

AER 22 novembre 2024



# Prise en charge initiale du choc septique

Pr Mathieu Jozwiak, service MIR Nice  
*jozwiak.m@chu-nice.fr*



UNIVERSITÉ  
CÔTE D'AZUR

FACULTÉ  
DE MÉDECINE

# Liens d'intérêts

Board du laboratoire VIATRIS

Lectures pour le laboratoire VIATRIS

PHRC-GIRCI 2022

# Prise en charge initiale

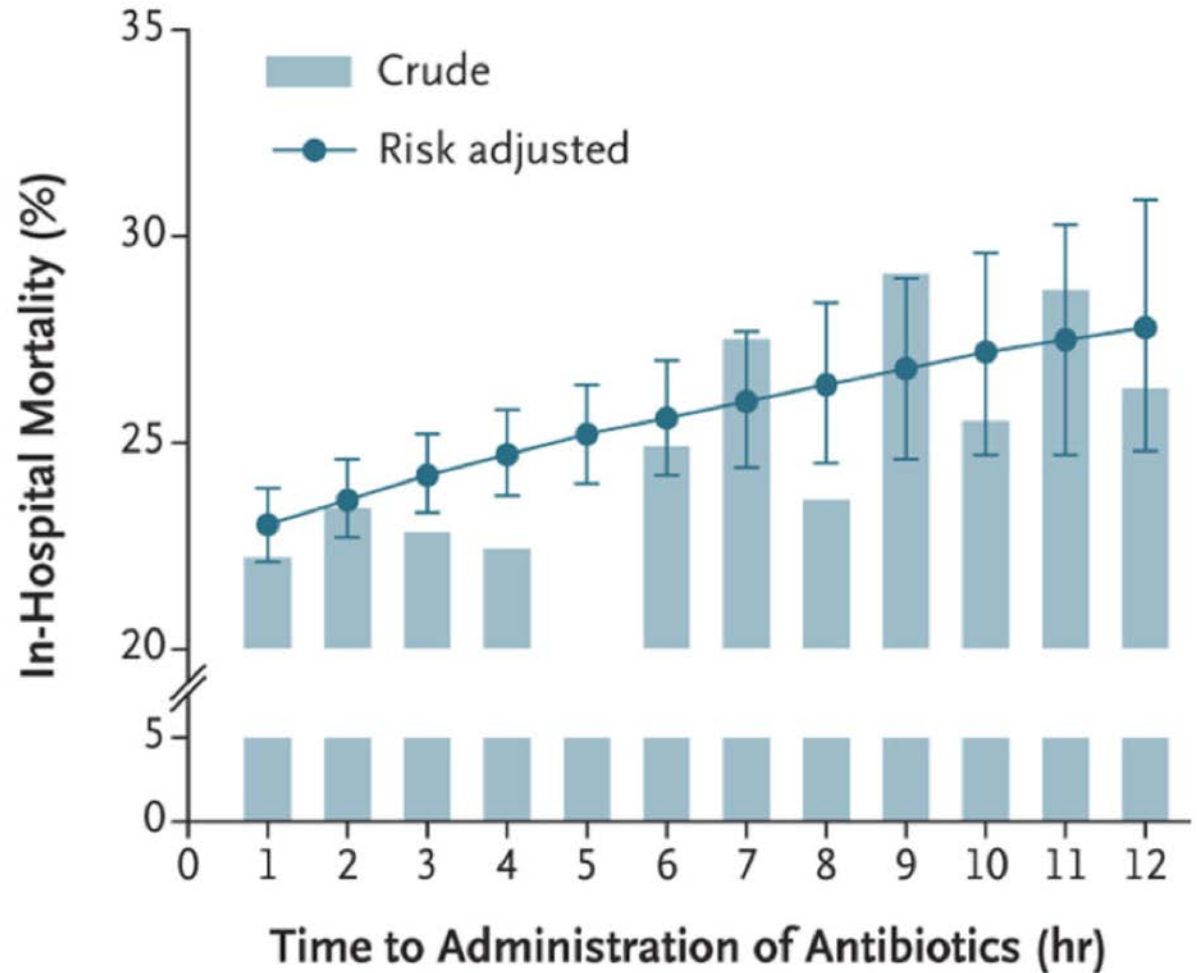
Surviving Sepsis Campaign

## Antibiotic Timing

|                                | Shock is present   | Shock is absent  |
|--------------------------------|--|--|
| Sepsis is definite or probable | <input checked="" type="checkbox"/> Administer antimicrobials <b>immediately</b> , ideally within 1 hour of recognition. | <input checked="" type="checkbox"/> Administer antimicrobials <b>immediately</b> , ideally within 1 hour of recognition.   |
| Sepsis is possible             | <input checked="" type="checkbox"/> Administer antimicrobials <b>immediately</b> , ideally within 1 hour of recognition. | <input checked="" type="checkbox"/> Rapid assessment* of infectious vs. noninfectious causes of acute illness.<br><br><input checked="" type="checkbox"/> Administer antimicrobials <b>within 3 hours</b> 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 of 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.

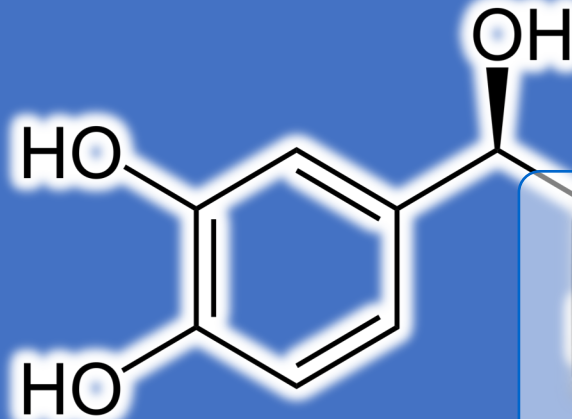
### Administration of Antibiotics



# Prise en charge initiale



Remplissage vasculaire



Vasopresseur



Monitorage hémodynamique

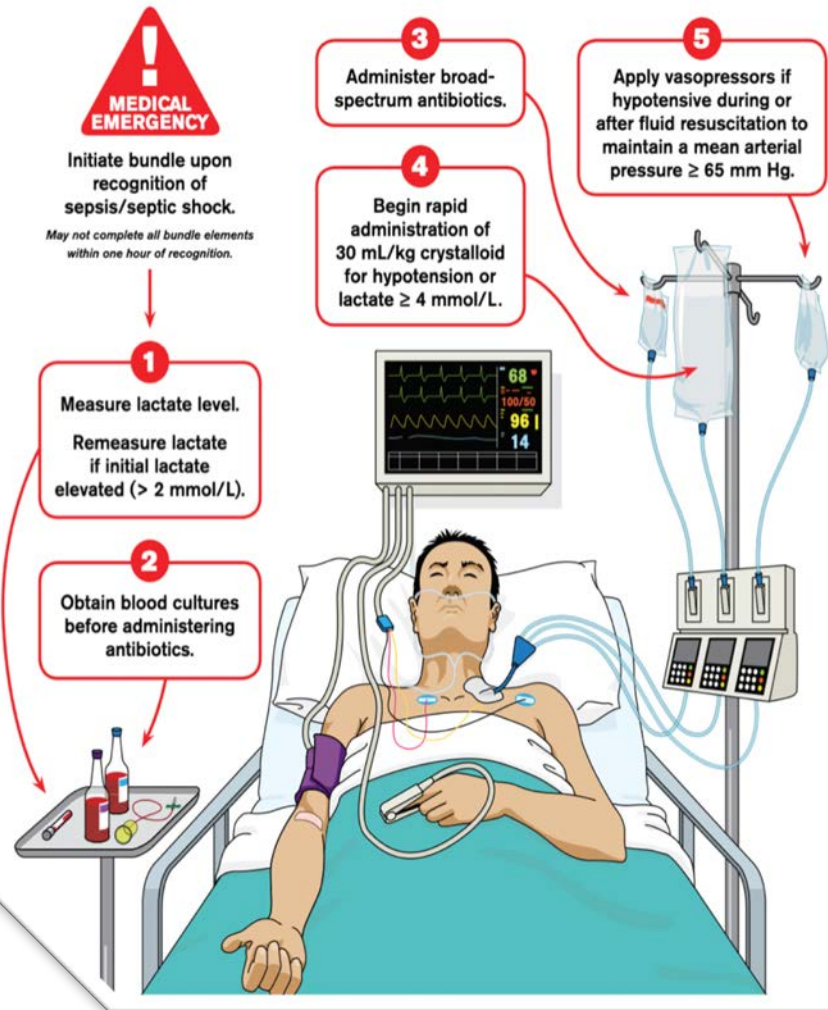
# Prise en charge initiale

2019

## Hour-1 Bundle

Initial Resuscitation for Sepsis and Septic Shock

Surviving Sepsis Campaign



Intensive Care Med (2021) 47:1181–1247  
<https://doi.org/10.1007/s00134-021-06506-y>

## GUIDELINES

### Surviving sepsis campaign: international guidelines for management of sepsis and septic shock 2021



There is insufficient evidence to make a recommendation on the use of restrictive versus liberal fluid strategies in the first 24 hours of sepsis or septic shock.

#### HEMODYNAMIC MANAGEMENT



**32** For adults with sepsis or septic shock, we **recommend** using crystalloids as first-line fluid for resuscitation.



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

#### 2016 STATEMENT



"We **suggest** using either balanced crystalloids or saline for fluid resuscitation of patients with sepsis or septic shock"



**34** For adults with sepsis or septic shock, we **suggest** using albumin in patients who received large volumes of crystalloids.

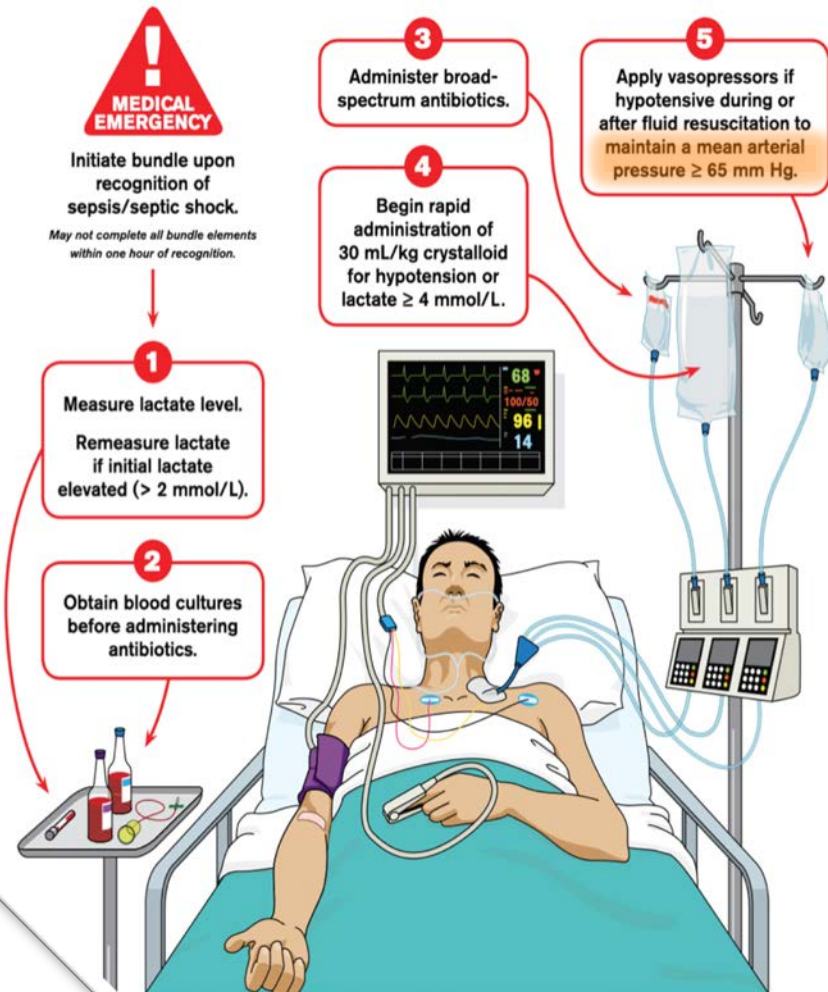
# Prise en charge initiale

2019

## Hour-1 Bundle

Initial Resuscitation for Sepsis and Septic Shock

Surviving Sepsis Campaign



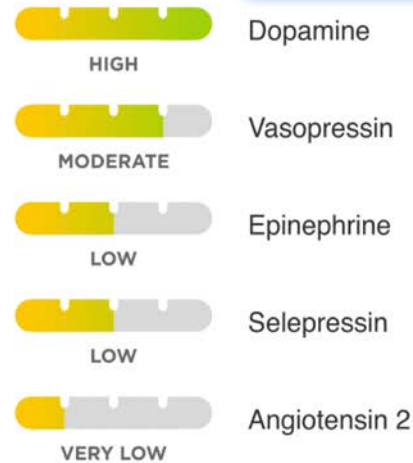
Intensive Care Med (2021) 47:1181–1247  
<https://doi.org/10.1007/s00134-021-06506-y>

## GUIDELINES

## Surviving sepsis campaign: international guidelines for management of sepsis and septic shock 2021



**37** For adults with septic shock, we **recommend** using norepinephrine as the first-line agent over other vasopressors.



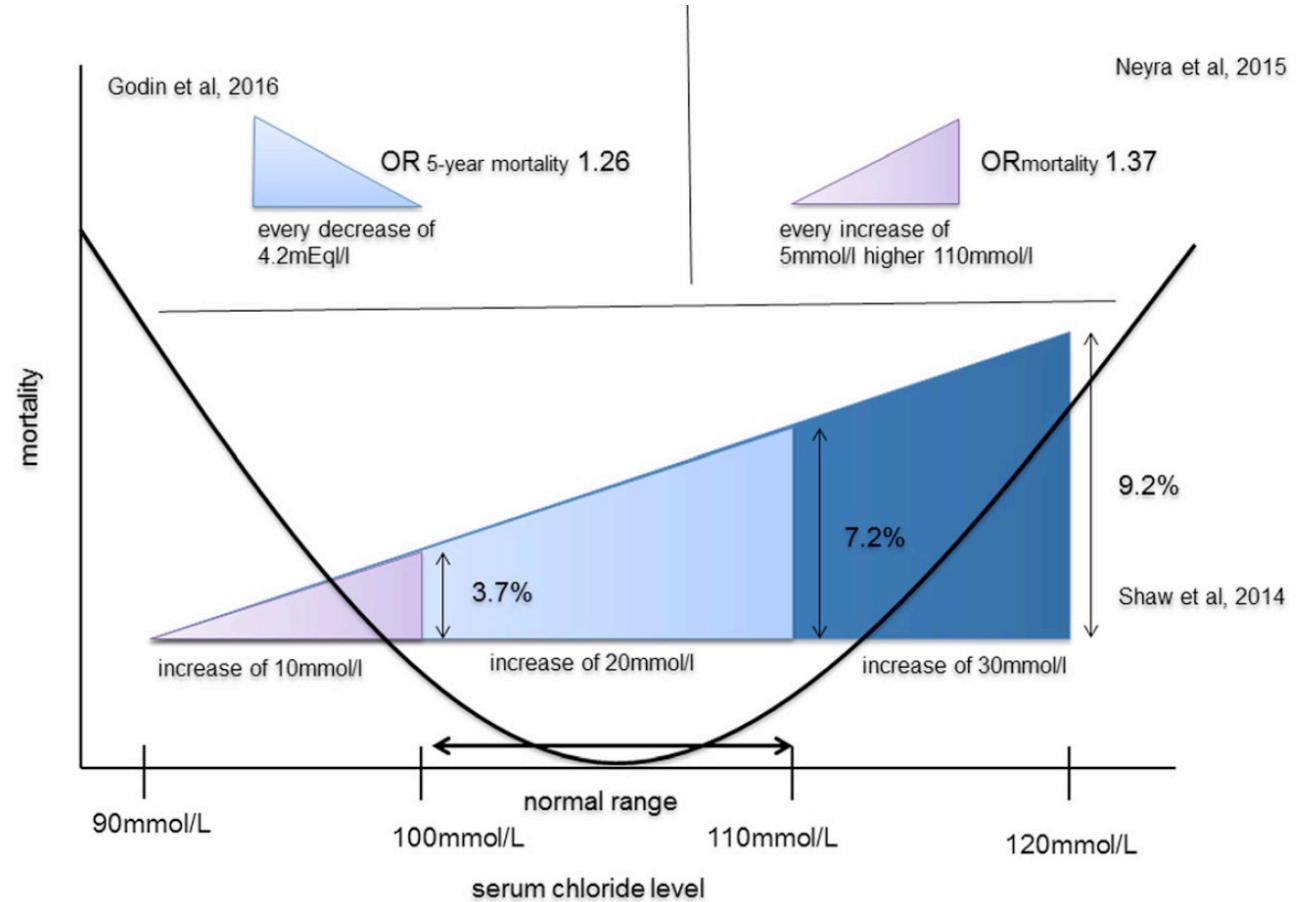
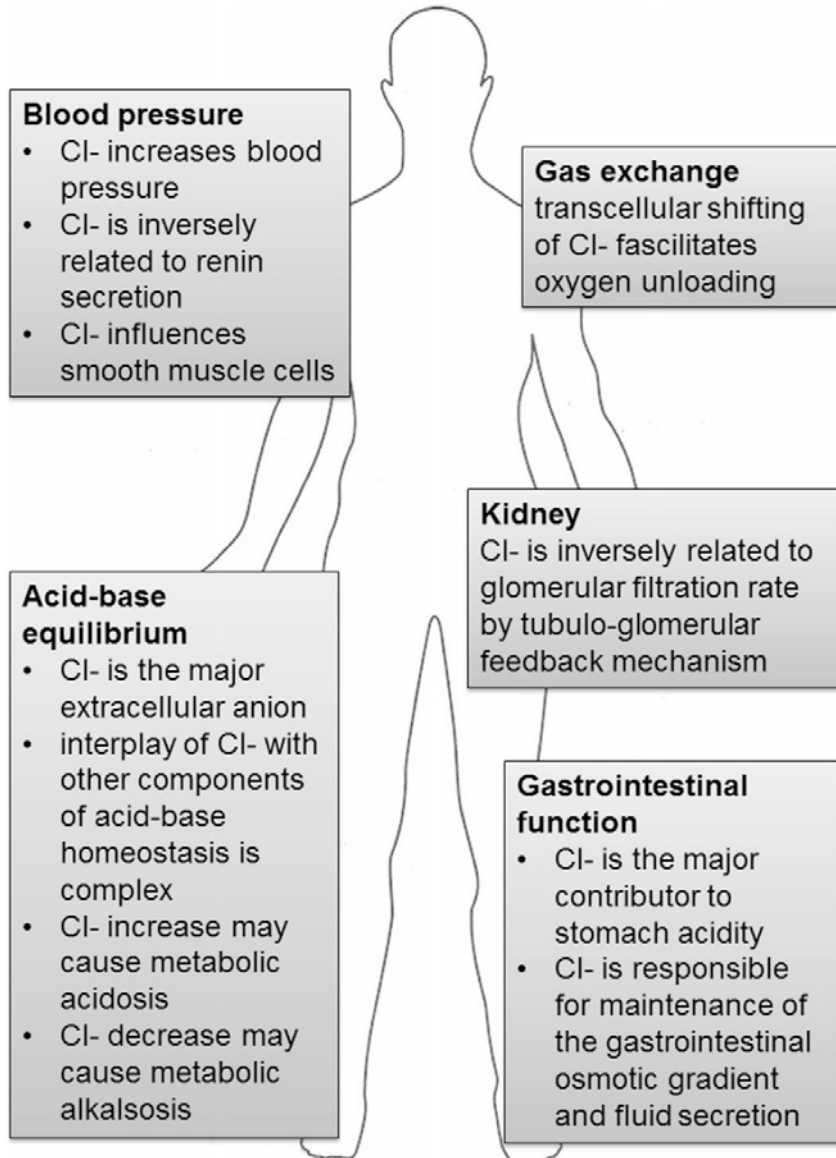
Hemodynamic Management **Strong** Vasoactive Agents

# Prise en charge initiale



Remplissage vasculaire

# Quel soluté? - *Et l'hyperchlorémie?*





# Quel soluté? - *Solutés balancés*



**SMART (NEJM 2018)**



**BASICS (JAMA 2021)**



**PLUS (NEJM 2022)**

Essai multicentrique (5 ICUs)

Essai multicentrique (75 ICUs)

Essai multicentrique (53 ICUs)

SSI vs. Plasmalyte-A ou RL

SSI vs. Plasmalyte-148

SSI vs. Plasmalyte-148

15 802 patients  
15% choc septique

11 052 patients  
20% choc septique

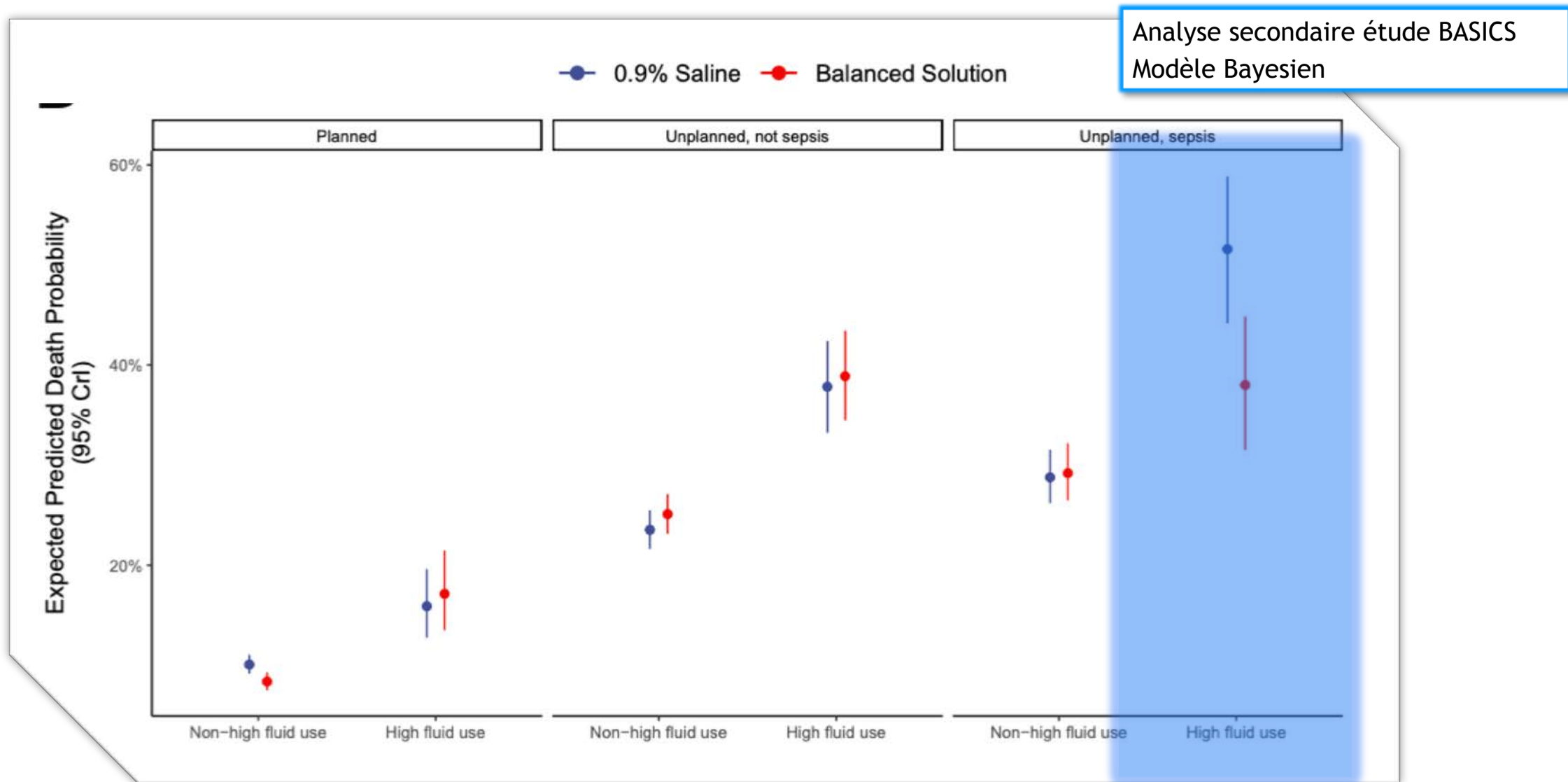
5037 patients  
40% choc septique

CJP = Critère composite MAKE à J30

CJP = Mortalité à J90

CJP = Mortalité à J90

# Quel soluté? - *Solutés balancés*



# Quel soluté? - *Solutés bilanciés*


## SUMMARY OF CLINICAL QUESTIONS AND RECOMMENDATIONS FOR BALANCED CRYSTALLOIDS VS. ISOTONIC SALINE

**Q7** Should balanced crystalloids vs. isotonic saline be used for volume expansion in adult critically ill patients in general?

 **CONDITIONAL RECOMMENDATION**

**R** We suggest using balanced crystalloids rather than isotonic saline for volume expansion in adult critically ill patients in general.<sup>a</sup>

 **LOW CERTAINTY OF EVIDENCE**

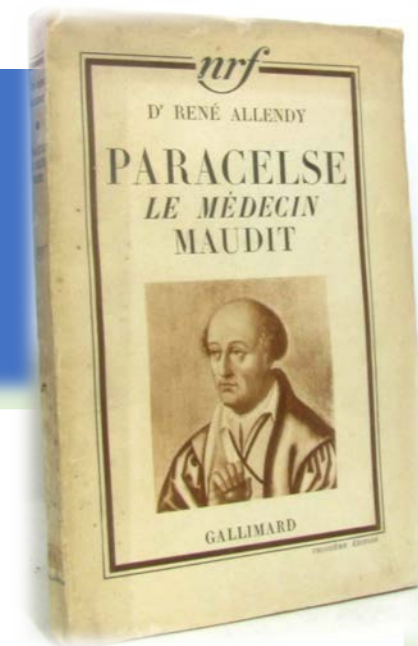
 In settings with a limited supply of balanced crystalloids, it is advised to prioritize using balanced crystalloids rather than isotonic saline in patients who require large volumes of resuscitation fluids and those with hyperchloremia or acidosis.

 In settings where balanced fluids are unavailable, isotonic saline is an acceptable alternative.

 Conversely, isotonic saline should be considered in patients with hypochloremia or metabolic alkalosis.

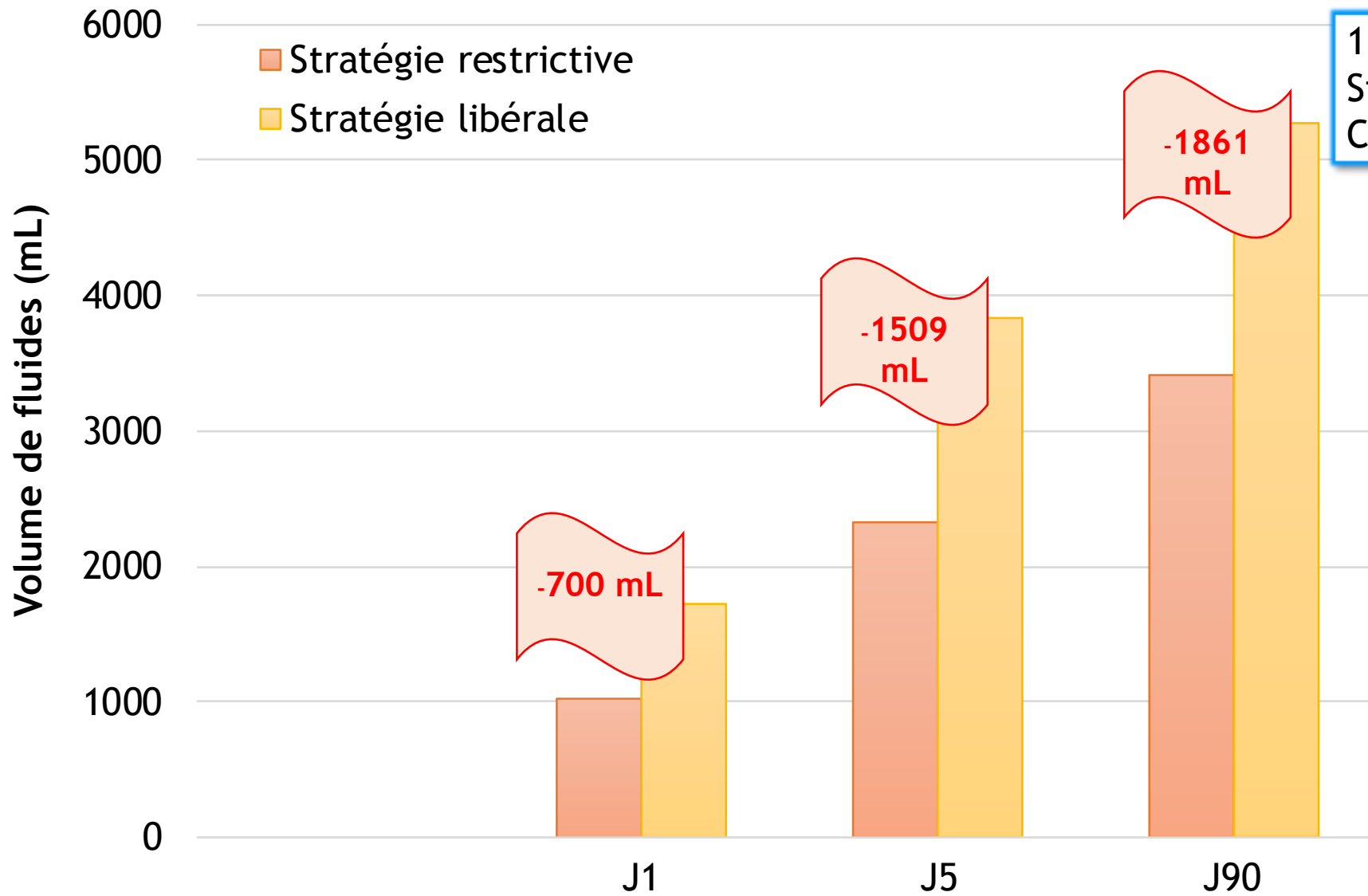
# Quel volume ?

## Volume de fluides



**Tout est poison, rien n'est poison, c'est la dose qui fait le poison**

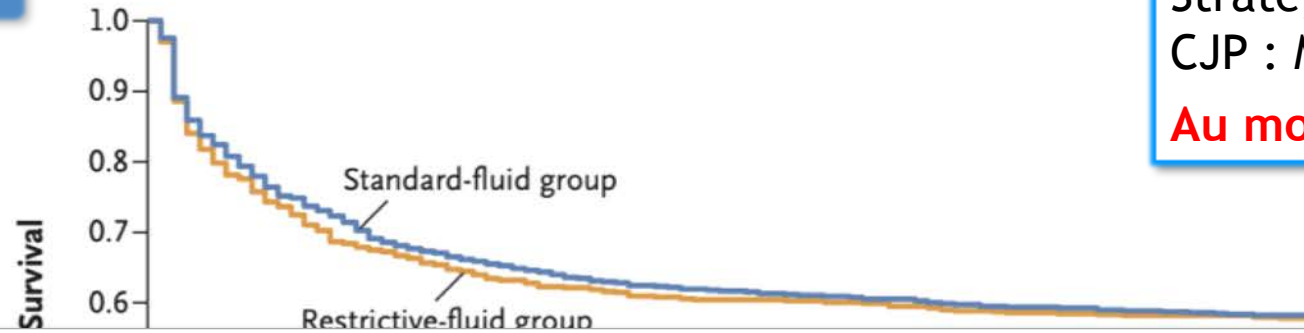
# Stratégie libérale ou restrictive?



1554 patients avec un choc septique  
Stratégie restrictive vs. libérale  
CJP : Mortalité toute cause J90  
CLASSIC trial

# Stratégie libérale ou restrictive?

## Mortalité à J90



1554 patients avec un choc septique  
Stratégie restrictive vs. libérale  
CJP : Mortalité toute cause J90

**Au moins 1L RV pré-inclusion**

CLASSIC trial

## Body weight, blood values, and interventions

|  |                  |                  |
|--|------------------|------------------|
| Median body weight (IQR) — kg  | 77 (67–90)       | 78 (67–91)       |
| Median highest plasma lactate (IQR) — mmol per liter¶                            | 3.8 (2.7–6.0)    | 3.9 (2.8–6.1)    |
| Median highest dose of norepinephrine (IQR) — $\mu\text{g}/\text{kg}/\text{min}$ | 0.25 (0.12–0.44) | 0.23 (0.12–0.41) |
| Median volume of intravenous fluid 24 hr before randomization (IQR) — ml**       | 3200 (2000–4700) | 3000 (2000–4842) |
| Use of systemic glucocorticoid — no. (%)   | 216 (28.6)       | 226 (29.1)       |
| Median highest plasma creatinine (IQR) — mg/dl††                                 | 1.6 (1.1–2.4)    | 1.6 (1.1–2.5)    |
| Use of respiratory support — no. (%)‡‡   | 397 (52.6)       | 377 (48.6)       |

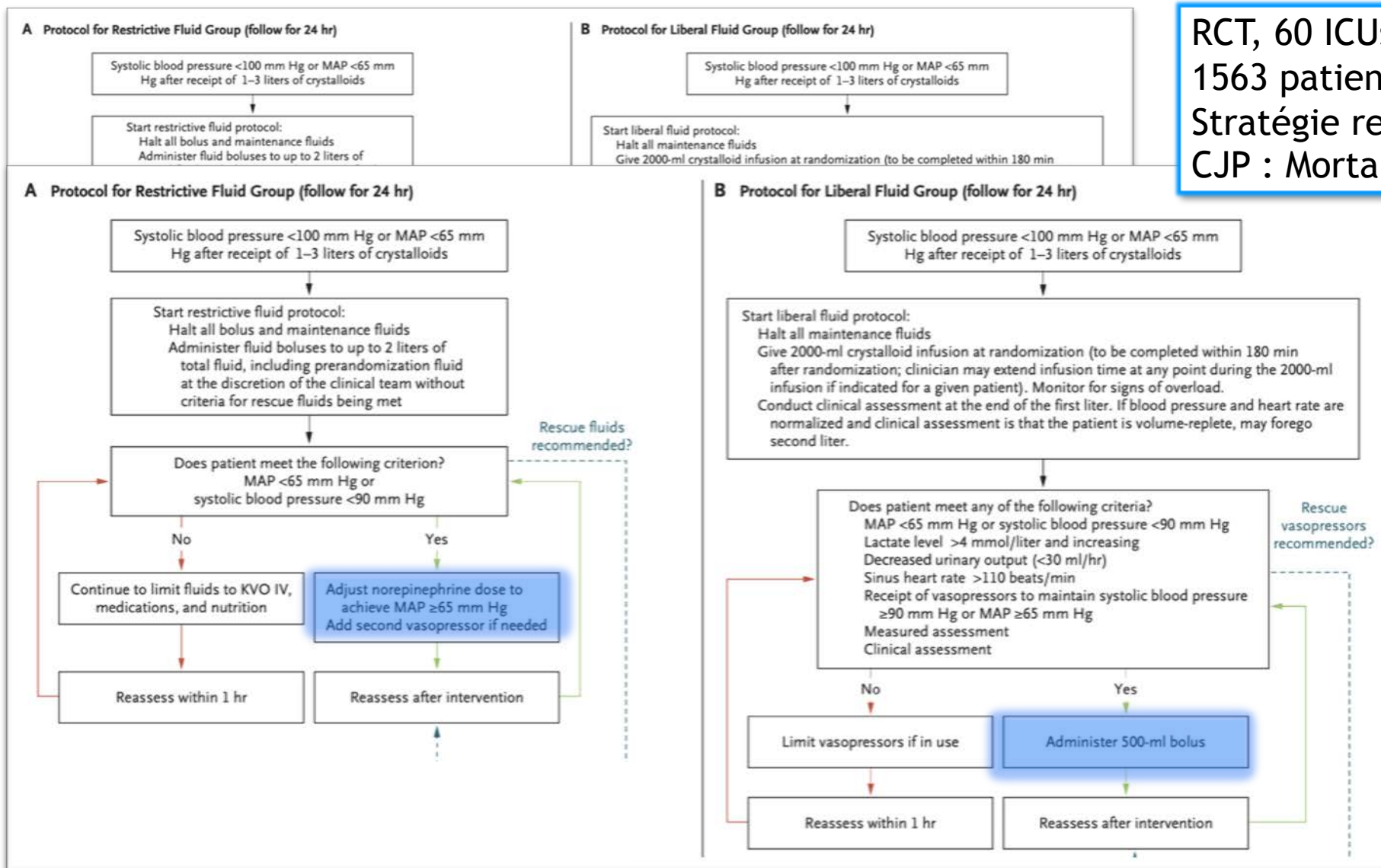
# Stratégie libérale ou restrictive?

## Mortalité à J90

CLASSIC trial

| Subgroup                                       | Restrictive-Fluid Group<br><i>no. of events/no. of patients</i> | Standard-Fluid Group | Absolute Percentage Point Difference (95% CI) |                                | P Value for Heterogeneity |
|--|---|----------------------|---|--------------------------------|---------------------------|
| <b>Secondary outcomes†</b>                     |   |                      |   |                                |                           |
| Serious adverse events —<br>no./total no. (%)§ | 221/751 (29.4)  | 238/772 (30.8)       | -1.7<br>(99% CI, -7.7 to 4.3)                 | 0.95<br>(99% CI, 0.77 to 1.15) | 0.46                      |
| Cerebral ischemia                              | 17/755 (2.3)  | 18/776 (2.3)         |   |                                |                           |
| Myocardial ischemia                            | 16/755 (2.1)  | 6/776 (0.8)          |   |                                |                           |
| Intestinal ischemia                            | 41/755 (5.4)  | 44/776 (5.7)         |   |                                |                           |
| Limb ischemia                                  | 18/755 (2.4)  | 18/776 (2.3)         |   |                                |                           |
| Severe acute kidney injury                     | 173/750 (23.1)  | 189/772 (24.5)       |   |                                |                           |
| IV fluid volume at randomization               |   |                      |   |                                | 0.15                      |
| ≥70 kg   | 104/401   | 103/423              |   | 2.5 (-4.1 to 9.0)              |                           |
| <76 kg   | 158/352   | 165/350              |   | -2.2 (-9.1 to 4.8)             |                           |
| ≥30 ml/kg body weight                          | 208/493   | 230/515              |   | -2.1 (-8.1 to 3.7)             |                           |
| <30 ml/kg body weight                          | 114/260   | 98/260               |   | 5.3 (-3.1 to 13.5)             |                           |

# Stratégie libérale ou restrictive?



RCT, 60 ICUs aux USA  
1563 patients avec un choc septique  
Stratégie restrictive vs. libérale pdt 24h  
CJP : Mortalité à J90

CLOVERS trial



# Stratégie libérale ou restrictive?

RCT, 60 ICUs aux USA  
 1563 patients avec un choc septique  
 Stratégie restrictive vs. libérale pdt 24h  
 CJP : Mortalité à J90

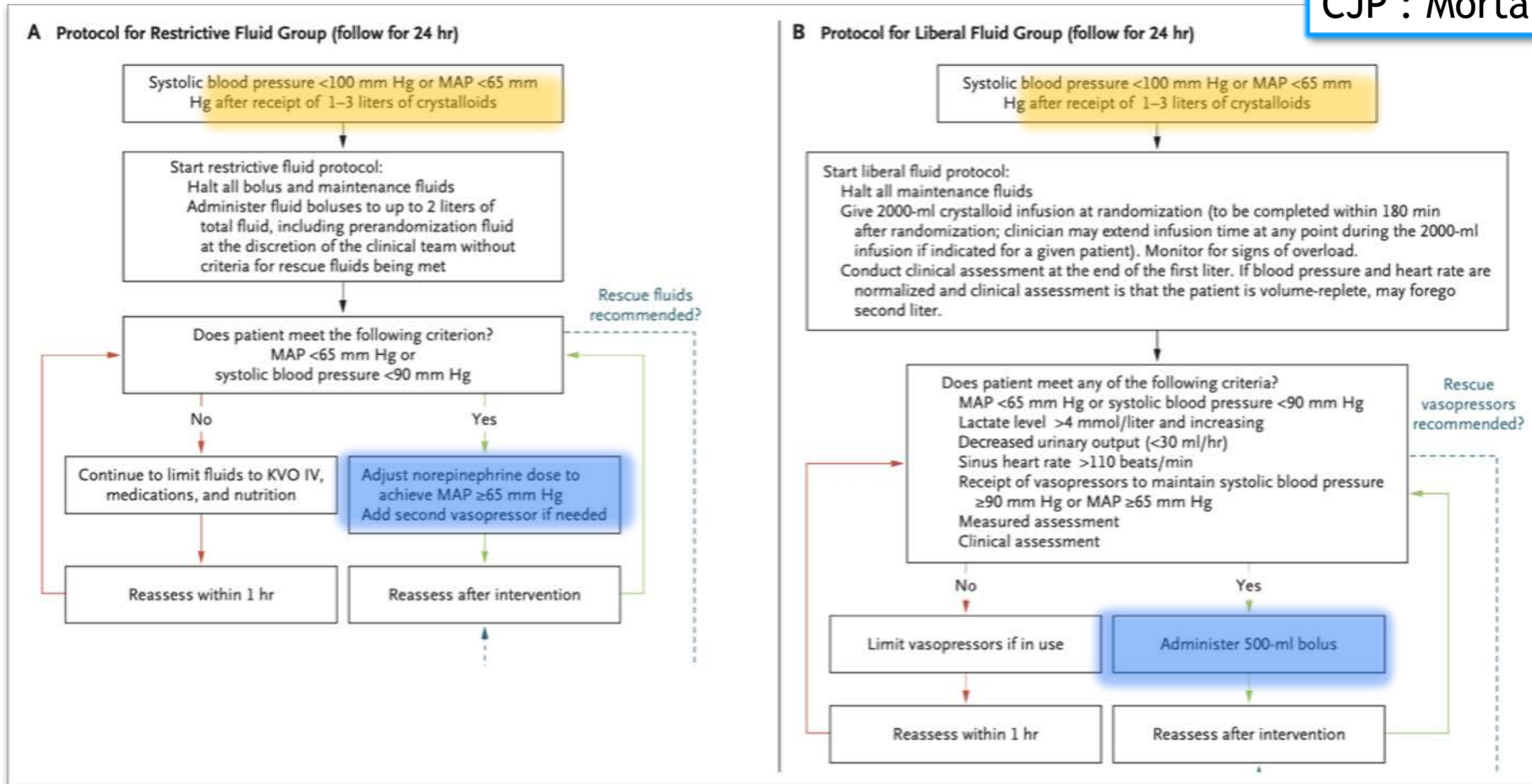
CLOVERS trial

| Therapeutic Outcome | Outcome  | Restrictive Fluid Group (N=782) |                     | Liberal Fluid Group (N=781) |                     | Difference (95% CI) <sup>†</sup> |
|---------------------|--|---------------------------------|---------------------|-----------------------------|---------------------|----------------------------------|
|                     |  | No. of Patients                 | Mean (95% CI)       | No. of Patients             | Mean (95% CI)       |                                  |
| Overall Mortality   | Death before discharge home by day 90 — % of patients <sup>‡</sup> | 782                             | 14.0 (11.6 to 16.4) | 781                         | 14.9 (12.4 to 17.4) | -0.9 (-4.4 to 2.6) <sup>§</sup>  |
| Vasopressor         | No. of days free from organ-support therapy at 28 days             | 778                             | 24.0 (23.4 to 24.6) | 778                         | 23.6 (23.0 to 24.3) | 0.3 (-0.5 to 1.2)                |
| Time                | No. of days free from ventilator use at 28 days                    | 773                             | 23.4 (22.7 to 24.1) | 771                         | 22.8 (22.0 to 23.5) | 0.6 (-0.4 to 1.6)                |
| Duration            | No. of days free from renal-replacement therapy at 28 days         | 737                             | 24.1 (23.4 to 24.8) | 738                         | 23.9 (23.2 to 24.6) | 0.2 (-0.8 to 1.2)                |
|                     | No. of days free from vasopressor use at 28 days <sup>¶</sup>      | 778                             | 22.0 (21.4 to 22.7) | 778                         | 21.6 (20.9 to 22.3) | 0.4 (-0.5 to 1.3)                |

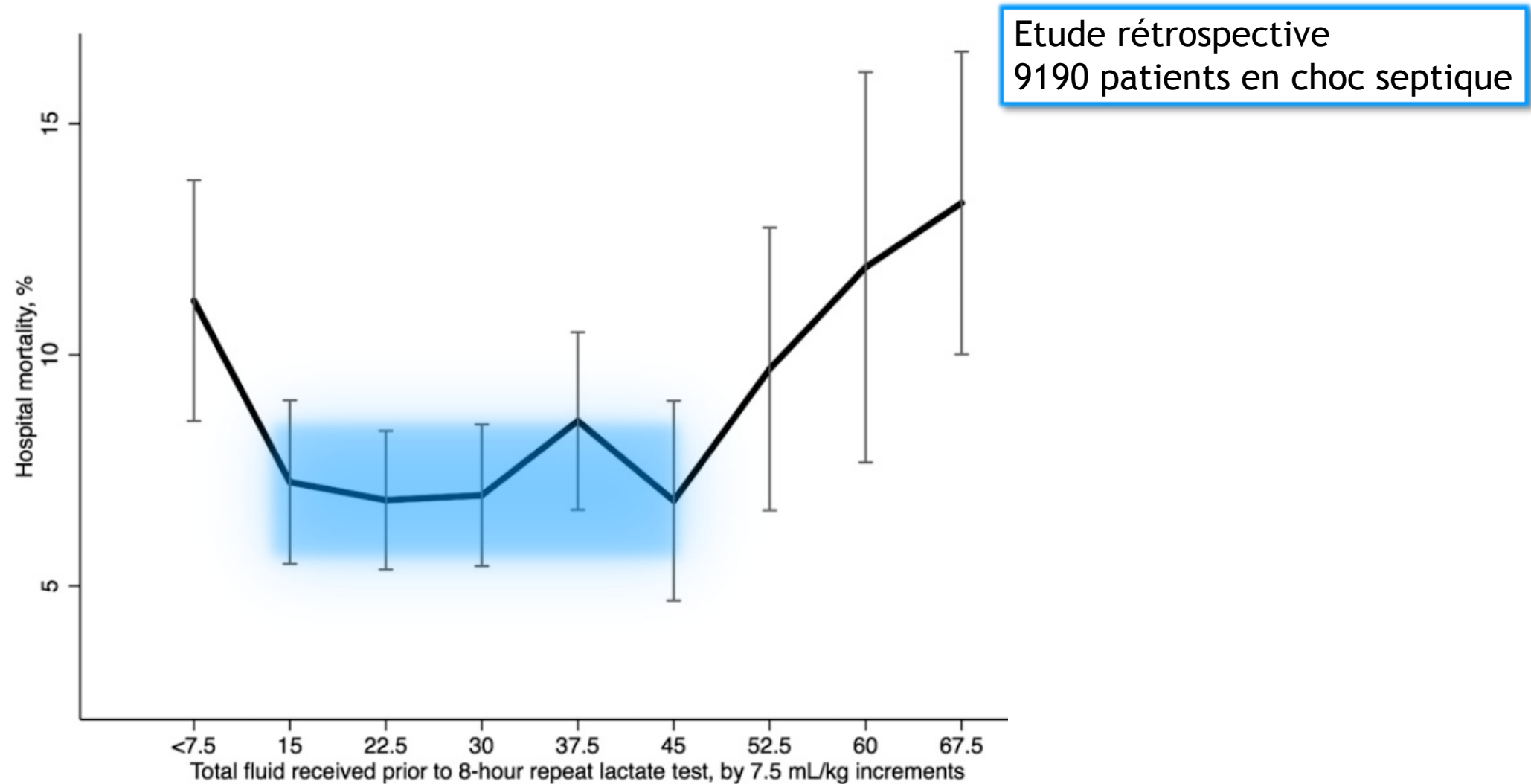
# Stratégie libérale ou restrictive?

RCT, 60 ICUs aux USA  
1563 patients avec un choc septique  
Stratégie restrictive vs. libérale pdt 24h  
CJP : Mortalité à J90

CLOVERS trial

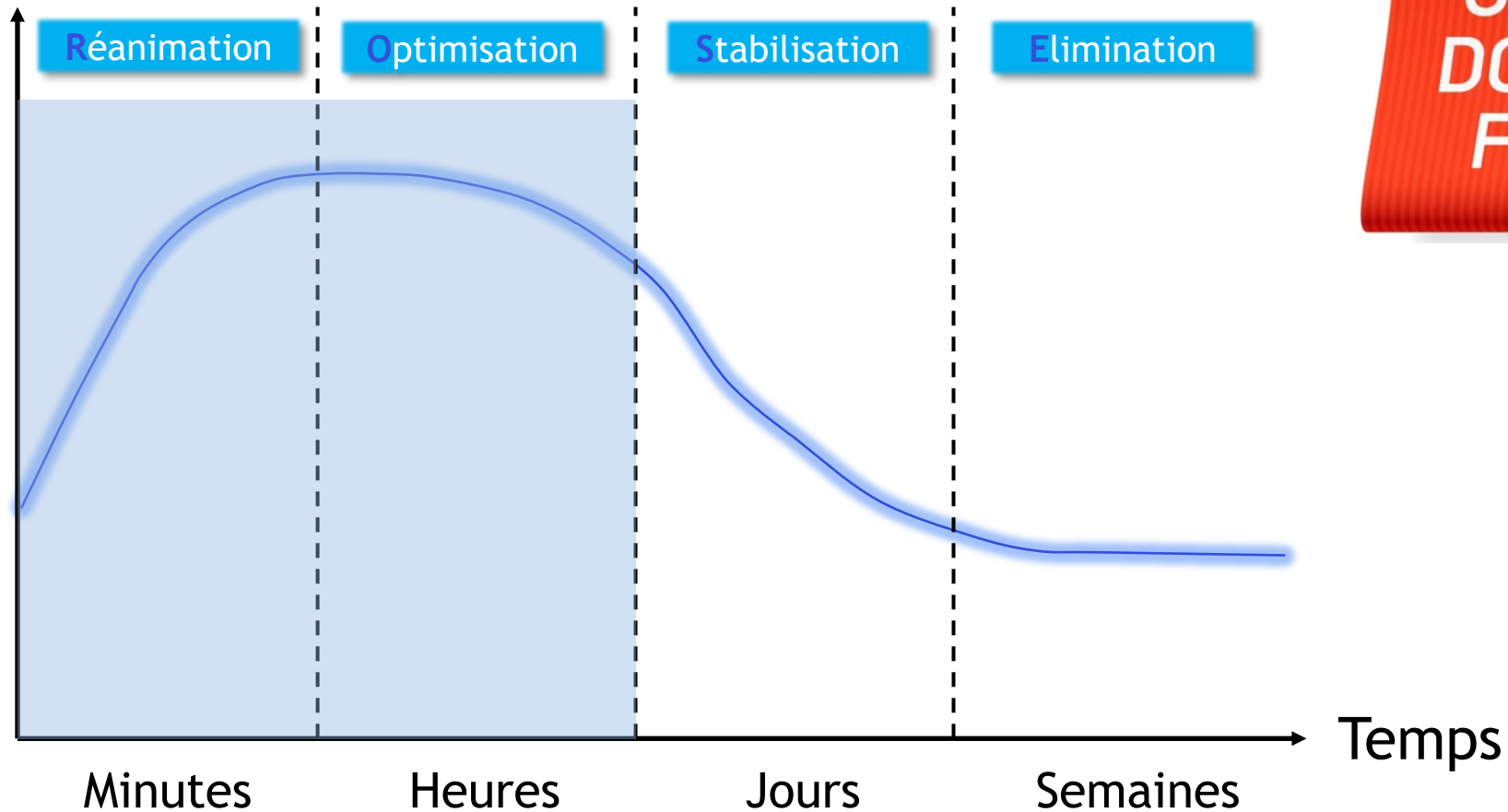


# Quel volume ? - *Pourquoi 30 mL/kg?*



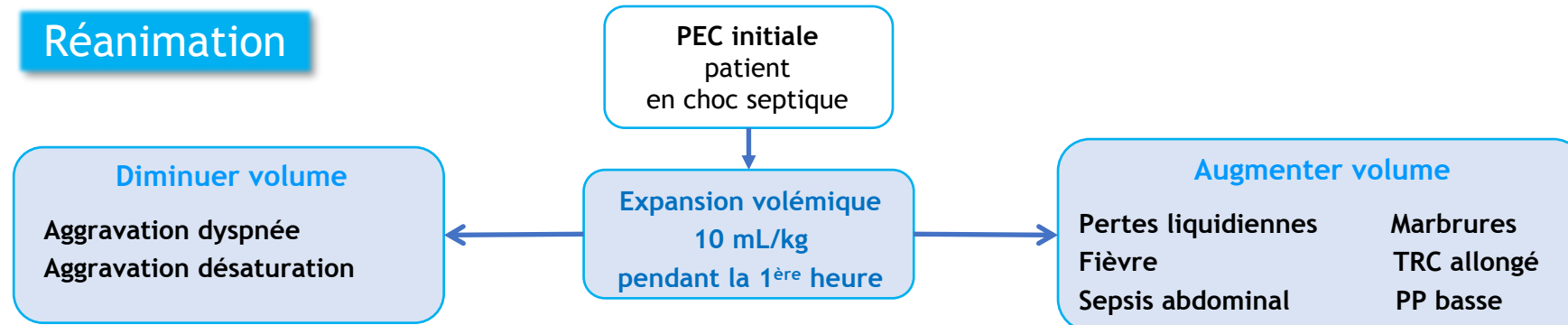
# Vers une personnalisation du remplissage?

Volémie

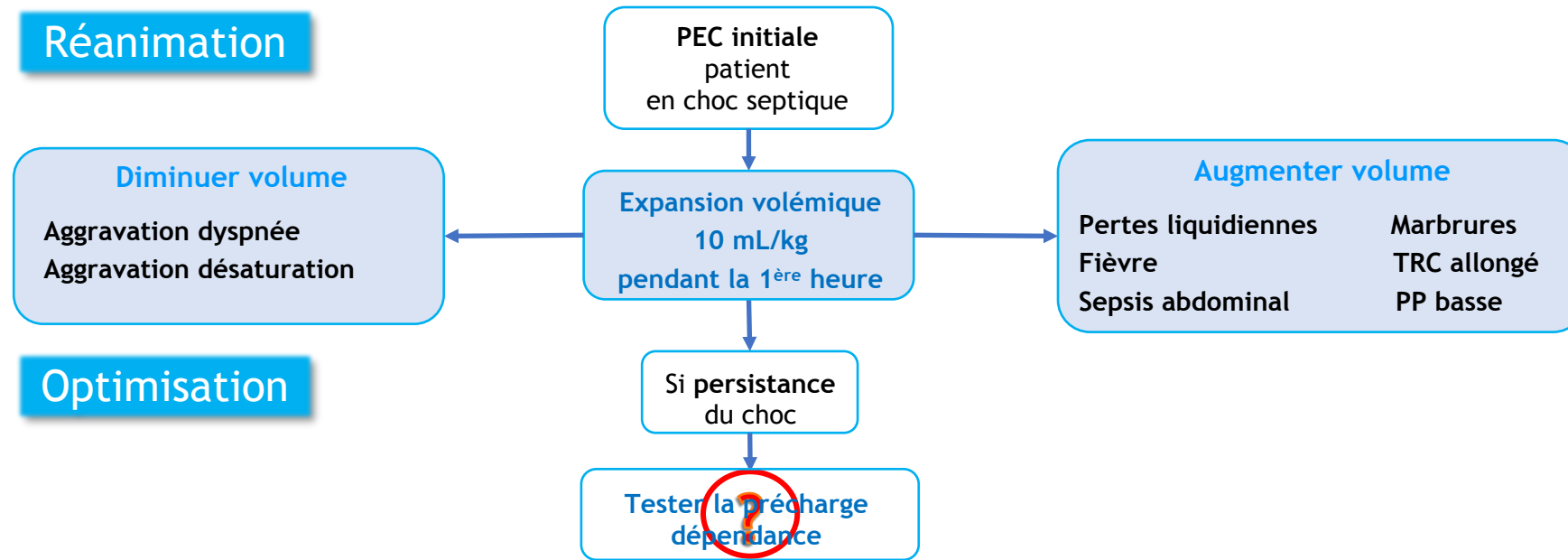


**ONE SIZE  
DOES NOT  
FIT ALL**

# Gestion de l'EV en pratique clinique



# Gestion de l'EV en pratique clinique



# Pourquoi tester la précharge dépendance ?

**BES > 0  
délétère**

**Adultes**

## Sepsis in European intensive care units: Results of the SOAP study\*

Jean-Louis Vincent, MD, PhD, FCCM; Yasser Sakr, MB, BCh, MSc; Charles L. Sprung, MD; V. Marco Ranieri, MD; Konrad Reinhart, MD, PhD; Herwig Gerlach, MD, PhD; Rui Moreno, MD, PhD; Jean Carlet, MD, PhD; Jean-Roger Le Gall, MD; Didier Payen, MD; on behalf of the Sepsis Occurrence in Acutely Ill Patients Investigators

**Mortalité, choc septique**

## Extravascular Lung Water is an Independent Prognostic Factor in Patients with Acute Respiratory Distress Syndrome\*

*Crit Care Med* 2013;41:472-480

Mathieu Jozwiak, MD; Serena Silva, MD; Romain Persichini, MD; Nadia Anguel, MD; David Osman, MD; Christian Richard, MD; Jean-Louis Teboul, MD, PhD; Xavier Monnet, MD, PhD

**Mortalité, SDRA**

Acheampong and Vincent *Critical Care* (2015) 19:251  
DOI 10.1186/s13054-015-0970-1



RESEARCH

Open Access

A positive fluid balance is an independent prognostic factor in patients with sepsis



Angela Acheampong and Jean-Louis Vincent\*

**Mortalité, choc septique**

Li et al. *Ann. Intensive Care* (2017) 7:83  
DOI 10.1186/s13613-017-0306-1

Annals of Intensive Care

RESEARCH

Open Access

Association between elevated central venous pressure and outcomes in critically ill patients



Dong-kai Li<sup>1</sup>, Xiao-ting Wang<sup>1</sup> and Da-wei Liu\*

**Mortalité, Réanimation**

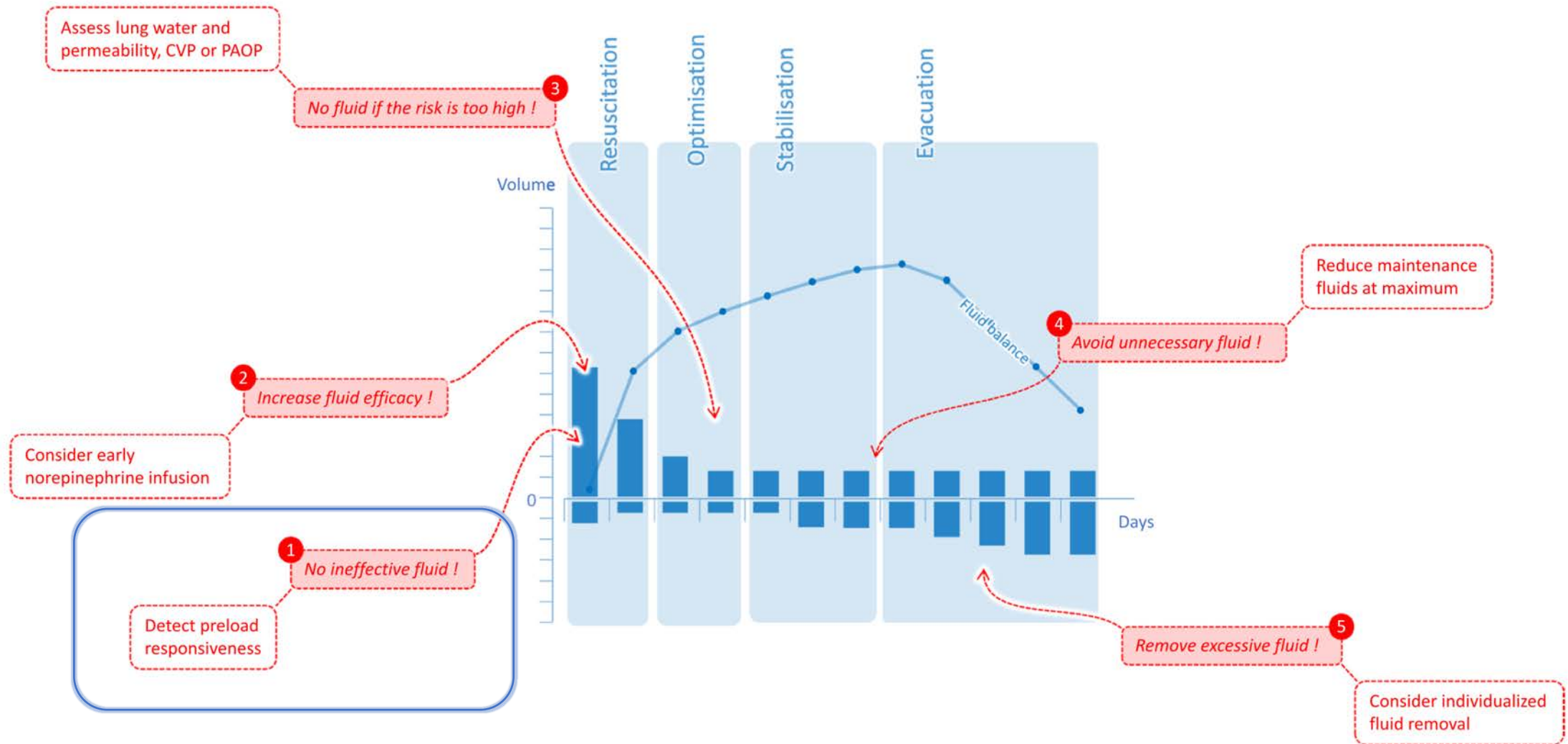
## Comparison of Two Fluid-Management Strategies in Acute Lung Injury

The National Heart, Lung, and Blood Institute Acute Respiratory Distress Syndrome (ARDS) Clinical Trials Network\*

**Durée de VM, SDRA**

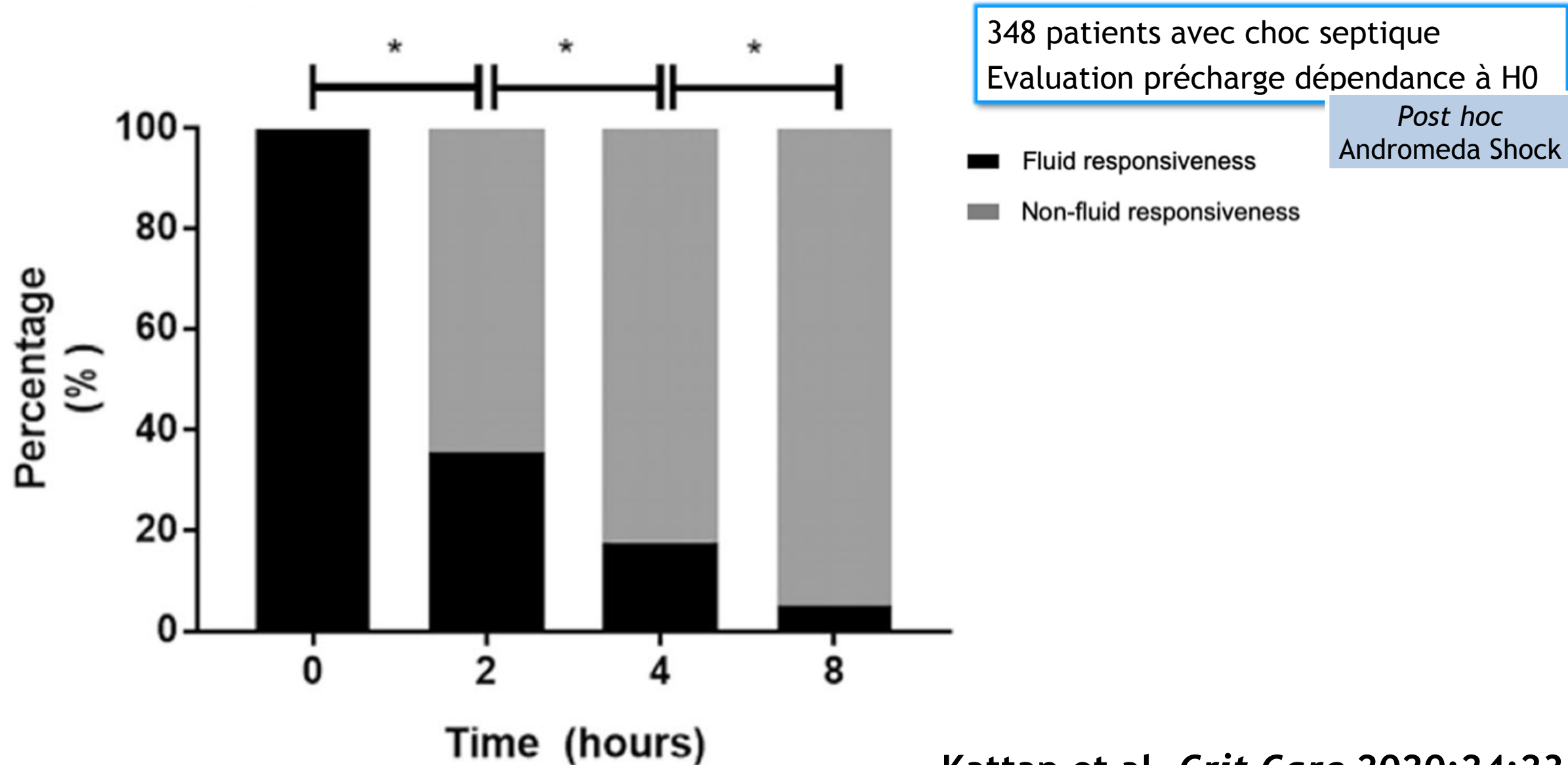
*N Engl J Med* 2006;354:2564-75

# Pourquoi tester la précharge dépendance ?

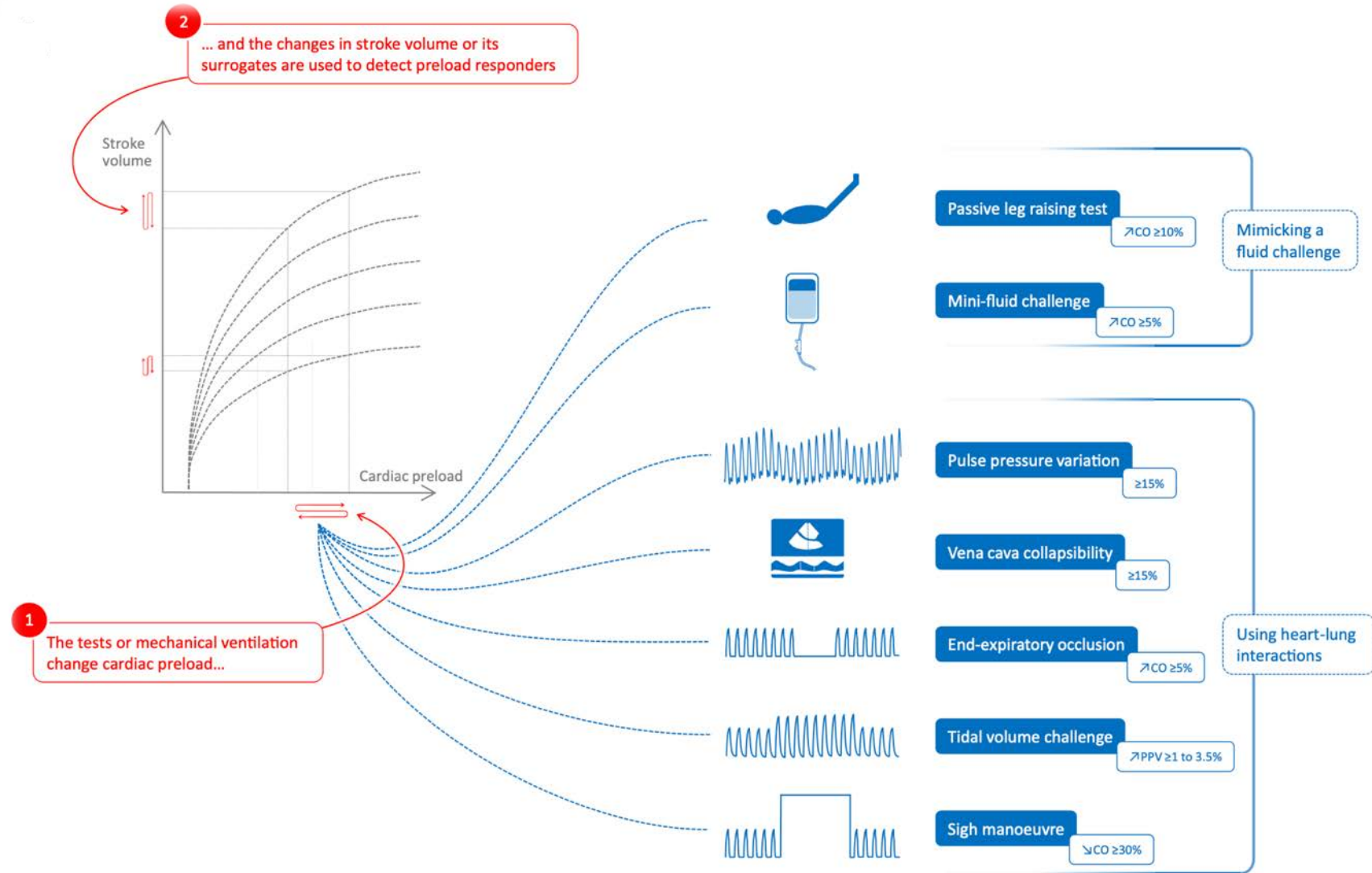
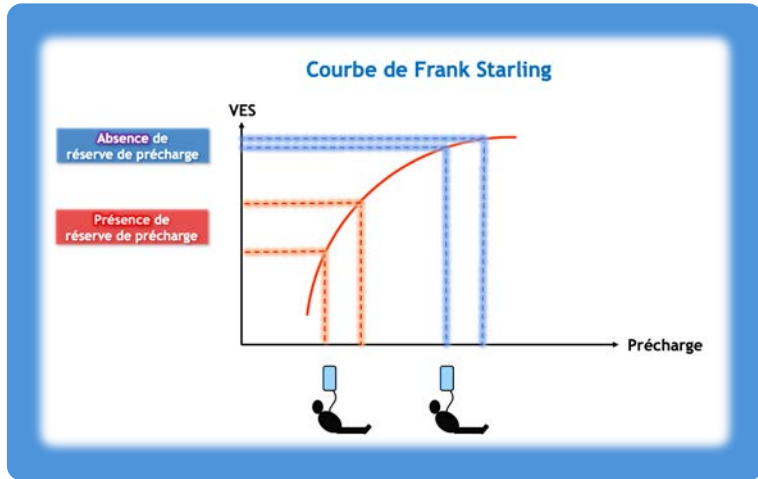




# Pourquoi tester la précharge dépendance ?



# Les indices de précharge dynamiques

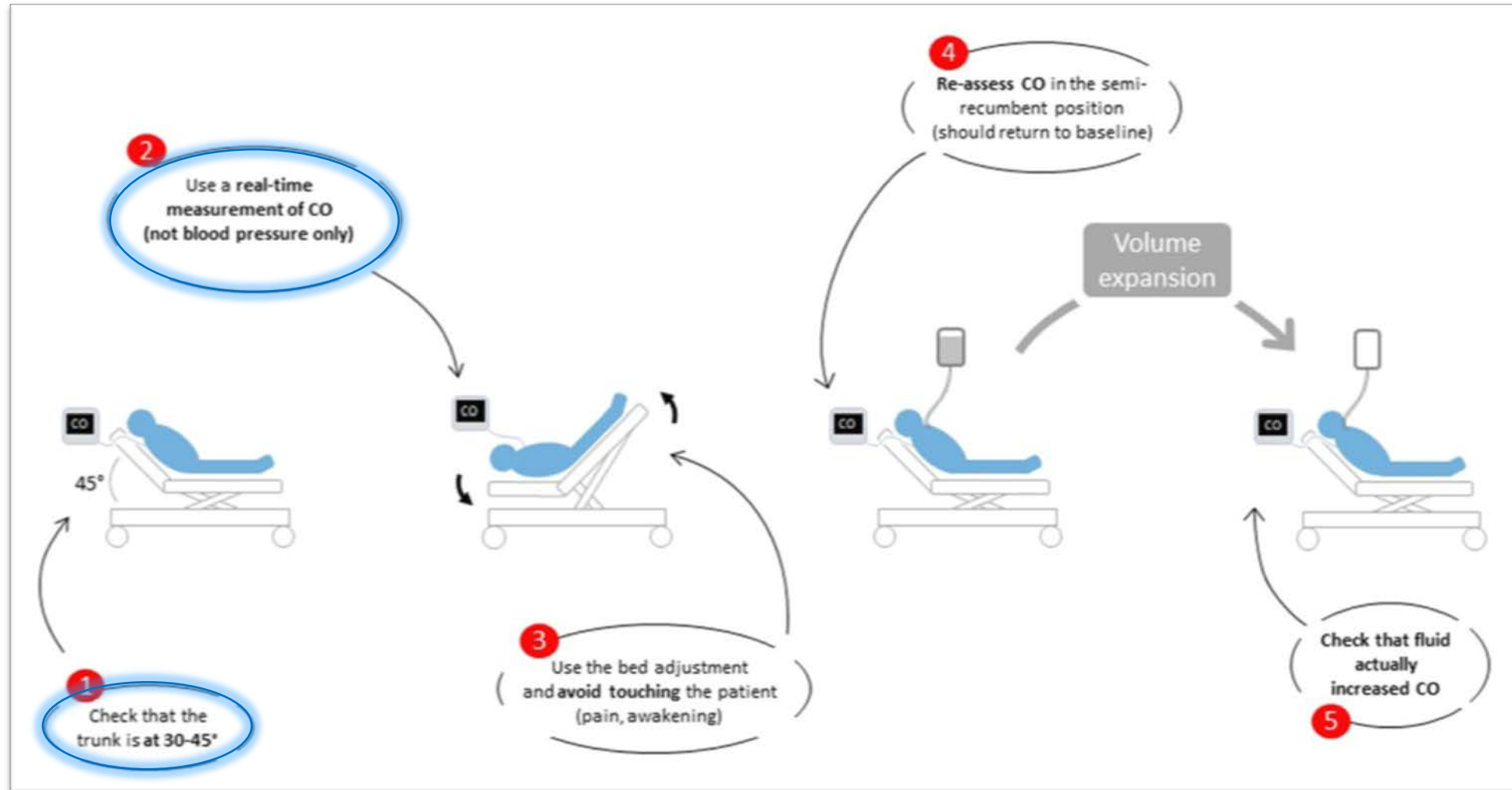


# Le lever de jambes passif

Valable

Patients avec VS

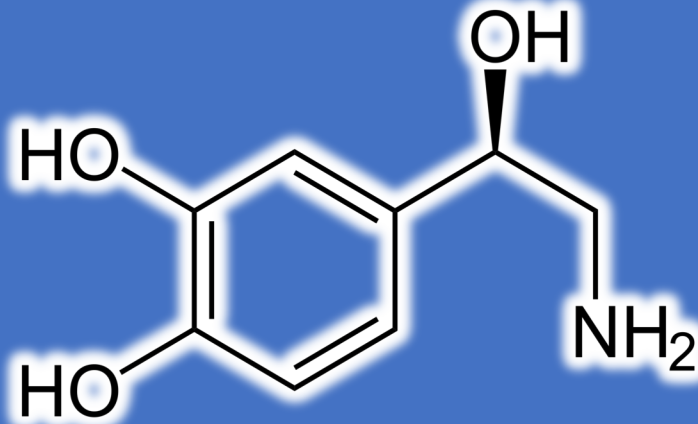
Patients en FA



# Prise en charge initiale



Remplissage vasculaire



Vasopresseur

# Noradrénaline - *Vasopresseur de 1<sup>ère</sup> ligne*

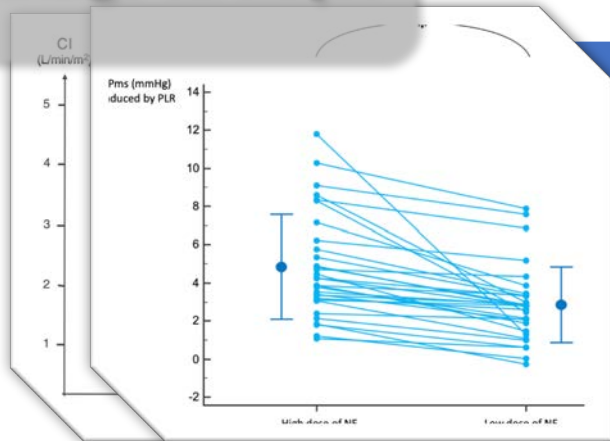
Enquête de pratique internationale (ESICM)  
Vasopresseurs et choc septique  
82 pays, 839 réanimateurs

Quel est votre vasopresseur de 1<sup>ère</sup> intention?

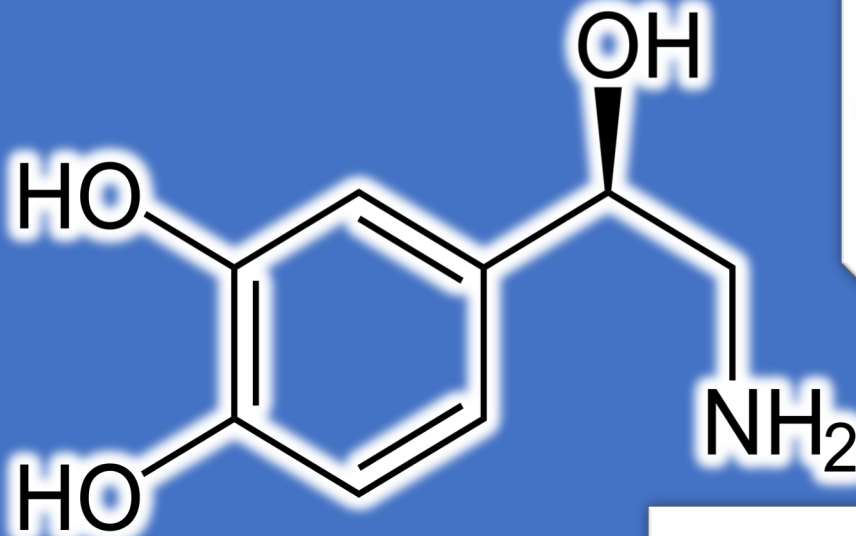
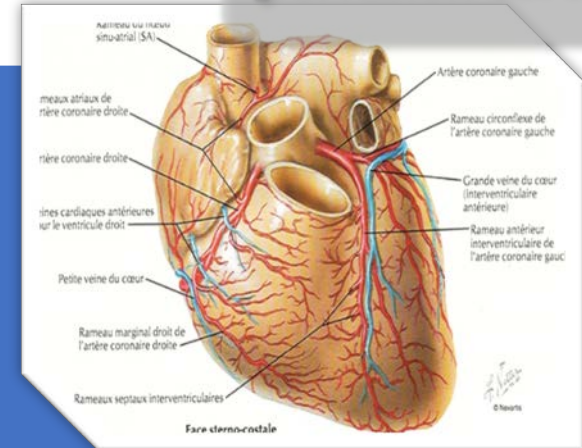
|                              |           |
|------------------------------|-----------|
| Adrenaline/epinephrine       | 4 (0.5%)  |
| Dopamine                     | 17 (2%)   |
| Noradrenaline/norepinephrine | 816 (97%) |
| Vasopressin/terlipressin     | 2 (0.3%)  |
| Phenylephrine                | 0 (0%)    |

# Noradrénaline - Vasopresseur de 1<sup>ère</sup> ligne

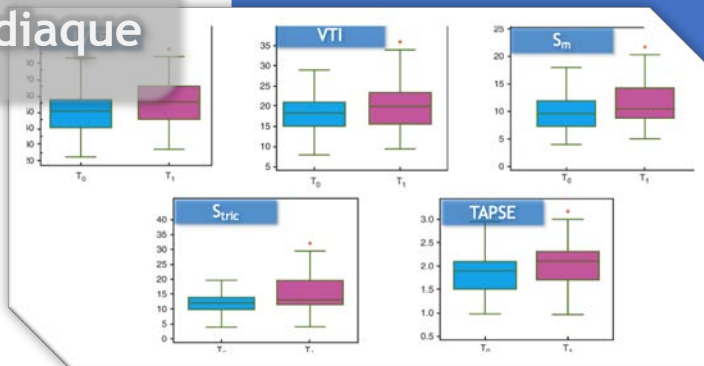
Augmente la précharge cardiaque



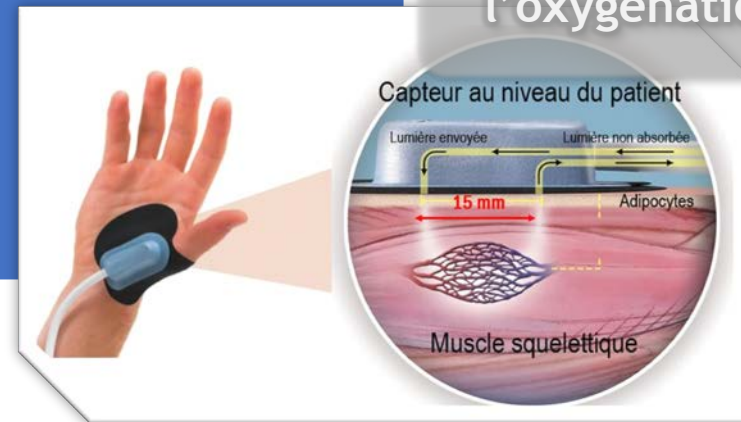
Améliore la perfusion coronaire



Augmente la contractilité cardiaque

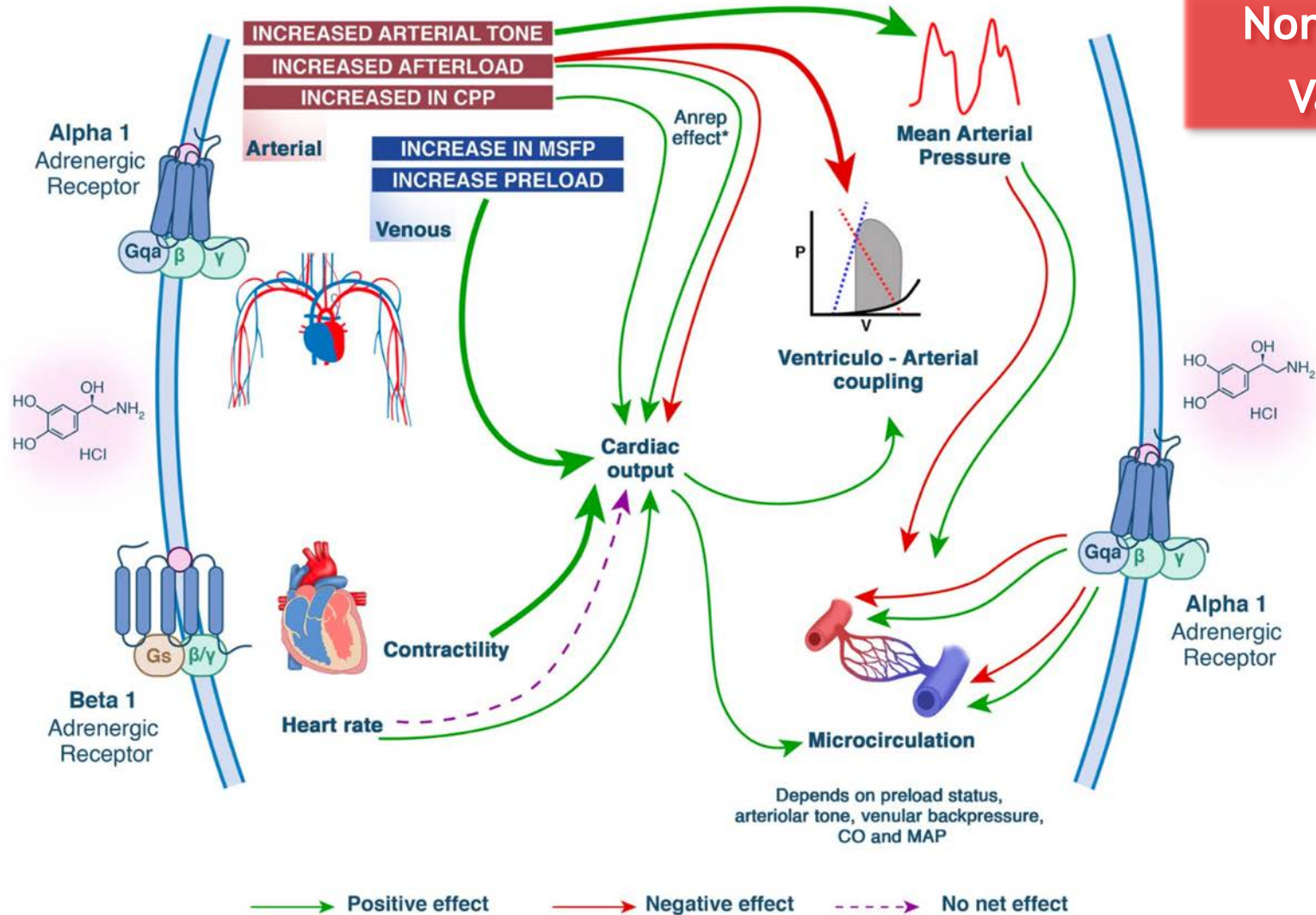


Améliore l'oxygénation tissulaire

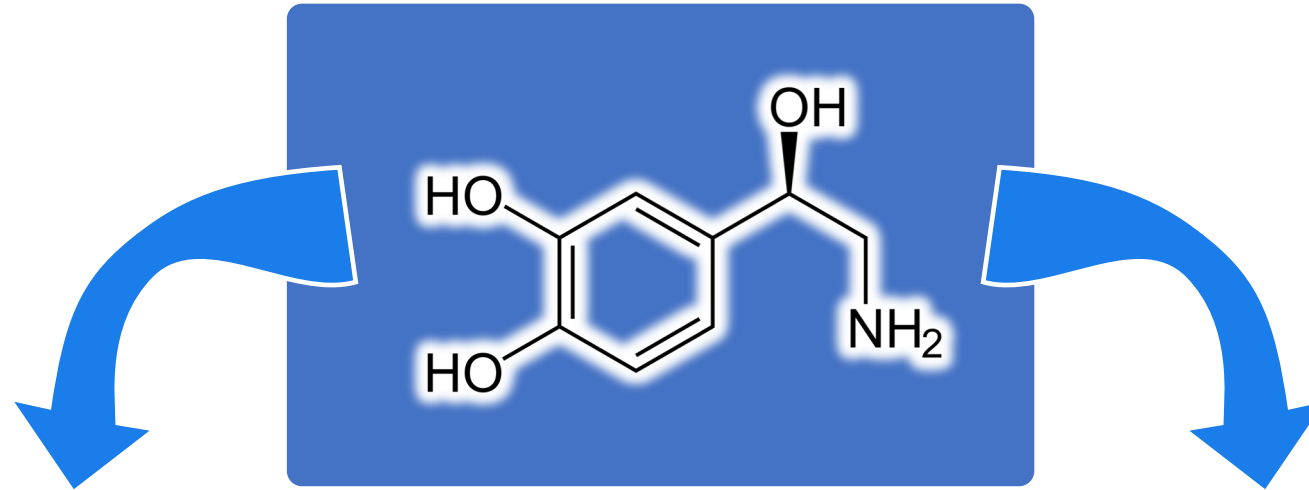


# Noradrénaline - Vasopresseur de 1<sup>ère</sup> ligne

Noradrénaline = inopresseur  
Vasopresseur + Inotrope



# Définition du choc septique réfractaire



Noradrénaline  
base

0,25  
µg/kg/min

Noradrénaline  
tartrate

0,5  
µg/kg/min

x2

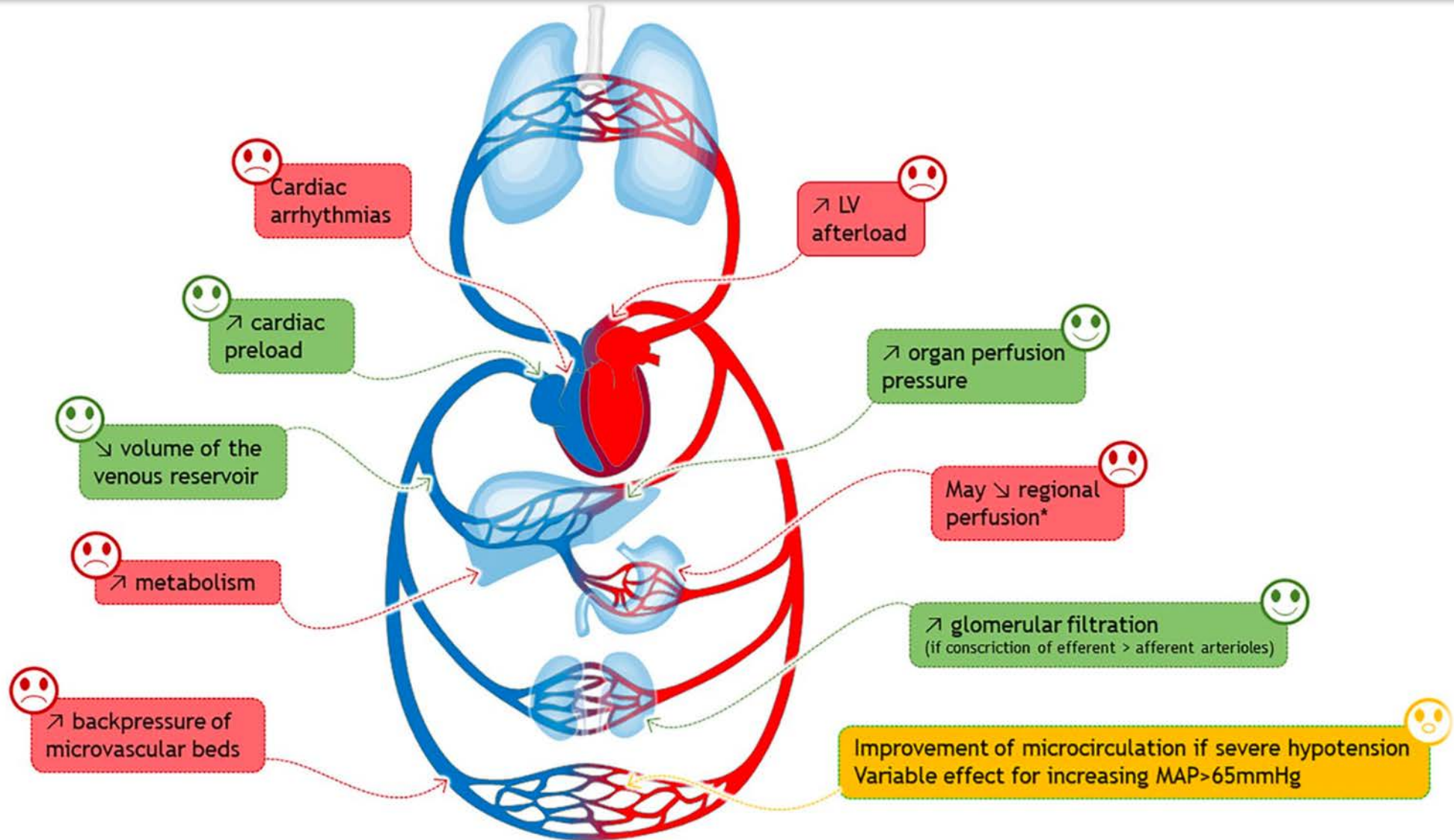


# Définition du choc septique réfractaire



1. Norepinephrine base should be adopted as the uniform, global standard for norepinephrine dosing and formulations in ICUs.
2. Hospital formularies and pharmacies should adopt a uniform reporting policy across countries.
3. ICU workflow teams, including but not limited to bedside nurses, pharmacists, and clinicians should report and chart norepinephrine in the medical record, drug dispensing systems and infusion pumps as norepinephrine base.
4. Researchers and research literature should clearly state norepinephrine formulation used in the investigation and include conversion to norepinephrine base for analysis.
5. Manufacturers should explicitly state norepinephrine formulation on drug vials as norepinephrine base.
6. Uniform norepinephrine formulation labeling and reporting globally is urgently needed to ensure patient safety, optimize clinical care and research. There is no reason to delay the implementation of the guidance developed by this task force.

# Noradrénaline - *Dans quel délai ?*



# Noradrénaline - *Dans quel délai ?*

## Administration noradrénaline



La noradrénaline devrait être débutée **précocement** chez les patients avec un choc septique

# Noradrénaline - *Dans quel délai ?*

Enquête de pratique internationale (ESICM)  
Vasopresseurs et choc septique  
82 pays, 839 réanimateurs

## Quand débiter les vasopresseurs ?

|  |           |
|--|-----------|
| I try to avoid any use of vasopressors and stick to volume therapy                           | 15 (2%)   |
| I use a vasopressor early, before complete volume resuscitation (despite preload dependency) | 104 (12%) |
| I use a vasopressor only after assessment of preload dependency                              | 371 (44%) |
| I use a vasopressor only after completed treatment of preload dependency                     | 228 (27%) |
| I use a vasopressor regardless of preload dependency   | 121 (14%) |

# Noradrénaline - *Dans quel délai ?*

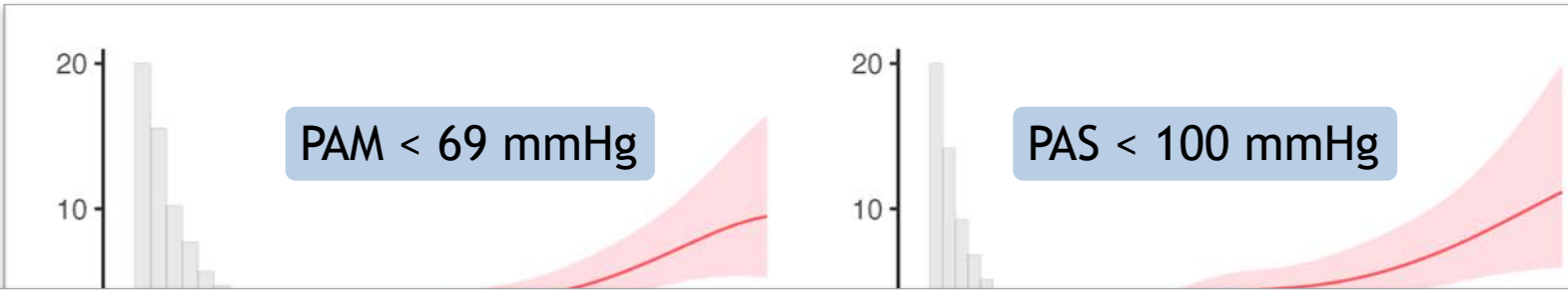
**Précocément !**



La durée et la sévérité de l'hPA sont associées à une augmentation de mortalité

# Noradrénaline - *Dans quel délai ?*

Etude rétrospective  
77 328 patients septiques dans 364 ICUs  
CJP : mortalité en réanimation



| PAD < ? mmHg              | N      | Death (%)   | Adjusted OR | 95% CI         | P value |
|---------------------------|--------|-------------|-------------|----------------|---------|
| Lowest DBP $\geq$ 60 mmHg | 7954   | 44 (0.6%)   | Reference   |                |         |
| Lowest DBP < 60 mmHg      | 69,371 | 2729 (3.9%) | 3.82        | 2.82 to 5.17   | <0.001  |
| Lowest DBP < 50 mmHg      | 46,073 | 2407 (5.2%) | 5.29        | 3.90 to 7.19   | <0.001  |
| Lowest DBP < 40 mmHg      | 14,005 | 1295 (9.2%) | 10.78       | 7.84 to 14.82  | <0.001  |
| Lowest DBP < 30 mmHg      | 1491   | 303 (20.3%) | 31.46       | 20.78 to 47.63 | <0.001  |

Time-Weighted Average of DBP < 60 (mmHg)

Time-Weighted Average of PP < 57 (mmHg)

# Noradrénaline - *Dans quel délai ?*

**Précocément !**



La durée et la sévérité de l'hPA sont associées à une augmentation de mortalité

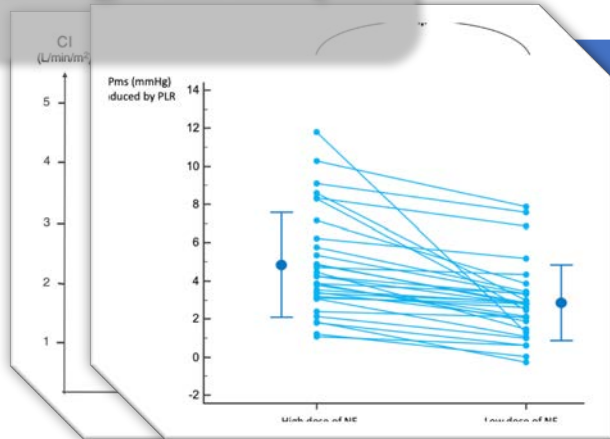
La NAD augmente le débit cardiaque

La NAD recrute des  $\mu$ vaisseaux et améliore l'oxygénation tissulaire

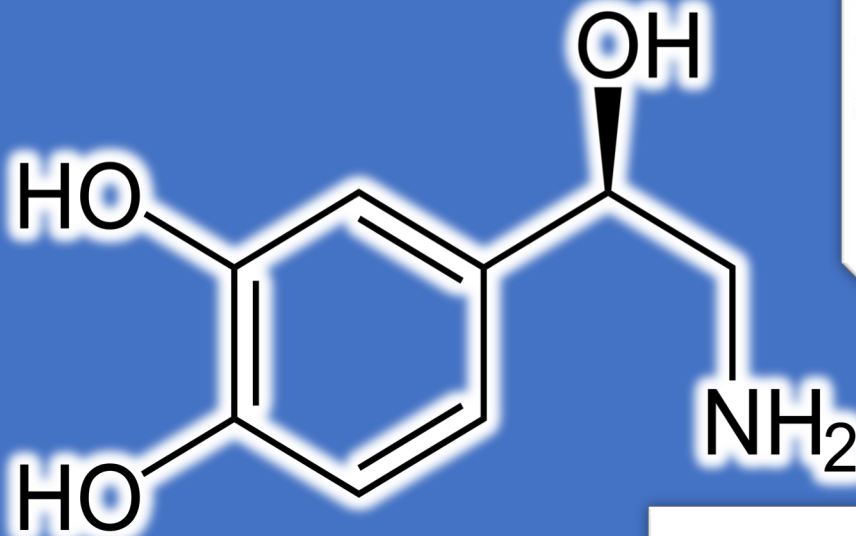
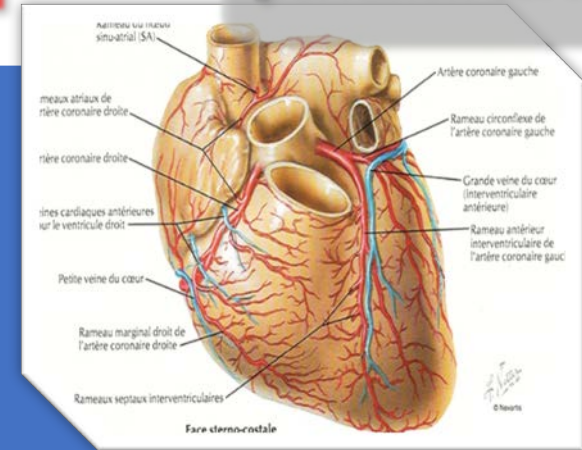
# Noradrénaline - *Effets physiologiques*

Noradrénaline = **inopresseur**  
Vasopresseur + Inotrope

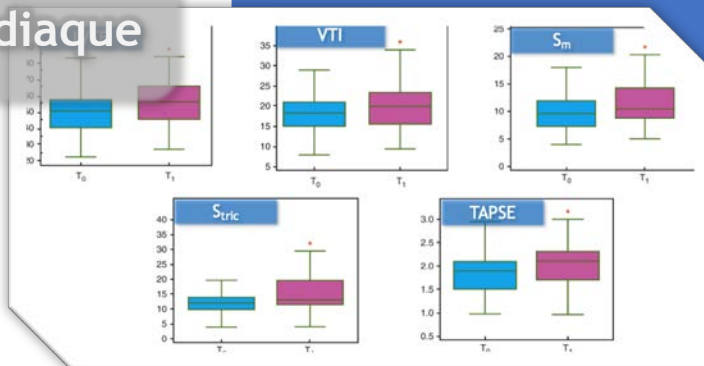
Augmente la précharge cardiaque



Améliore la perfusion coronaire



Augmente la contractilité cardiaque



Améliore l'oxygénation tissulaire





# Noradrénaline - *Dans quel délai ?*

## Précocément !



La durée et la sévérité de l'hPA sont associées à une augmentation de mortalité

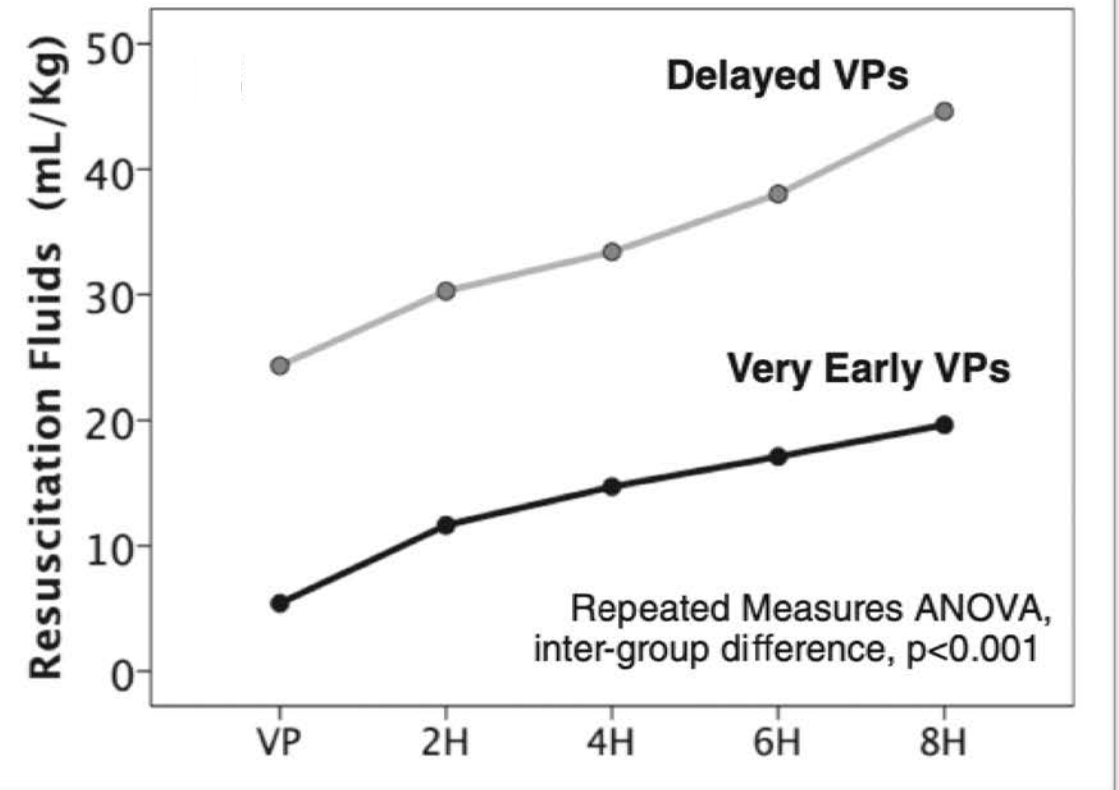
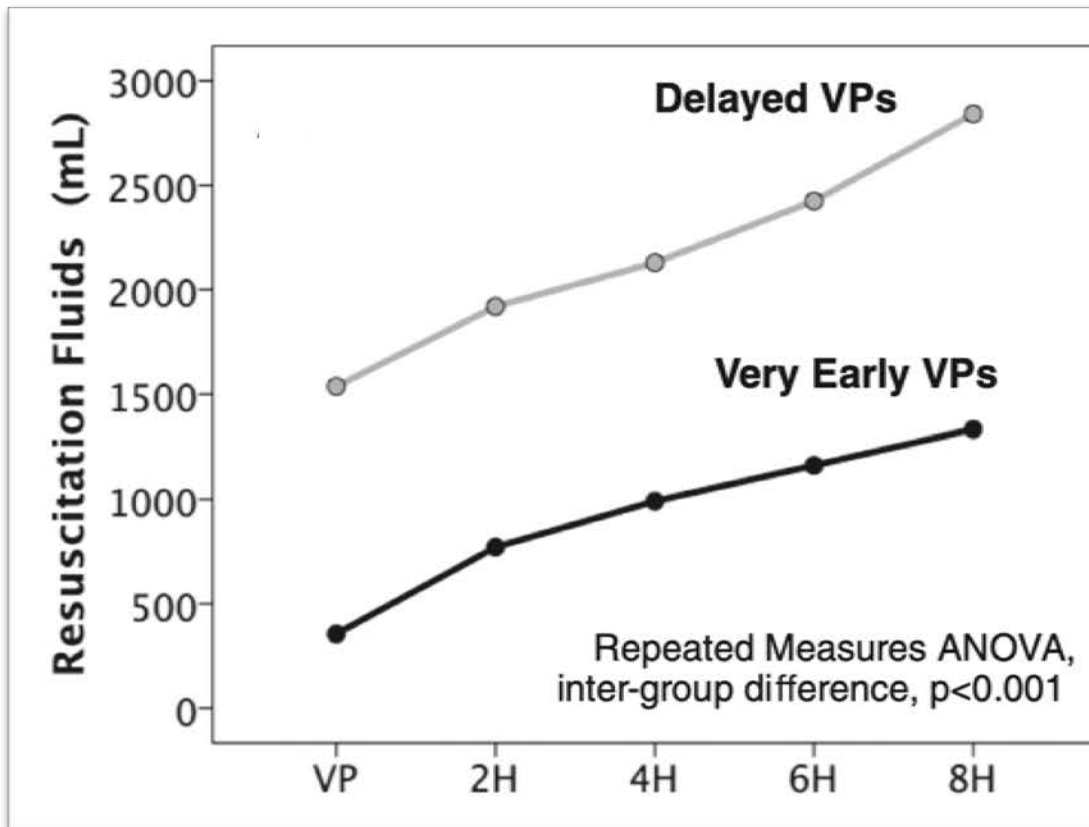
La NAD augmente le débit cardiaque

La NAD recrute des  $\mu$ vaisseaux et améliore l'oxygénation tissulaire

La NAD peut prévenir la surcharge liquidienne délétère

# Noradrénaline - *Dans quel délai ?*

186 patients avec choc septique  
Matching 2 groupes patients  
NAD précoce : dans l'heure EV  
NAD tardive : >1h après EV



# Noradrénaline - *Dans quel délai ?*

## Précocément !



La durée et la sévérité de l'hPA sont associées à une augmentation de mortalité

La NAD augmente le débit cardiaque

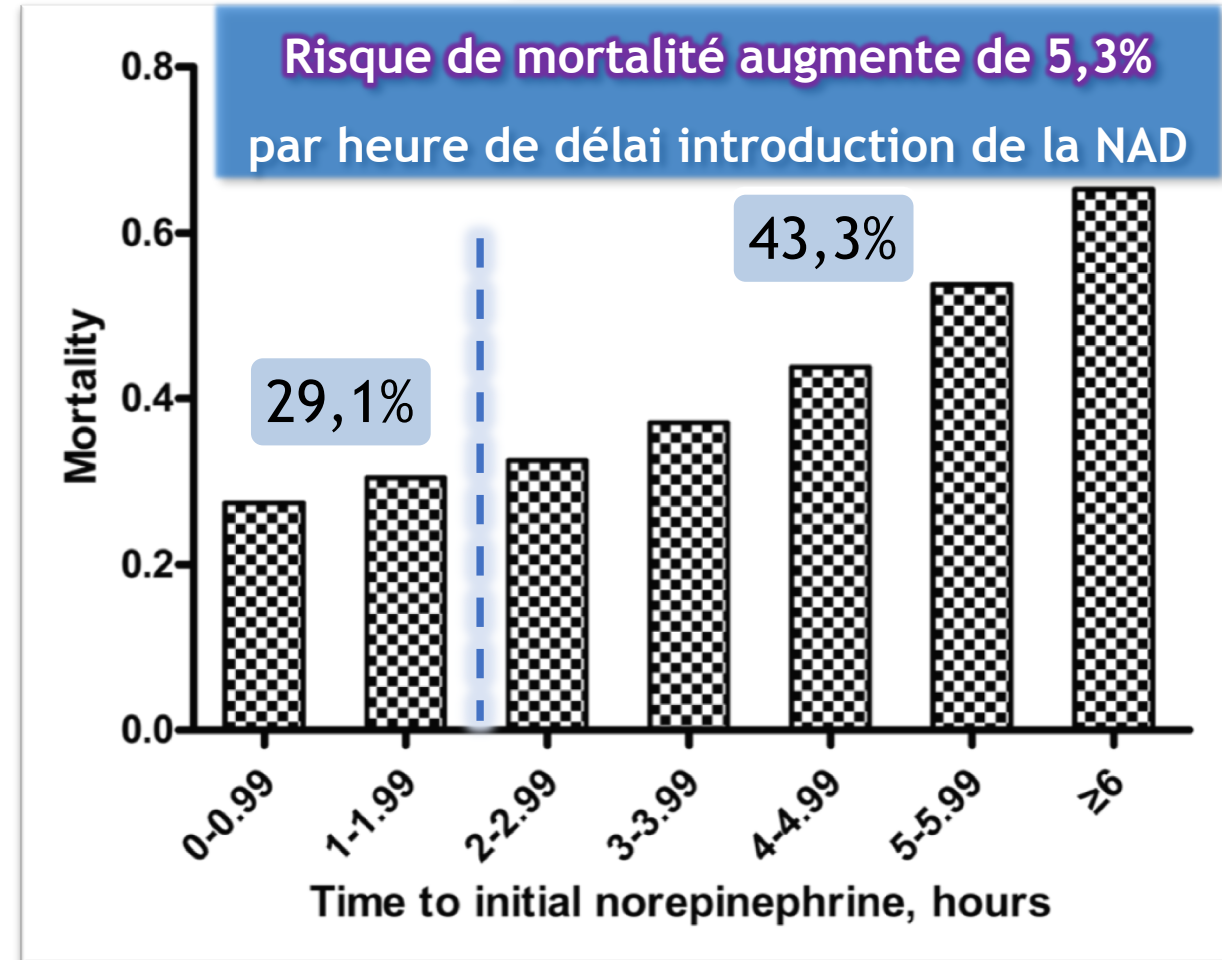
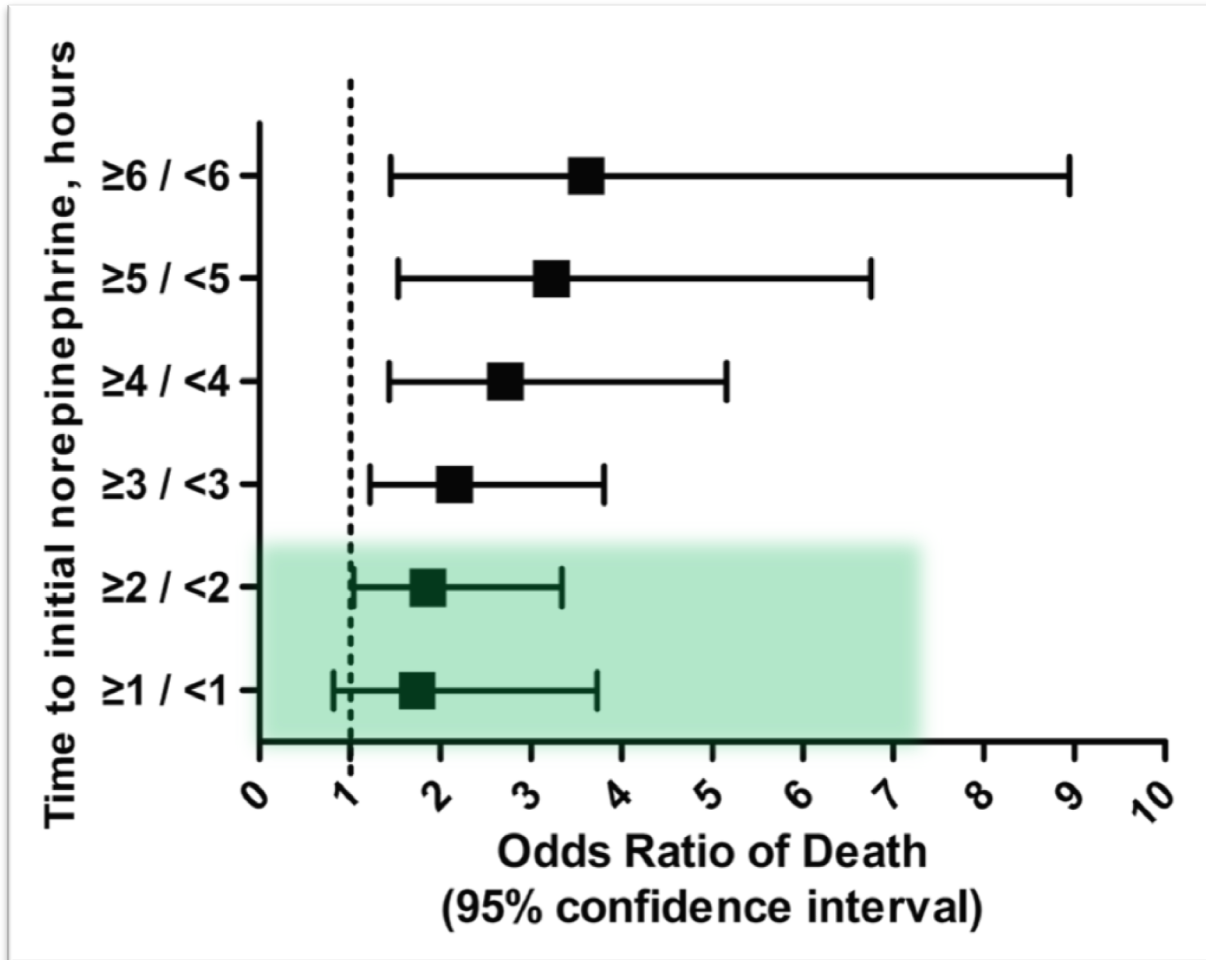
La NAD recrute des  $\mu$ vaisseaux et améliore l'oxygénation tissulaire

La NAD peut prévenir la surcharge liquidienne délétère

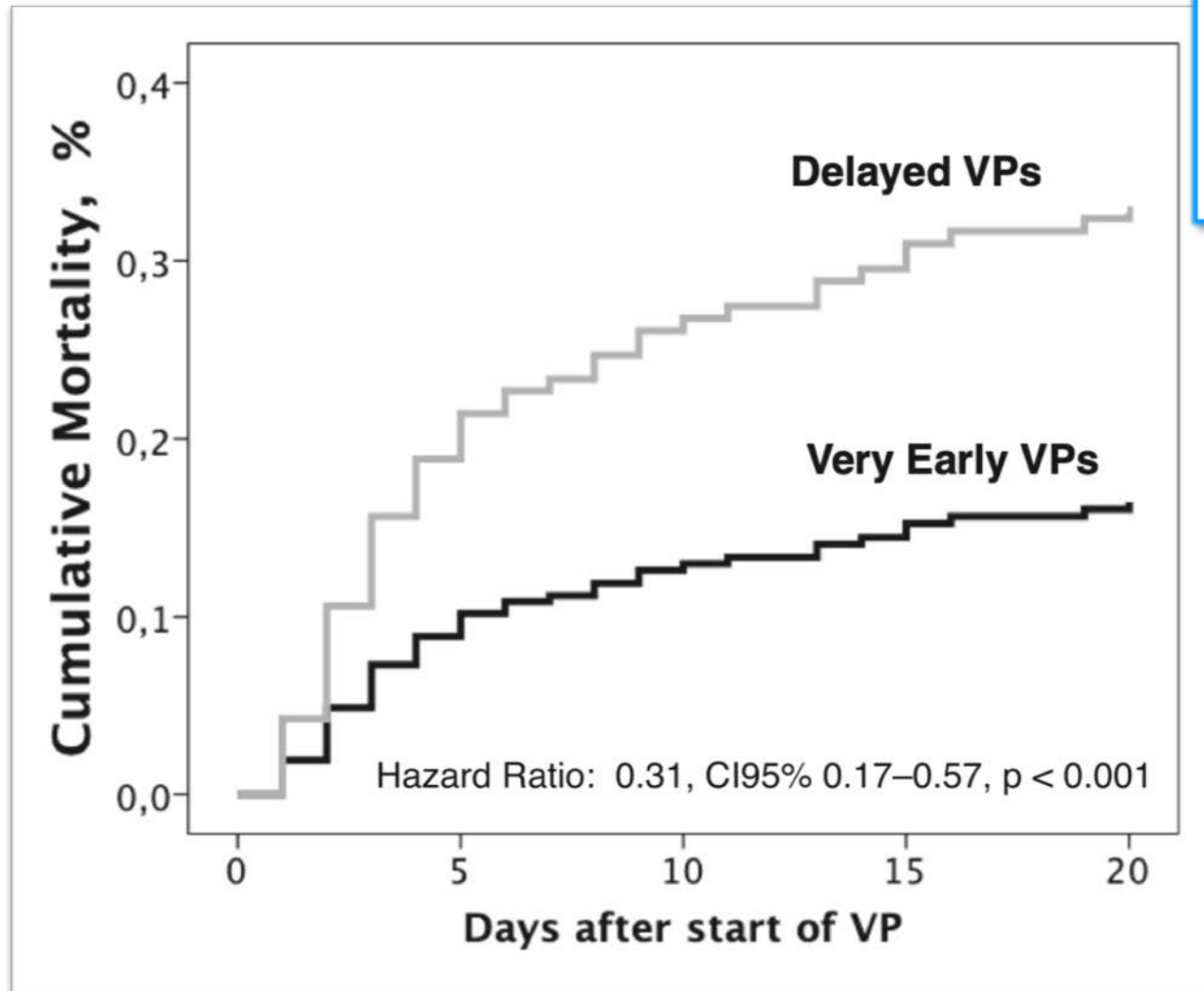
La NAD peut améliorer le pronostic des patients

# Noradrénaline - *Dans quel délai ?*

Etude rétrospective  
213 patients en choc septique



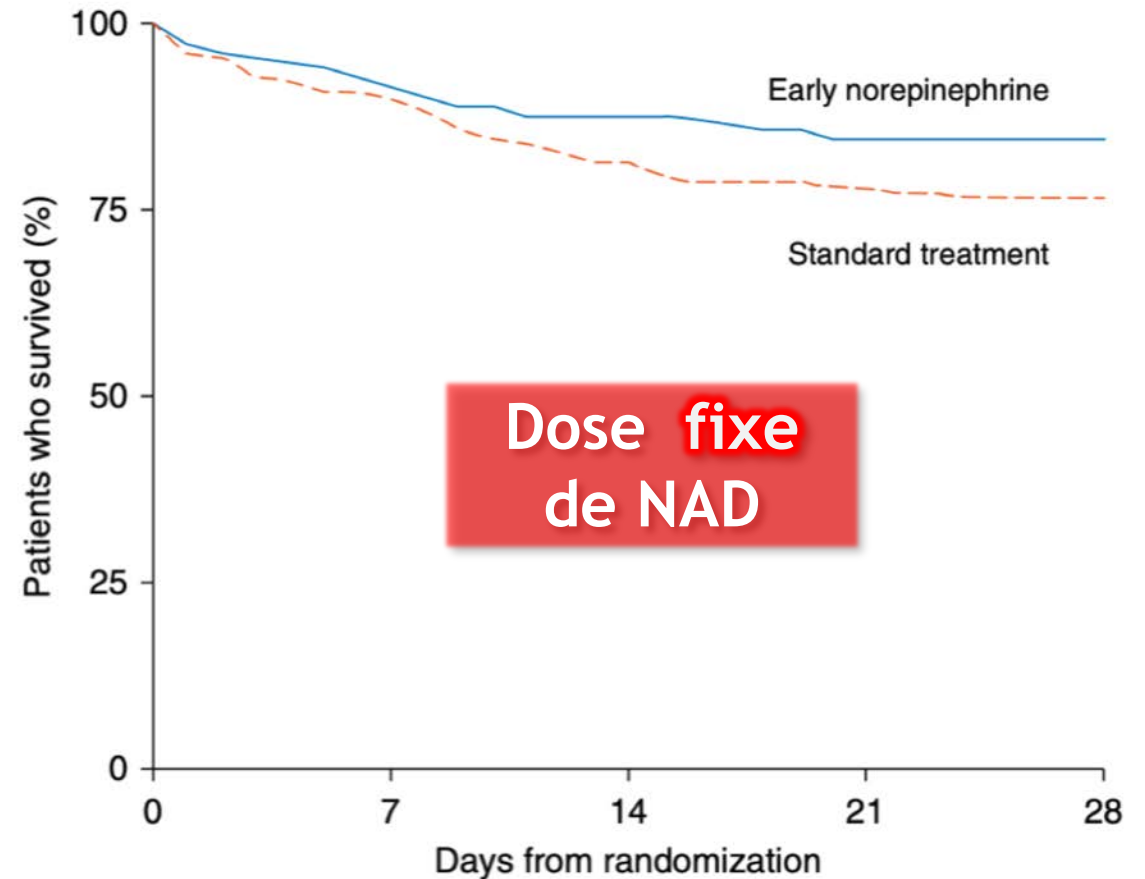
# Noradrénaline - *Dans quel délai ?*



186 patients avec choc septique  
Matching 2 groupes patients  
NAD précoce : dans l'heure EV  
NAD tardive : >1h après EV

# Noradrénaline - *Dans quel délai ?*

| Outcome   | Early |
|---|-------|
| Primary outcome, n (%)  |       |
| Achieved target mABP + tissue perfusion goal by 6 h                 | 11    |
| Achieved target mABP + urine output + lactate clearance >10% by 6 h | 4     |
| Achieved target mABP + urine output by 6 h                          | 5     |
| Achieved target mABP + lactate clearance >10% by 6 h                | 1     |



| No. at Risk          | 0   | 7   | 14  | 21  | 28  |
|----------------------|-----|-----|-----|-----|-----|
| Early Norepinephrine | 155 | 142 | 136 | 131 | 131 |
| Placebo              | 155 | 139 | 126 | 121 | 119 |

# Noradrénaline - *Dans quel délai ?*

**20% des patients**  
reçoivent de la NAD avant l'inclusion

RCT, 60 ICUs aux USA  
1563 patients avec un choc septique  
Stratégie restrictive vs. libérale pdt 24h  
CJP : Mortalité à J90

CLOVERS trial

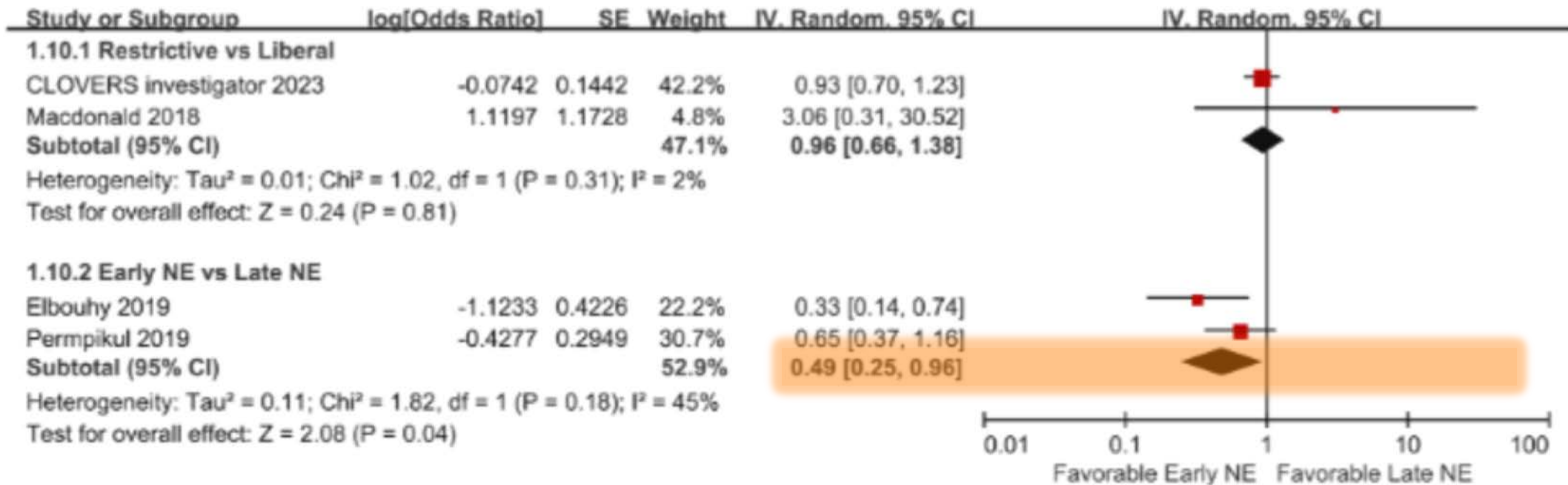
| Therapeutic Category | Outcome  | Restrictive Fluid Group (N=782) |                     | Liberal Fluid Group (N=781) |                     | Difference (95% CI) <sup>†</sup> |
|----------------------|--|---------------------------------|---------------------|-----------------------------|---------------------|----------------------------------|
|                      |  | No. of Patients                 | Mean (95% CI)       | No. of Patients             | Mean (95% CI)       |                                  |
| Medication           | Death before discharge home by day 90 — % of patients <sup>‡</sup> | 782                             | 14.0 (11.6 to 16.4) | 781                         | 14.9 (12.4 to 17.4) | -0.9 (-4.4 to 2.6) <sup>§</sup>  |
| Vasopressors         | No. of days free from organ-support therapy at 28 days             | 778                             | 24.0 (23.4 to 24.6) | 778                         | 23.6 (23.0 to 24.3) | 0.3 (-0.5 to 1.2)                |
| Time                 | No. of days free from ventilator use at 28 days                    | 773                             | 23.4 (22.7 to 24.1) | 771                         | 22.8 (22.0 to 23.5) | 0.6 (-0.4 to 1.6)                |
| Duration             | No. of days free from renal-replacement therapy at 28 days         | 737                             | 24.1 (23.4 to 24.8) | 738                         | 23.9 (23.2 to 24.6) | 0.2 (-0.8 to 1.2)                |
|                      | No. of days free from vasopressor use at 28 days <sup>¶</sup>      | 778                             | 22.0 (21.4 to 22.7) | 778                         | 21.6 (20.9 to 22.3) | 0.4 (-0.5 to 1.3)                |

# Noradrénaline - *Dans quel délai ?*

## Mortalité

Meta-analyse, 12 études (4 RCT)  
 7281 patients en choc septique  
 NAD précoce vs. tardive (selon étude)  
 CJP : mortalité tout délai (J28, J30, J90)

| Study or Subgroup | log [OR] | SE     | Weight | OR                 | IV, Random, 95% CI |
|-------------------|----------|--------|--------|--------------------|--------------------|
| <b>1.1.1 RCTs</b> |          |        |        |                    |                    |
| Elbouhy 2019      | -1.1233  | 0.4226 | 5.8%   | 0.33 [0.14 - 0.74] |                    |
| Permpikul 2019    | -0.4277  | 0.2949 | 8.4%   | 0.65 [0.37 - 1.16] |                    |

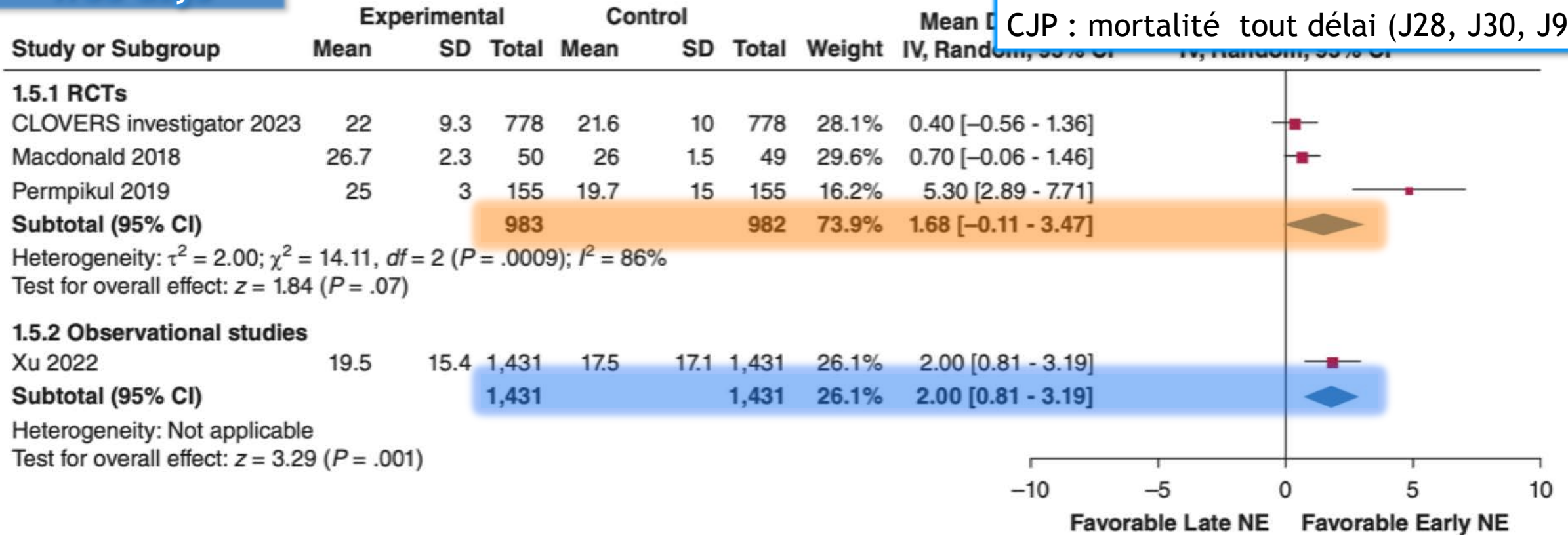




# Noradrénaline - *Dans quel délai ?*

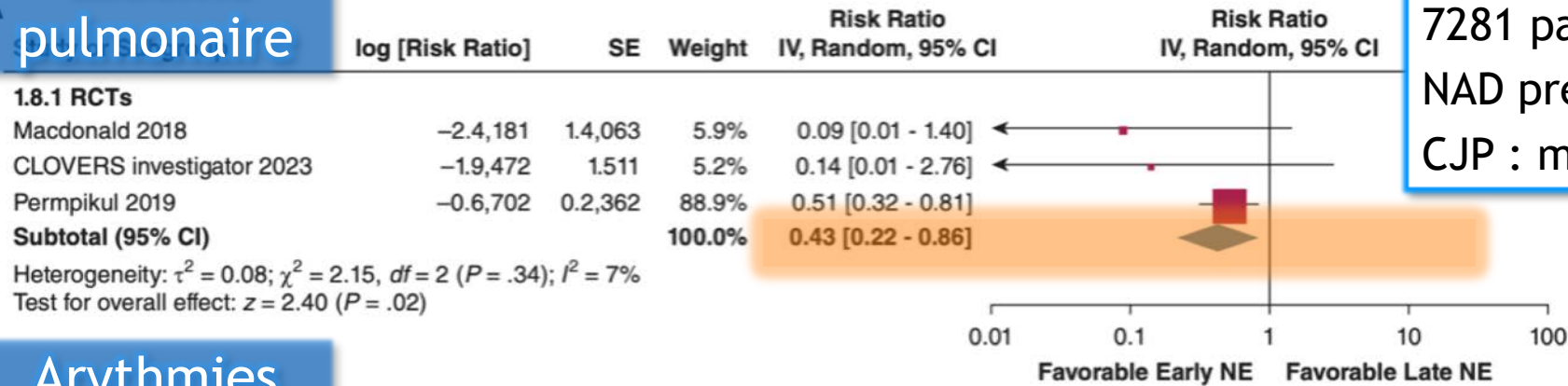
Vasopressors  
free days

Meta-analyse, 12 études (4 RCT)  
7281 patients en choc septique  
NAD précoce vs. tardive (selon étude)  
CJP : mortalité tout délai (J28, J30, J90)



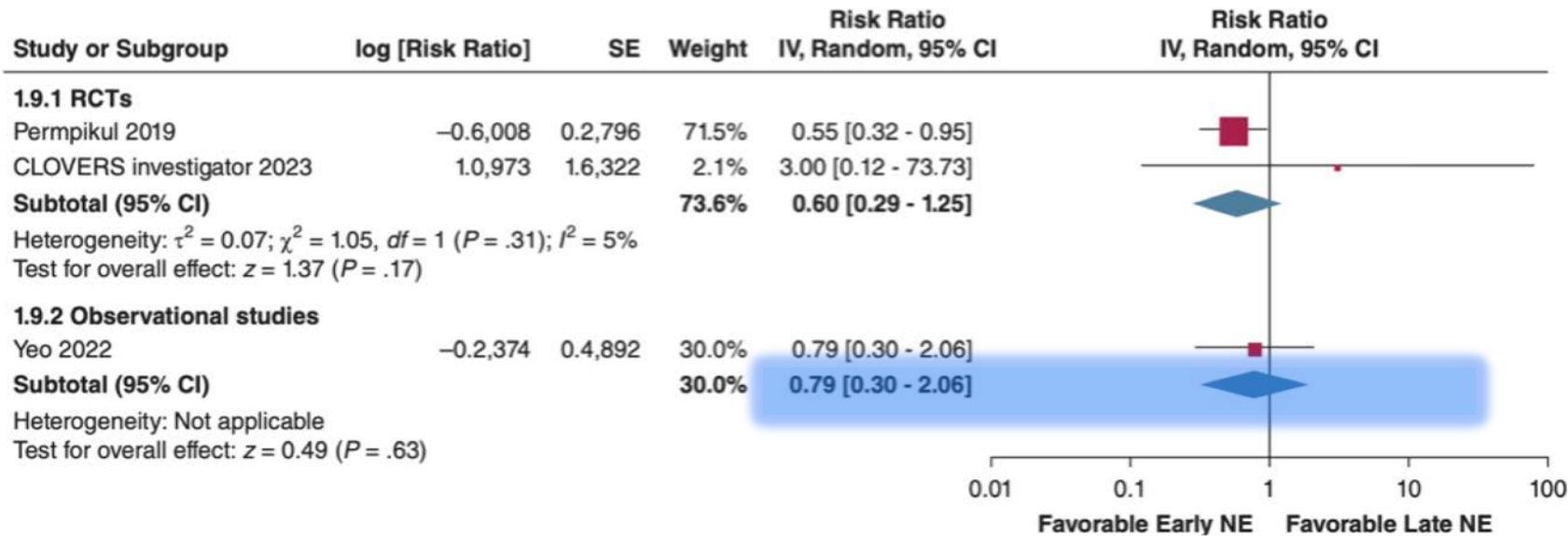
# Noradrénaline - *Dans quel délai ?*

## Œdème pulmonaire



Meta-analyse, 12 études (4 RCT)  
7281 patients en choc septique  
NAD précoce vs. tardive (selon étude)  
CJP : mortalité tout délai (J28, J30, J90)

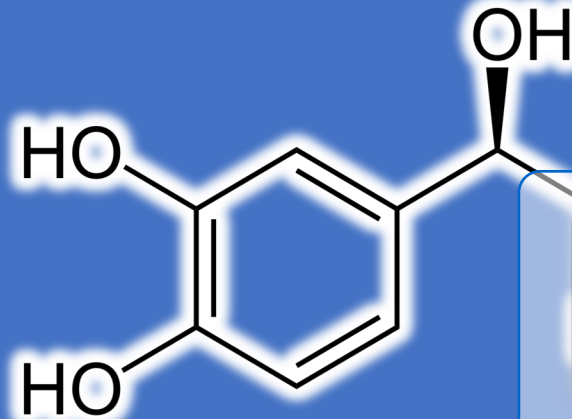
## Arythmies



# Prise en charge initiale



Remplissage vasculaire



Vasopresseur



Monitorage hémodynamique

# Quel monitoring hémodynamique?

1970

Cathéter artériel  
pulmonaire

Techniques de monitoring  
moins invasives

Thermodilution transpulmonaire

Dilution au lithium

Analyse du contour de l'onde de pouls  
non-calibrés

Doppler oesophagien

2024

Techniques  
non-invasives

Méthode du volume-clamp

Tonométrie artérielle radiale

Bio-impedance  
Bio-réactance

Temps de transit  
de l'onde de pouls

*Le choix du monitoring hémodynamique le plus approprié dépend de*

- la phase de l'état de choc
- la complexité du patient
- la réponse à la prise en charge thérapeutique initiale

# A la phase initiale du choc

Intensive Care Med (2014) 40:1795–1815  
DOI 10.1007/s00134-014-3525-z

CONFERENCE REPORTS AND EXPERT PANEL

Maurizio Cecconi  
Daniel De Backer  
Massimo Antonelli  
Richard Beale  
Jan Bakker  
Christoph Hofer  
Roman Jaeschke  
Alexandre Mebazaa  
Michael R. Pinsky  
Jean Louis Teboul  
Jean Louis Vincent  
Andrew Rhodes

**Consensus on circulatory shock and hemodynamic monitoring. Task force of the European Society of Intensive Care Medicine**

Patients en choc

Evaluation hémodynamique initiale

- Cathéter veineux central
- Cathéter artériel

PVC

Sc

$\Delta P$

Intensive Care Med (2016) 42:1350–1359

CONFERENCE REPORTS AND EXPERT PANEL

Less invasive hemodynamic monitoring in critically ill patients



Jean-Louis Teboul<sup>1\*</sup>, Bernd Saugel<sup>2</sup>, Maurizio Cecconi<sup>3</sup>, Daniel De Backer<sup>4</sup>, Christoph K. Hofer<sup>5</sup>, Xavier Monnet<sup>1</sup>, Azriel Perel<sup>6</sup>, Michael R. Pinsky<sup>7</sup>, Daniel A. Reuter<sup>2</sup>, Andrew Rhodes<sup>3</sup>, Pierre Squara<sup>8</sup>, Jean-Louis Vincent<sup>9</sup> and Thomas W. Scheeren<sup>10</sup>

PA,  $\Delta PP$

, PaCO<sub>2</sub>, SaO<sub>2</sub>

Intensive Care Med (2014) 40:1795–1815  
DOI 10.1007/s00134-014-3525-z

CONFERENCE REPORTS AND EXPERT PANEL

Maurizio Cecconi  
Daniel De Backer  
Massimo Antonelli  
Richard Beale  
Jan Bakker  
Christoph Hofer  
Roman Jaeschke  
Alexandre Mebazaa  
Michael R. Pinsky  
Jean Louis Teboul  
Jean Louis Vincent  
Andrew Rhodes

**Consensus on circulatory shock and hemodynamic monitoring. Task force of the European Society of Intensive Care Medicine**

“Pour compléter l'évaluation hémodynamique initiale et caractériser le type de choc, il est recommandé d'utiliser **l'échographie cardiaque** et non des techniques de monitoring hémodynamique plus invasives”.

*Recommendation: Level 2; QoE moderate (B)*

# A la phase initiale du choc - *Echo cœur*

## Echocardiography

Normal cardiac chambers and (usually) preserved contractility

Distributive shock

Small cardiac chambers and normal or high contractility

Hypovolemic shock

Large ventricles and poor contractility

Cardiogenic shock

In tamponade: pericardial effusion, small right and left ventricles, dilated inferior vena cava; in pulmonary embolism or pneumothorax: dilated right ventricle, small left ventricle

Obstructive shock



Dysfonction VG



Cœur pulmonaire aigu



« Swinging heart »

# Après la phase initiale du choc

Intensive Care Med (2014) 40:1795–1815  
DOI 10.1007/s00134-014-3525-z

CONFERENCE REPORTS AND EXPERT PANEL

Maurizio Cecconi  
Daniel De Backer  
Massimo Antonelli  
Richard Beale  
Jan Bakker  
Christoph Hofer  
Roman Jaeschke  
Alexandre Mebazaa  
Michael R. Pinsky  
Jean Louis Teboul  
Jean Louis Vincent  
Andrew Rhodes

**Consensus on circulatory shock and hemodynamic monitoring. Task force of the European Society of Intensive Care Medicine**

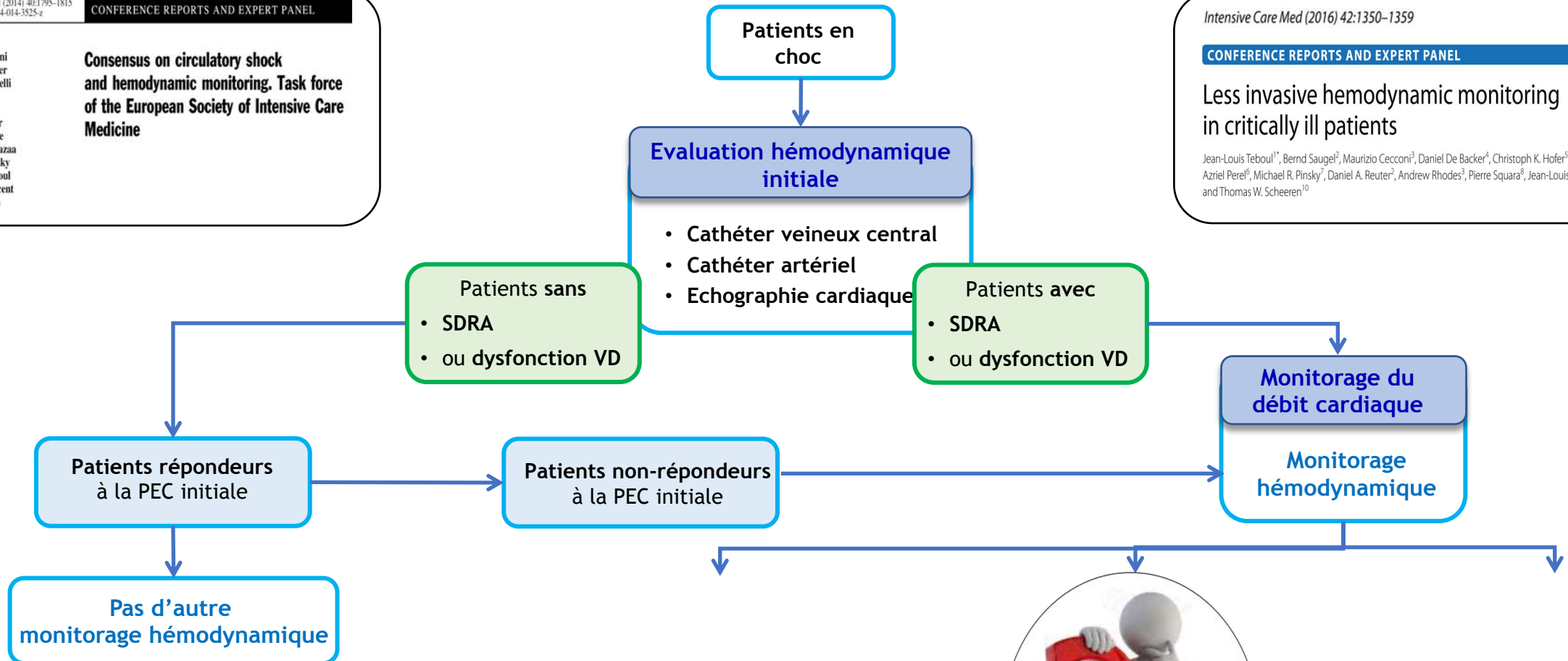
Intensive Care Med (2016) 42:1350–1359

CONFERENCE REPORTS AND EXPERT PANEL



**Less invasive hemodynamic monitoring in critically ill patients**

Jean-Louis Teboul<sup>1\*</sup>, Bernd Saugel<sup>2</sup>, Maurizio Cecconi<sup>3</sup>, Daniel De Backer<sup>4</sup>, Christoph K. Hofer<sup>5</sup>, Xavier Monnet<sup>1</sup>, Azriel Perel<sup>6</sup>, Michael R. Pinsky<sup>7</sup>, Daniel A. Reuter<sup>2</sup>, Andrew Rhodes<sup>3</sup>, Pierre Squara<sup>8</sup>, Jean-Louis Vincent<sup>9</sup> and Thomas W. Scheeren<sup>10</sup>

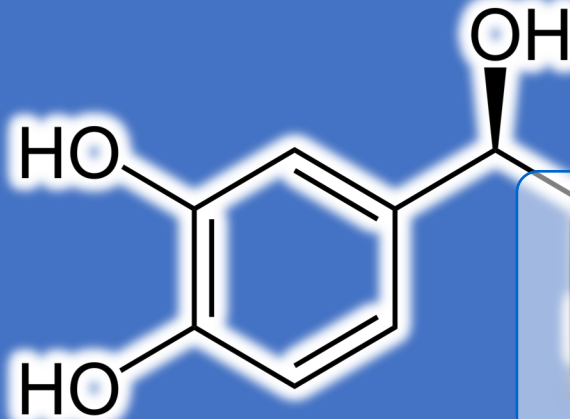


# Prise en charge initiale



Remplissage vasculaire

- Balancés ?
- Personnalisation



Noradrénaline

- 1<sup>ère</sup> ligne
- Précocement



Monitorage hémodynamique



AER 22 novembre 2024



# Prise en charge initiale du choc septique

Pr Mathieu Jozwiak, service MIR Nice  
*jozwiak.m@chu-nice.fr*

