recommendations.

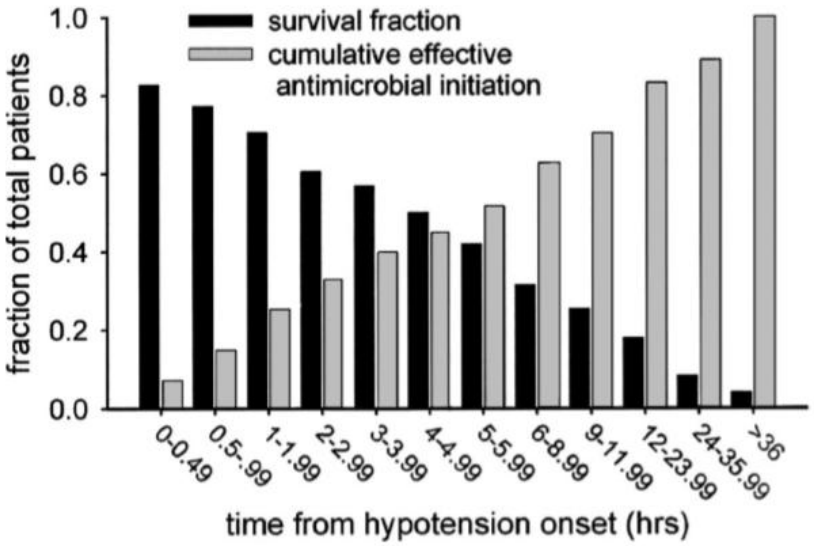
Management de l'infection

Recommendations		Strength
Infection Control		
	For possible septic shock or a high likelihood of sepsis, administer antimicrobials immediately.	Strong
	For possible sepsis without shock, complete a time-limited evaluation, administer antimicrobials within 3 hours if concern for infection persists.	Strong
	For sepsis or septic shock, evaluate whether source control is needed.	Strong
	For sepsis or septic shock, remove of intravascular access devices that are a possible source once other vascular access is established.	Strong
	For sepsis or septic shock, assess daily for de-escalation of antimicrobials.	Weak
	For sepsis or septic shock, use shorter over longer duration of antimicrobial therapy.	Weak
	When optimal duration of antimicrobial therapy is unclear, use procalcitonin and clinical evaluation to decide when to discontinue antimicrobials.	Weak

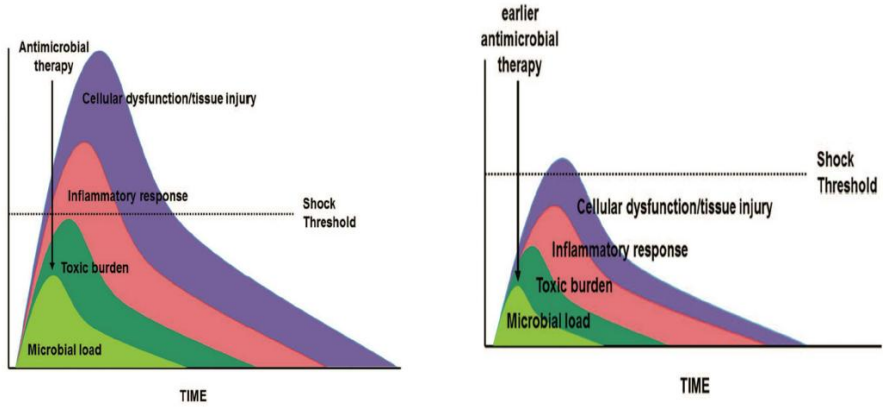
Surviving Sepsis Campaign

Antibiothérapie

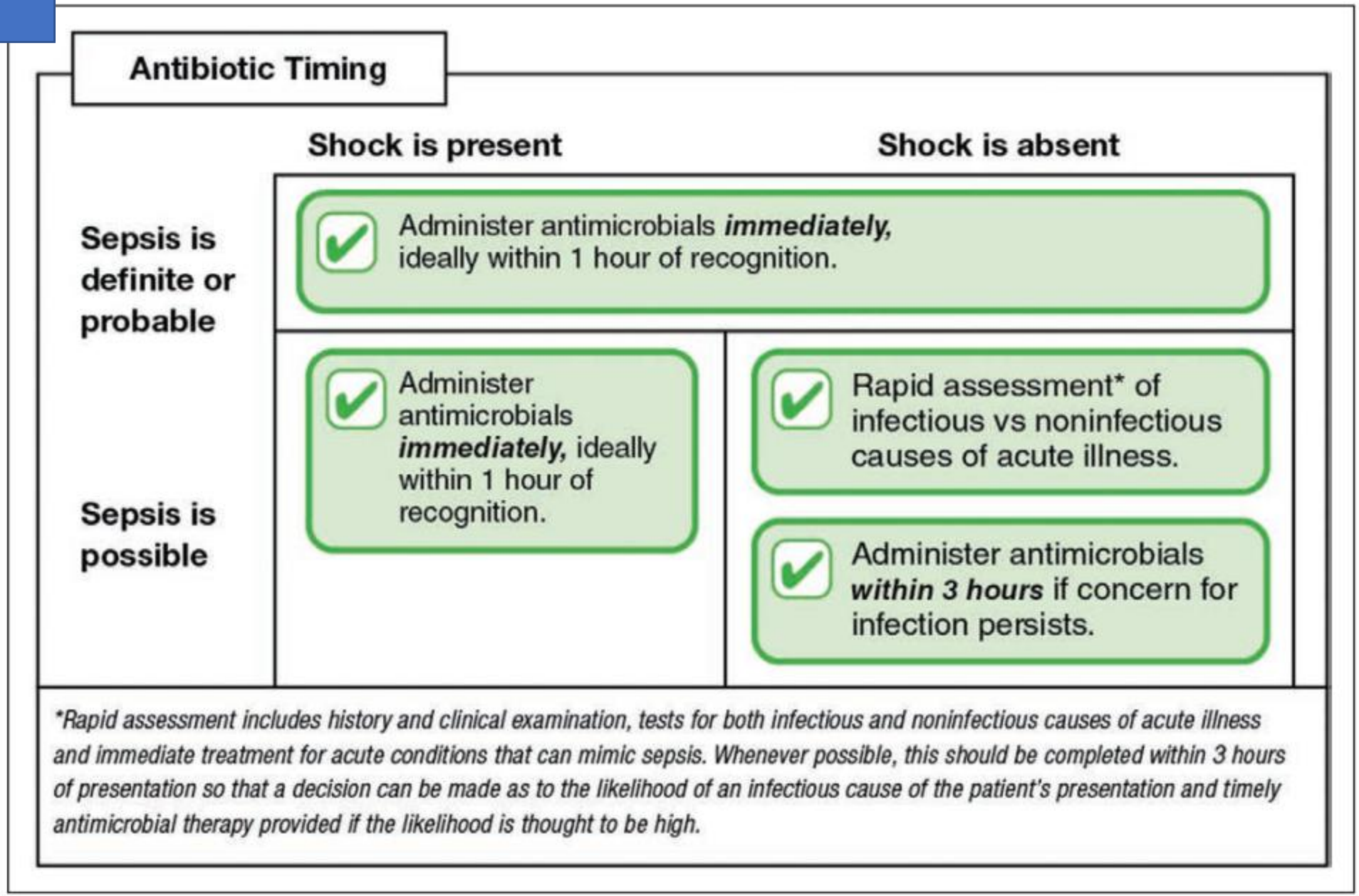
- Retard d'administration et aggravation du pronostic
  - ↗ mortalité de 7.6% par heure de retard au traitement antibiotique
  - Dans l'heure de la reconnaissance du choc septique faire: prélèvements bactériologiques, hémocultures et antibiothérapie.



Rationnel du traitement anti-infectieux



A Kumar; Virulence, 2014; 5:1, 80–97.


Antibiotic Timing
Shock is present
Shock is absent
Sepsis is definite or probable
Administer antimicrobials *immediately,* ideally within 1 hour of recognition.
Sepsis is possible
Administer antimicrobials *immediately,* ideally within 1 hour of recognition.
Rapid assessment* of infectious vs noninfectious causes of acute illness.
Administer antimicrobials *within 3 hours* if concern for infection persists.
*Rapid assessment includes history and clinical examination, tests for both infectious and noninfectious causes of acute illness and immediate treatment for acute conditions that can mimic sepsis. Whenever possible, this should be completed within 3 hours of presentation so that a decision can be made as to the likelihood of an infectious cause of the patient's presentation and timely antimicrobial therapy provided if the likelihood is thought to be high.

Infection

- Traitement probabiliste la plupart du temps
- Choix antibiothérapie
  - Site présumé infection
  - Sévérité infection
  - Épidémiologie locale
  - Facteurs de risque de germes atypiques ou résistants
  - Colonisation
  - Historique antibiothérapie préalable

- Initiation dans l'heure
- Antibiothérapie IV
- Association d'antibiotiques
  - ↗ **bactéricidie et élargir le spectre**
  - → **β-lactamine/aminosides.**
    - Si choc septique
    - Non recommandé pour les bactériémies et les sepsis sans choc
    - Non recommandé pour le neutropénique sans choc
  - → **PAC grave: β-lactamine/macrolide**
- Adapter le traitement aux particularités PK/PD des patients septiques
- Désescalade après documentation
  - En spectre
  - En nombre
  - En durée, si la source est contrôlée
  - Réévaluation quotidienne
- PCT peut être utilisée pour guider l'arrêt

Surviving Sepsis Campaign

Contrôle de la source

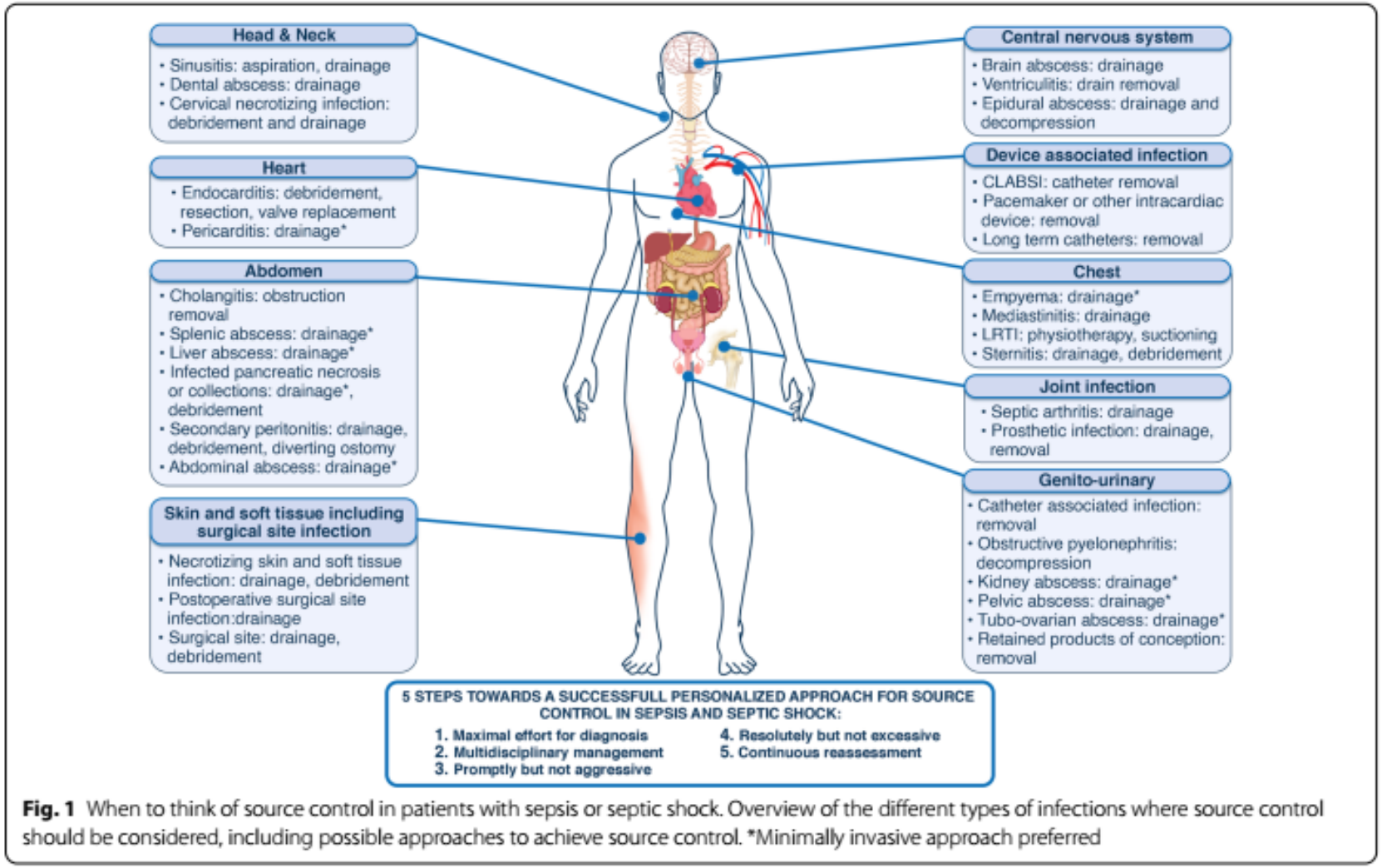


Fig. 1 When to think of source control in patients with sepsis or septic shock. Overview of the different types of infections where source control should be considered, including possible approaches to achieve source control. *Minimally invasive approach preferred

De Waele ICM 2022

Prehospital antibiotics in the ambulance for sepsis: a multicentre, open label, randomised trial

Lancet Respir Med 2018; 6: 40–50

Nadia Alam, Erick Oskam, Patricia M Stassen, Pieternel van Exter, Peter M van de Ven, Harm R Haak, Frits Holleman, Arthur van Zanten, Hien van Leeuwen-Nguyen, Victor Bon, Bart A M Duineveld, Rishi S Nannan Panday, Mark H H Kramer, Prabath W B Nanayakkara, on behalf of the PHANTASi Trial Investigators and the ORCA (Onderzoeks Consortium Acute Geneeskunde) Research Consortium the Netherlands*

- RCT/regional ambulance service
- Pre hospital CRX 2g vs control
- 58% patients with (severe) sepsis
- Only 3% with septic shock
- 91% of « true » infections

	Usual care group (n=1137)	Intervention group (n=1535)
Age (years)	72·5 (14·1)	73·0 (13·6)
Sex		
Male	650 (57%)	885 (58%)
Female	487 (43%)	650 (42%)
Charlson comorbidity score	1 (1–3)	1 (1–3)
Patients already on oral antibiotics before randomisation	255 (22%)	322 (21%)
National Early Warning Score (in the ambulance)*		
0	1 (<1%)	0
1–4	145 (19%)	192 (19%)
5–6	241 (31%)	306 (30%)
≥7	382 (50%)	521 (51%)
qSOFA score (in the ambulance)†		
<2	872 (83%)	1132 (78%)
≥2	181 (17%)	318 (22%)
DNR policy in place at admission	437 (38%)	609 (40%)
Severity of sepsis		
Non-severe sepsis	424 (37%)	579 (38%)
Severe sepsis	657 (58%)	868 (57%)
Septic shock	37 (3%)	66 (4%)
Other diagnosis	19 (2%)	22 (1%)

(Table 1 continues in next column)

	Usual care group (n=1137)	Intervention group (n=1535)
(Continued from previous column)		
Organ dysfunction		
Respiratory	378 (34%)	540 (35%)
Tissue perfusion	280 (25%)	276 (18%)
Neurological	239 (21%)	340 (22%)
Cardiovascular	119 (11%)	180 (12%)
Renal	79 (7%)	119 (8%)
Haematological	15 (1%)	25 (2%)
TTA before arriving at the ED (min)	..	26 (19–34)
Intravenous fluids administered prehospital		
n (%)	418 (37%)	986 (64%)
Median total (mL)	500 (500–500)	500 (300–500)
Mean total (mL)	450·7 (185·8)	447·1 (247·9)
Intravenous fluids administered at ED		
n (%)	495 (44%)	629 (41%)
Median total (mL)	1000 (500–1000)	1000 (500–1500)
Mean total (mL)	1026·3 (813·3)	1019·2 (687·0)

Alam – Lancet Resp Med 2018; 6: 40-50

Infection

	Usual care group (n=1137)	Intervention group (n=1535)	Relative risk (95% CI)	Risk difference (%, 95% CI)	p value
28 day mortality	93 (8%)*	120 (8%)	0·95 (0·74 to 1·24)	−0·37 (−2·5 to 1·7)	0·78
90 day mortality	134 (12%)*	178 (12%)	0·98 (0·80 to 1·21)	−0·20 (−2·7 to 2·3)	0·87
Median TTA in the ED (min)	70 (36–128)	..	..	..	..
TTA in the ED (min)					
0–60	410 (42%)	..	..	..	..
61–120	254 (26%)	..	..	..	..
121–180	125 (13%)	..	..	..	..
181–240	78 (8%)	..	..	..	..
>240	56 (6%)	..	..	..	..
Missing	50 (5%)	..	..	..	..
No antibiotics in the ED	164 (14%)	..	..	..	..
Intensive care unit admission	98 (9%)	155 (10%)	1·17 (0·92 to 1·49)	1·5 (−0·73 to 3·7)	0·19
28 day re-admission	119 (10%)	102 (7%)	..	..	0·0004
Median length of stay (days)					
Intensive care unit	3 (2–8)	4 (2–10)	..	..	0·28
Hospital	6 (3–9)	6 (4–10)	..	..	0·12

Table 2. Landmark Sepsis Clinical Trials since 2015.*

Trial or Trials	Patients	Intervention and Control	Outcome	Interpretation and Lessons Learned
PHANTASi[65]	2689 Patients with sepsis, identified in ambulance, at 34 sites in the Netherlands	Antibiotic administration before arrival at hospital vs. in hospital	28-Day mortality, 7.8% vs. 8.2%	In-ambulance antibiotic therapy yielded numerically but not significantly lower mortality. However, the difference of 0.4 percentage points is consistent with effect sizes in observational studies adjusted for less severely ill trial participants.

Alam – Lancet Resp Med 2018; 6: 40-50

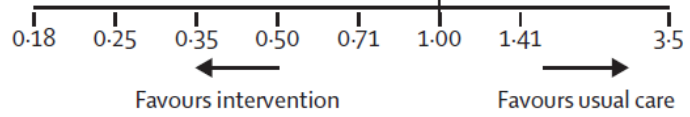
Infection

Prehospital antibiotics in the ambulance for sepsis: a multicentre, open label, randomised trial

Lancet Respir Med 2018; 6: 40–50

*Nadia Alam, Erick Oskam, Patricia M Stassen, Pieternel van Exter, Peter M van de Ven, Harm R Haak, Frits Holleman, Arthur van Zanten, Hien van Leeuwen-Nguyen, Victor Bon, Bart A M Duineveld, Rishi S Nannan Panday, Mark H H Kramer, Prabath W B Nanayakkara, on behalf of the PHANTASi Trial Investigators and the ORCA (Onderzoeks Consortium Acute Geneeskunde) Research Consortium the Netherlands**

	Usual care group (n=1137)	Intervention group (n=1535)	Relative risk (95% CI)	p value
Age (years)				
<65	12/276 (4%)	6/336 (2%)	0·41 (0·16–1·08)	0·10
≥65	81/860 (9%)	114/1199 (10%)	1·01 (0·77–1·32)	1·00
qSOFA (prehospital)				
<2	59/872 (7%)	71/1132 (6%)	0·93 (0·66–1·29)	0·72
2	25/180 (14%)	45/318 (14%)	1·02 (0·65–1·60)	1·00
NEWS (prehospital)				
<5	7/146 (5%)	7/192 (4%)	0·76 (0·27–2·12)	0·80
≥5	53/622 (9%)	71/827 (9%)	1·01 (0·72–1·42)	1·00
SBP (prehospital)				
≤100	15/112 (13%)	25/181 (14%)	1·03 (0·57–1·87)	1·00
>100	75/1001 (7%)	95/1337 (7%)	0·95 (0·71–1·27)	0·78
Severity of sepsis				
Sepsis	8/424 (2%)	12/579 (2%)	1·10 (0·45–2·66)	1·00
Severe sepsis	74/656 (11%)	88/868 (10%)	0·90 (0·67–1·20)	0·53
Septic shock	10/37 (27%)	19/66 (29%)	1·07 (0·56–2·04)	0·85
Overall	93/1136 (8%)	120/1535 (8%)	0·95 (0·74–1·24)	0·78



Les pistes pour les antibiothérapies

- 1- Arrêt précoce en l'absence de documentation?
  - La mortalité des patients avec un LBA<10^4 cfu n'est pas augmentée par un arrêt de l'antibiothérapie précoce *Raman - Crit Care Med 2013; 41:1656–1663*
  - Sur 1047 survivants d'un sepsis non documenté la durée médiane d'antibiothérapie est de 6 jours *Lockhart Open Forum Infect Dis. 2019 Oct 9;6(10):ofz397.*
  - L'arrêt précoce des anti-SARM ne modifie pas le pronostic des PAVM est associé à moins de DC et moins d'IRA *Labelle AJ et al - Chest 2010; 137:1130–7.; Cowley MC - Chest. 2019 Jan;155(1):53-59*
- 2- Identification ultra précoce
  - Oui!! mais avec l'aide d'experts… *Banerjee R et al -Clin Infect Dis 2015;61(7):1071-80*
- 3- Optimisation de la PK?
  - Une fT> 6XCMI semble être l'objectif le plus associé au succès clinque pour les betalactamines

Wong G et al - J Antimicrob Chemother. 2019 in press

Broad-spectrum antibiotic use and poor outcomes in community-onset pneumonia

- **731/2198 Broad spectrum AB (39.7%)**
- **Drug-resistant pathogens 3%!!**
- **Broad spectrum prescription is mainly expalined by patients severity**
  - higher eCURB (8.1% vs 5.0%)
  - Lower PaO2/FIO2 ratio (248.2 vs 269.5) and more sCAP criteria (2 versus 1).
  - Intubation (13.3% vs 2.8%)
  - vasopressor use (13% vs 1.7%) were more common in the broad-spectrum group.
- Observed 30-day mortality was 18.3% versus 4.4%.
- 2 analyses:
  - Multivariate regression
  - IPTW adjusted on the probability of Broad-spectrum AB
- **Antibiotic-associated events were found in 17.5% of mortality cases in the broad-spectrum group**

TABLE 2 Unweighted and inverse-probability treatment weighting (IPTW) multivariable regression effects of broad-spectrum antibiotics on 30-day mortality

	Primary regression OR (95% CI)	p-value	IPTW-ATT OR (95% CI)	p-value
(Intercept)	0.04 (0–0.38)	0.012	0.01 (0–0.27)	0.008
Broad-spectrum antibiotics	3.82 (2.48–5.92)	<0.001	4.61 (2.92–7.46)	<0.001
Age#	2.16 (1.68–2.82)	<0.001	2.51 (1.9–3.38)	<0.001
Female	1.13 (0.78–1.63)	0.522	1.11 (0.74–1.67)	0.608
eCURB#	1.15 (0.97–1.36)	0.107	1.16 (0.97–1.38)	0.103
P_{aO_2}/F_{IO_2} ratio#	0.99 (0.79–1.22)	0.902	1.02 (0.8–1.28)	0.889
sCAP	1.7 (1.41–2.05)	<0.001	1.74 (1.42–2.14)	<0.001
Intubation	1.22 (0.62–2.37)	0.559	1.4 (0.7–2.75)	0.335
Vasopressors	2.53 (1.29–5.01)	0.007	2.55 (1.31–5)	0.006
Inadequate antibiotic therapy	5.34 (1.1–23.19)	0.03	5.56 (1.11–24.92)	0.029
Bacteraemia	1.53 (0.68–3.27)	0.291	1.54 (0.68–3.34)	0.282
Length of stay#	0.82 (0.66–0.99)	0.045	0.7 (0.56–0.86)	0.001
Charlson Comorbidity Index	0.99 (0.91–1.09)	0.91	0.92 (0.83–1.01)	0.088
HCAP	1.19 (0.76–1.85)	0.449	1.24 (0.8–1.93)	0.332

TABLE 3 Unweighted and inverse-probability treatment weighting (IPTW) multivariable regression effects of broad-spectrum antibiotics on secondary outcomes

Outcome	Unweighted regression e^{β} (95% CI)#	p-value	IPTW-ATT e^{β} (95% CI)#	p-value
Length of stay	1.66 (1.53–1.8)	<0.001	1.52 (1.41–1.63)	<0.001
Cost	1.83 (1.68–2.01)	<0.001	1.7 (1.57–1.84)	<0.001
Clostridioides difficile infection	3.85 (1.55–10.93)	0.006	5.79 (1.86–27.51)	0.008

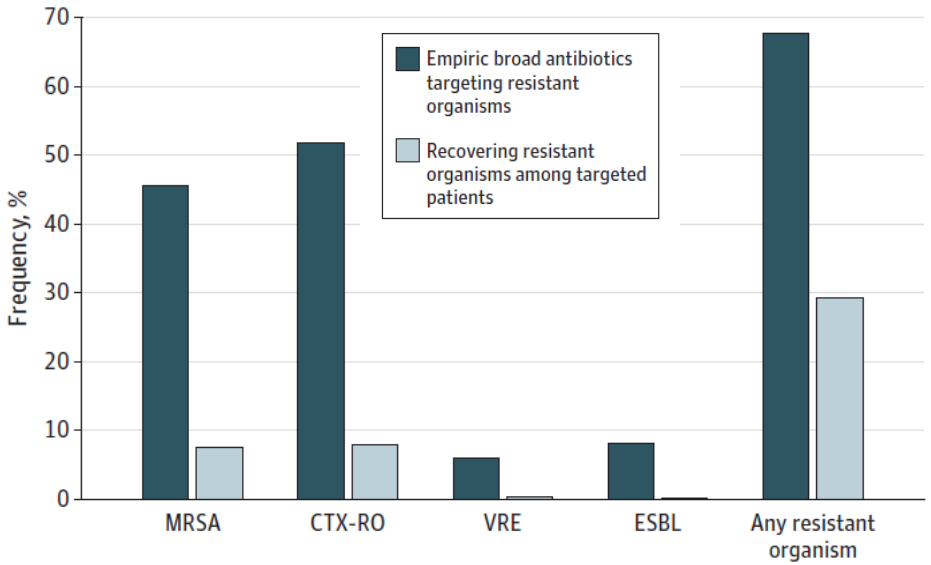
Webb BJ et al. Eur Respir J 2019; 54: 1900057

JAMA Network Open

Original Investigation | Infectious Diseases

Prevalence of Antibiotic-Resistant Pathogens in Culture-Proven Sepsis and Outcomes Associated With Inadequate and Broad-Spectrum Empiric Antibiotic Use

Chanu Rhee, MD, MPH; Sameer S. Kadri, MD, MSc; John P. Dekker, MD, PhD; Robert L. Danner, MD; Huai-Chun Chen, PhD; David Fram, BA; Fang Zhang, PhD; Rui Wang, PhD; Michael Klompas, MD, MPH; for the CDC Prevention Epicenters Program



- 17 430 adults/104 US hospitals
- Community-onset sepsis and positive clinical cultures within 2 days of admission.
- **Unnecessary: unne**cessarily coverage of MRSA, VRE, CTX-R GNB when none of these were isolated)
- 15 183 cases with ST → **12 398 [81.6%]) received adequate empiric AB**
- Empiric coverage of resistant organisms 11 683/17 430 cases (67.0%)
- ***Resistant organisms were* uncommon** (MRSA, 2045 [11.7%]; CTX-RO, 2278 [13.1%]; VRE, 360 [2.1%]; ESBLs, 133 [0.8%])

Table 2. Outcomes Associated With Inadequate and Unnecessarily Broad Empiric Antibiotic Therapy[a]

	Inadequate vs adequate empiric therapy						Unnecessarily broad vs not unnecessarily broad empiric therapy[b]					
	No./total No. (%)						No./total No. (%)					
Outcome	Inadequate	Adequate empiric therapy	Unadjusted OR (95% CI)	*P* value	Adjusted OR (95% CI)	*P* value	Unnecessarily broad	Not unnecessarily broad	Unadjusted OR (95% CI)	*P* value	Adjusted OR (95% CI)	*P* value
In-hospital death	488/2785 (17.5)	2011/12 388 (16.3)	1.10 (0.98-1.22)	.09	1.19 (1.03-1.37)	.02	1575/8405 (18.7)	436/3993 (10.9)	1.88 (1.68-2.11)	<.001	1.22 (1.06-1.40)	.007
Hospital-onset acute kidney injury	486/2785 (17.5)	2196/12 398 (17.7)	0.98 (0.88-1.09)	.74	1.02 (0.90-1.16)	.72	1641/8405 (19.5)	555/3993 (13.9)	1.50 (1.35-1.67)	<.001	1.12 (1.00-1.26)	.05
Clostridioides difficile	207/2785 (7.4)	498/12 398 (4.0)	1.92 (1.63-2.27)	<.001	1.19 (0.98-1.45)	.09	367/8405 (4.4)	131/3993 (3.3)	1.34 (1.10-1.65)	.004	1.26 (1.01-1.57)	.04

JAMA Network Open. 2020;3(4):e202899

Autres

Red Blood Cell (RBC) Transfusion Targets

Recommendation
61. For adults with sepsis or septic shock, we **recommend** using a restrictive (over liberal) transfusion strategy. *Strong recommendation; moderate quality of evidence.* **Remarks:** A restrictive transfusion strategy typically includes a hemoglobin concentration transfusion trigger of 70 g/L; however, RBC transfusion should not be guided by hemoglobin concentration alone. Assessment of a patient's overall clinical status and consideration of extenuating circumstances such as acute myocardial ischemia, severe hypoxemia or acute hemorrhage is required.

Vitamin C

Recommendation
70. For adults with sepsis or septic shock, we **suggest against** using IV vitamin C. *Weak recommendation, low quality of evidence.*

Corticoïdes et choc septique

Recommendation
58. For adults with septic shock and an ongoing requirement for vasopressor therapy we **suggest** using IV corticosteroids.
Weak recommendation; moderate quality of evidence.
Remarks:
The typical corticosteroid used in adults with septic shock is IV hydrocortisone at a dose of 200 mg/d given as 50 mg intravenously every 6 hours or as a continuous infusion. It is suggested that this is commenced at a dose of norepinephrine or epinephrine ≥ 0.25 mcg/kg/min at least 4 hours after initiation.

Table 2. Landmark Sepsis Clinical Trials since 2015.*

Trial or Trials	Patients	Intervention and Control	Outcome	Interpretation and Lessons Learned
ADRENAL and [62] APROCCHSS[63]	ADRENAL: 3800 patients with septic shock at 69 sites in Australia, United Kingdom, New Zealand, Saudi Arabia, and Denmark APROCCHSS: 1241 patients with multiorgan failure and septic shock at 34 sites in France	ADRENAL: hydrocortisone vs. placebo APROCCHSS: hydrocortisone plus fludrocortisone vs. placebo (and activated protein C vs. placebo)	ADRENAL: 90-day mortality, 27.9% vs. 28.8% (P=0.50) APROCCHSS: 90-day mortality, 43.0% vs. 49.1% (P=0.03)	Glucocorticoids were associated with reduced mortality in APROCCHSS but not in ADRENAL, although secondary outcomes in ADRENAL favored glucocorticoids. After these trials, guidelines were updated to include a weak recommendation to use glucocorticoids for persistent septic shock.[53] However, the benefit varies among patients, so treatment decisions should be individualized.

Meyer, NEJM, 2024

Intensive Care Med (2025) 51:21–38
https://doi.org/10.1007/s00134-024-07735-7

REVIEW

Management of adult sepsis in resource-limited settings: global expert consensus statements using a Delphi metho

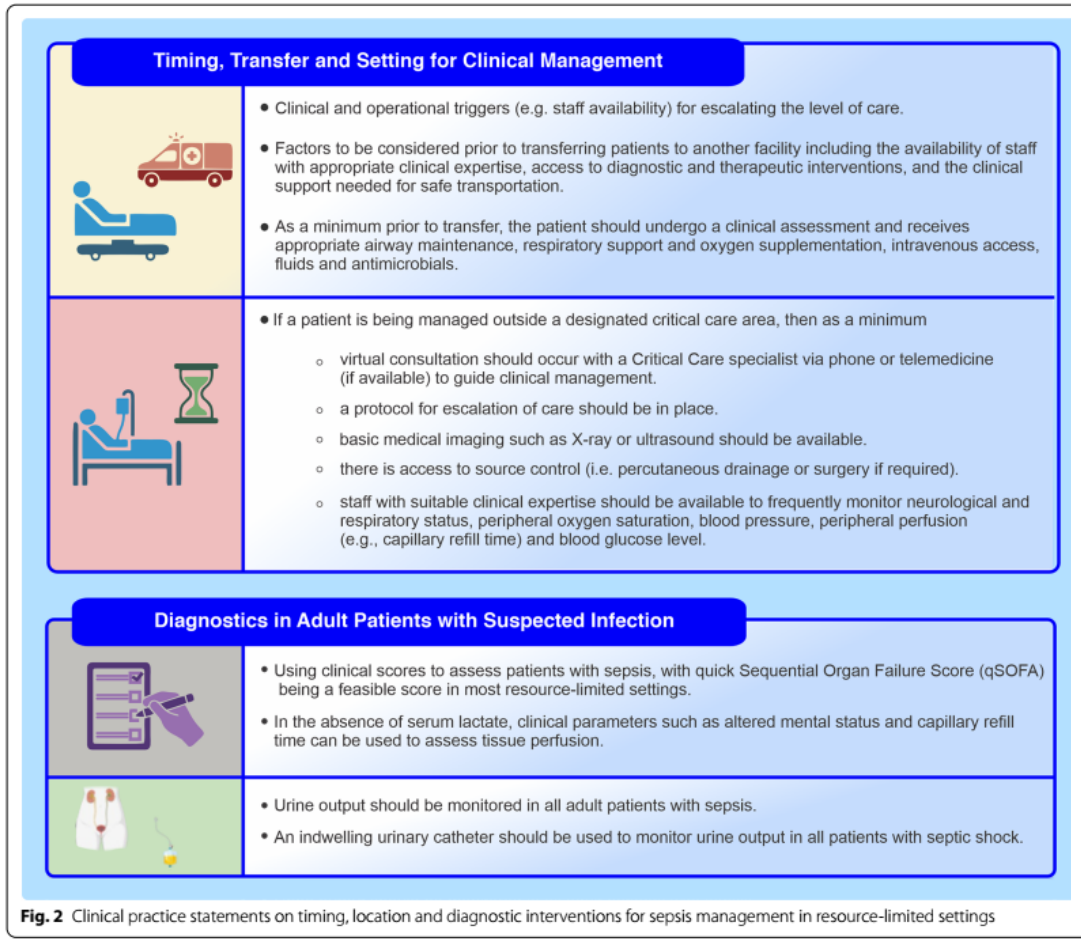


Fig. 2 Clinical practice statements on timing, location and diagnostic interventions for sepsis management in resource-limited settings

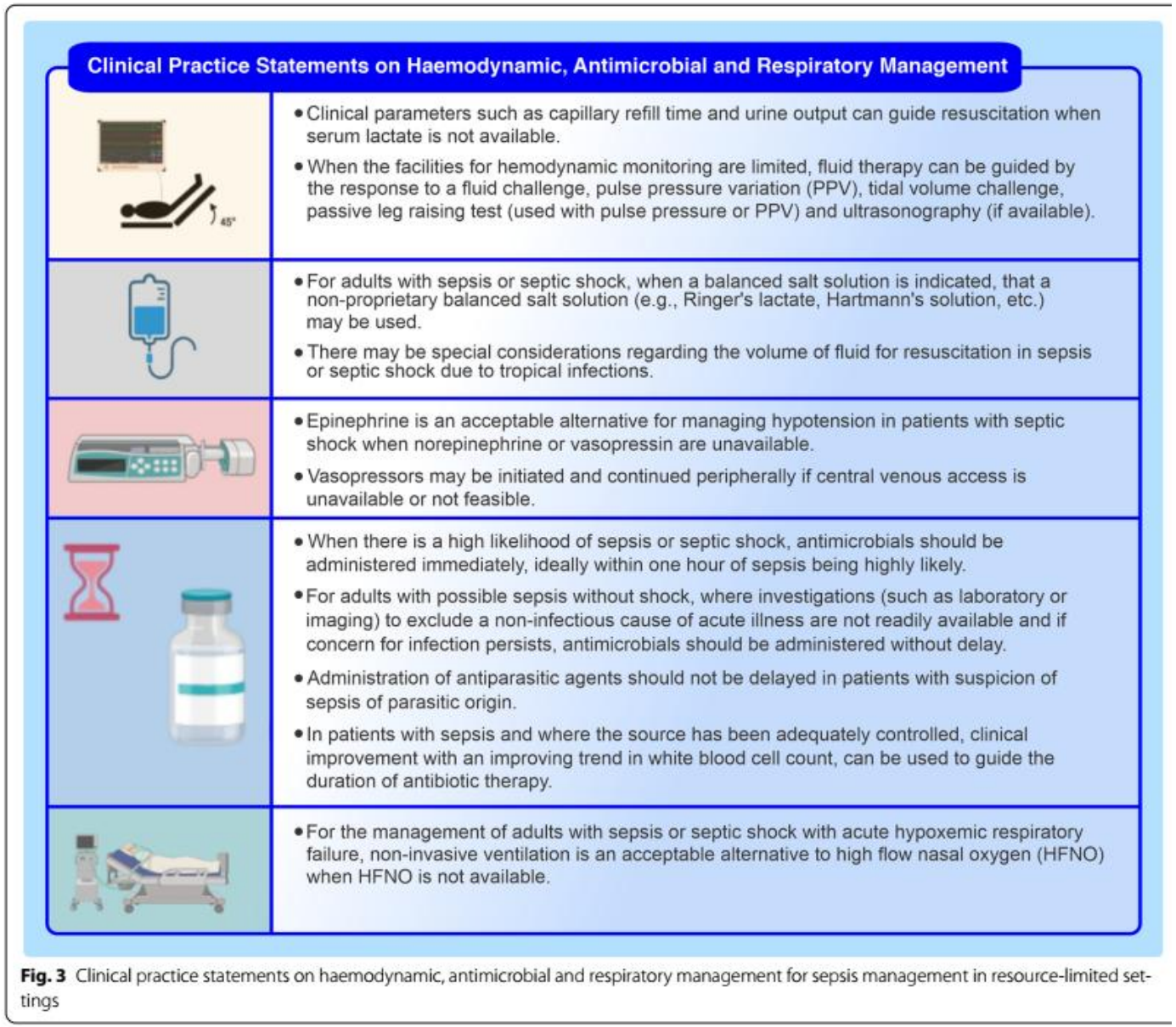


Fig. 3 Clinical practice statements on haemodynamic, antimicrobial and respiratory management for sepsis management in resource-limited settings

Messages à retenir

- Maladie fréquente, grave, hétérogène
- Pronostic en fonction de la rapidité de prise en charge
- Reconnaissance précoce
- Prise en charge précoce
  - Hémodynamique
    - Remplissage avec cristalloïde balancé
    - Introduction précoce Noradrénaline sur vvp
    - Monitorage en fonction rapidité résolution du choc
    - Introduction vasopressine si noradrénaline > 0.5 µg/kg/min
    - Dobutamine si dysfonction cardiaque
  - Infection
    - Antibiothérapie probabiliste précoce
    - Contrôle de la source
  - Pour inflammation:
    - Corticoïdes

Merci pour votre attention