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La ventilation de l'OAP

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Liens d’intérêt

- Vygon

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2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure

The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC)

Developed with the special contribution of the Heart Failure Association (HFA) of the ESC

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Introduction

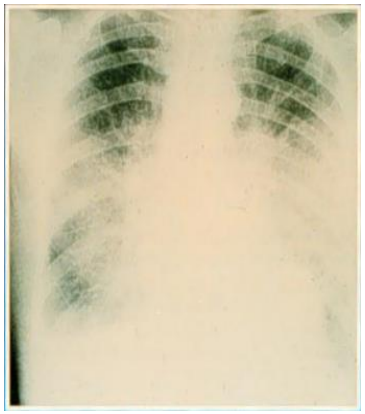
- Prévalence de l'IC chez les > 70 ans = 10-20%
- Age moyen = 75 ans; Sex/ratio = 1
- ↑ patients avec insuffisance cardiaque chronique
- ↑ hospitalisations pour décompensation cardiaque aiguë (5% des admissions)
- 50% de réhospitalisations à 1 an
- Mauvais pronostic :
  - Fonction de la cause (40-60% de mortalité post-SCA)
  - Mortalité de l'OAP : 12% intrahospitalière et 40% à un an (Roguin et al. *Eur J Heart Fail*, 2000)

Scénario 1 (65%)

Dyspnée et/ou congestion avec PAS > 150 mmHg

- Apparition brutale des symptômes
- Dyspnée surtout due à OAP
- Peu d'œdème systémique
- Patients volontiers normo ou hypovolémiques (ATCD d'HTA, traitement par diurétiques)
- FEVG le plus souvent normale (Kawaguchi M , C*irculation 2003*), mais compliance diminuée

toujours

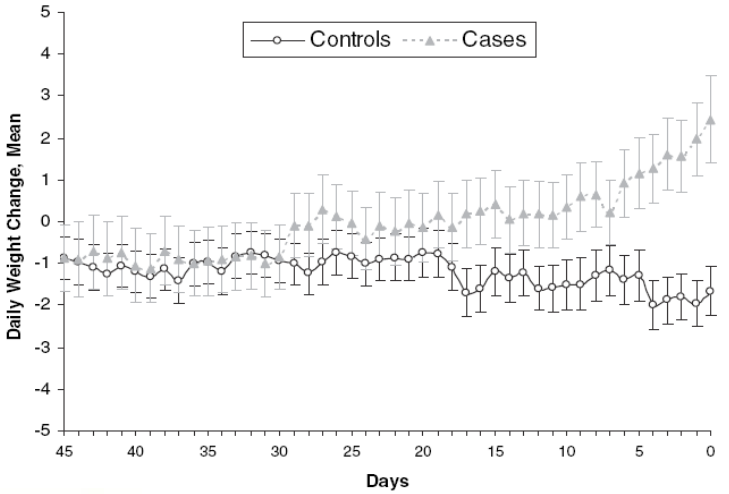


Chaudhry E al. Circulation 2007

Scénario 2 (25%)

Dyspnée et/ou congestion avec 100<PAS< 150 mmHg

- Apparition progressive des symptômes avec ↑ poids
- Oedème systémique ± pulmonaire
- P veineuses et de remplissage élevées chroniquement
- **= maladie systémique** : altération fonction rénale, anémie, hypoalbuminémie
- → Insuffisance cardiaque chronique



Chaudhry E al. Circulation 2007

Scénario 3 (< 10%)

Dyspnée et/ou congestion avec PAS < 100 mmHg

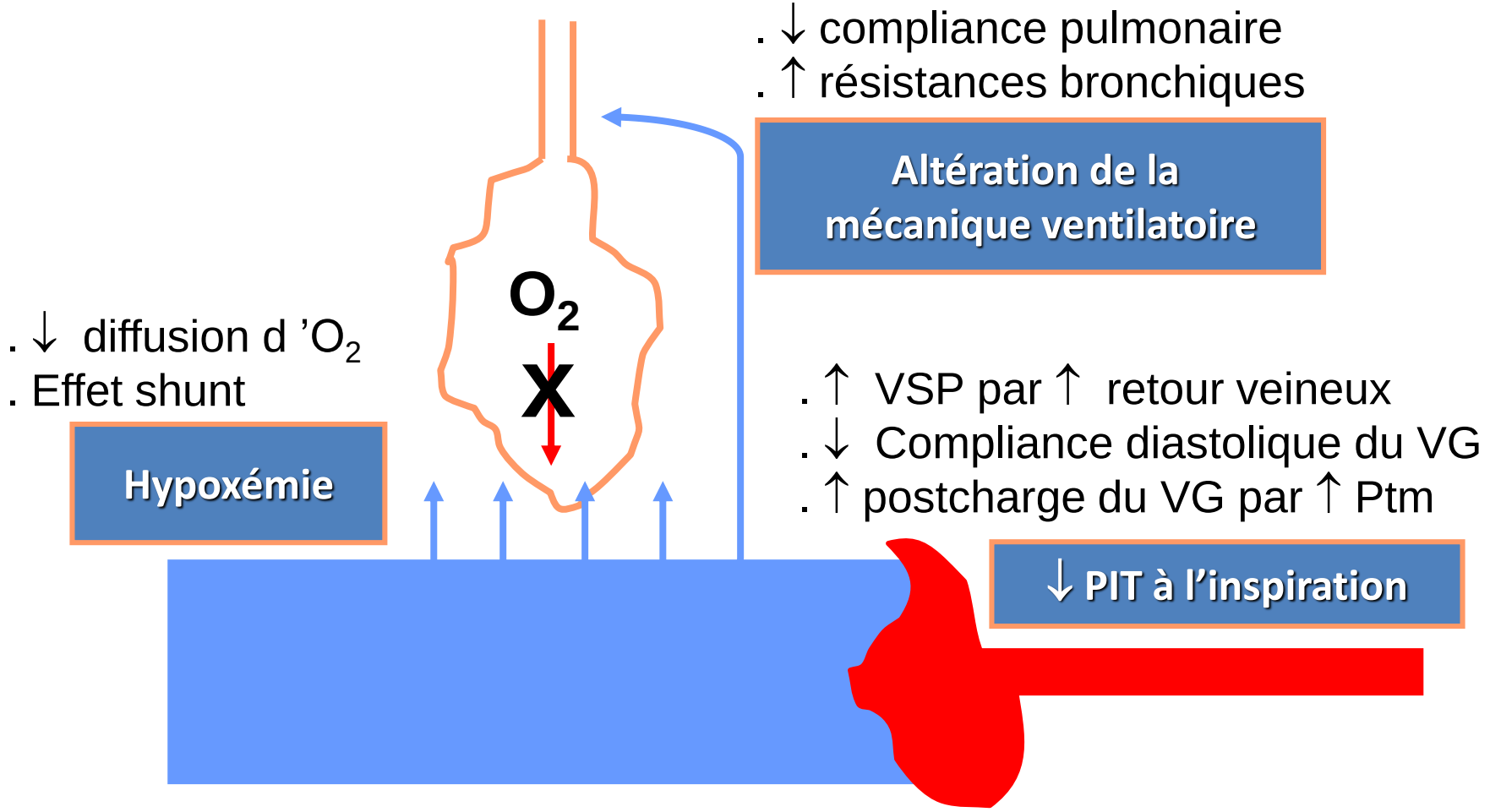
- Hypoperfusion
- Pas ou peu d'œdème pulmonaire
- Apparition ± rapide des symptômes (→ sem ou mois)
- P. remplissage élevées de façon chronique
- ± Signes d'hypoperfusion, ± choc cardiogénique

Scénario 4

Dyspnée et/ou congestion avec SCA

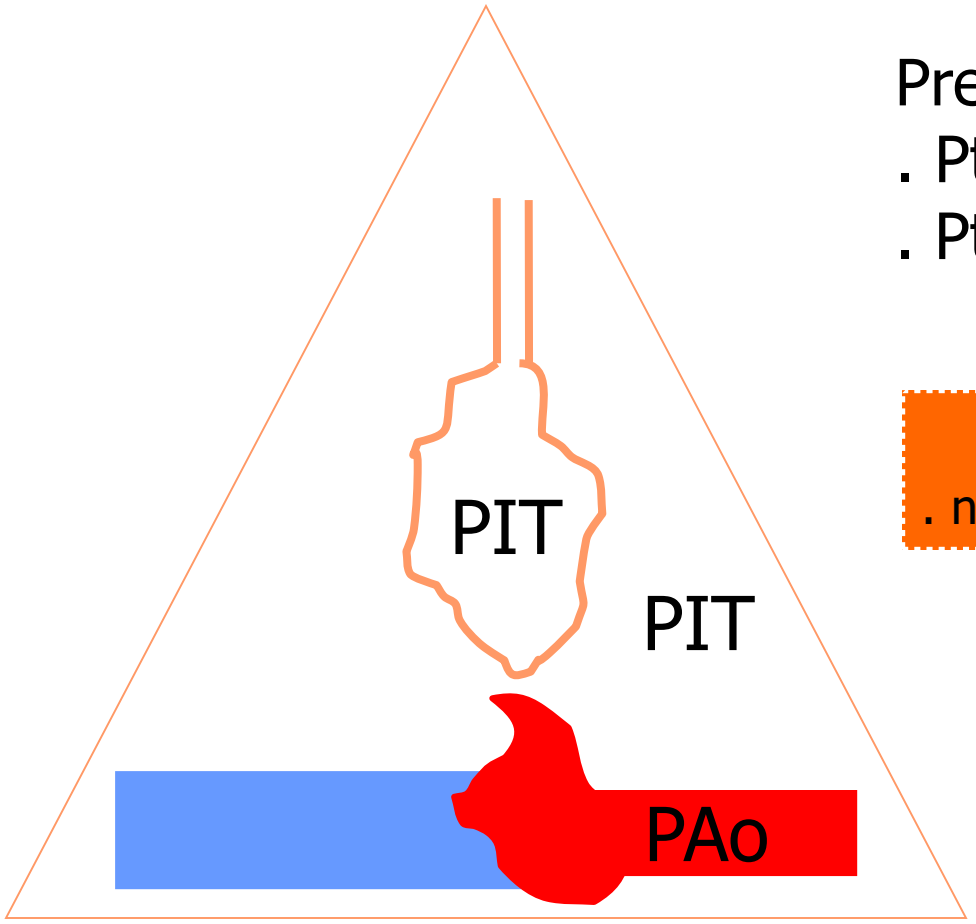
- Signes de SCA ± élévation du ST

Conséquences de l'OAP



↑ travail respiratoire

Pression transmurale (Ptm)



Pression transmurale :

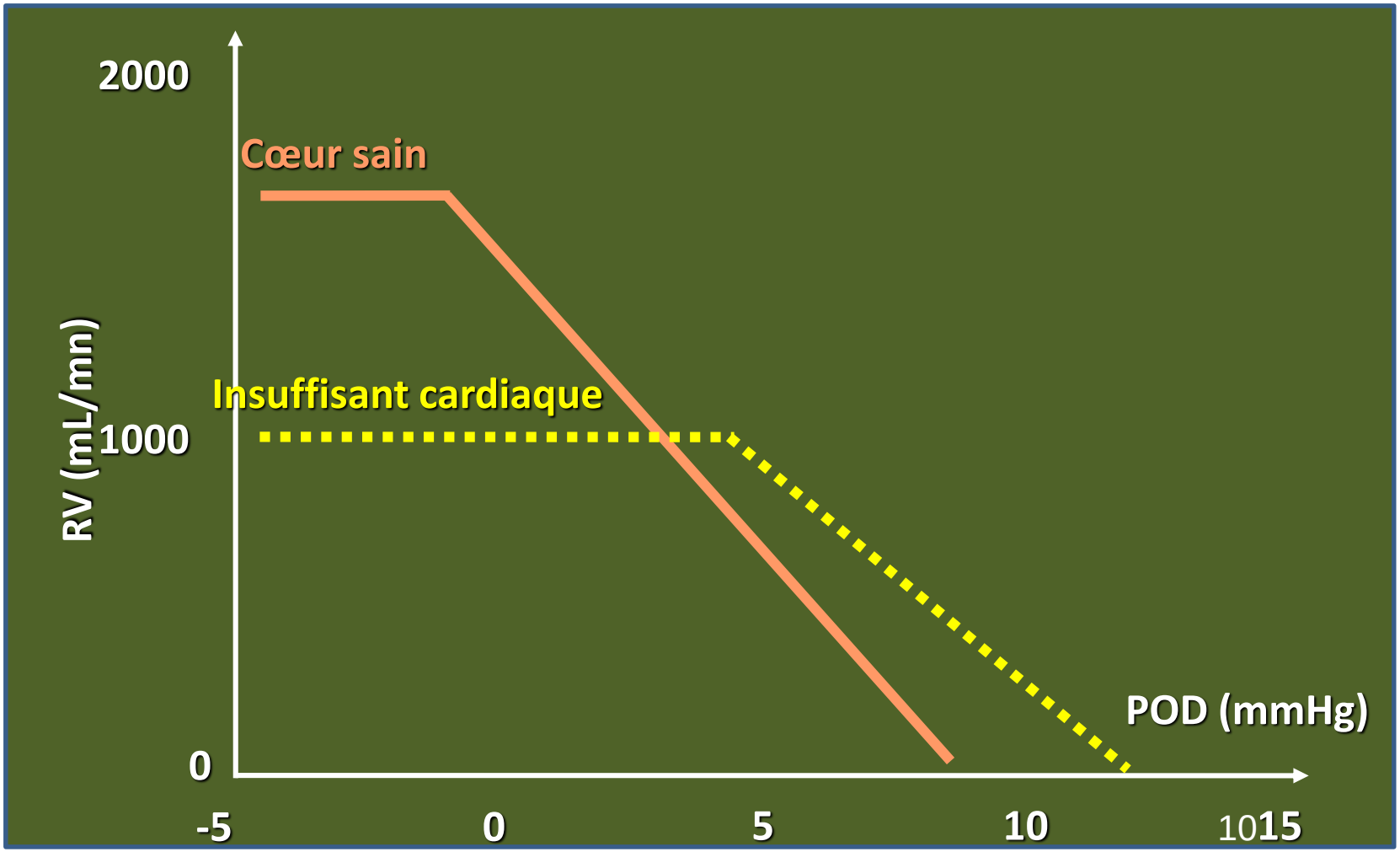
. Ptm = PAo – PIT

. Ptm // R à l'éjection du VG

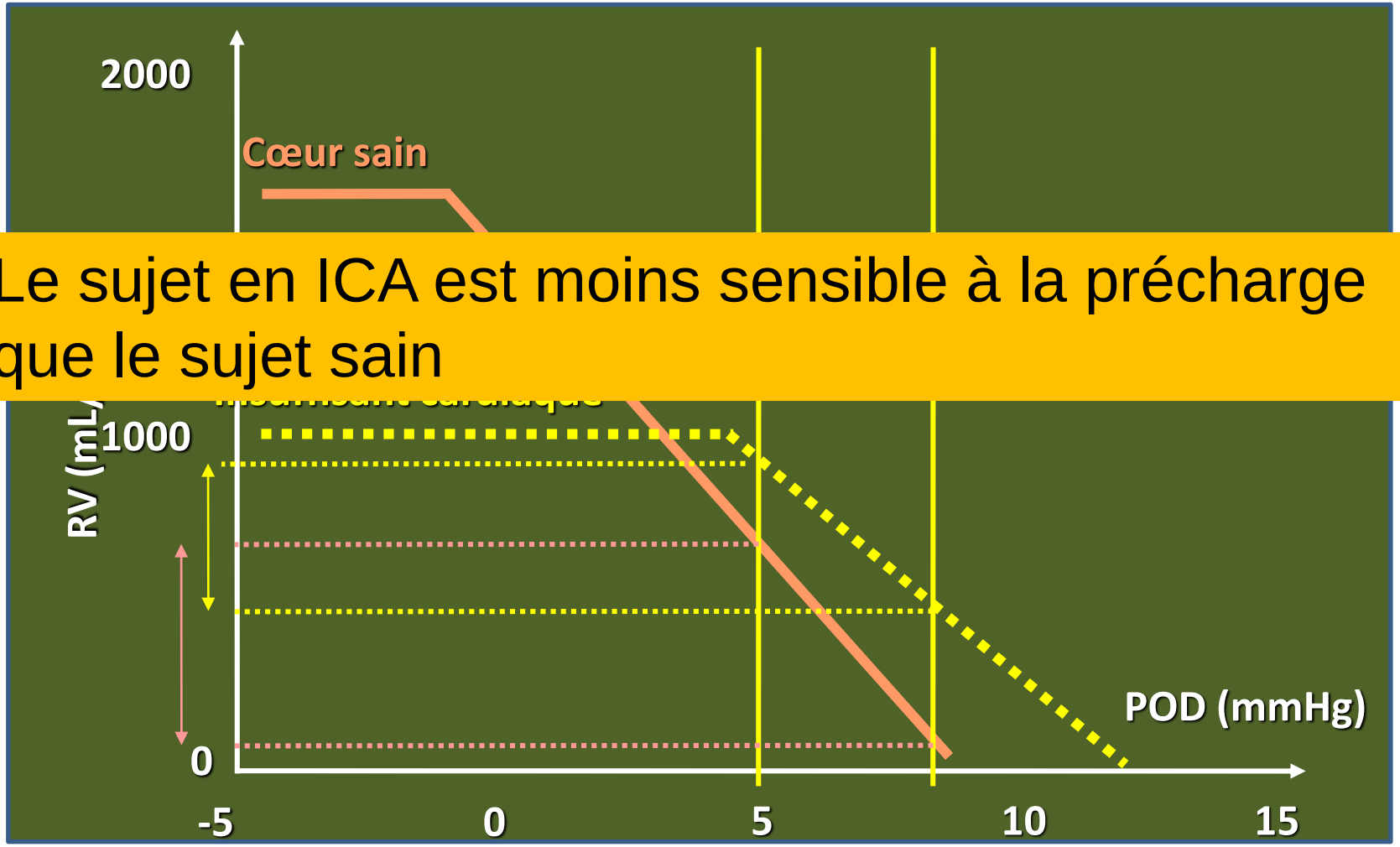
Ptm

. normal = 100 - (- 2) = 102 cmH_2O

Relation POD/Retour veineux

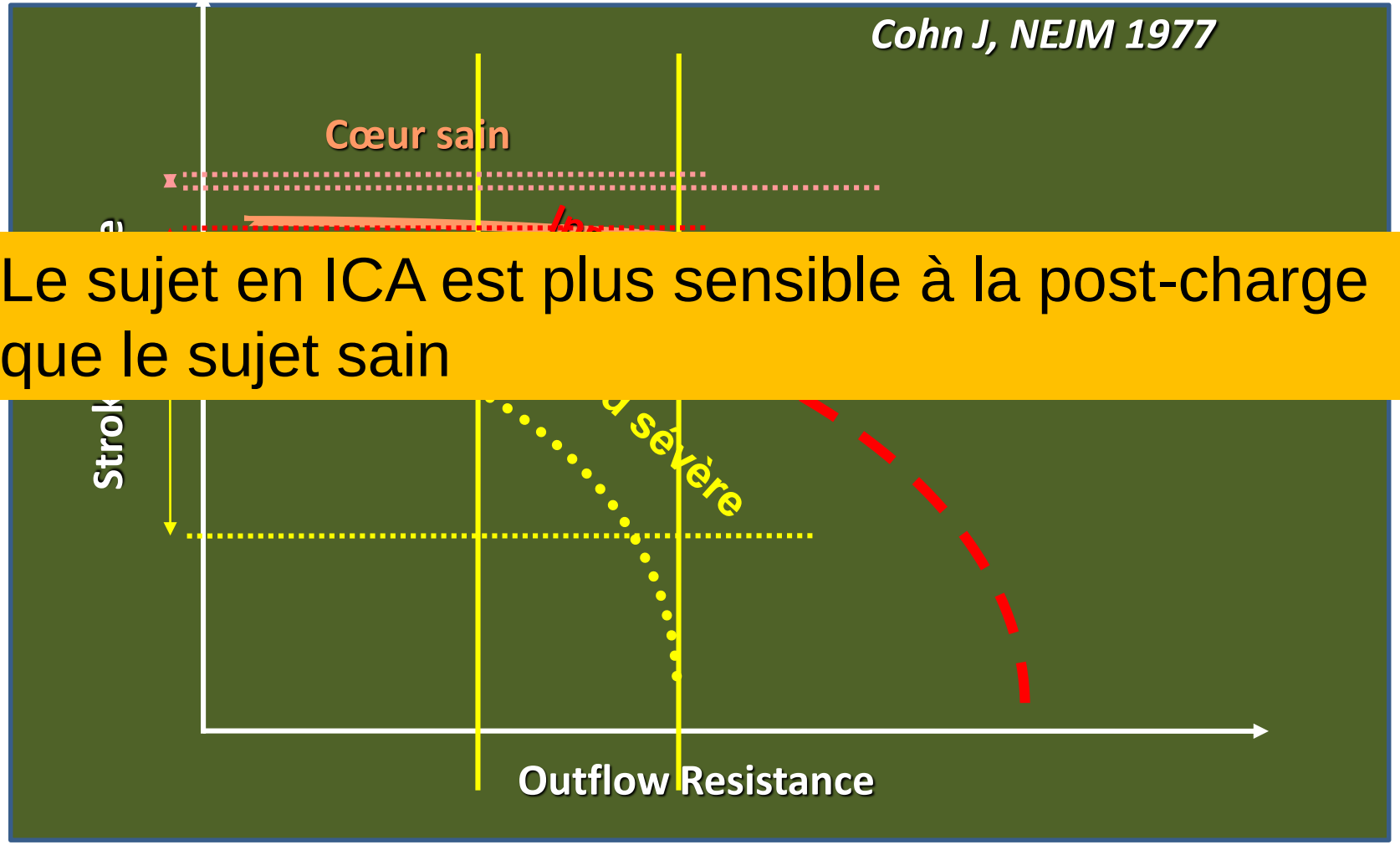


Relation POD/RV



Le sujet en ICA est moins sensible à la précharge que le sujet sain

Relation RAS/VES



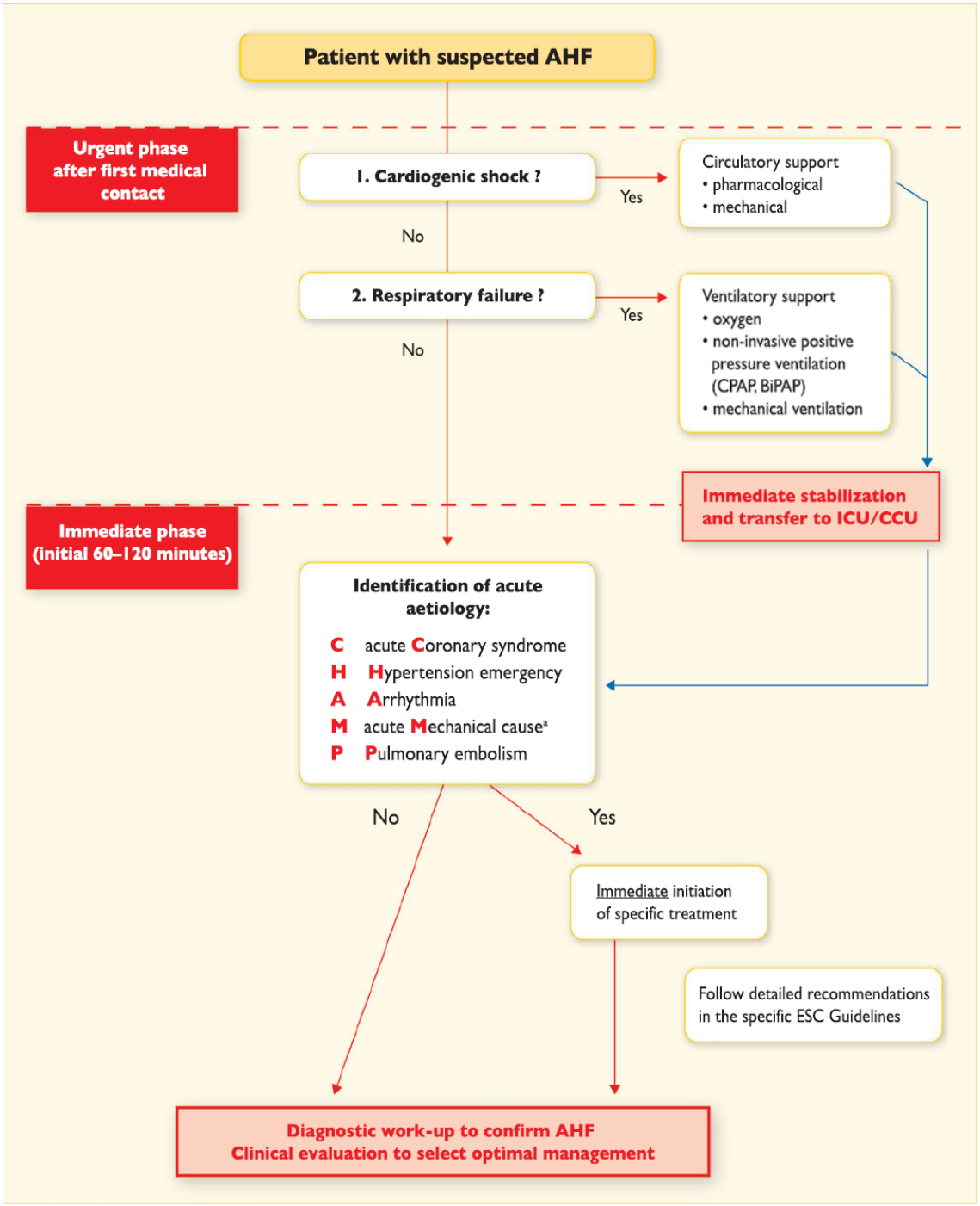
Traitement initial de l'ICA

Place de la ventilation

"NIV with positive end-expiratory pressure (PEEP) should be considered as early as possible in every patient with acute cardiogenic pulmonary oedema and hypertensive AHF…" (1,C)

ESC Guidelines Eur Heart J. 2008

2016 ESC Guidelines.
Eur. Heart J. 2016



Traitement ventilatoire

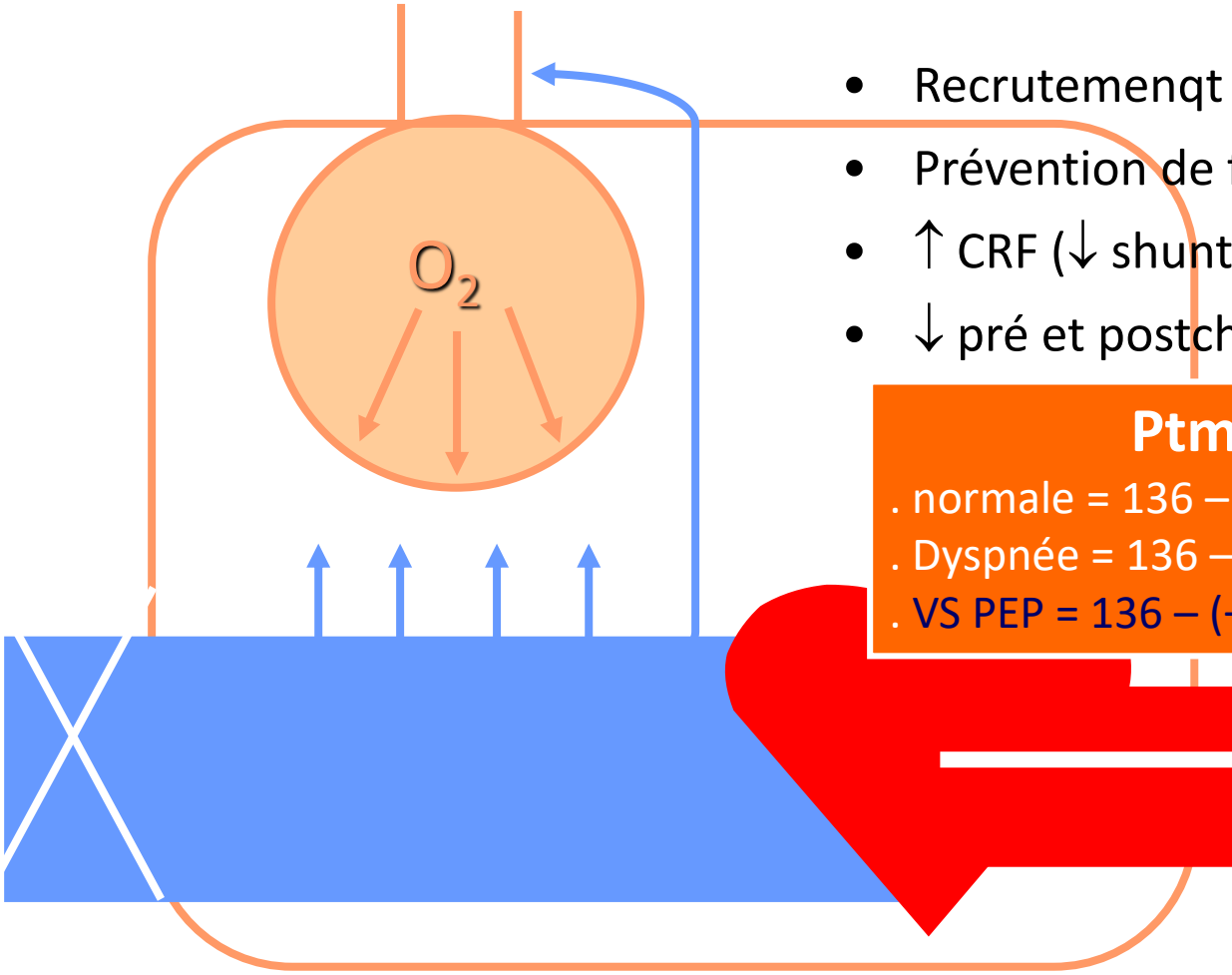
Recommendations for the management of patients with acute heart failure: oxygen therapy and ventilatory support

Recommendations	Class [a]	Level [b]	Ref [c]
Monitoring of transcutaneous arterial oxygen saturation (SpO_2) is recommended.	I	C	
Measurement of blood pH and carbon dioxide tension (possibly including lactate) should be considered, especially in patients with acute pulmonary oedema or previous history of COPD using venous blood. In patients with cardiogenic shock arterial blood is preferable.	IIa	C	
Oxygen therapy is recommended in patients with AHF and SpO_2 <90% or PaO_2 <60 mmHg (8.0 kPa) to correct hypoxaemia.	I	C	
Non-invasive positive pressure ventilation (CPAP, BiPAP) should be considered in patients with respiratory distress (respiratory rate >25 breaths/min, SpO_2 <90%) and started as soon as possible in order to decrease respiratory distress and reduce the rate of mechanical endotracheal intubation. Non-invasive positive pressure ventilation can reduce blood pressure and should be used with caution in hypotensive patients. Blood pressure should be monitored regularly when this treatment is used.	IIa	B	541–545
Intubation is recommended, if respiratory failure, leading to hypoxaemia (PaO_2 <60 mmHg (8.0 kPa)), hypercapnia ($PaCO_2$ >50 mmHg (6.65 kPa)) and acidosis (pH <7.35), cannot be managed non-invasively.	I	C	

2016 ESC Guidelines. *Eur. Heart J.* 2016

CPAP ou Bi-PAP ?

Mécanisme d'action de la CPAP



- Recrutemenqt alvéolaire
- Prévention de fermeture VA
- ↑ CRF (↓ shunt, ↑ compliance)
- ↓ pré et postcharge VG (↓ Ptm)

Ptm

. normale = 136 – (- 2) = 138 cmH_2O
. Dyspnée = 136 – (- 10) = 146 cmH_2O
. VS PEP = 136 – (+ 5) = 131 cmH_2O

↓ travail respiratoire

CPAP, Bi-PAP, Traitement STD

- 32 études randomisées (27 = NPPV vs STD; 14 = CPAP vs bilevel NPPV)
- Bi-PAP et CPAP comparées au traitement conventionnel :
  - ↓ FR
  - ↓ taux d'intubation
  - ↓ durée de séjour en USC
  - ↓ mortalité hospitalière
  - Pas d'augmentation du risque de SCA
- CPAP :
  - ↓ risque d'arrêt cardiaque
  - Moins d'incidence d'arythmies

Vital F. et al. *Cochrane Database.* 2013

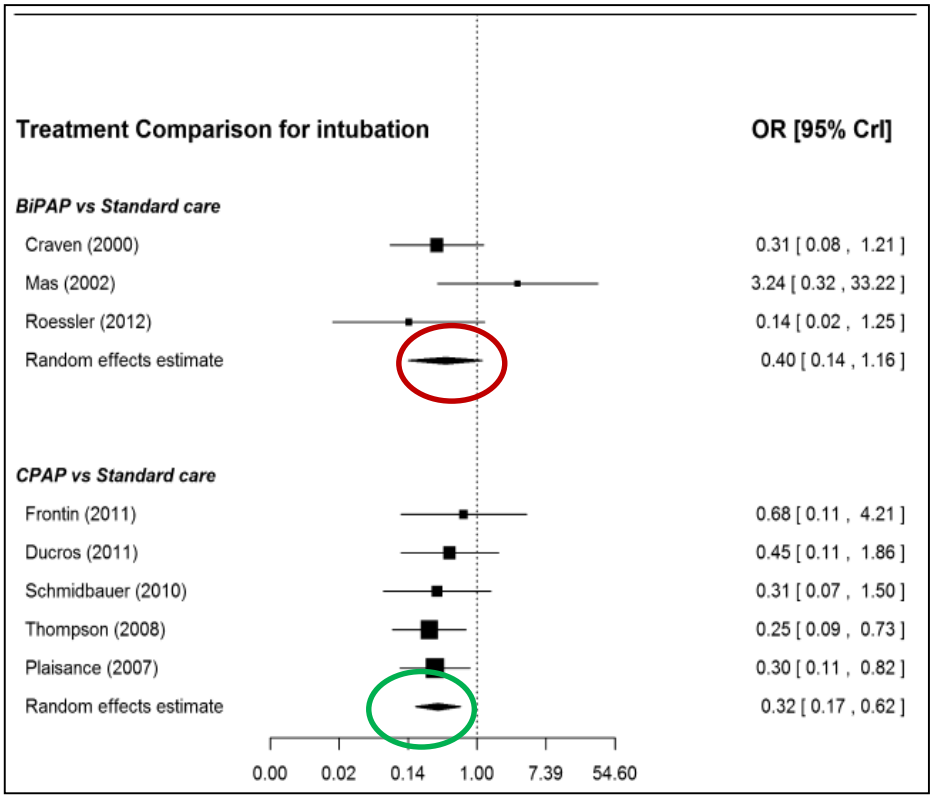
CPAP vs Bi-PAP

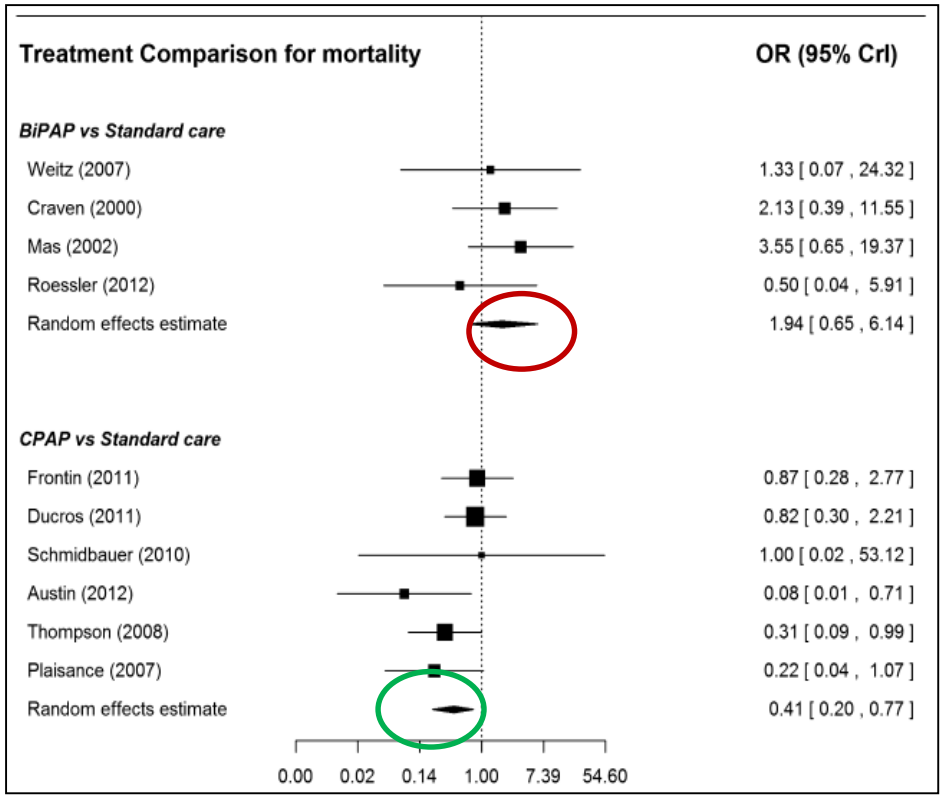
Prehospital Noninvasive Ventilation for Acute Respiratory Failure: Systematic Review, Network Meta-analysis, and Individual Patient Data Meta-analysis

Steve Goodacre, PhD, John W. Stevens, PhD, Abdullah Pandor, MSc, Edith Poku, MBChB, Shijie Ren, PhD, Anna Cantrell, MA, Vincent Bounes, PhD, Arantxa Mas, MD, Didier Payen, PhD, David Petrie, MD, Markus Soeren Roessler, PhD, Gunther Weitz, MD, Laurent Ducros, MD, and Patrick Plaisance, PhD

Goodcare S. et al. *Acad. J Emerg Med* 2014

CPAP vs Bi-PAP
Intubation et mortalité





Goodcare S. et al. *Acad. J Emerg Med* 2014

CPAP vs Bi-PAP

Abstract

Objectives: This meta-analysis aimed to determine the effectiveness of prehospital continuous positive airway pressure (CPAP) or bilevel inspiratory positive airway pressure (BiPAP) in acute respiratory failure.

Methods: Fourteen electronic databases and research registers were searched from inception to August 2013. Randomized or quasi-randomized controlled trials that reported mortality or intubation rate for prehospital CPAP or BiPAP were selected and compared to a relevant comparator in patients with acute respiratory failure. An aggregate data network meta-analysis was used to jointly estimate intervention effects relative to standard care. A network meta-analysis using a mixture of individual patient-level data and aggregate data was carried out to assess potential treatment effect modifiers.

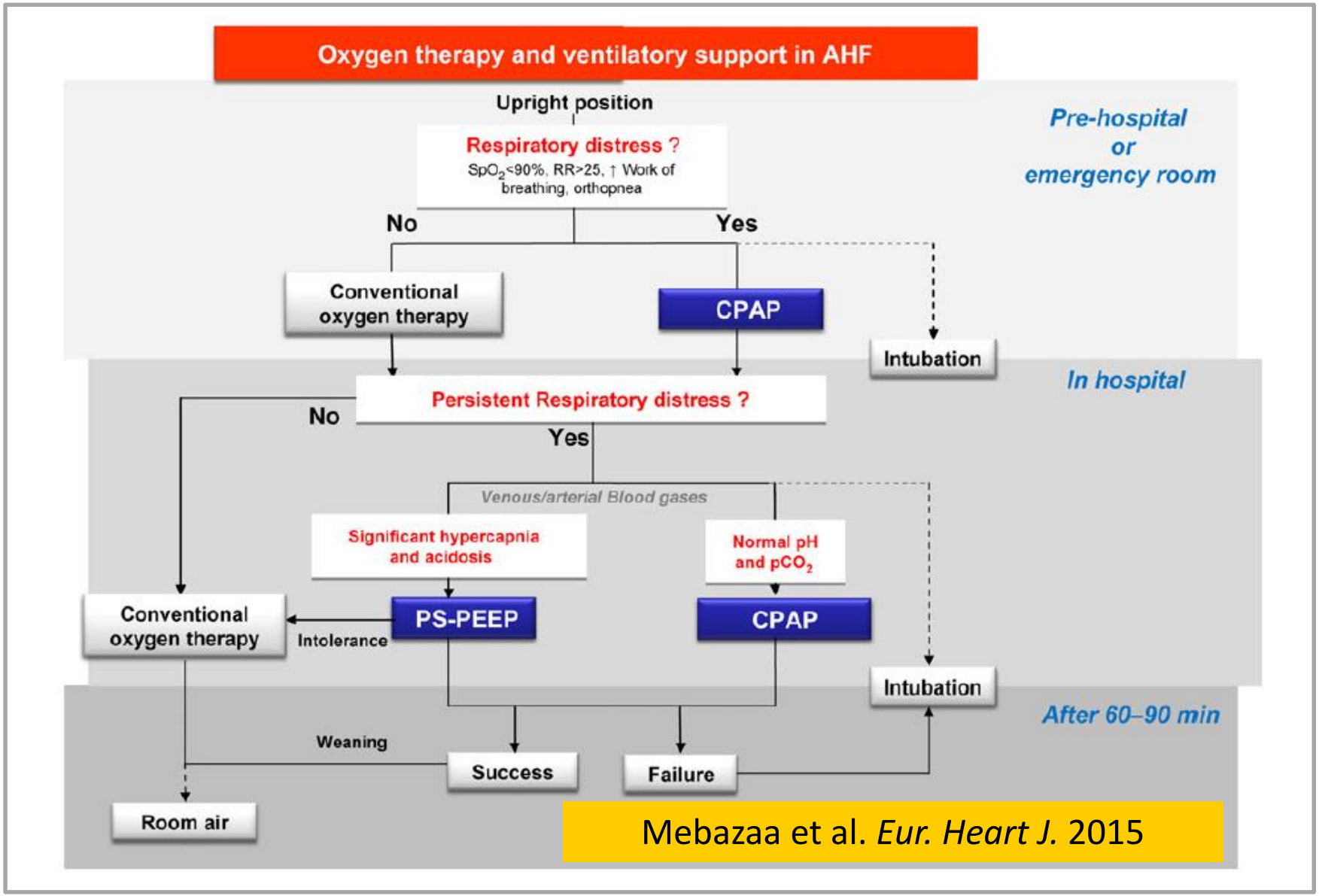
Results: Eight randomized and two quasi-randomized controlled trials (six CPAP, four BiPAP, sample sizes 23 to 207) were identified. The aggregate data network meta-analysis suggested that CPAP was the most effective treatment in terms of mortality (probability = 0.989) and intubation rate (probability = 0.639) and reduced both mortality (odds ratio [OR] = 0.41; 95% credible interval [CrI] = 0.20 to 0.77) and intubation rate (OR = 0.32; 95% CrI = 0.17 to 0.62), compared to standard care. The effect of BiPAP on mortality (OR = 1.94; 95% CrI = 0.65 to 6.14) and intubation rate (OR = 0.40; 95% CrI = 0.14 to 1.16) was uncertain. The network meta-analysis using individual patient-level data and aggregate data suggested that sex was a modifier of the effect of treatment on mortality.

Conclusions: Prehospital CPAP can reduce mortality and intubation rates compared to standard care, while the effectiveness of prehospital BiPAP is uncertain.

ACADEMIC EMERGENCY MEDICINE 2014;21:960–970

Goodcare S. et al. *Acad. J Emerg Med* 2014

Traitement ventilatoire de l'ICA



Indications de la Bi-PAP

« *Bi-level PPV also allows inspiratory pressure support that improves minute ventilation and is especially useful in patients with hypercapnia, most typically COPD patients.* »

2016 ESC Guidelines. *Eur. Heart J.* 2016

- Fatigue
- Acidose hypercapnique
- BPCO

VNI ou ventilation mécanique ?

Traitement ventilatoire

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2016 ESC Guidelines. *Eur. Heart J.* 2016

VNI vs ventilation mécanique
Différence de caractéristiques

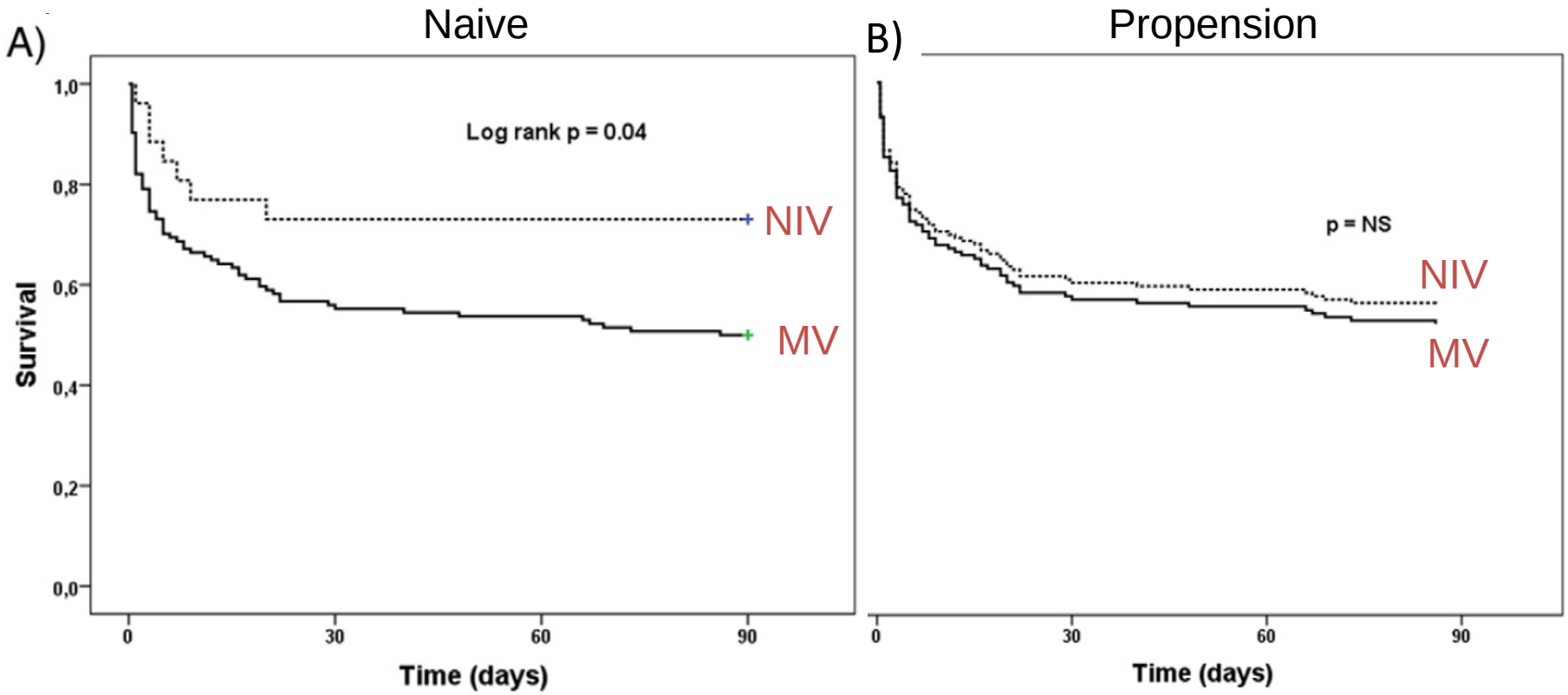
- Choc cardiogénique

Physiologic parameters at baseline, mortality, and length of ICU/CCU and hospital stay.

	All (n = 219)	MV (n = 137)	NIV (n = 26)	p-Value*	Supplementary oxygen (n = 56)
Clinical findings					
Systolic blood pressure, mmHg	78 (14)	78 (15)	83 (10)	0.03	75 (11)
Heart rate, beats per minute	90 (28)	91 (29)	87 (23)	0.2	89 (29)
LVEF, %	33 (14)	32 (14)	33 (12)	0.7	36 (17)
Confusion, n (%)	148 (68)	113 (83)	8 (31)	<0.001	26 (46)
Biochemistry					
Blood hemoglobin, g/L	128 (22)	130 (23)	125 (22)	0.3	124 (24)
Arterial blood lactate, mmol/L	2.8 (1.7–5.8)	3.7 (2.2–7.0)	1.7 (1.4–2.8)	<0.001	2.3 (1.6–3.5)
hsTnT, ng/L	2190 (388–5418)	1597 (337–4178)	363 (128–1070)	0.06	2427 (418–7459)
NT-proBNP, pg/mL	2710 (585–9434)	2367 (559–8563)	7375 (2053–17,372)	0.04	1860 (511–8976)
Creatinine, mmol/L	104 (78–140)	110 (87–144)	100 (69–119)	0.1	107 (84–140)
eGFR, mL/min/1.73 m^2	61 (41–87)	64 (30)	67 (28)	0.6	59 (28)
CRP, g/L	16 (4–54)	15 (4–49)	37 (6–79)	0.2	15 (4–48)
Management, n (%)					
Coronary angiography	182 (83)	114 (83)	23 (89)	0.8	45 (80)
PCI	149 (68)	90 (66)	19 (73)	0.5	40 (71)
CABG	9 (4)	5 (4)	3 (12)	0.1	1 (2)
IABP	122 (56)	85 (62)	16 (62)	1.0	21 (38)
Mortality, n (%)					
In-hospital mortality	80 (37)	62 (45)	5 (19)	0.01	13 (23)
90-day mortality	89 (41)	67 (49)	7 (27)	0.03	15 (27)
ICU/CCU length of stay, days	5 (2–10)	6 (2–11)	4 (2–8)	0.2	3 (1–7)
In-hospital length of stay, days	12 (7–25)	17 (10–27)	12 (7–27)	0.2	8 (4–18)

Hongisto. et al. *International J of Cardiol.* 2017

VNI vs ventilation mécanique
Différence de survie



Hongisto. et al. *International J of Cardiol.* 2017

Revoir nos recommandations…

Traitement
VNI

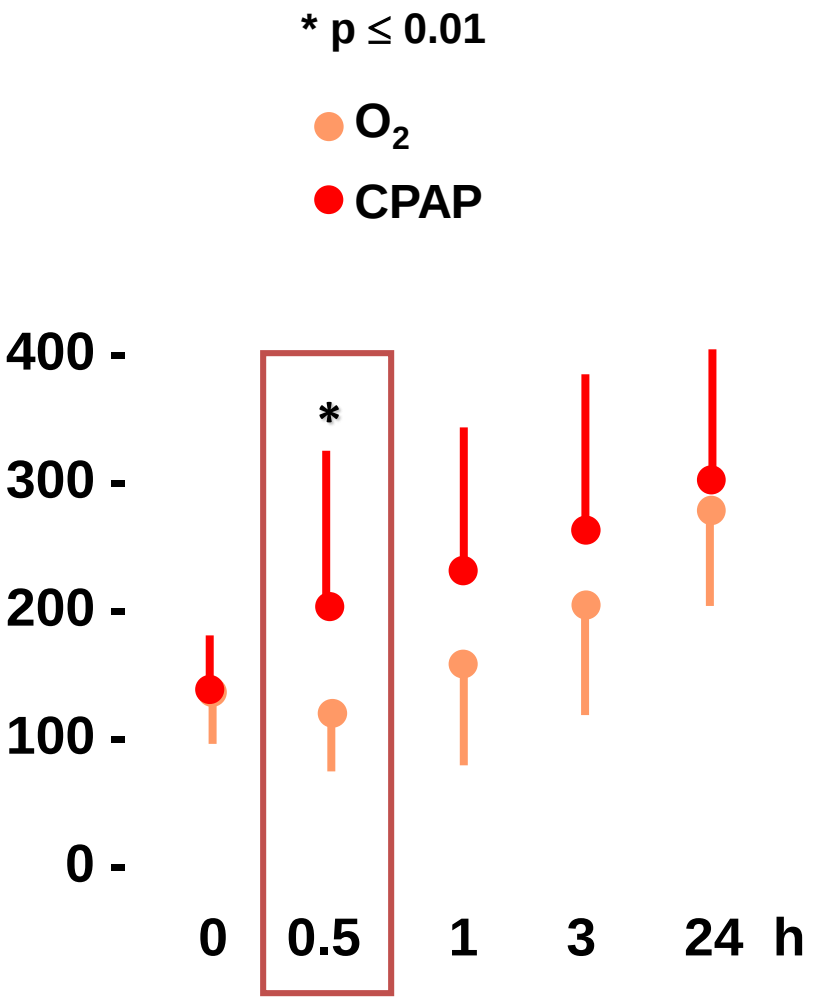
- Indications :
  - SC1, 2 et 4
  - Détresse respiratoire aiguë avec crépitants
  - $PaO_2/FiO_2 < 250$ mmHg
  - FR > 30 / min
  - $SpO_2 < 90\%$ AA
- Contre-indications:
  - Indication d'intubation immédiate
  - État de choc
  - Arythmie ventriculaire
  - $SpO_2 < 80\%$ sous O_2
  - Insuffisance rénale chronique sévère
  - pneumothorax

Conférence de consensus SFAR, SRLF,SPLF. 2006

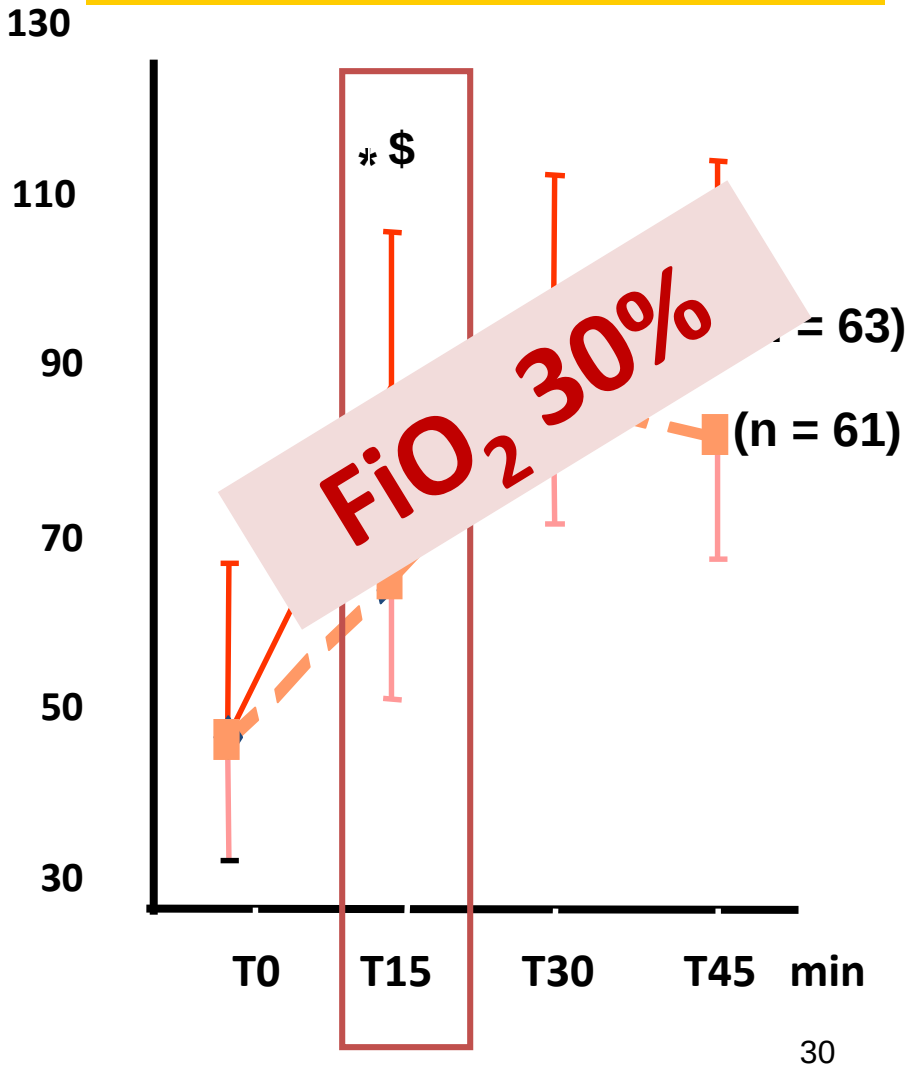
Quel niveau de FiO_2 ?

CPAP Délai d'action

Bersten et al., *NEJM* 1991



Plaisance et al. *Eur Heart J.* 2007



Efficacité

- Etude multicentrique randomisée (10 centres)
- Critère principal (combiné) :
  - Mortalité,
  - Présence de critères d'
  - Persistence de t s d'inclusion ou de défaillance circulatoire à H2
  - ou leur réapparition à 48 h.

FiO_2 30%

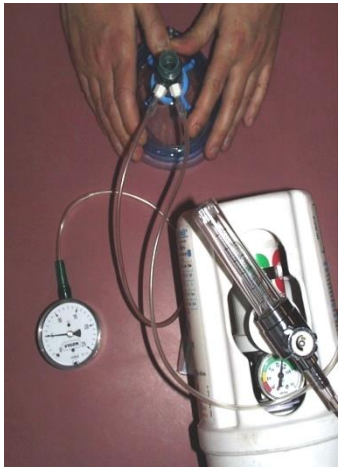
Ducros et al. *ICM* 2011

	Control group ($n = 100$)	CPAP group ($n = 107$)	OR [95% CI] control/CPAP
Primary end point (combined criteria)	37 (37)	23 (21)	2.1 [1.2, 4.0]
Death	3 (3)	4 (4)	1.4 [0.4, 5.2]
Persistence of inclusion criteria[a] at H2	23 (26)	12 (12)	2.5 [1.2, 5.5]
Reappearance of inclusion criteria[a] after H2	1 (1)	3 (3)	0.4 [0, 3.5]
Persistence of circulatory failure at H2	6 (6)	1 (1)	7.0 [0.8, 58.9]
Reappearance of circulatory failure after H2	6 (6)	1 (1)	6.8 [0.8, 57.7]
Presence of intubation criteria	13 (14)	4 (4)	3.9 [1.2, 12.5]

Quel équipement ?

Appareils




Ducros & Plaisance Le point sur l'ICA, Springer 2006

Systèmes avec valves

- Turbine
- Bonne qualité de trigger
- Rapid pressurisation avec différents débits inspiratoires
- Compensation de fuites
- Spirométrie expiratoire

Elisée 250

Oxylog 3000

Conclusion

- La VNI a toute sa place dans le traitement précoce.
- La CPAP est le traitement le plus adéquat et simple notamment en préhospitalier.
- La VNI diminue le taux d'intubation. L'impact sur la mortalité à court terme n'est pas clair.
- La VNI peut être indiquée chez les patients hypotendus
- VNI ou VM : dans tous les cas, recherche de la "Best PEEP"

Merci !