La ventilation non invasive au cours du SDRA

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Service de réanimation polyvalente de Sfax
Pr Mounir Bouaziz

Introduction

Syndrome de détresse respiratoire aigu (SDRA): L'une des formes les plus graves d'insuffisance respiratoire aigu:

- Début brutal.
- Hypoxémie sévère.
- Infiltrat alvéolaire bilatéral.
- Absence d'argument en faveur d'un dysfonction VG sous jacente.

Urgence de prise en charge thérapeutique:

- Traitement étiologique.
- Traitement symptomatique:
  - **Ventilatoire (+++)**
  - Non ventilatoire.

Ventilation mécanique au cours des années 70

N Engl J Med. 1972 Oct 19;287(16):799-806.

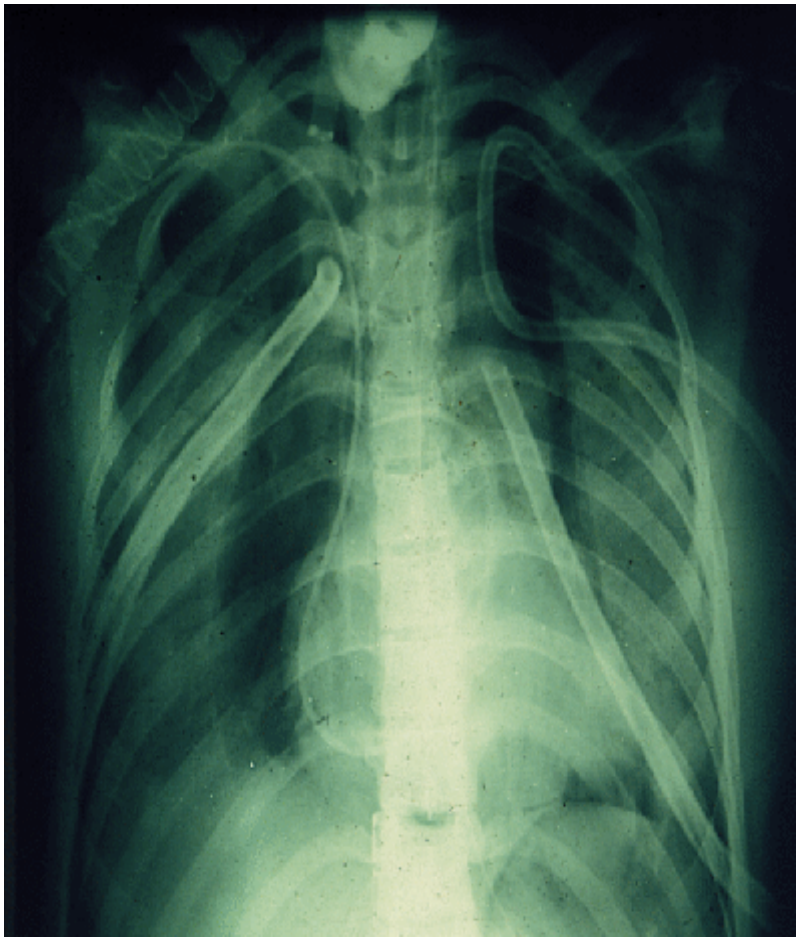
Acute respiratory failure in the adult. 3.

Pontoppidan H, Geffin B, Lowenstein E.

Vt = 12 – 15 ml/kg; PEEP = 5 à 10 cmH_2O

« We ventilated thousands of patients in this way

and the only side effect was hypocapnia »



Autres facteurs de surmortalité :

- Infections nosocomiales (PAVM++).
- Sepsis / Choc septique.
- Séjour prolongé en réanimation.
- Curarisation, corticothérapie

→ Neuromyopathie de réanimation

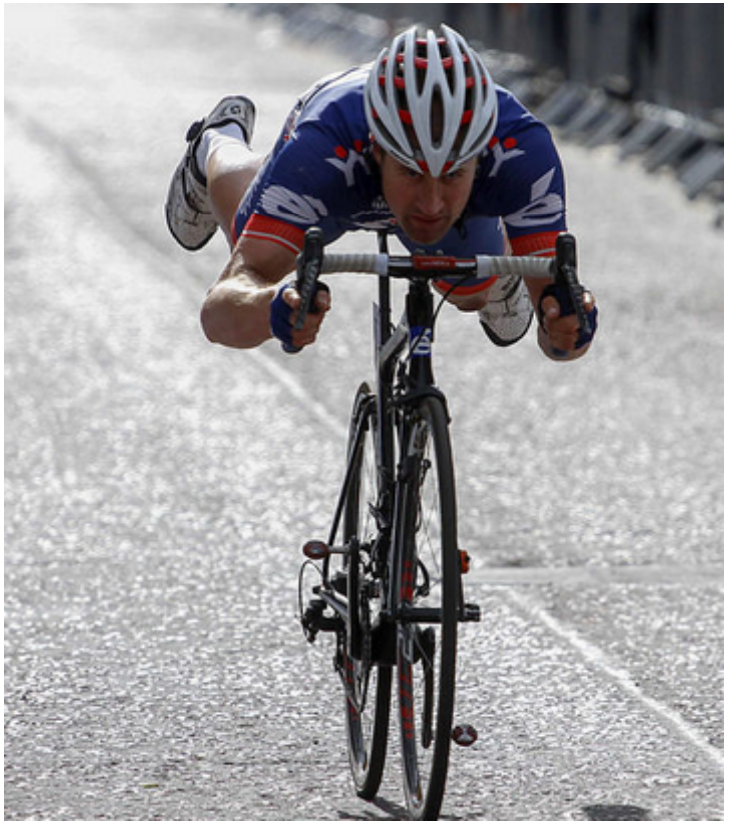
→ difficulté de sevrage de la VM.

- ...

Y a-t-il une place pour la VNI ?

Avantages potentiels

Risque potentiels



Que recommandent les sociétés savantes ?

Intensive Care Med (2001) 27: 166–178
DOI 10.1007/s001340000721

CONSENSUS CONFERENCE

Timothy W. Evans

International Consensus Conferences in Intensive Care Medicine: Non-invasive positive pressure ventilation in acute respiratory failure

Organised jointly by the American Thoracic Society, the European Respiratory Society, the European Society of Intensive Care Medicine, and the Société de Réanimation de Langue Française, and approved by the ATS Board of Directors, December 2000

Significant controversy exists concerning the exact indications for NPPV in patients with hypoxemic ARF.

The addition of NPPV to standard medical treatment in patients with ARF may prevent ETI, reduce the rate of complications and mortality in patients with hypercapnic ARF.

Several randomized, controlled studies support the use of NPPV as an appropriate treatment in selected patient populations with ARF. A single study has demonstrated NPPV to be an adequate alternative to conventional ventilatory support in such patients. More studies are required to confirm this finding.

Larger, controlled studies are required to determine the potential benefit of adding NPPV to standard medical treatment in the avoidance of ETI in hypoxemic ARF.

Prise en charge ventilatoire du syndrome de détresse respiratoire aiguë de l'adulte et de l'enfant (nouveau-né exclu) — recommandations d'experts de la Société de réanimation de langue française

Réanimation 14 (2005) 2–12

6. Champ 6. Place de la ventilation non invasive (VNI) et de la ventilation spontanée en pression expiratoire positive

6.1. La ventilation spontanée en pression expiratoire positive (VS-PEP) ou *continuous positive airway pressure* (CPAP) n'est pas recommandée dans cette indication ***(accord fort)***.

6.2. La VNI est une technique de VM difficile et à haut risque au cours du SDRA ***(accord fort)***. Pour ces raisons, la VNI ne doit être pratiquée que par une équipe entraînée et dans un service de réanimation afin de pouvoir recourir à l'intubation à tout moment ***(accord fort)***.

6.3. Le meilleur bénéfice de la VNI dans l'IRA hypoxémique est actuellement obtenu chez les patients immunodéprimés en raison du risque important lié à l'intubation chez ces patients ***(accord fort)***.

6.4. La VNI, utilisée à un stade précoce dans l'évolution du SDRA, peut permettre d'éviter l'intubation et d'améliorer le pronostic de patients sélectionnés ***(accord faible)***.

6.5. En dehors du patient immunodéprimé, la persistance de critères de SDRA ou l'existence d'une défaillance associée, en particulier hémodynamique, doit faire envisager le recours à l'intubation ***(accord fort)***. De même, l'existence de désaturations répétées sous VNI doit faire envisager le recours à l'intubation ***(accord fort)***.

Quel est l'état des lieux ?

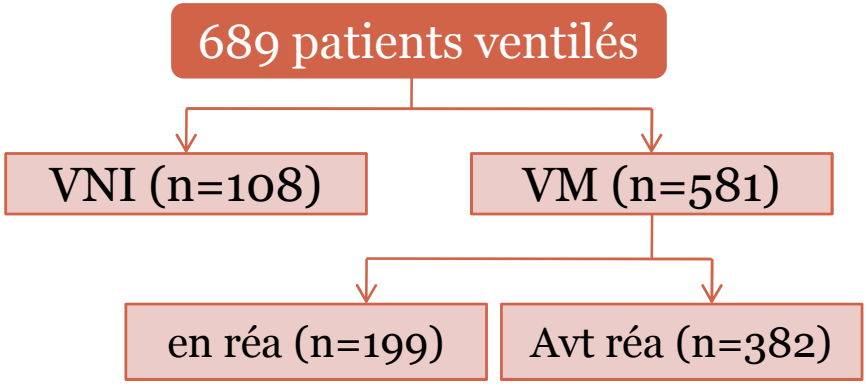
Noninvasive Versus Conventional Mechanical Ventilation

An Epidemiologic Survey

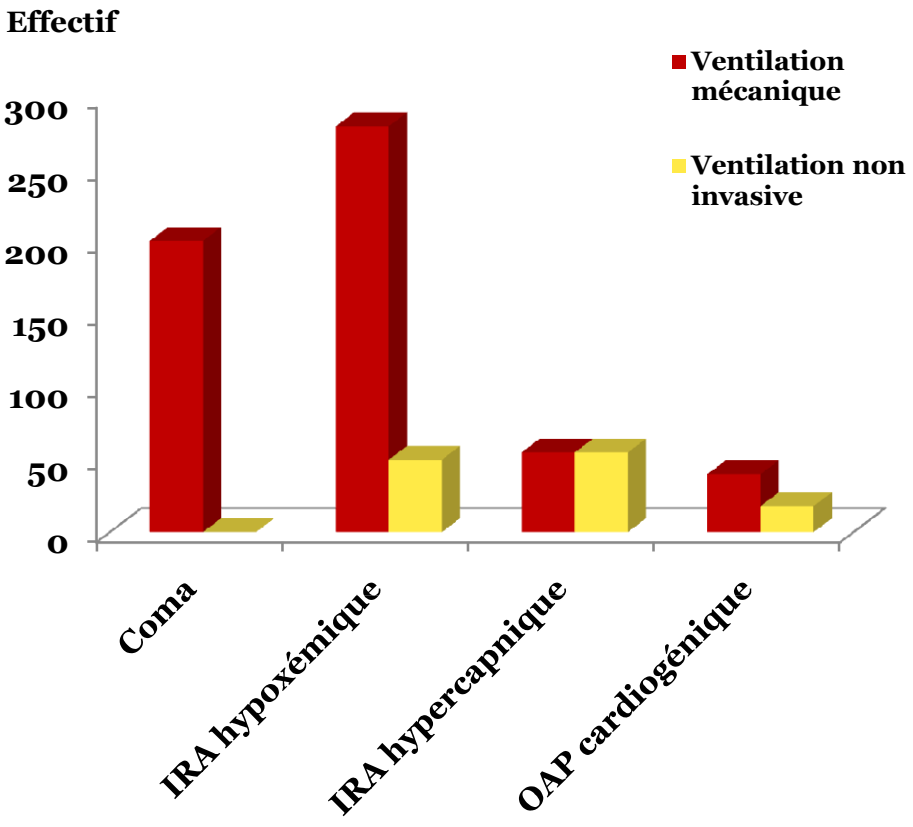
ANNALISA CARLUCCI, JEAN-CHRISTOPHE RICHARD, MARC WYSOCKI, ERIC LEPAGE, LAURENT BROCHARD and the SRLF Collaborative Group on Mechanical Ventilation

Am J Respir Crit Care Med Vol 163. pp 874–880, 2001

- Etude prospective multicentrique.
- Période: 15 sept – 15 oct 1997.
- 42 unités de réanimations.
- Pays: France (++), Suisse, Belgique, Espagne et **Tunisie**.
- Objectif: Evaluation des modalités de ventilation utilisées en réanimation à travers un questionnaire.



La VNI a été utilisée chez **35 %** des patients nécessitant un support ventilatoire (comateux exclus).



Répartition des patients selon le mode ventilatoire de première intention

TABLE 1. MAIN CHARACTERISTICS OF PATIENTS WITHOUT COMA REQUIRING NONINVASIVE VENTILATION OR ENDOTRACHEAL INTUBATION

	NIV (*n* = 108)	ETI (*n* = 380)	p Value
Age, yr	63 ± 16	61 ± 18	NS
Origin of patients			
Home	21 (20%)	79 (21%)	
Emergency ward	21 (20%)	62 (16%)	
Medical ward	49 (45%)	82 (22%)	< 0.001
Surgical ward	4 (4%)	94 (25%)	< 0.001
Other hospital	13 (12%)	63 (16%)	
SAPS II	36 ± 20	47 ± 21	< 0.001
McCabe/Jackson score			
0	30 (28%)	152 (40%)	< 0.05
1	56 (52%)	152 (40%)	< 0.05
2	22 (20%)	76 (20%)	
Previous NIV	18%	3%	< 0.001
ABG at admission			
Pa_{CO_2}, mm Hg	56 ± 25	44 ± 17	< 0.004
pH	7.35 ± 0.1	7.33 ± 0.13	NS
Pa_{O_2}/FI_{O_2}, mm Hg	214 ± 84	212 ± 121	NS

Succès de la VNI: 62 %

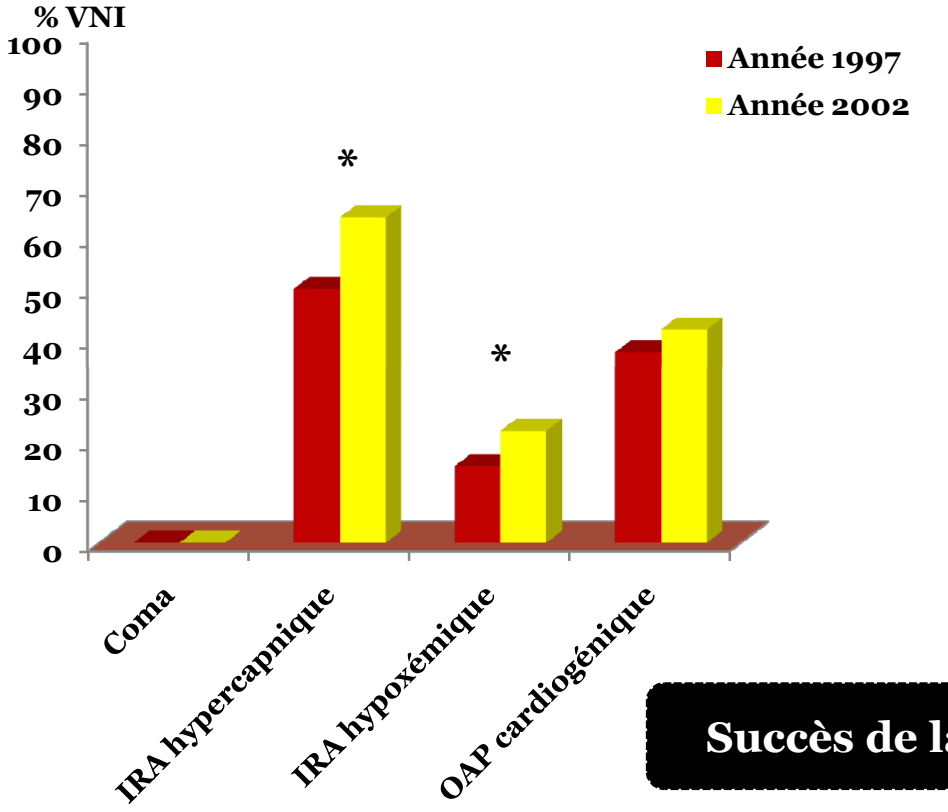
5 ans après…

Intensive Care Med (2006) 32:1747–1755
DOI 10.1007/s00134-006-0229-z

ORIGINAL

Increased use of noninvasive ventilation in French intensive care units

Alexandre Demoule
Emmanuelle Girou
Jean-Christophe Richard
Solenne Taillé
Laurent Brochard



Succès de la VNI: 56 % (NS)

Evolution du recours à la VNI en 1ère intention entre 1997 et 2002

Indications « consensuelles »

Réel bénéfice ou « simple confort » ?

CARING FOR THE CRITICALLY ILL PATIENT

Noninvasive Ventilation for Treatment of Acute Respiratory Failure in Patients Undergoing Solid Organ Transplantation

A Randomized Trial

Massimo Antonelli, MD
Giorgio Conti, MD
Maurizio Bufi, MD
Maria Gabriella Costa, MD
Angela Lappa, MD
Monica Rocco, MD
Alessandro Gasparetto, MD
Gianfranco Umberto Meduri, MD

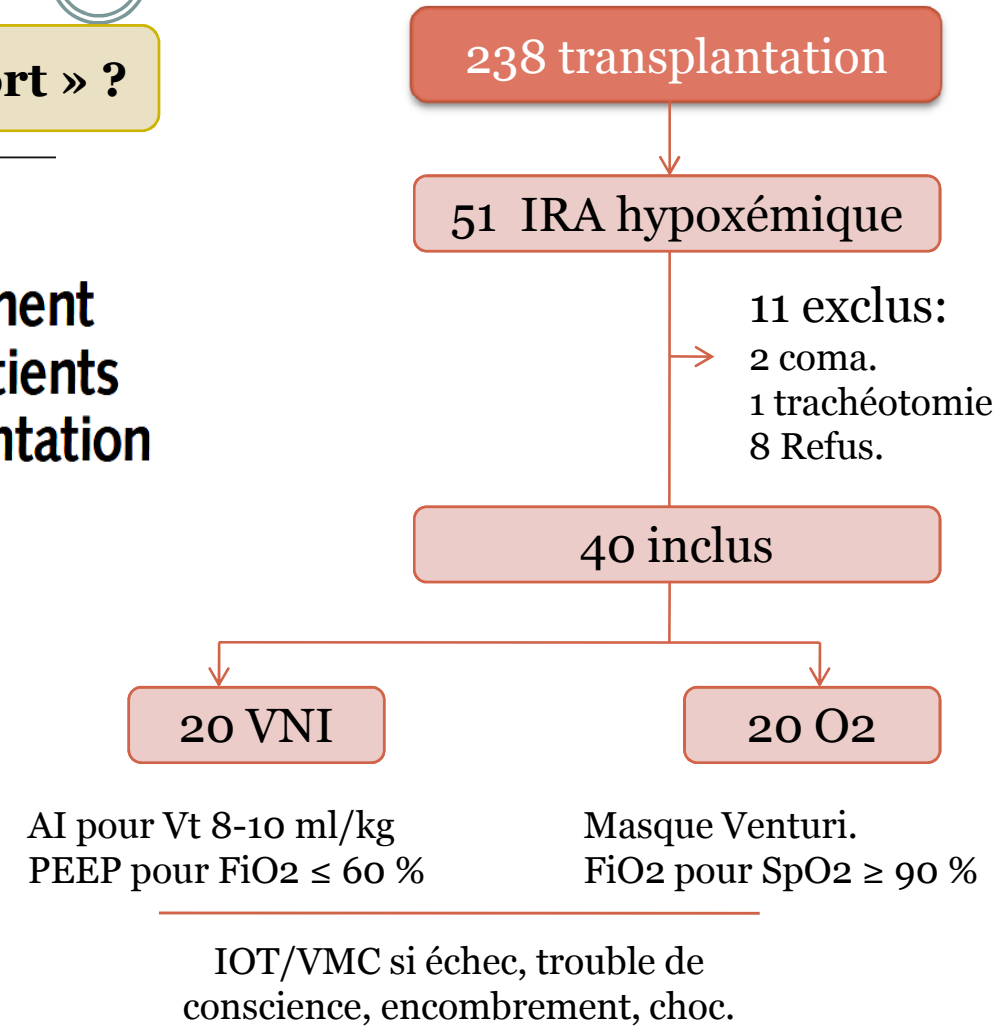


Table 1. Baseline Characteristics of the Patients and Causes of Acute Respiratory Failure*

	Noninvasive Ventilation Group (n = 20)	Standard Treatment Group (n = 20)	*P* Value
Age, y	45 (19)	44 (10)	.89
No. (%) of men	13 (65)	12 (60)	.50
Simplified Acute Physiologic Score	13 (4)	13 (3)	.93
No. of invasive devices per patient	5 (1)	5 (1)	.90
Heart rate, beats/min	96 (20)	101 (14)	.38
Respiratory rate, breaths/min	38 (3)	37 (1)	.32
Body temperature, °C	37.2 (0.9)	37 (0.7)	.35
White blood cells, $\times 10^9$/L	0.005 (0.002)	0.007 (0.005)	.12
No. (%) of infections prior to entry	8 (40)	9 (45)	.19
Systolic blood pressure, mm Hg	135 (23)	140 (24)	.53
Arterial pH	7.46 (0.05)	7.43 (0.04)	.13
$Paco_2$, mm Hg	42 (10)	38 (9)	.14
No. (%) of patients with $Paco_2$ >45 mm Hg	7 (35)	3 (15)	.13
Ratio of Pao_2 to fraction of inspired oxygen	129 (30)	129 (30)	.96
No. (%) of patients who received an organ transplant			
Liver	10 (50)	12 (60)	.37
Lung	4 (20)	2 (10)	.33
Kidney	6 (30)	6 (30)	.63
Time from transplantation, d†	23 (14)	22 (15)	.88
Causes of acute respiratory failure‡			
Pneumonia	2 (10)	2 (10)	.69
Cardiogenic pulmonary edema	4 (20)	5 (25)	.50
Acute respiratory distress syndrome§	8 (40)	7 (35)	.50
Mucous plugging or atelectasis	5 (25)	5 (25)	.64
Pulmonary embolism	1 (5)	1 (5)	.75

Figure 1. Changes in the Ratio of PaO_2 to Fraction of Inspired Oxygen (FIO_2) and $PaCO_2$ Over Time

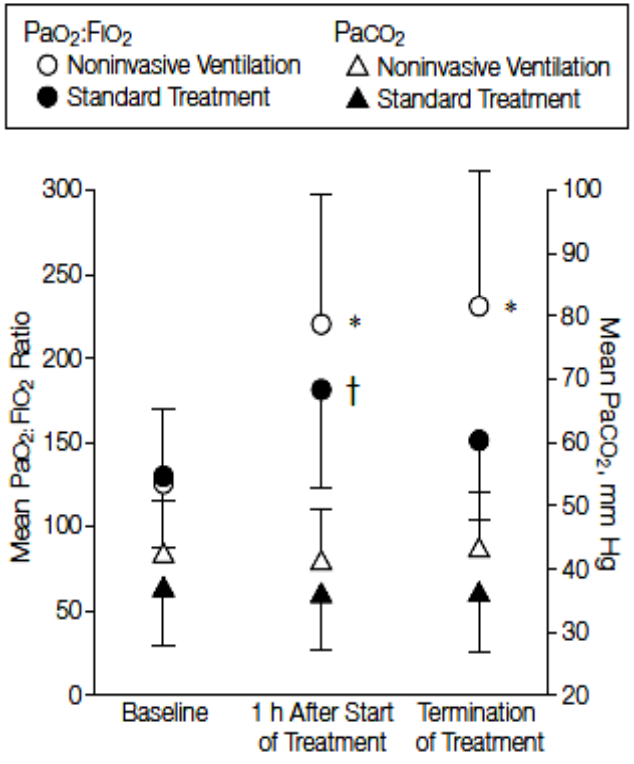


Table 2. Outcome Variables*

Variable	Noninvasive Ventilation Group (n = 20)	Standard Treatment Group (n = 20)	*P* Value
Initial improvement in ratio of PaO_2 to fraction of inspired oxygen	14 (70)	5 (25)	.005
Sustained improvement in ratio of PaO_2 to fraction of inspired oxygen, without intubation	12 (60)	5 (25)	.03
Patients intubated within 24 h of study entry	3 (15)	10 (50)	.02
Patients requiring intubation	4 (20)	14 (70)	.002
Failures per subgroup of patients			
Acute respiratory distress syndrome (pulmonary etiology)†	2/5 (40)	2/2 (100)	.28
Acute respiratory distress syndrome (extrapulmonary etiology)†	1/3 (33)	4/5 (80)	.28
Pneumonia†	1/2 (50)	1/2 (50)	.83
Cardiogenic pulmonary edema†	0/4 (0)	5/5 (100)	.007
Pulmonary embolism	0/1 (0)	0/1 (0)	.99
Mucous plugging or atelectasis†	0/5 (0)	2/5 (40)	.22
Duration of mechanical ventilation, d‡§	4 (5)	5 (6)	.58
Duration of mechanical ventilation in survivors, d‡	2 (0.7)	1.6 (2)	.50
Duration of use for all invasive devices present at study entry, d‡	5 (5)	9 (6)	.05
Length of intensive care unit stay, d‡	7 (5)	10 (6)	.18
Length of intensive care unit stay in survivors, d‡	5.5 (3)	9 (4)	.03
Intensive care unit deaths‖	4 (20)	10 (50)	.05
Intensive care unit deaths per subgroup of patients†			
Acute respiratory distress syndrome	3/8 (37)	4/7 (57)	.40
Pneumonia	1/2 (50)	1/2 (50)	.80
Cardiogenic pulmonary edema	0/4 (0)	4/5 (80)	.04
Pulmonary embolism	0/1 (0)	0.1 (0)	.99
Mucous plugging or atelectasis	0/5 (0)	1/5 (20)	.50
Hospital deaths¶	7 (35)	11 (55)	.17

Noninvasive versus invasive ventilation for acute respiratory failure in patients with hematologic malignancies: A 5-year multicenter observational survey*

Crit Care Med 2011 Vol. 39, No. 10

Giuseppe R. Gristina, MD; Massimo Antonelli, MD; Giorgio Conti, MD; Alessia Ciarlone, MD; Silvia Rogante, MD; Carlotta Rossi, Stat Sci; Guido Bertolini, MD; on behalf of the GiViTI (Italian Group for the Evaluation of Interventions in Intensive Care Medicine)

- Etude rétrospective, observationnelle.
- 158 unités de réanimation italiennes.
- Durée : 2002-2006.
- Inclusion:
  - Hémopathie maligne.
  - IRA.
- Exclusion:
  - Séjour en réa < 24 H.
  - Transplantation de moelle.
  - Chirurgie récente.

1032 patients inclus

- **Neutropénie : n=149.**
- **ALI/ARDS : n= 288.**
- **N def ≥ 2 :n=788**

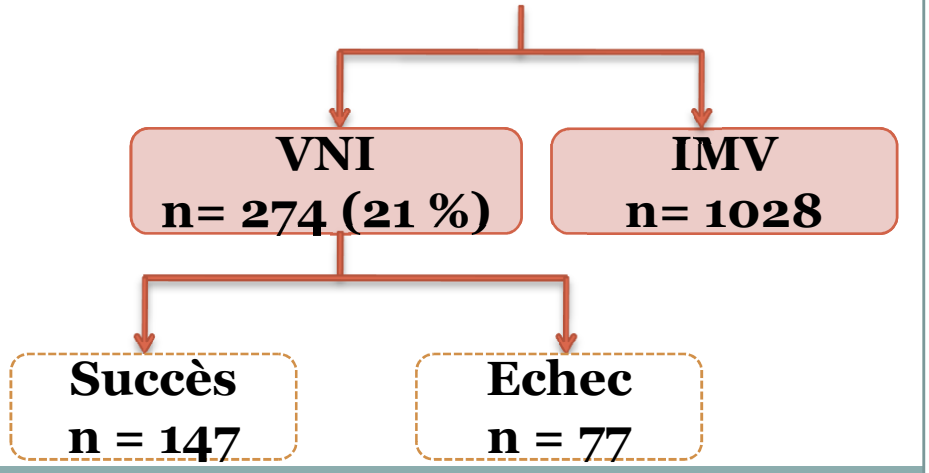


Table 1. Characteristics of the study population and the invasive mechanical ventilation and noninvasive mechanical ventilation subgroups

Population Characteristics	Total Population n = 1302	Invasive Mechanical Ventilation Group n = 1028	Noninvasive Mechanical Ventilation Group n = 274	*p*
Males–no. (%)	764 (59)	602 (59)	162 (59)	.95
Mean Age (SD), yrs	64 (15)	65 (15)	60 (16)	<.0001
Mean Simplified Acute Physiology Score II (SD)	56 (18)	58 (18)	49 (16)	<.0001
Median Glasgow Coma Score (interquartile range)	12 (8–15)	10 (7–15)	15 (14–15)	<.0001
Admission From Same Hospital–no. (%)	1053 (81)	807 (79)	246 (90)	<.0001
Clinical Conditions at Admission–no. (%)				
Neutropenia	149 (11.4)	103 (10.0)	46 (16.8)	.002
PaO_2/FIO_2				
≥200	459 (35.3)	384 (37.4)	75 (27.4)	<.0001
100–199	548 (42.1)	427 (41.5)	121 (44.2)	
<100	241 (18.5)	189 (18.4)	52 (20.0)	
Main Causes of Acute Respiratory Failure–no. (%)				
Atelectasis	49 (4)	41 (4)	8 (3)	.52
Infectious pneumonia	377 (29)	268 (26)	109 (40)	.0001
Inhalation pneumonia	25 (2)	24 (2)	1 (0.3)	.06
Pulmonary contusion	13 (1)	10 (1)	3 (1)	.07
Acute lung injury	167 (13)	110 (11)	57 (21)	<.0001
Adult respiratory distress syndrome	121 (9)	89 (9)	32 (12)	.13
Infections[a]–no. (%)				
Present on ICU admission	316 (41)	228 (39)	88 (50)	<.01
Onset during ICU stay	142 (18)	122 (21)	20 (11)	.01
Mean Duration of Care (SD), days				
Total hospital stay	30 (34)	30 (36)	30 (27)	.72
ICU stay	12 (15)	12 (16)	9 (10)	<.01
Duration of mechanical ventilation	—	11 (13)	4 (4)	<.0001
Mortality–no. (%)				
ICU				
All patients	617 (47)	511 (50)	106 (39)	<.01
Patients with acute lung injury or adult respiratory distress syndrome	171 of 288 (59)	119 of 199 (60)	52 of 89 (58)	.83
Hospital				
All patients	730 (56)	597 (58)	133 (49)	<.01
Patients with acute lung injury or adult respiratory distress syndrome	193 of 288 (67)	137 of 199 (69)	56 of 89 (63)	.32

Table 2. Risk factors for mortality

Factor	Odds Ratio[a] Point Estimate (95% Confidence Limits)
Initial ventilatory support: Noninvasive Mechanical Ventilation vs. Invasive Mechanical Ventilation	0.73 (0.53–1.00)
Hematologic Malignancy: Admission Diagnosis vs. Comorbidity	1.34 (1.03–1.73)
Admission from Another Intensive Care Unit vs. Medical Ward	0.98 (0.60–1.60)
Admission from Emergency Department vs. Medical Ward	0.66 (0.49–0.88)
Admission from Surgical Ward vs. Medical Ward	0.62 (0.42–0.92)
Acute Lung Injury	1.69 (1.16–2.47)
Adult Respiratory Distress Syndrome	2.09 (1.32–3.31)
Stroke	2.29 (1.11–4.75)
Septic Shock	2.43 (1.61–3.65)
Other Type of Shock	2.16 (1.24–3.76)
Coagulopathy	1.59 (1.13–2.23)
Coma	1.68 (1.05–2.69)
Age	1.01 (1.01–1.02)
Simplified Acute Physiology Score II (each 4-point increase)	4.66 (2.98–7.28)
Propensity score	5.07 (1.40–18.32)

[a]Number of observations: 1302; Likelihood Ratio: chi-square: 195.39; Degrees of freedom: 15; $p <$ .0001; association of predicted probabilities and observed responses: Percent concordant: 73.1; Percent discordant: 26.7; Somers' D: 0.46; c statistic: 0.73.

Stroke, any form of shock, and coma refers to condition occurring after the study inclusion.

Table 3. Comparison of the successful and unsuccessful noninvasive mechanical ventilation groups

Group Characteristics	Successful NIMV (n = 147 [54%])	Unsuccessful NIMV (n = 127 [46%])	*p*
Males–no. (%)	83 (56)	79 (63)	.30
Mean Age (SD), yrs	60 (17)	60 (14)	.73
Mean Simplified Acute Physiology Score II (SD)	47 (17)	51 (15)	.07
Median Glasgow Coma Scale (interquartile range)	15 (14–15)	15 (14–15)	.95
ALI-ARDS at Admission–no. (%)			
ALI	21 (14)	36 (28)	<.01
ARDS	15 (10)	17 (13)	.41
Infections[a]–no. (%)			
Present at ICU admission	46 (31)	42 (33)	.60
Onset during ICU stay	1 (1)	19 (15)	<.0001
Organ Failure–no. (%)			
Present at ICU admission	141 (96)	121 (95)	.80
Onset during ICU stay	40 (27)	80 (63)	.00005
Mean Duration of Care (SD)–days			
Total hospital stay	29 ± 24	32 ± 30	.39
ICU stay	6 ± 5	14 ± 12	<.0001
Duration of NIMV	5 ± 4	3 ± 3	<.0001
Mortality–no. (%)			
ICU mortality			
All patients	28 (19)	78 (61)	<.0001
Patients with ALI or ARDS	13 of 36 (36)	39 of 53 (74)	.0005
Hospital mortality			
All patients	50 (34)	83 (65)	<.0001
Patients with ALI or ARDS	15 of 36 (42)	41 of 53 (77)	.001

ALI, acute lung injury; ARDS, adult respiratory distress syndrome; ICU, intensive care unit; NIMV, noninvasive mechanical ventilation.

[a]Information on infections was available only for 768 patients admitted during 2005–2006 (591 invasive mechanical ventilation group, 177 NIMV group).

ALI/SDRA: indications encore loin d'être consensuelles

Noninvasive Positive Pressure Ventilation*

Successful Outcome in Patients With Acute Lung Injury/ARDS

Graeme M. Rocker, MA, DM; Mary-Gordon Mackenzie, RN, BSc, MSc, PhD; Bruce Williams, RRT; and P. Mark Logan, MB

Succès si éviction de l'IOT pendant 72 heures.

Etude rétrospective ayant inclus 12 épisodes de VNI chez 10 patients en ALI/ARDS (01/08/94 – 31/07/96)

Table 1—*Patient Characteristics*

Trial/Age, yr/Sex	Risk Factor for ALI/ARDS*	Baseline PaO_2/FIO_2	PaO_2/FIO_2 2–6 h After NPPV
1/25/F	Candidemia: self-extubation	83	–
2/34/M	Malaria	80	273
3/26/M	Fat emboli	74	78
4/29/F	Postpartum TTP	100	125
5	Postpartum TTP (second time)	80	203
6/83/F	Inhalation and surface burns	277	363
7/54/F	Near drowning: postextubation	83	–
8/42/M	Trauma: self-extubation	98	140
9/89/F	*Staphylococcus aureus* bacteremia	50	82
10/35/F	Bone marrow transplant for CML	100	144
11/50/F	Aspiration	87	168
12	Aspiration (second time)	116	150

*TTP = thrombotic thrombocytopenic purpura; CML = chronic myelogenous leukemia.

Répartition des patients selon la réponse à la VNI

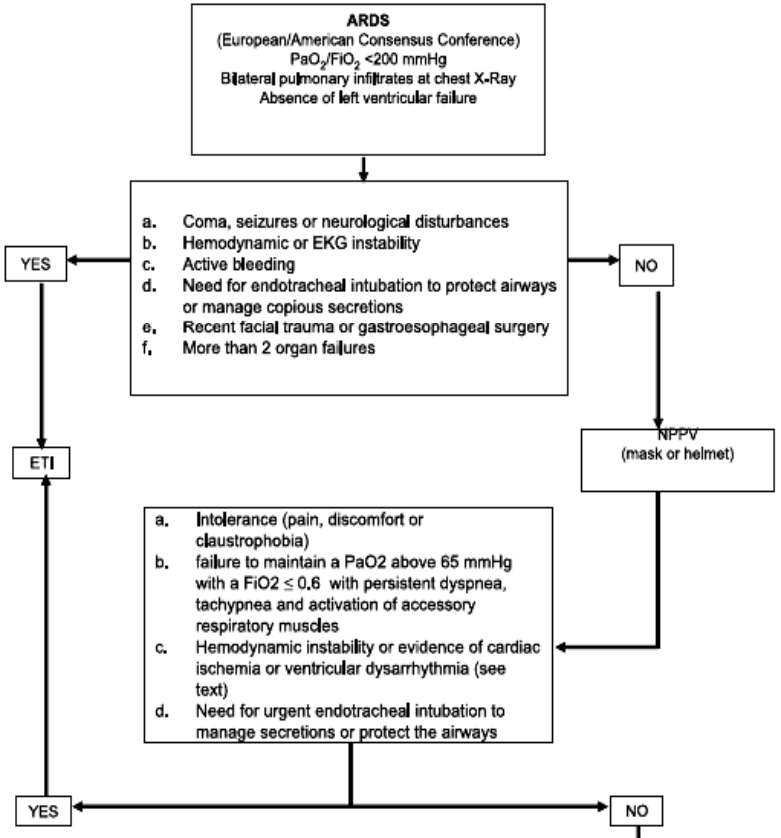
	Succès	Echec
VNI primaire	6	3
Post-extubation	0	3
Durée (H)	64.5	7.3
Séjour réa (j)	3.7 (1-19)	7 (4-15)

A multiple-center survey on the use in clinical practice of noninvasive ventilation as a first-line intervention for acute respiratory distress syndrome*

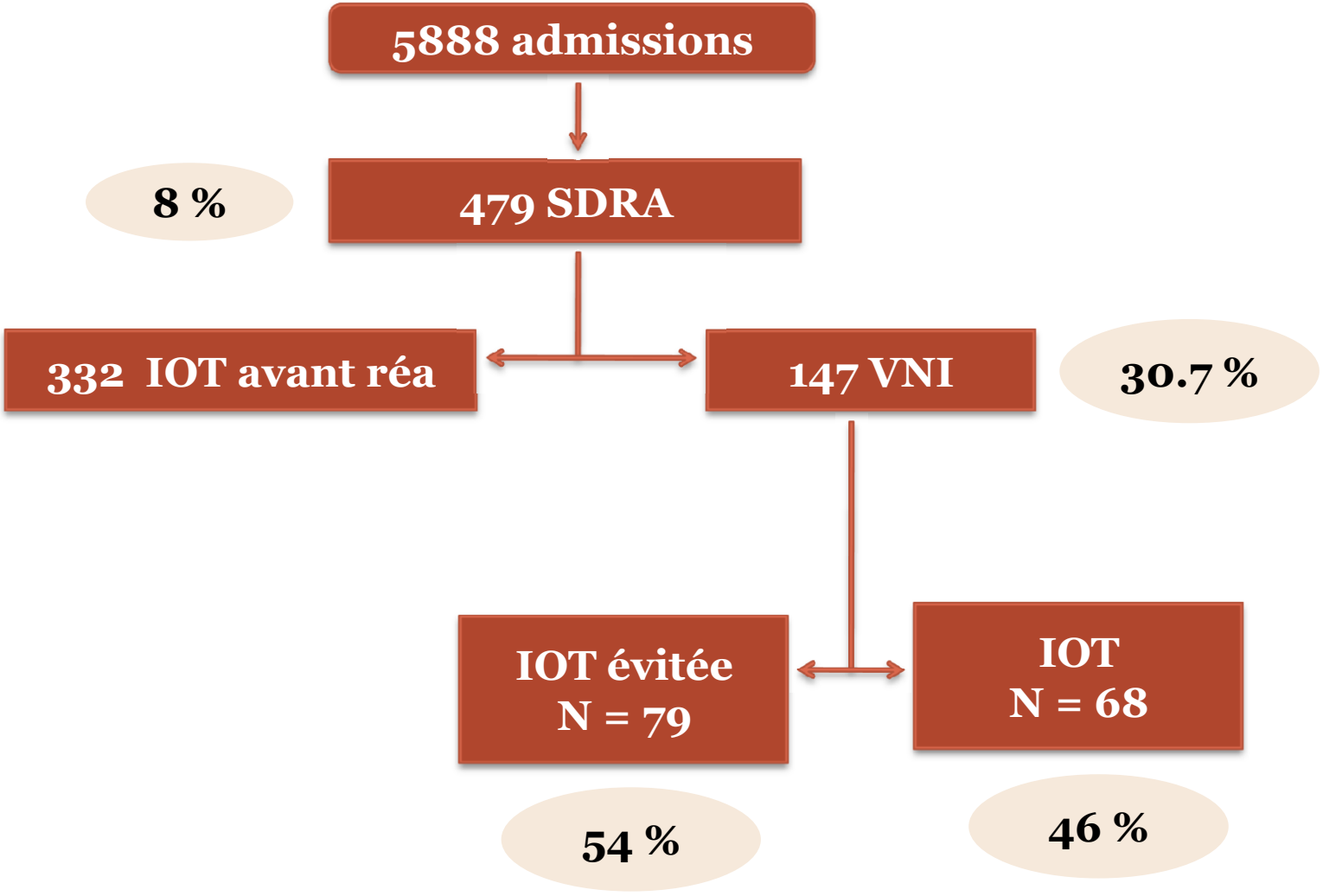
Crit Care Med 2007 Vol. 35, No. 1

Massimo Antonelli, MD; Giorgio Conti, MD; Antonio Esquinas, MD; Luca Montini, MD; Salvatore Maurizio Maggiore, MD, PhD; Giuseppe Bello, MD; Monica Rocco, MD; Riccardo Maviglia, MD; Mariano Alberto Pennisi, MD; Gumersindo Gonzalez-Diaz, MD; Gianfranco Umberto Meduri, MD

- Etude prospective multicentrique.
- Période: Mars 2002 – avril 2004.
- **Inclusion:** SDRA survenant dans les 24 H précédant l'admission.
- **Critères de jugement primaires:**
  - Nécessité d'IOT+VMI.
  - F. prédictifs d'échec de la VNI.
- **Critères secondaires:**
  - Durée de ventilation.
  - Infections nosocomiales.
  - Durée de séjour en réa.
  - Mortalité en réa/à l'hôpital.



Protocole de l'étude



Répartition des patients inclus

Table 1. Baseline characteristics in patients who avoided and required intubation

Variable	Avoided Intubation (n = 79)	Required Intubation (n = 68)	*p* Value
Age, yrs, median (25th–75th)	53 (35–64)	60 (51–68)	.02
Male gender, n (%)	43 (54)	50 (73)	.02
SAPS II on admission, median (25th–75th)	32 (28–36)	38 (34–41)	<.001
GCS, mean (SD)	14 (1)	14 (1)	.9
PEEP[a] basal, mean (SD)	7 (2)	8 (2)	.03
PSV, cm H_2O, mean (SD)	14 (3)	16 (4)	.02
NPPV started in the ER, n (%)	17 (21)	13 (19)	.43
Patients treated with the helmet, n (%)	25 (32)	19 (28)	.37
Pa_{O_2}/Fi_{O_2} at baseline, mean (SD)	116 (38)	105 (33)	.06
pH at baseline, mean (SD)	7.41 (0.08)	7.39 (0.07)	.12
Pa_{CO_2} at baseline, mm Hg, mean (SD)	40 (13)	40 (13)	.94
RR at baseline, mean (SD)	35 (5)	36 (5)	.27
HR at baseline, mean (SD)	105 (21)	106 (24)	.9
Comorbid conditions, n (%)			
None	45 (57)	37 (54)	.8
Systemic hypertension	9 (11)	9 (13)	.9
Diabetes	3 (4)	9 (13)	.09
Immunosuppression[b]	16 (20)	6 (9)	.1
Cardiac ischemia	6 (8)	7 (10)	.72
Etiology of ARDS, n (%)			
Pulmonary	36 (45)	33 (48)	.84
Extrapulmonary	43 (54)	35 (51)	.84

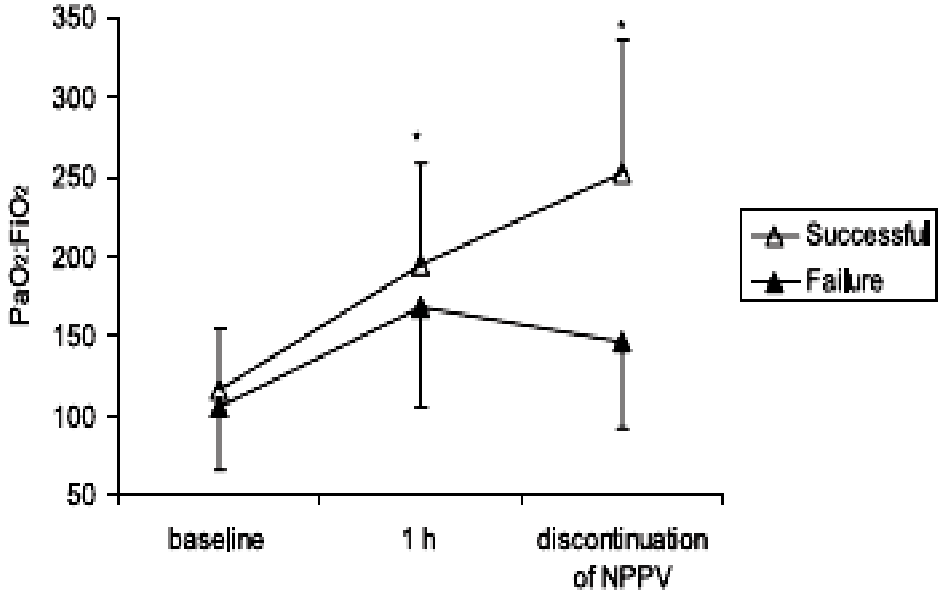


Figure 2. $Pa0_2$:$Fi0_2$ ratio over time in patients who avoided (successful) and required (failure) intubation. Discontinuation of noninvasive positive pressure ventilation (*NPPV*) corresponds to the discontinuation of ventilation for patients who avoided intubation and timing of endotracheal intubation for those who required intubation. $*p < .01$ between the two groups.

Table 2. Outcome variables and complications after study entry

	Avoided Intubation (n = 79)	Required Intubation (n = 68)	*p* Value
Outcome variables			
Improvement of gas exchange after 1 hr, n (%)	32 (41)	20 (29)	.21
Sustained improvement of gas exchange, n (%)	59 (75)	12 (18)	<.001
Duration of NPPV (hrs) without discontinuation, median (25th–75th)	42 (24–51)	24 (21–47)	.002
ICU length of stay (days), median (25th–75th)	6 (3–11)	7 (3–18)	.24
Skin breakdown, n (%)	8 (10)	9 (13)	.32
ICU mortality, n (%)	5 (6)	36 (53)	<.001
Hospital mortality, n (%)	15 (19)	38 (54)	<.01
Complications after study entry, n (%)			
None	58 (73)	19 (28)	<.001
Sepsis	13 (16)	19 (28)	.11
Severe sepsis or septic shock	6 (7)	16 (23)	.01
Ventilator-associated pneumonia	2 (2)	14 (20)	.001

NPPV, noninvasive positive pressure ventilation; ICU, intensive care unit.

In most cases, the longer duration of NPPV was related to the use of a helmet (see text). The etiology of hospital-acquired pneumonia is reported in the text. For the definition of initial and sustained improvement, see text. For all the five patients who died in the successful group, death occurred some days after weaning from NPPV.

Table 3. Noninvasive positive pressure ventilation (NPPV) failure and mortality rates stratified by Simplified Acute Physiology Score (SAPS) II and Pao_2/Fio_2 findings after 1 hr of NPPV

	SAPS II ≤34 n = 78	SAPS II >34 n = 69	Total	p^a
NPPV failure, no. of failures/no. of patients per subgroup (% of subgroup)				
Pao_2/Fio_2 >175 (n = 79)	10/42 (24)	18/37 (49)	28/79 (35)	.02
Pao_2/Fio_2 ≤175 (n = 68)	15/36 (41)	25/32 (78)	40/68 (59)	.003
Total	25/78 (32)	43/69 (62)	68/147 (46)	
Mortality, no. of death/no. of patients per subgroup (% of subgroup)				
Pao_2/Fio_2 >175 (n = 79)	8/42 (19)	13/37 (35)	21/79 (26)	.09
Pao_2/Fio_2 ≤175 (n = 68)	9/36 (25)	11/32 (34)	20/68 (29)	.28
Total	17/78 (22)	24/69 (35)	41/147 (28)	

[a]Chi-square test. Data show that the highest failure rate and subsequent endotracheal intubation occurred in the subgroup of patients with the combination of a SAPS II score >34 and a Pao_2/Fio_2 ratio ≤175.

The potential efficacy of noninvasive ventilation with administration of a neutrophil elastase inhibitor for acute respiratory distress syndrome☆

Kenji Tsushima, MD, PhD [a,b,*], Toshiki Yokoyama, MD, PhD [a], Takuya Matsumura, MD [b], Tomonobu Koizumi, MD, PhD [a], Keishi Kubo, MD, PhD [a], Koichiro Tatsumi, MD, PhD [b] Acute Lung Injury Group in Nagano

Journal of Critical Care 29 (2014) 420–425

Inhibition de la production d'élastases par les PNN (**Elaspol®**) → Possible modalité de traitement physiopathologique du SDRA.

→ Efficacité maximale si administration avant ou au début de la phase inflammatoire.

Rationnel: Tester l'impact de l'association VNI – inhibiteur d'élastase sur la mortalité à J28 chez les patients ayant un SDRA (classification de Berlin).

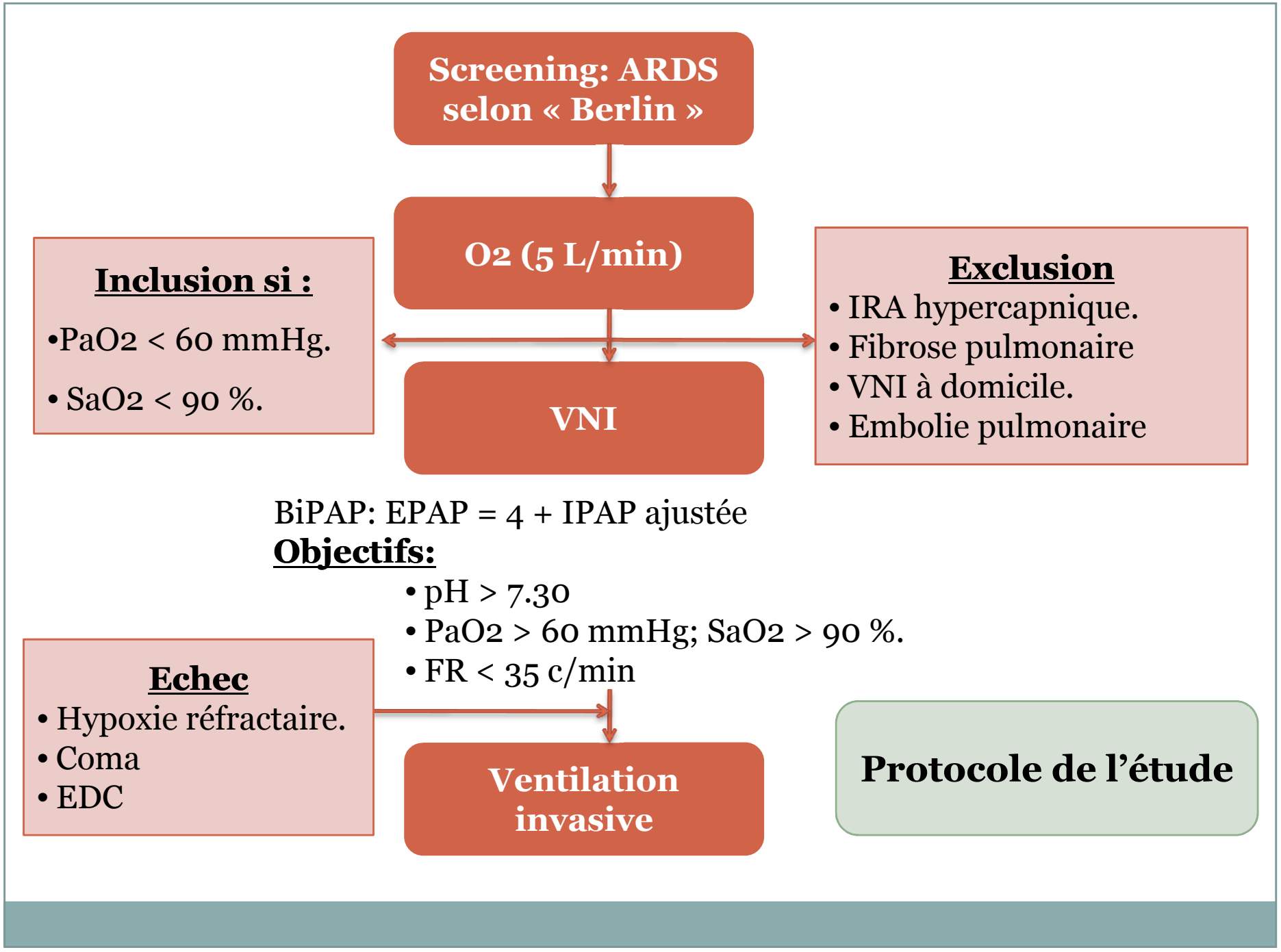

Screening: ARDS selon « Berlin »
O2 (5 L/min)
Inclusion si :
•PaO2 < 60 mmHg.
• SaO2 < 90 %.
VNI
Exclusion
• IRA hypercapnique.
• Fibrose pulmonaire
• VNI à domicile.
• Embolie pulmonaire
BiPAP: EPAP = 4 + IPAP ajustée
Objectifs:
• pH > 7.30
• PaO2 > 60 mmHg; SaO2 > 90 %.
• FR < 35 c/min
Echec
• Hypoxie réfractaire.
• Coma
• EDC
Ventilation invasive
Protocole de l'étude

Table 1
Comparison of enrolled ARDS patients

	Mild ARDS (n = 10)	Moderate ARDS (n = 22)	Severe ARDS (n = 15)
Age, years	66.4 ± 19.5	73.0 ± 13.1	75.6 ± 6.6
Sex, M/F, n	7/3	18/4	11/4
Direct/Indirect ARDS, n	8/2	15/7	12/3
Initial EPAP, cmH_2O	5.7 ± 1.9	5.9 ± 1.6	6.1 ± 1.2
Initial IPAP, cmH_2O	9.2 ± 3.9	9.6 ± 1.7	9.9 ± 1.6
PF ratio before NIV	242.7 ± 23.1	145.9 ± 26.2	67.5 ± 16.2
Lung injury score	1.30 ± 0.38	2.26 ± 0.22	2.43 ± 0.38
Infection, n	10 (100%)	15 (68%)	14 (93%)
Number of MOF	1.6 ± 1.2	1.7 ± 0.9	1.6 ± 1.2
Time until starting NIV after onset, days	1.8 ± 1.5	1.7 ± 2.6	1.9 ± 2.3
Duration of NIV, days	6.4 ± 5.5	10.3 ± 11.2	15.4 ± 2.9
Usage of neutrophil elastase inhibitor, n	9 (90%)	19 (86%)	11 (73%)
Survivors with neutrophil elastase inhibitor, n	7 (78%)	17 (89%)	7 (64%)
Intubation/Refusal intubation, n	2/0 (20%)	4/4 (18%/18%)	4/3 (27%/20%)
Survivors with intubation/ Refusal intubation, n	0/0 (0%/0%)	3/0 (75%/0%)	2/0 (50%/0%)
28-day mortality, n	2 (20%)	5 (23%)	5 (30%)
Successful NIV, n	8 (80%)	14 (64%)	8 (53%)

MOF, multiple organ failure.

Table 2
Comparison between survivors and nonsurvivors of ARDS patients

	Survivors (n = 35)	Nonsurvivors (n = 12)	*P*
Age, years	70.6 ± 13.6	80.7 ± 4.7	.016 a)
Sex, M/F, n	26/9	9/3	.961 b)
Direct/Indirect ARDS, n	24/11	11/1	.113 b)
EPAP, cmH_2O	5.5 ± 1.7	6.2 ± 1.7	.621 a)
IPAP, cmH_2O	9.2 ± 3.3	9.5 ± 2.3	.682 a)
Lung injury score	2.1 ± 0.5	2.2 ± 0.5	.735 a)
Infection, n	31 (88.6%)	12 (100%)	.221 b)
Number of MOF	1.8 ± 1.1	1.3 ± 0.7	.200 a)
Time until starting NIV after onset, days	1.3 ± 3.6	2.8 ± 4.1	.323 a)
Duration of NIV, days	8.5 ± 8.9	5.5 ± 4.1	.357 a)
PF ratio before NIV	143 ± 62.0	122 ± 84	.456 a)
PF ratio ≧150 torr	19	2	
PF ratio <150 torr	16	10	.024 b)
Neutrophil elastase inhibitor, n	31 (88%)	8 (67%)	.081 b)

MOF, multiple organ failure.
a) Mann-Whitney *U* test, b) Fisher's exact test.

Quel réglage pour la VNI en cas de SDRA ?

Physiologic Effects of Noninvasive Ventilation during Acute Lung Injury

Erwan L'Her, Nicolas Deye, François Lellouche, Solenne Taille, Alexandre Demoule, Amanda Fraticelli, Jordi Mancebo, and Laurent Brochard

Am J Respir Crit Care Med Vol 172. pp 1112–1118, 2005

3 modalités testées :

- CPAP (10 cmH2O).

- PEEP = 10 cmH2O + PSV = 10 cmH2O.

- PEEP = 5 cmH2O + PSV = 15 cmH2O.

TABLE 1. PATIENT CHARACTERISTICS

Patient No.	Age (*yr*)	Sex (*M/F*)	SAPS II	Main Diagnosis	Chronic Heart Disease	Survival
1	37	M	29	ARDS/*Pneumocystis carinii* pneumonia	No	Yes
2	77	M	29	ARDS/CAP	No	No
3	75	F	27	ARDS/CAP	No	No
4	78	F	70	ARDS/aspiration	No	No
5	73	M	33	ARDS/nosocomial pneumonia	No	Yes
6	42	M	35	ALI/CAP	No	Yes
7	69	F	22	ALI/CAP	Yes	Yes
8	64	M	53	ARDS/eosinophilic pneumonia	Yes	No
9	61	M	34	ARDS/CAP	Yes	Yes
10	36	F	36	ARDS/aspiration	No	Yes
Overall	61 ± 17	6 M/4 F	41 ± 17	8 ARDS/2 ALI	30%	60%

Definition of abbreviations: ALI = acute lung injury; ARDS = acute respiratory distress syndrome; CAP = community-acquired pneumonia; F = female; M = male; SAPSII = Simplified Acute Physiologic Score II.

TABLE 2. RESPIRATORY PATTERN AND HEMODYNAMIC PARAMETERS DURING THE FIVE STUDY PERIODS

Variable	Initial*	CPAP	PSV10/PEEP10	PSV15/PEEP5	Final‖
V_{TE}, Ml	524 ± 212	394 ± 224†	483 ± 247	591 ± 279‡§	535 ± 229
RR, breaths/min	29 ± 10	28 ± 11	28 ± 11	26 ± 9†	30 ± 12
$\dot{V}_E$, L/min	15.7 ± 4.4	12.3 ± 3.4	14.6 ± 3.8	17.6 ± 5.4‡	15.6 ± 5.3
Leaks, %	25 ± 13	39 ± 18†	36 ± 18	37 ± 22†	24 ± 15
MAP, mm Hg	77 ± 13	79 ± 16†	77 ± 16	75 ± 16	84 ± 17†
HR, beats/min	100 ± 13	100 ± 9	95 ± 14	96 ± 16	99 ± 14

Definition of abbreviations: CPAP = continuous positive airway pressure; HR = heart rate; MAP = mean arterial pressure; PEEP = positive end-expiratory pressure; PSV = pressure-support ventilation; RR = respiratory rate; V_{TE} = expiratory V_T.

* Initial indicates parameter value measured during the initial baseline.

† $p \leq 0.05$ compared with initial baseline.

‡ $p \leq 0.005$ compared with CPAP.

§ $p \leq 0.05$ compared with PSV10/10.

‖ Final indicates parameter value measured after the randomized sequences and return to the baseline condition.

TABLE 3. ARTERIAL BLOOD GASES DURING THE FIVE STUDY PERIODS

Variable	Initial*	CPAP	PSV10/PEEP10	PSV15/PEEP5	Final¶
pH	7.37 ± 0.10	7.36 ± 0.12	7.39 ± 0.08	7.40 ± 0.08†§	7.38 ± 0.10
Pa_{O_2}/FI_{O_2} mm Hg	131 ± 61	184 ± 74†	206 ± 120‡	153 ± 41‖	169 ± 83
Pa_{CO_2}, mm Hg	42.0 ± 11.3	44.4 ± 17.8	40.2 ± 14.3	38.6 ± 12.3§	42.2 ± 14.4

Definition of abbreviations: CPAP = continuous positive airway pressure; PEEP = positive end-expiratory pressure; PSV = pressure-support ventilation.

* Initial indicates parameter value measured during the initial baseline

† $p \leq 0.05$ compared with initial baseline.

‡ $p \leq 0.005$ compared with initial baseline.

§ $p \leq 0.05$ compared with CPAP.

‖ $p \leq 0.05$ compared with PSV10/PEEP10.

¶ Final indicates parameter value measured after the randomized sequences and return to the baseline condition.

Donc, pour que la VNI soit « bénéfique »…

- Groupe de patients bien sélectionné : SDRA mineur ou modéré.
- Au début de l'évolution de l'atteinte respiratoire.
- Equipe soignante expérimentée.
- **Séances prolongées (du moins pendant les premières 48 H).**
- Détection précoce des facteurs prédictifs d'échec.
- **Ne pas hésiter à passer à la ventilation invasive en cas d'échec.**

Intensive Care Med (2012) 38:458–466
DOI 10.1007/s00134-012-2475-6

ORIGINAL

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Antoni Torres

Non-invasive ventilation in community-acquired pneumonia and severe acute respiratory failure

Table 1 Clinical and ventilatory characteristics of patients with "de novo" acute respiratory failure and with previous cardiac or respiratory disease

	"De novo" ARF ($n = 102$)	Previous CR disease[a] ($n = 82$)	p value
Age (years)	62 ± 18	72 ± 11	<0.001
Sex, male/female	60/42	63/19	0.015
NIV success, n (%)	55 (54%)	61 (74%)	0.007
SAPS-II	42 ± 14	46 ± 14	0.078
CURB65	2.5 ± 1.0	2.7 ± 0.9	0.097
Maximum SOFA score			
During NIV	7.0 ± 3.8	6.3 ± 3.2	0.16
During ICU stay	8.2 ± 4.9	7.0 ± 4.2	0.064
Vasoactive drugs at onset of NIV, n (%)	31 (30%)	19 (23%)	0.35
ARDS criteria, n (%)	35 (34%)	15 (18%)	0.024
Glasgow Coma Score ≤12, n (%)	8 (8%)	20 (24%)	0.004
Respiratory rate (breaths/min)	37 ± 7	34 ± 7	0.003
Heart rate (beats/min)	108 ± 20	105 ± 20	0.28
PaO_2/FiO_2 ratio (mmHg)	127 ± 34	136 ± 37	0.084
$PaCO_2$ (mmHg)	42 ± 14	60 ± 22	<0.001
Arterial pH	7.37 ± 0.08	7.27 ± 0.12	<0.001
HCO_3 (mEq/L)	21.3 ± 2.8	30.1 ± 6.2	<0.001
ICU stay (days)	10 ± 12	7 ± 7	0.089
Hospital stay (days)	20 ± 16	20 ± 18	0.87
ICU mortality, n (%)	22 (22%)	12 (15%)	0.31
Hospital mortality, n (%)	28 (28%)	19 (23%)	0.63

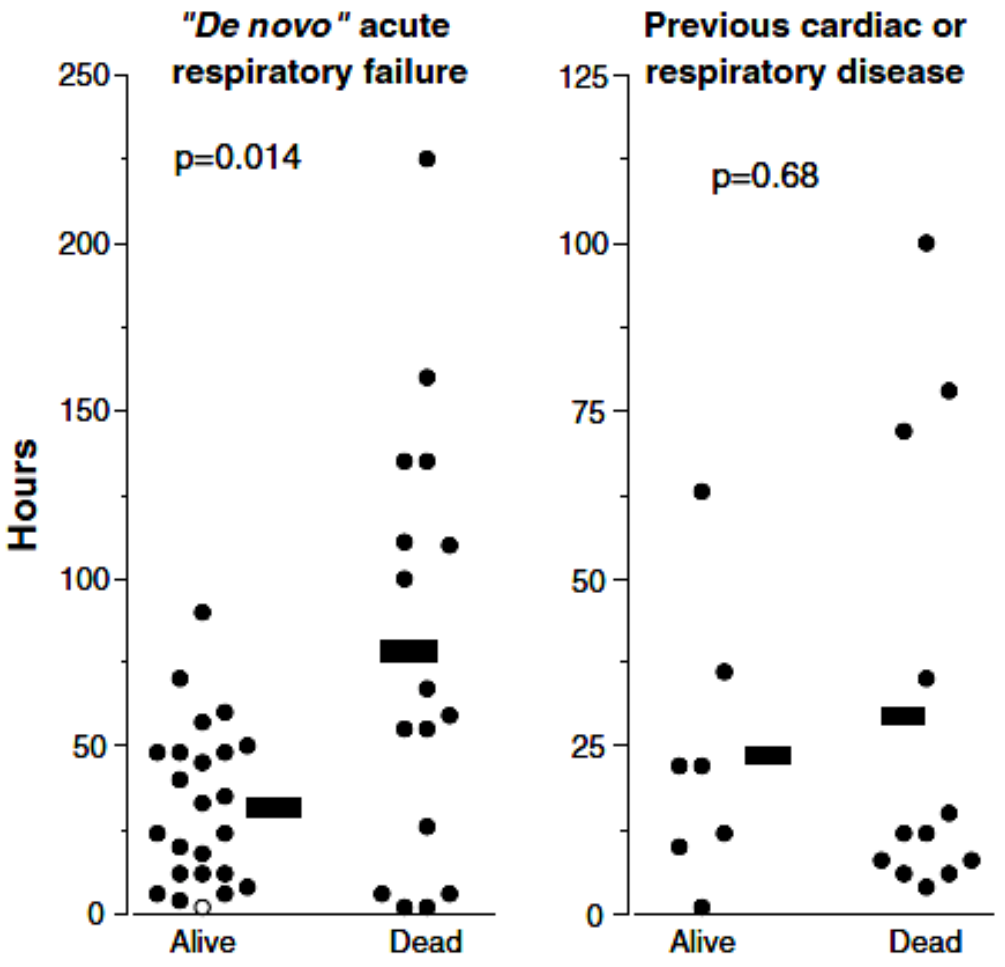


Fig. 1 Duration of non-invasive ventilation in patients who needed intubation and survived or died in the hospital. *Left panel* patients with "de novo" acute respiratory failure. *Right panel* patients with previous cardiac or respiratory disease. *Horizontal bars* represent mean values of survivors and non-survivors for intubated patients from each group

Finalement, quel bénéfice ?

Does noninvasive positive pressure ventilation improve outcome in acute hypoxemic respiratory failure? A systematic review

Sean P. Keenan, MD, FRCPC, MSc (Epid); Tasnim Sinuff, MD, FRCPC; Deborah J. Cook, MD, FRCPC, MSc (Epid); Nicholas S. Hill, MD

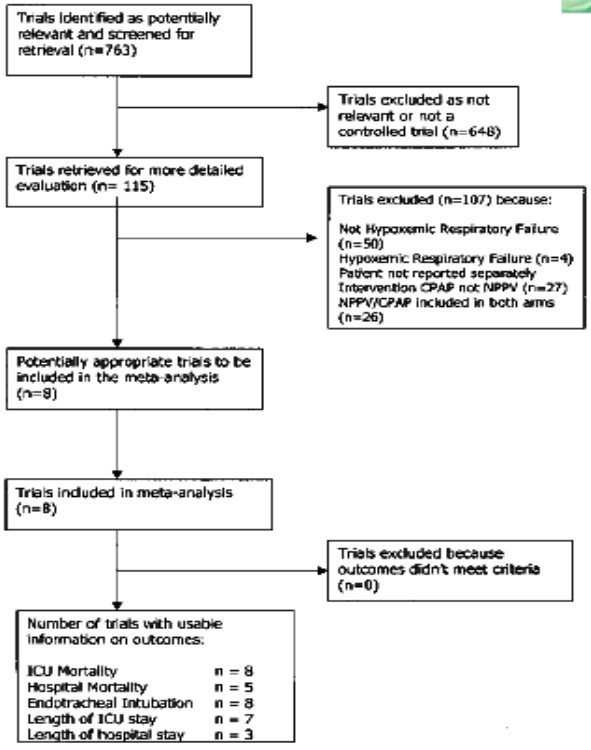
Crit Care Med 2004 Vol. 32, No. 12

Inclusion:

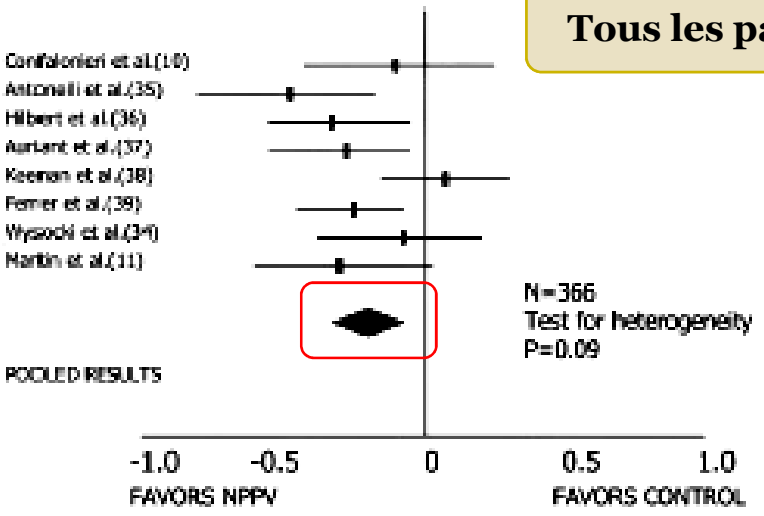
- Essais randomisés portant sur la VNI chez les patients hypoxémiques.
- Majorité de patients non BPCO/ICC.
- Pas d'IOT à la prise en charge initiale

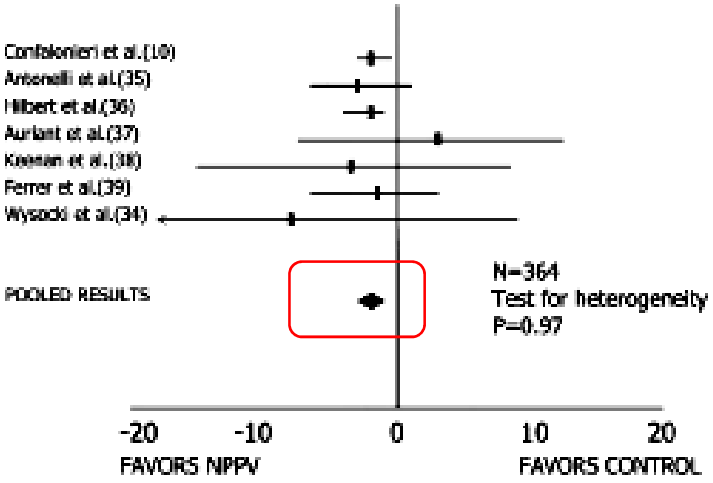
Exclusion:

- Critères méthodologiques.
- Patients ayant eu une CPAP.

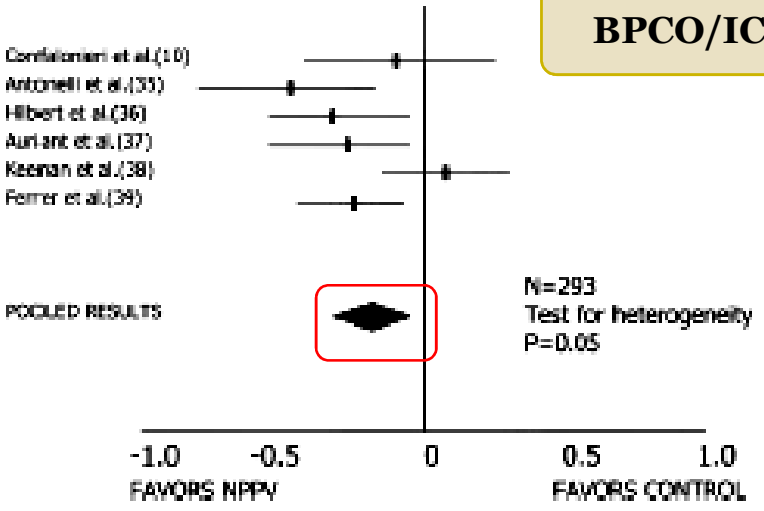


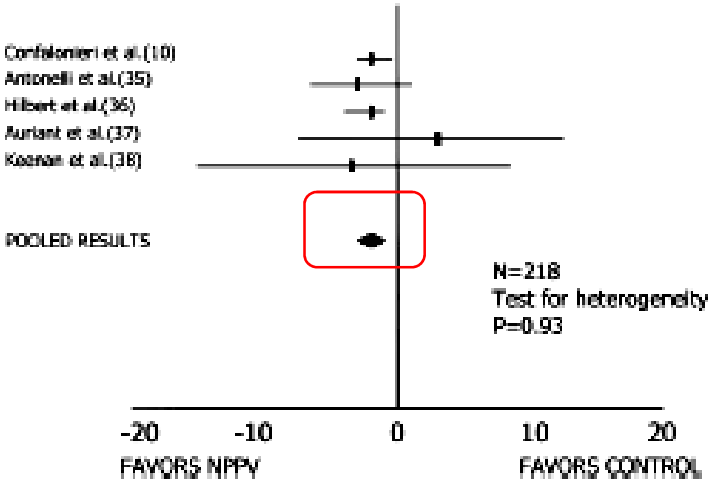
Tous les patients





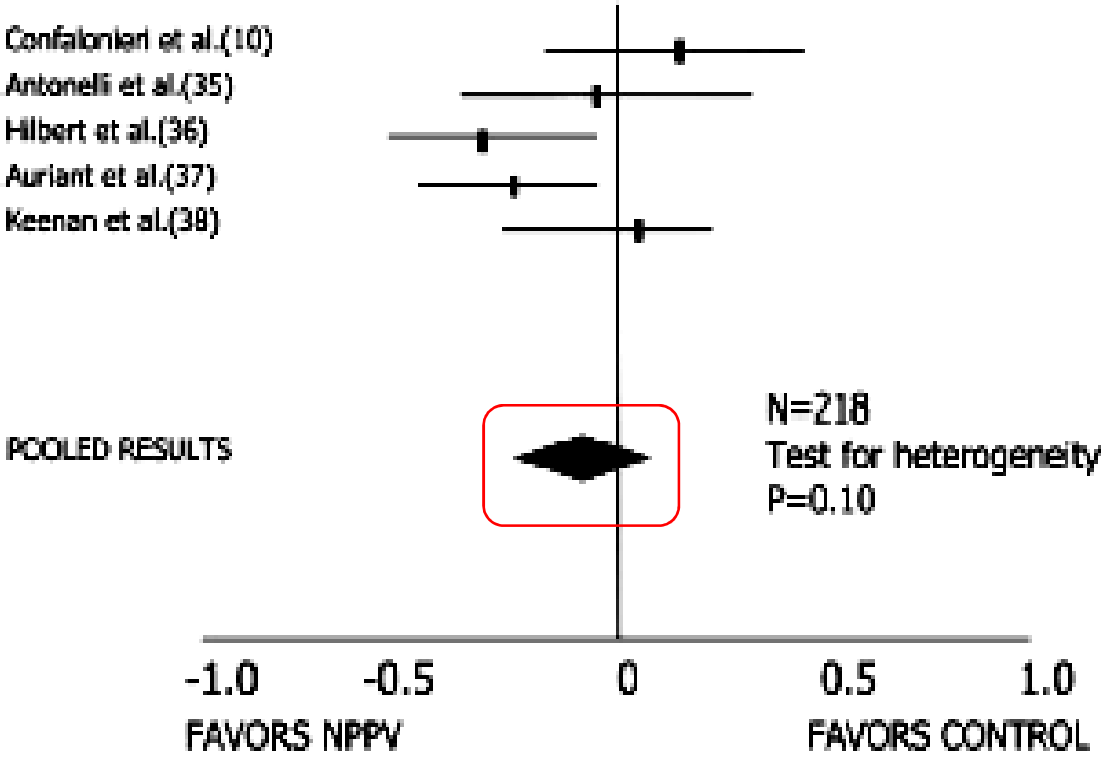
BPCO/IC exclus





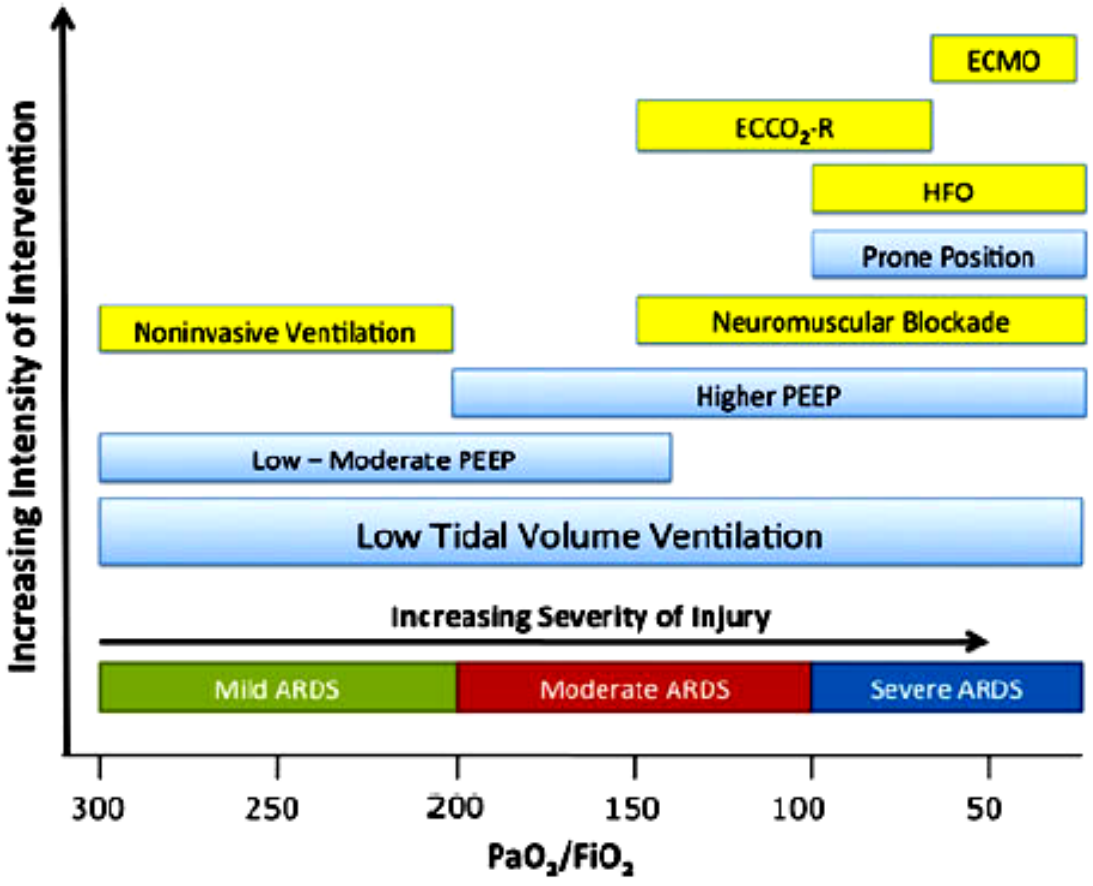
VNI et éviction d'IOT.

VNI et séjour en réa.



VNI et mortalité en réa (aucune de ces études n'a inclus des BPCO/ICC

En pratique…



ARDS definition Task Force, Ranieri VM et al. JAMA 2012 Jun 20;307(23):2526-33.

Conclusion

- SDRA: Réel problème de prise en charge thérapeutique, en particulier ventilatoire
- La place de la VNI n'est pas encore codifiée.
- Elle serait bénéfique pour un groupe **de patients bien sélectionné**.
- Le recours à l'intubation ne doit pas être retardé en cas d'échec de la VNI.