

NorAdrénaline en traumatologie

Pr Pierre Bouzat

Pôle Anesthésie Réanimation
Université Grenoble Alpes
GIN – INSERM U1216 UJF-CEA-CHU, Equipe 5
CHU Grenoble Alpes

Journée du TRENAU, le 12 Octobre 2021

DUEL DES STRATEGIES

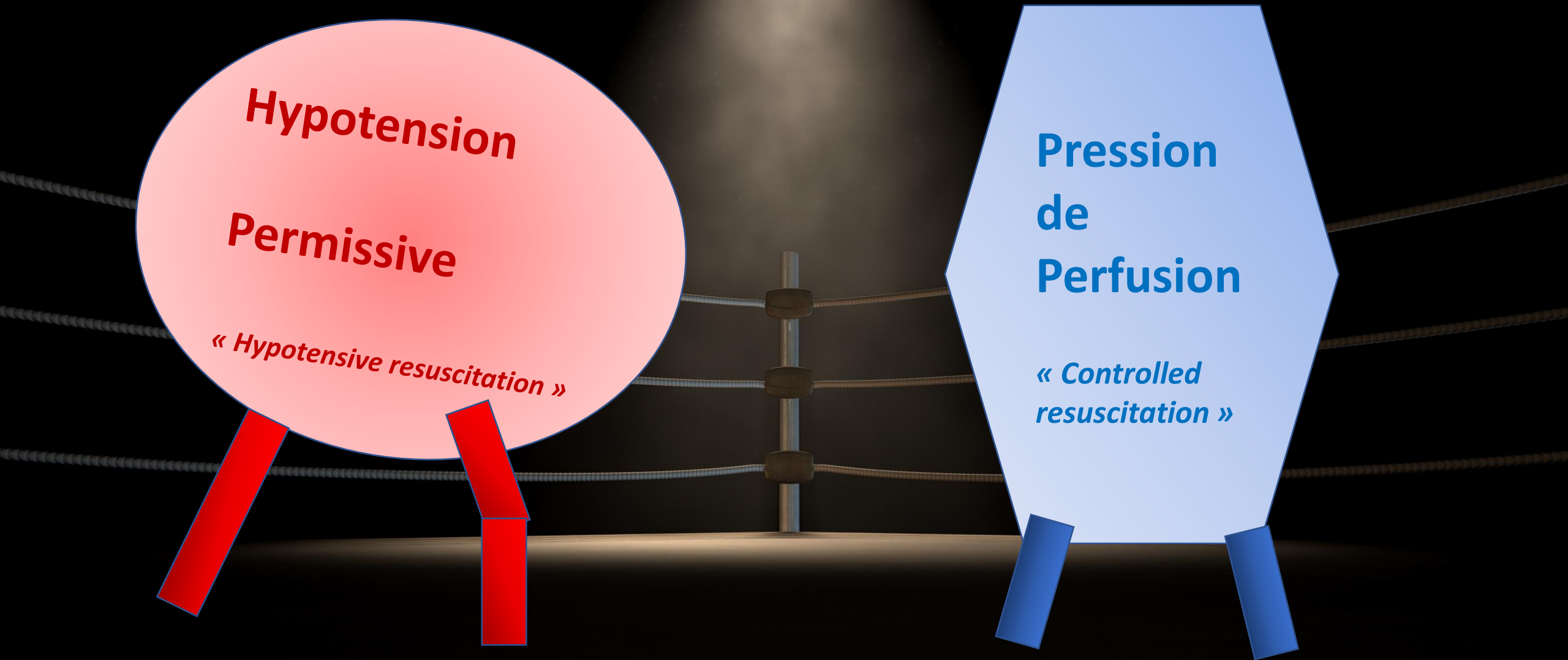
Hypotension

Permissive

« Hypotensive resuscitation »

**Pression
de
Perfusion**

*« Controlled
resuscitation »*



La NAD dans le choc hémorragique

Postcharge ↑

Consommation O₂ ↑

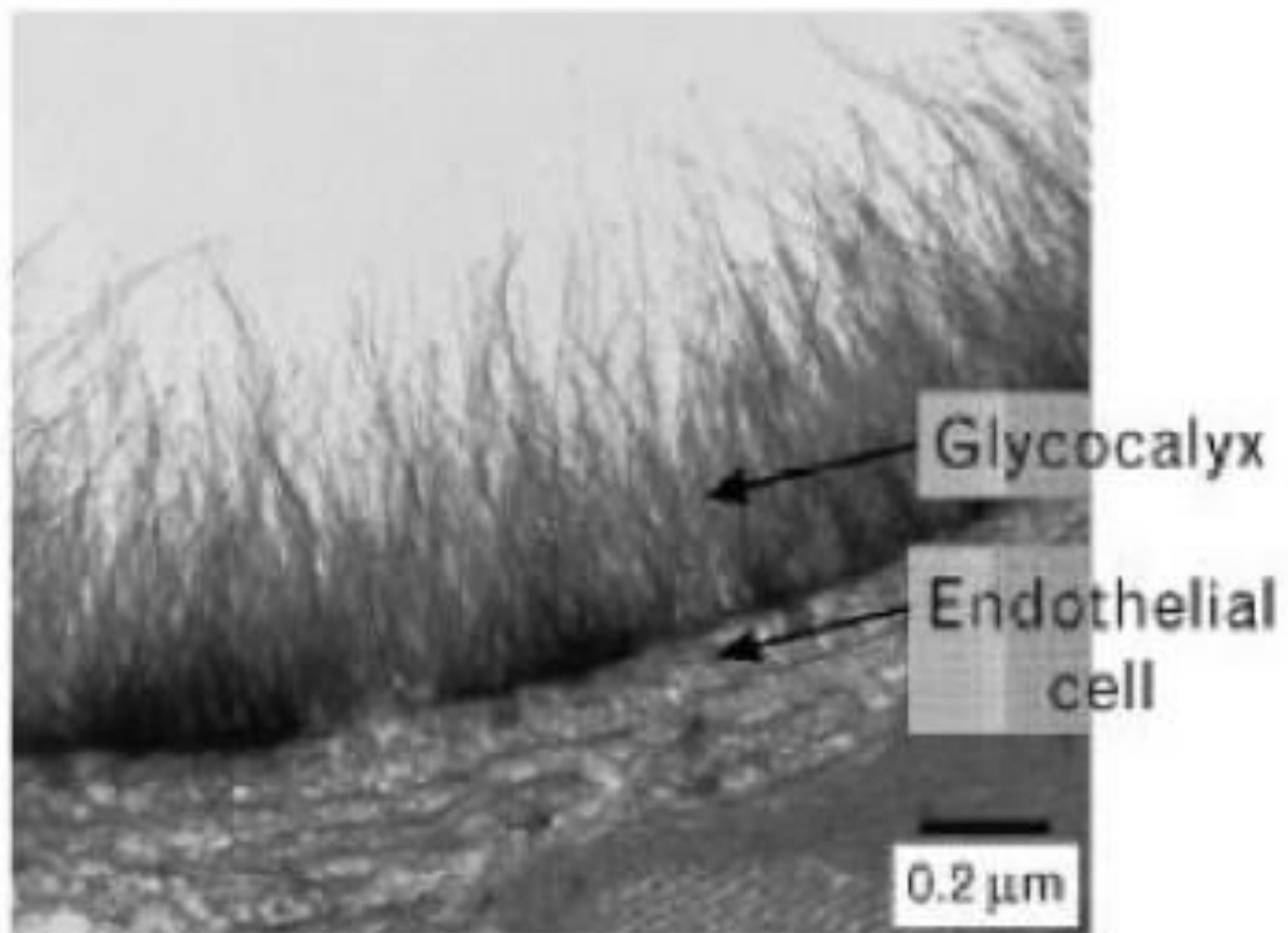
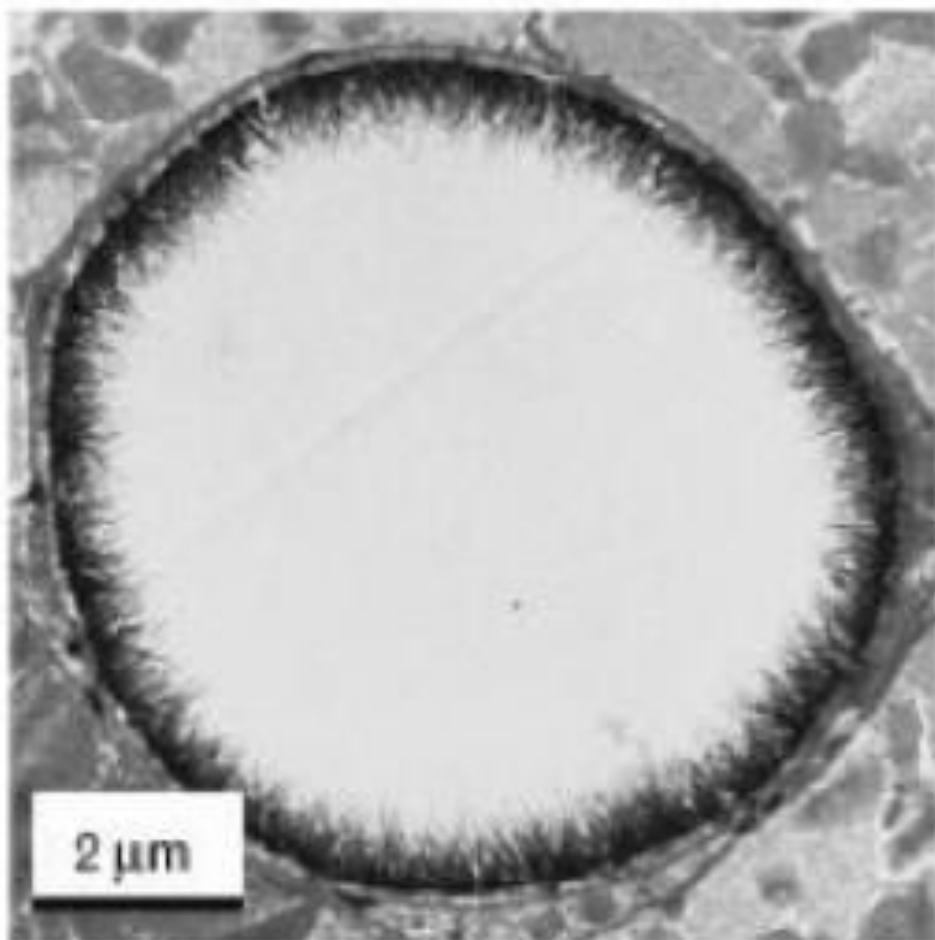
Perfusion Splanchnique ↓

Pression hydrostatique ↑

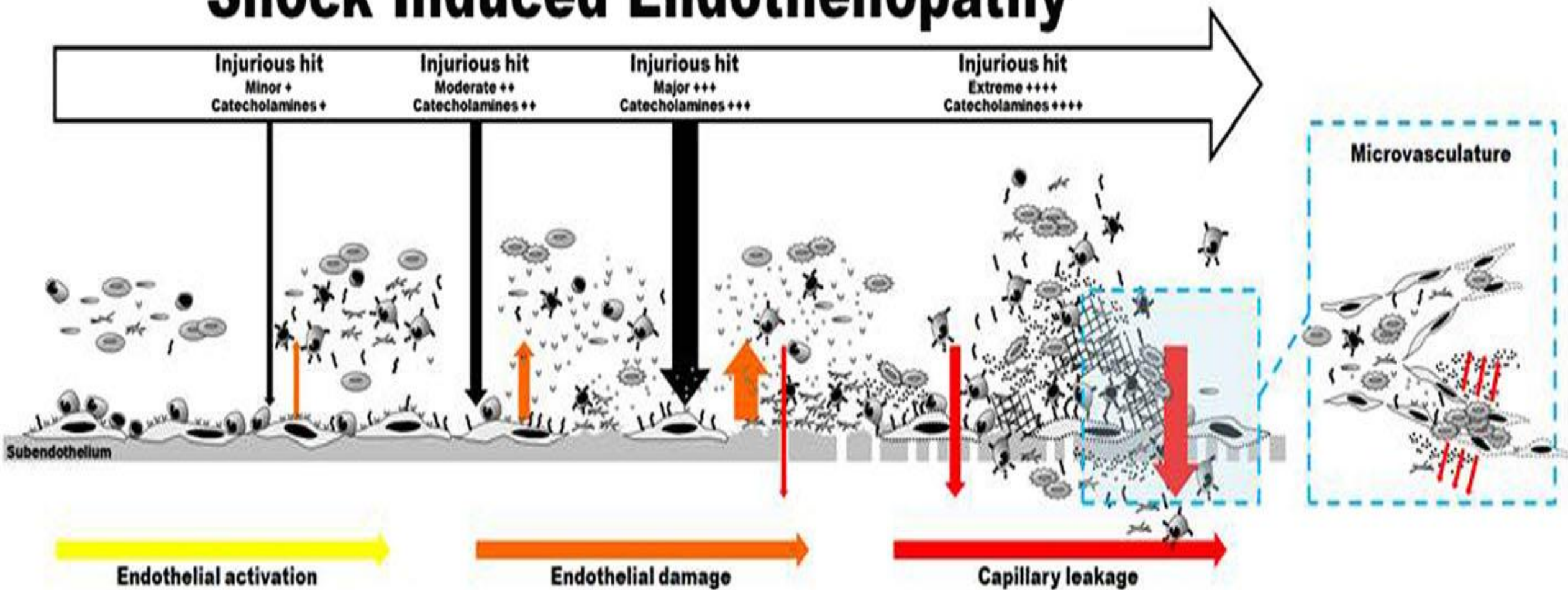
Substitution réponse
neuro-humorale

Perfusion coronaire ↑

Pression perfusion ↑



Shock Induced Endotheliopathy



PärIngemar Johansson, Jakob Stensballe and SisseRye Ostrowski
 Johansson et al. Critical Care (2017) 21:25 DOI 10.1186/s13054-017-1605-5

A close-up shot of Arnold Schwarzenegger as the Terminator from the movie Terminator 2: Judgment Day. He is wearing his signature black leather jacket and dark sunglasses, looking intensely at the camera with a serious expression. His right hand is raised, with fingers slightly curled. In the background, a green 'EXIT' sign is visible at the top, and a blue and red 'PEP' logo is partially visible on the left.

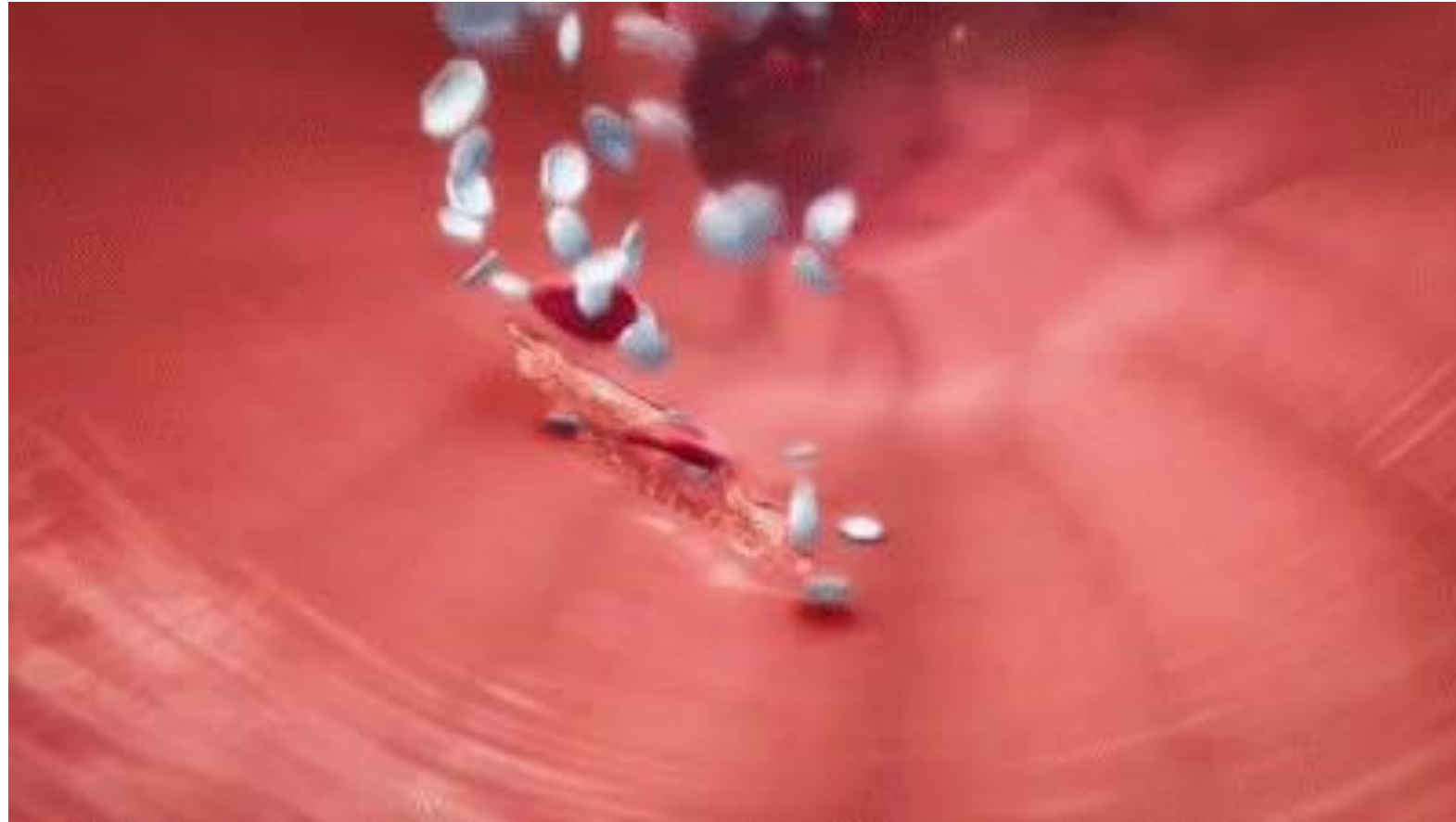
**ADRENALINE INTRINSEQUE
=
GLYCOCALIX TERMINATOR**

**MAIS PAS LES CATECHOLAMINES
EXTRINSEQUES.....**

HYPOTENSION PERMISSIVE



«POP THE CLOT»



The NEW ENGLAND JOURNAL *of* MEDICINE

REVIEW ARTICLE

Dan L. Longo, M.D., *Editor*

Hemorrhagic Shock

Jeremy W. Cannon, M.D.

2018

The New England Journal of Medicine

©Copyright, 1994, by the Massachusetts Medical Society

Volume 331

OCTOBER 27, 1994

Number 17

IMMEDIATE VERSUS DELAYED FLUID RESUSCITATION FOR HYPOTENSIVE PATIENTS WITH PENETRATING TORSO INJURIES

WILLIAM H. BICKELL, M.D., MATTHEW J. WALL, JR., M.D., PAUL E. PEPE, M.D.,
R. RUSSELL MARTIN, M.D., VICTORIA F. GINGER, M.S.N., MARY K. ALLEN, B.A.,
AND KENNETH L. MATTOX, M.D.

Dutton 2002

Sperry 2008

Plurad 2011



Pas de standardisation et objectifs clairs

Différents molécules vasoactifs utilisées

Exclusion des morts des 24h

Introduction tardive des traitements

Contrôle facteurs confondants insuffisant

Dutton RP, et al. Hypotensive resuscitation during active hemorrhage: impact on in-hospital mortality. J Trauma. 2002;52(6): 1141–1146

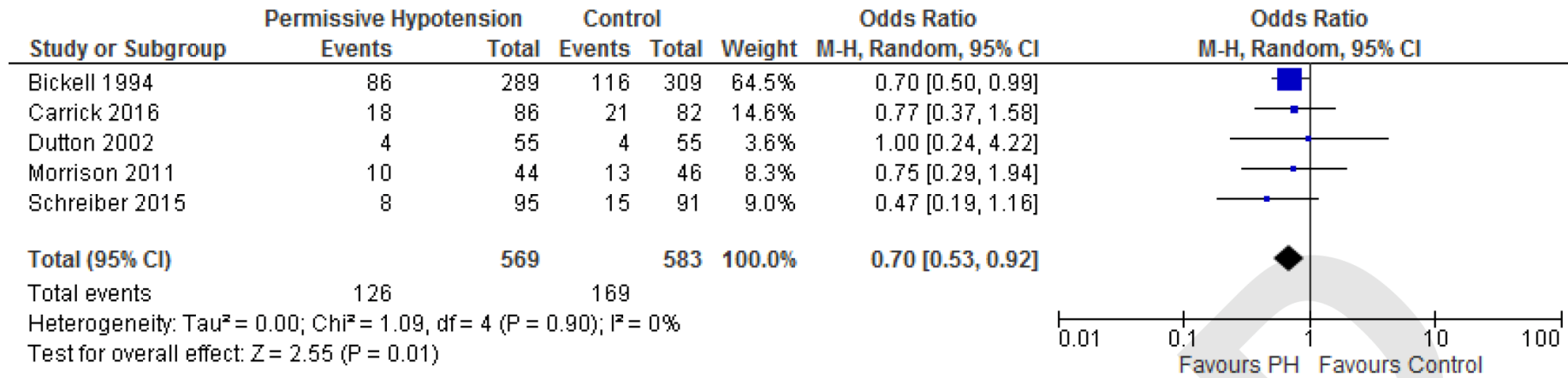
Sperry, J.L. et al (2008). Early use of vasopressors after injury: caution before constriction. J Trauma 64, 9–14

Plurad, D.S. et al. (2011). Early vasopressor use in critical injury is associated with mortality independent from volume status. J Trauma 71, 565–570; discussion 570-572.

Permissive hypotension versus conventional resuscitation strategies in adult trauma patients with hemorrhagic shock: A systematic review and meta-analysis of randomized controlled trials

Tran et al 2017 J Trauma and Acute Care Surgery

Figure 2 – Forest Plot of Permissive Hypotension vs. Conventional Resuscitation

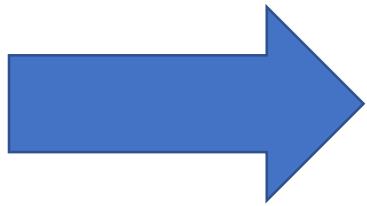


Concept dogmatique... Peu de preuves

Surtout dans le pénétrant

HYPOTENSION PERMISSIVE
Hypotensive resuscitation

Mais cela reste un concept!



Objectif PAS 80-90 mmHg

Limiter expansion en bolus de 250 ml

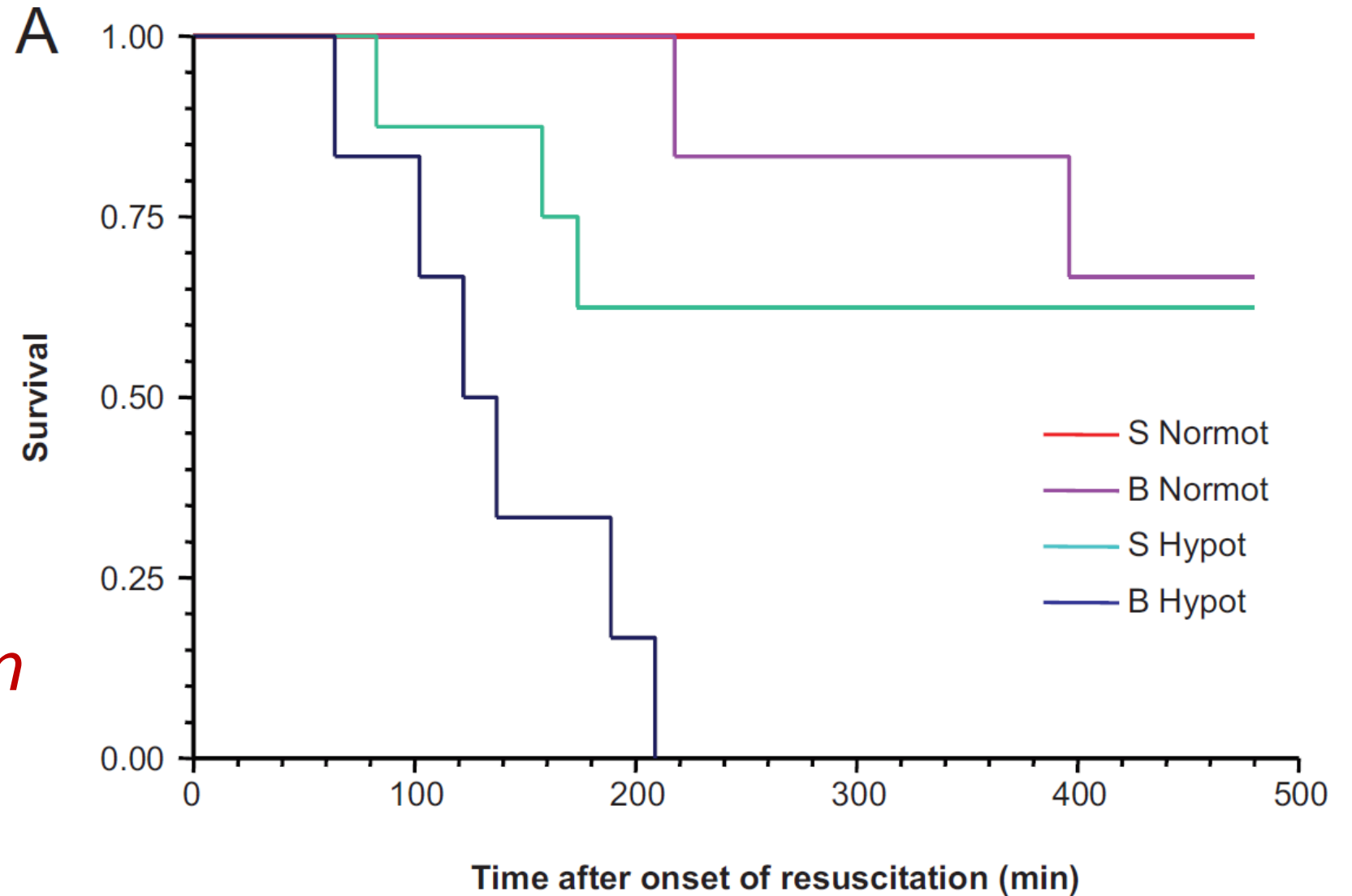
Pas de vasopresseurs

Modèle cochon
Choc non-pénétrant

PAM < 50 mmHg
(pouls palpable)
Vs

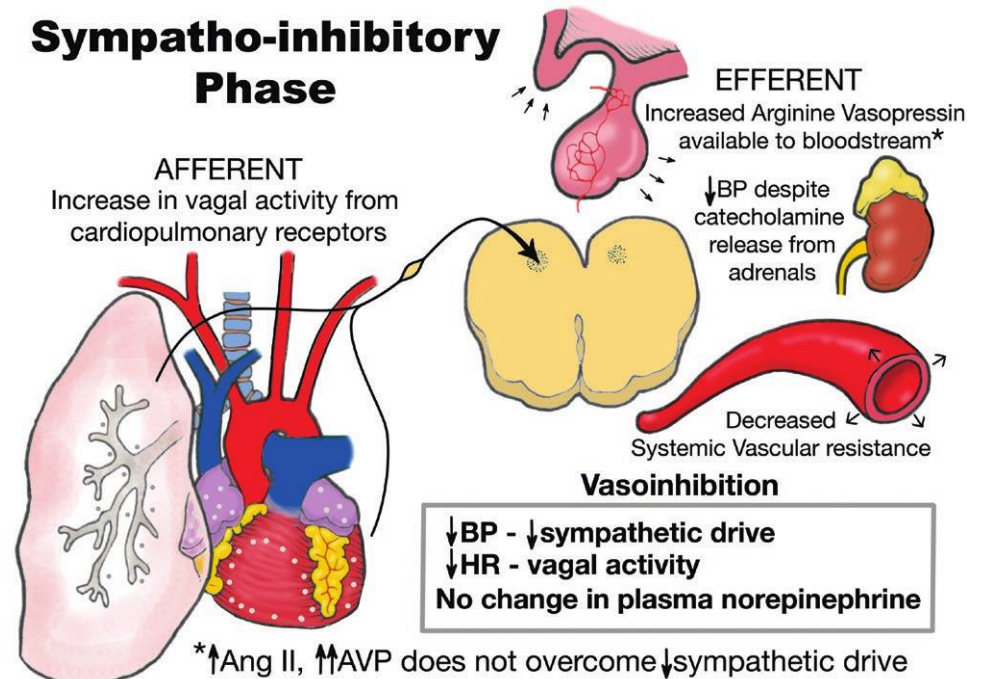
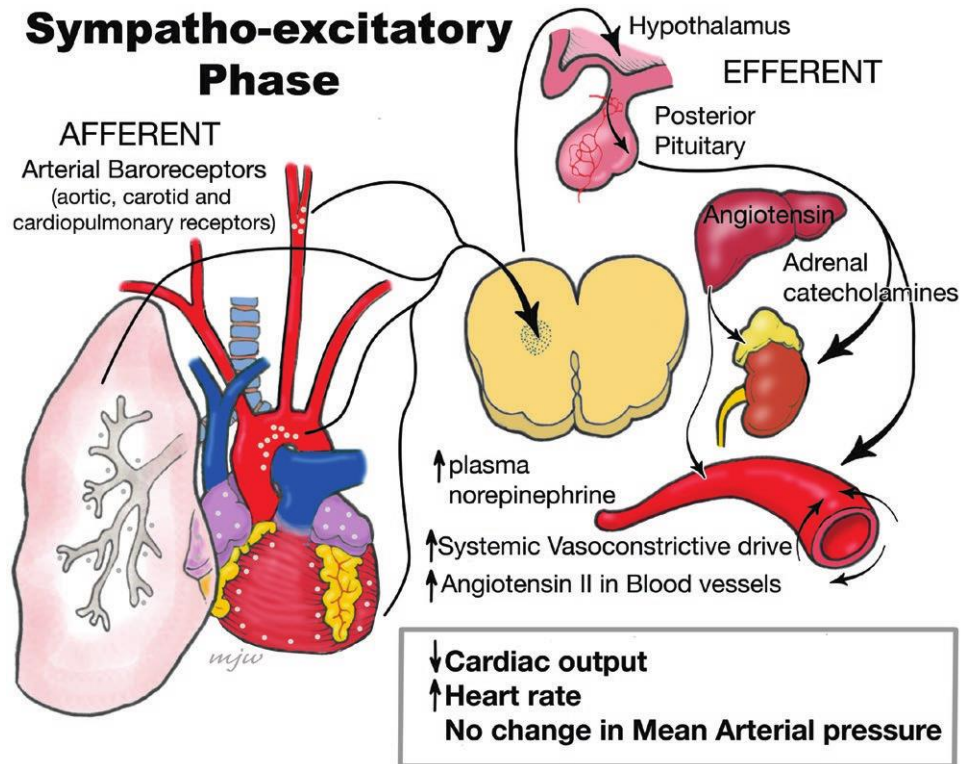
PAM > 50 mmHg

Mortalité ↑ > 60 min
hypotension



Vasopressors in Trauma: A Never Event?

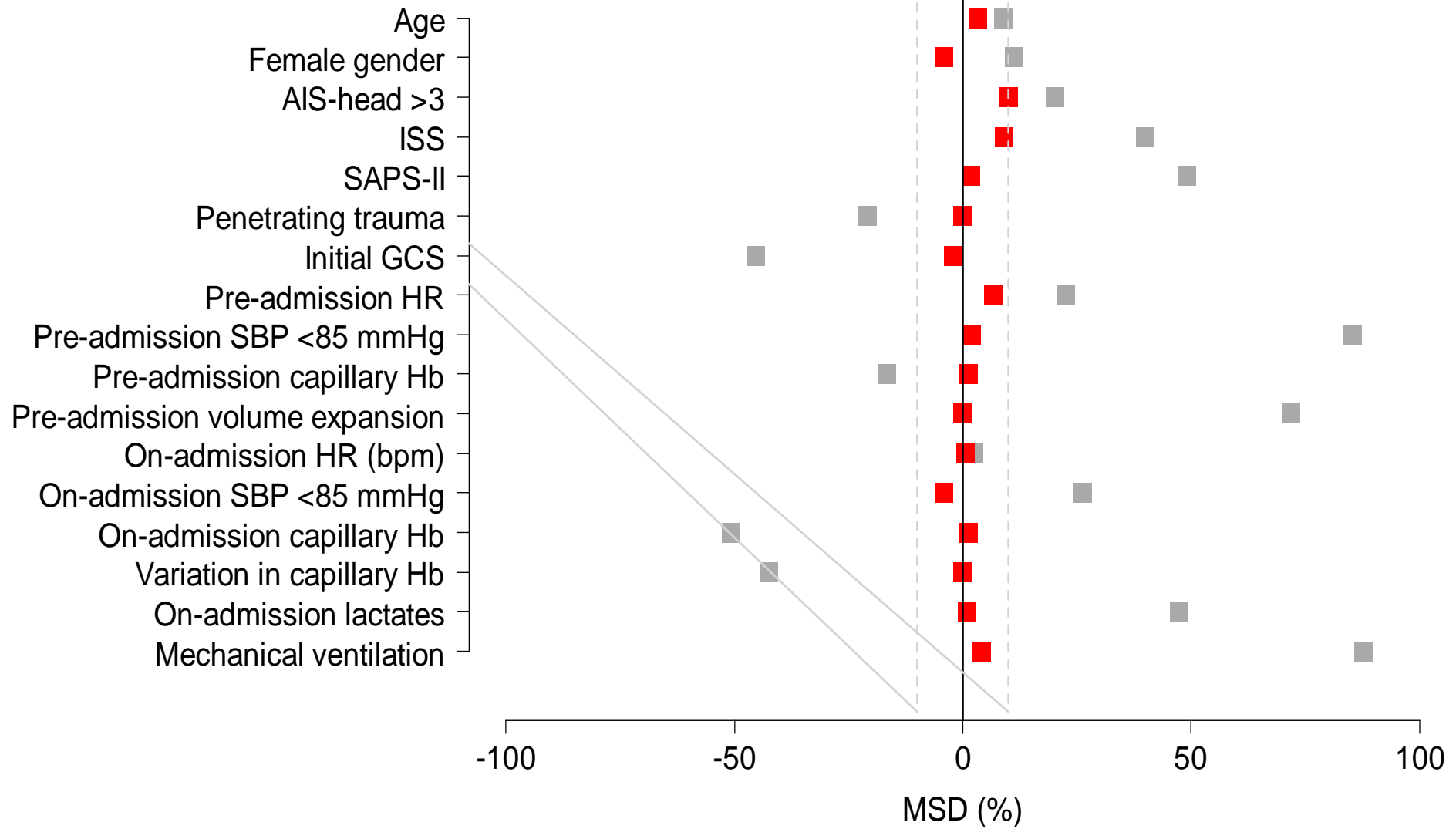
Justin E. Richards, MD,* Tim Harris, MD,†‡ Martin W. Dünser, MD,§ Pierre Bouzat, MD, PhD,|| and Tobias Gauss, MD¶

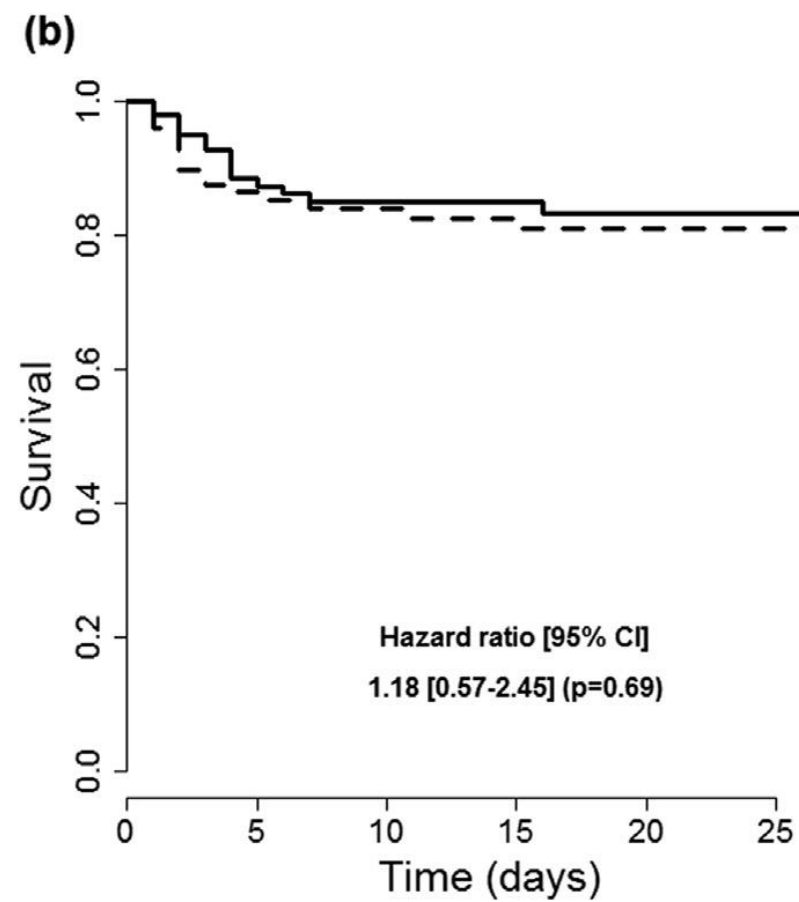
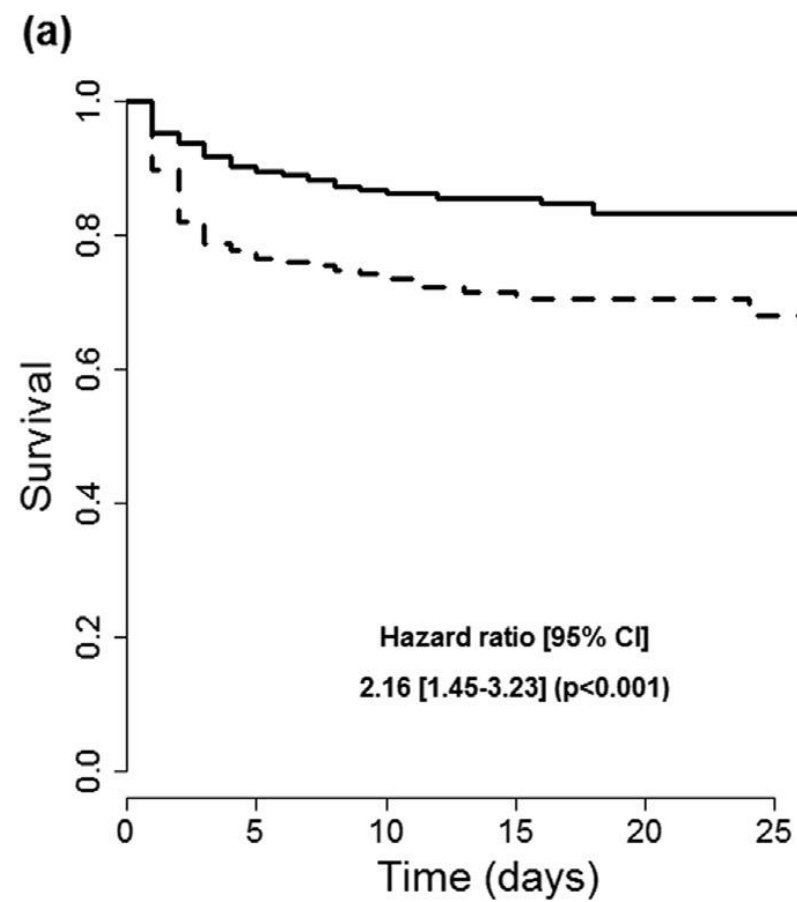


CLINICAL INVESTIGATION

Effect of early use of noradrenaline on in-hospital mortality in haemorrhagic shock after major trauma: a propensity-score analysis|

T. Gauss^{1,*}, E. Gayat², A. Harrois³, M. Raux^{4,5}, A. Follin⁶, J.-L. Daban⁷, F. Cook⁸, S. Hamada³, and The TraumaBase Group





Use of Vasopressor Increases the Risk of Mortality in Traumatic Hemorrhagic Shock: A Nationwide Cohort Study in Japan

Makoto Aoki, MD, PhD¹; Toshikazu Abe, MD, MPH^{2,3}; Daizoh Saitoh, MD, PhD⁴;
Shuichi Hagiwara, MD, PhD¹; Kiyohiro Oshima, MD, PhD¹

Objectives: To evaluate the possible association of vasopressor use with mortality in traumatic hemorrhagic shock patients.

Design: Retrospective cohort study.

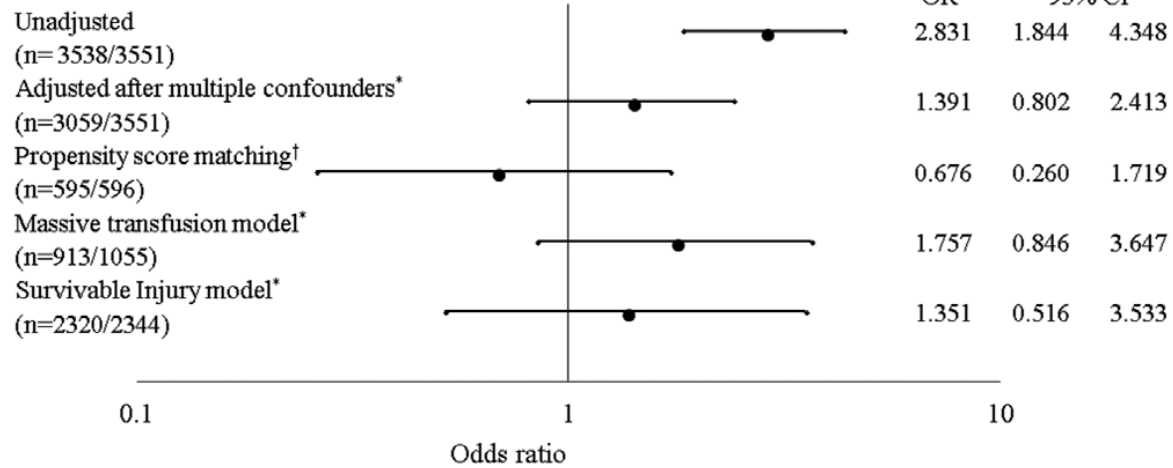
Setting: Traumatic hemorrhagic shock patients at 260 emergency hospitals in Japan between 2004 and 2015.

Patients: Three-thousand five-hundred fifty-one traumatic hemorrhagic shock patients who had systolic hypotension (< 90 mm Hg)

C, 1.442–3.320), (odds ratio, 2.029; 95% CI, 1.414–2.939; massive transfusion model), and (odds ratio, 1.959; 95% CI, 1.364–2.814; survivable injury model).

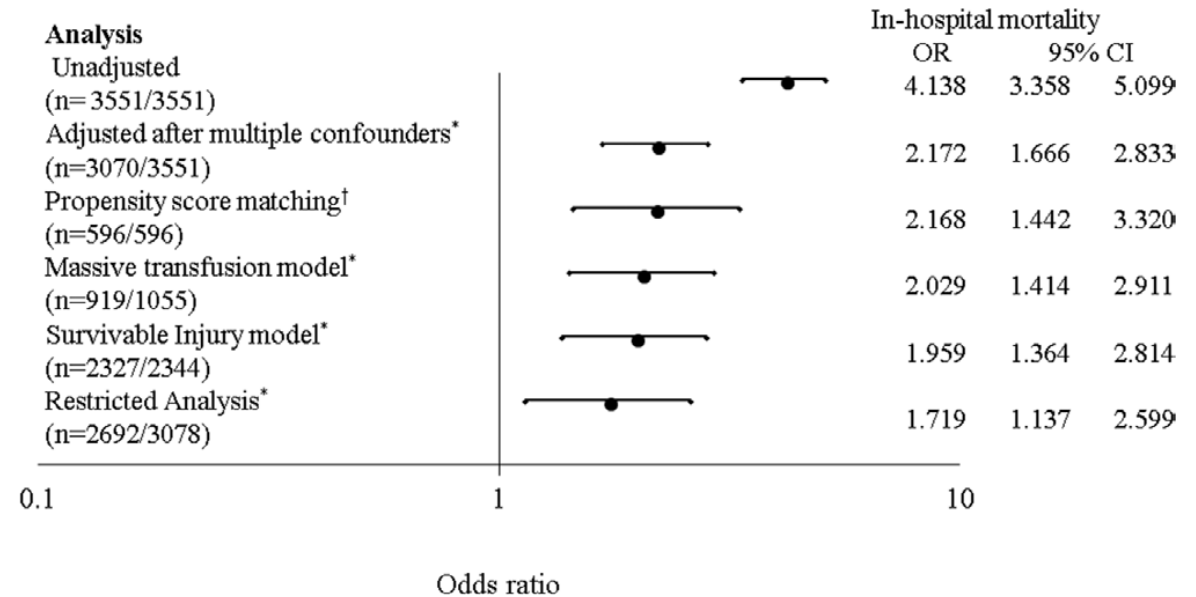
Conclusions: Use of vasopressor for traumatic hemorrhagic shock was associated with mortality after controlling for biases (trauma severity; volume of fluid resuscitation). (*Crit Care Med* 2016;XX:00–00)

Analysis

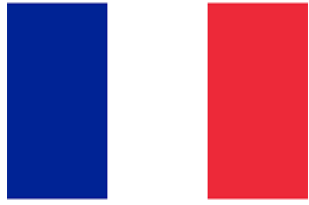


PAS DE DIFFERENCE MORTALITE 24h

Analysis



DIFFERENCE MORTALITE INTRA-HOSP



Utilisation homogène et précoce
selon reco Européennes, après
échec expansion

Même molécule (NAD)

Ajustement/prédicteurs précisés
(Graphique équilibre facteurs)

Contrôle hémostase plus court

Choc hémorrag. > 4CG/6h



Contexte et indications inconnues, tardif,
molécules non spécifiés

ISS et transfusion ↑ dans groupe
vasopresseur

Ajustement/prédicteurs non-précisés
(Pas de graphique équilibre)

Contrôle hémostase long

Choc hémorrag. PAS < 90mmHg sans
notion de transfusion

CRITERES INCLUSION

Age >18 ans

Mécanisme non-pénétrant

SAP <100mmHg

Ou

Déchoc SAP < 100mmHg

Sans ou avec NAD

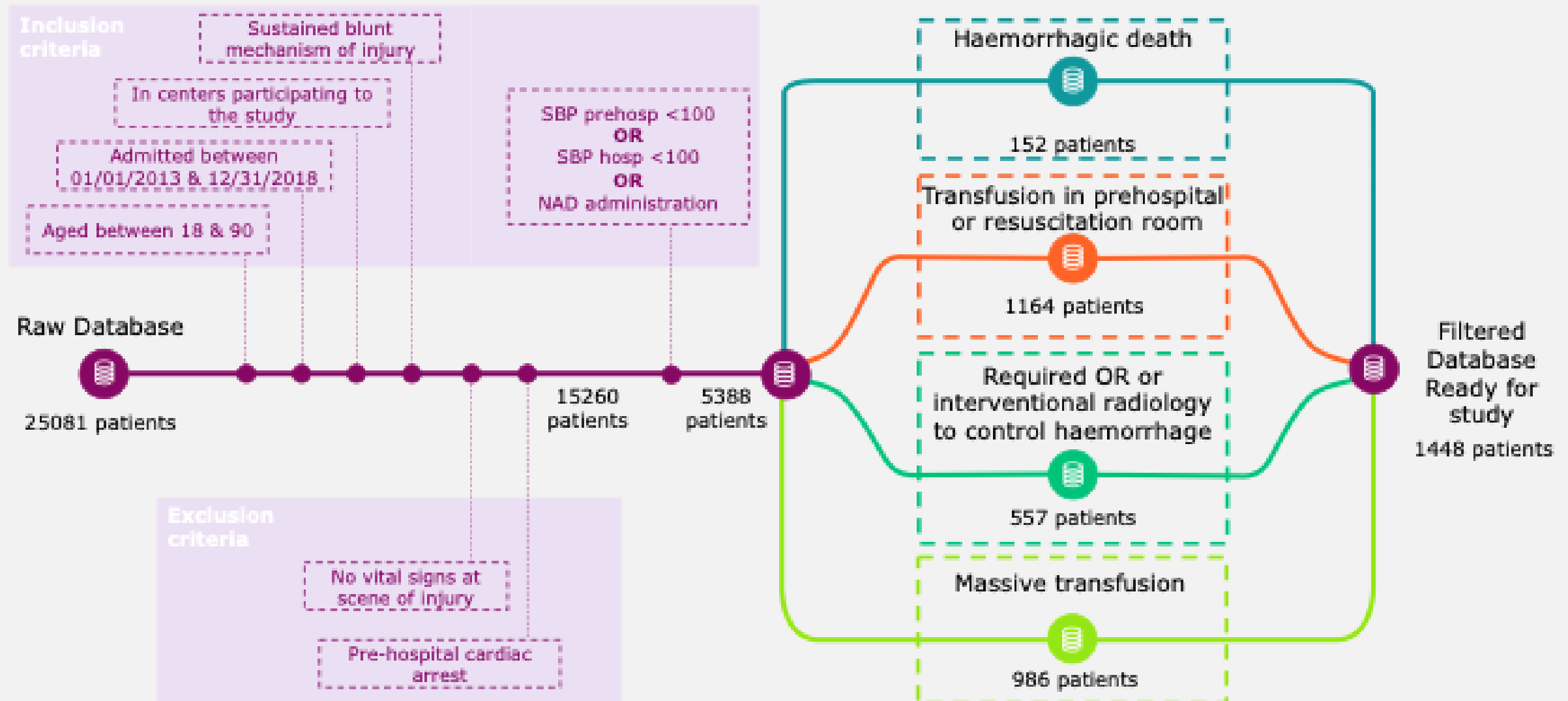
CDJ

Mortalité à 24h

CDJs

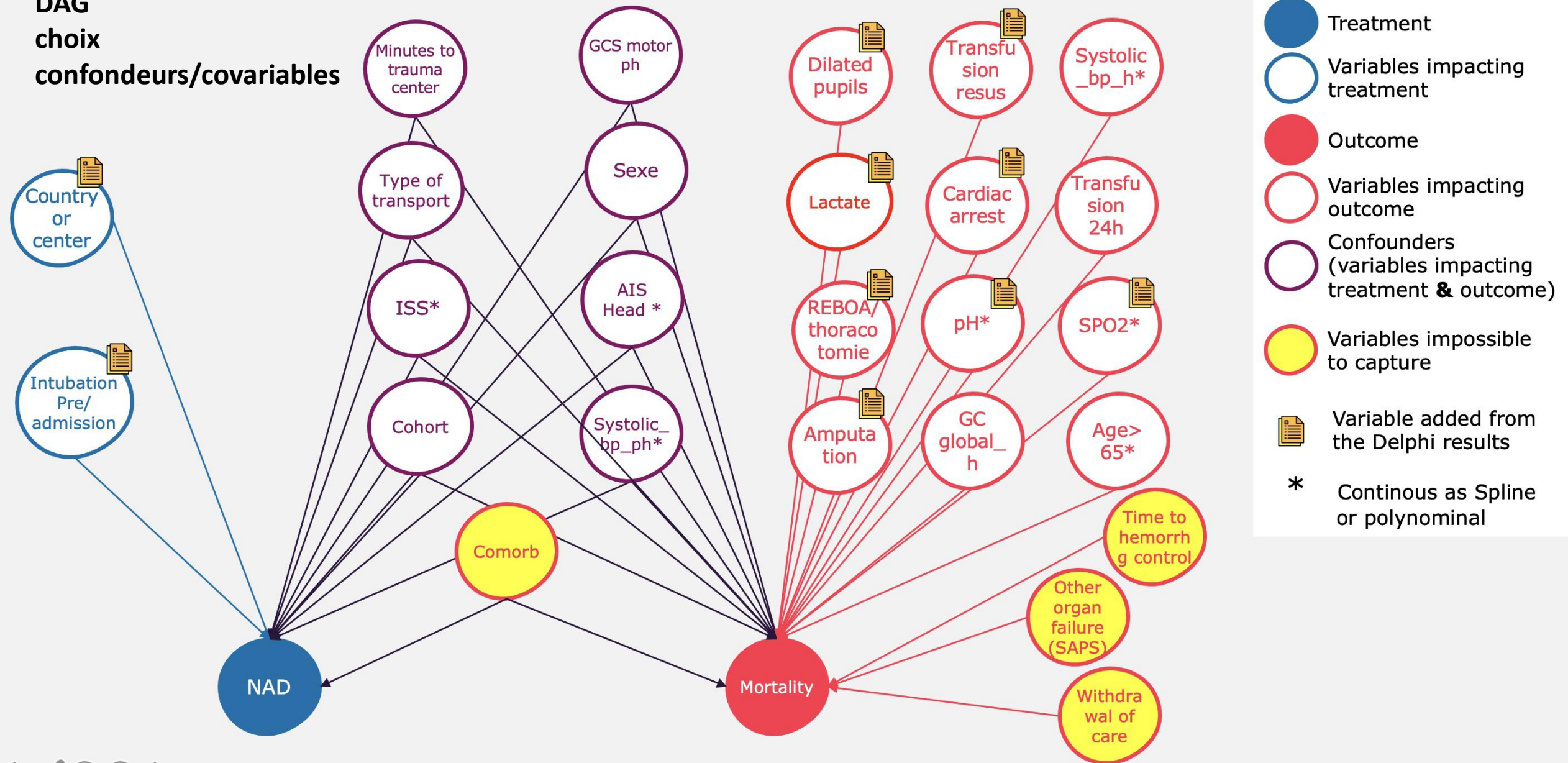
Mortalité hôpital

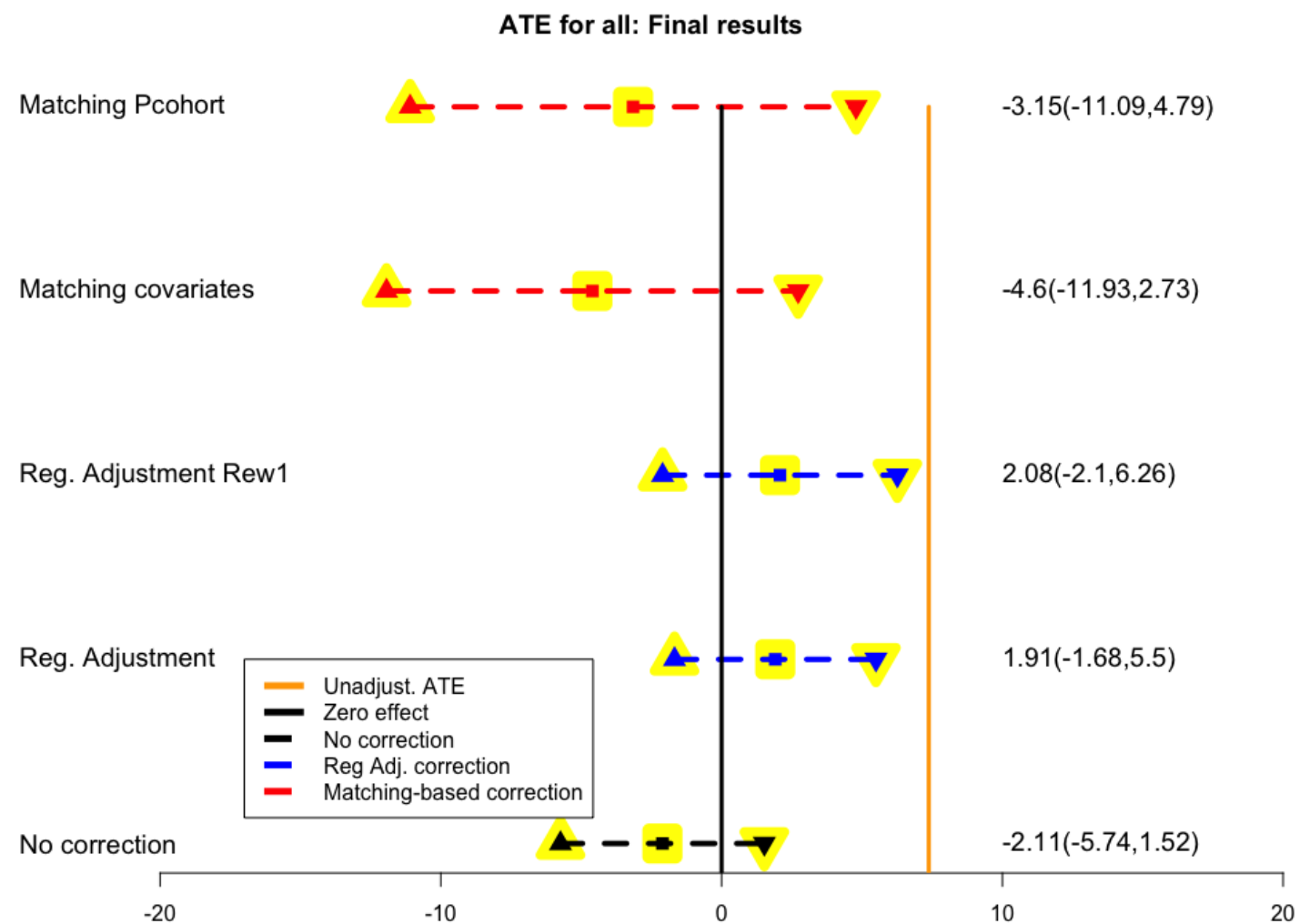
Filtering patients' Flow chart for Traumabase



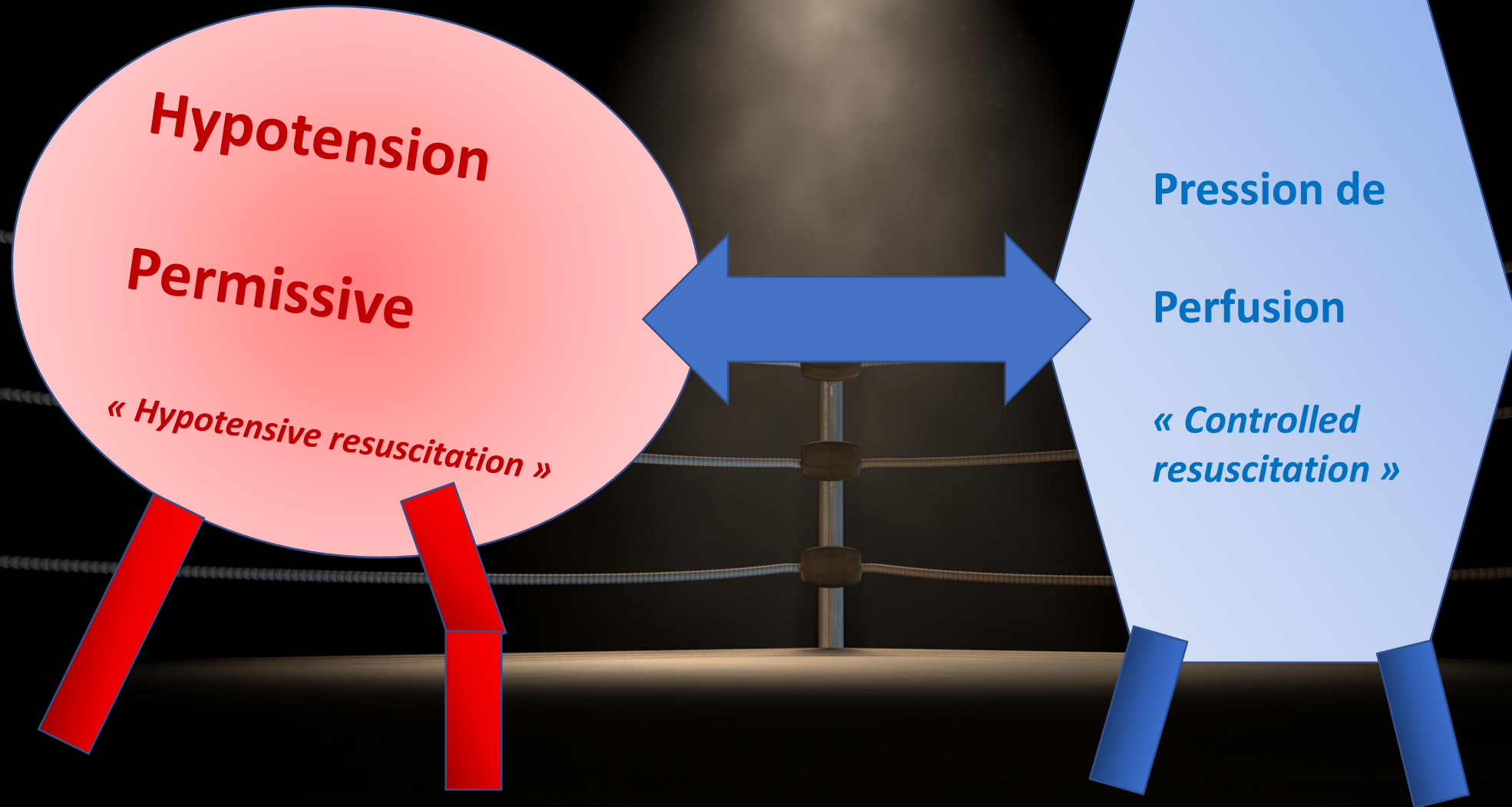
	TRENAU (F) n= 396	TRAUMABASE (F) n= 1374	BALTIMORE (US) n=355
Mortalité	18%	18%	15%
NAD (préhosp/déchoc)	67%	87%	0%
Mortalié sans NAD	11%	9%	15%

DAG choix confondeurs/covariables





STRATEGIE COMPLEMENTAIRE



REANIMATION HYBRIDE/REANIMATION PERMISSIVE

< 60'

Réanimation hypotensive

- Limiter expansion
- Expansion bolus 250 ml
- PAS 80-90 mmHg

PSL des que possible

> 60'

Objectif pression de perfusion

- PAM >55-65 mmHg
- Limiter expansion

PSL des que possible



QUAND et COMMENT DOPER NOTRE CHAMPION AVEC LA NAD?

- 60'
- ECHEC expansion
(PAS < 60?, 1000ml)
- Aggravation
rapide
- Lactate ↑



- PAM 55-65 mmHg
- Dose plus faible
possible
- Possible en VVP
- Sevrer des que
possible
- PSL des que
possible



REANIMATION HYBRIDE

UN OUTIL POUR LIMITER
RETENTISSEMENT DU CHOC
JUSQU'À OBTENTION HEMOSTASE

HEMOSTASE = PRIORITE

40% † premières 40 min