ΜΗ ΕΠΕΜΒΑΤΙΚΟΣ ΜΗΧΑΝΙΚΟΣ ΑΕΡΙΣΜΟΣ

Γαβριηλίδης Γιώργος
Εντατικολόγος
Μονάδα Εντατικής Θεραπείας
Α΄ Πανεπιστημιακής Πνευμονολογικής Κλινικής
Γ.Ν.Ν.Θ.Α. "Σωτηρία¨

Absolute Contraindications

- Respiratory arrest
- Unable to fit mask

Relative Contraindications

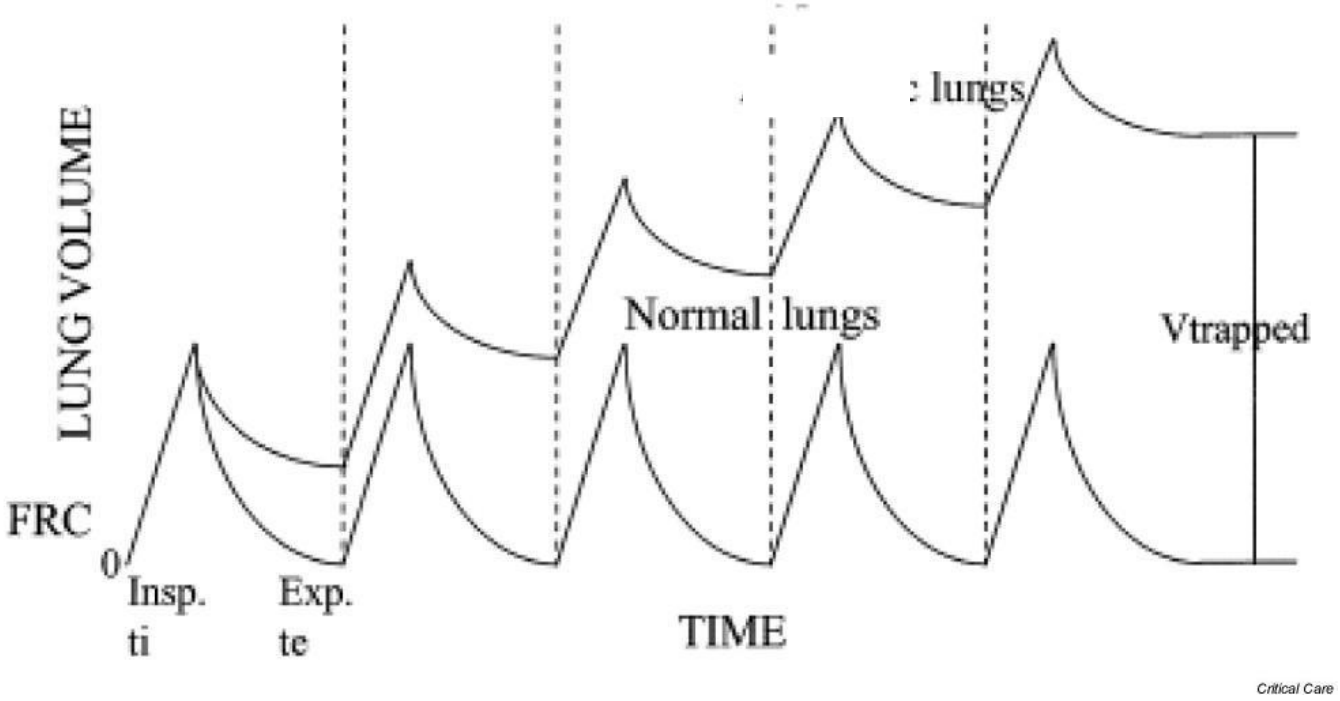
- Hypotensive shock
- Cardiac ischemia arrhythmia
- Upper gastrointestinal bleeding
- Agitation
- Unable to protect airway
- Swallowing impairment
- Excessive secretions
- Recent upper airway or upper gastrointestinal surgery

NIV οπωσδήποτε

- Παρόξυνση ΧΑΠ
- Καρδιογενές πνευμονικό οίδημα
- Ανοσοκαταστολή
- Weaning

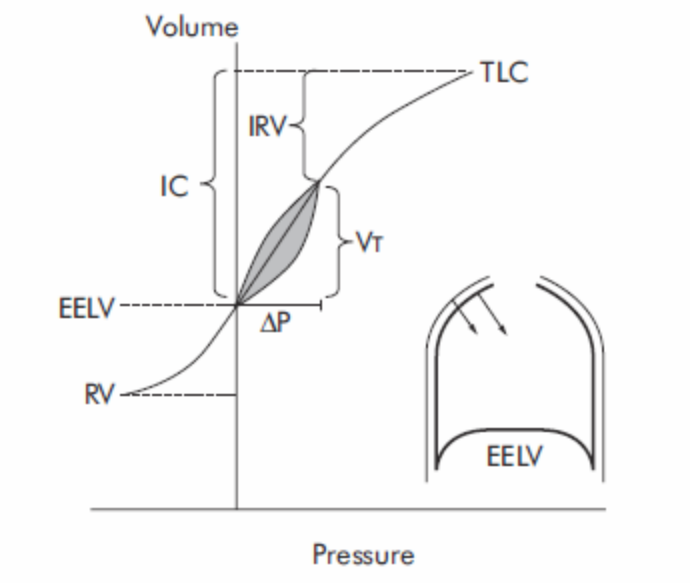
ΜΗ ΕΠΕΜΒΑΤΙΚΟΣ ΜΗΧΑΝΙΚΟΣ ΑΕΡΙΣΜΟΣ ΣΕ ΑΣΘΕΝΕΙΣ ΜΕ ΠΑΡΟΞΥΝΣΗ ΧΡΟΝΙΑΣ ΑΠΟΦΡΑΚΤΙΚΗΣ ΠΝΕΥΜΟΝΟΠΑΘΕΙΑΣ

Παθοφυσιολογία

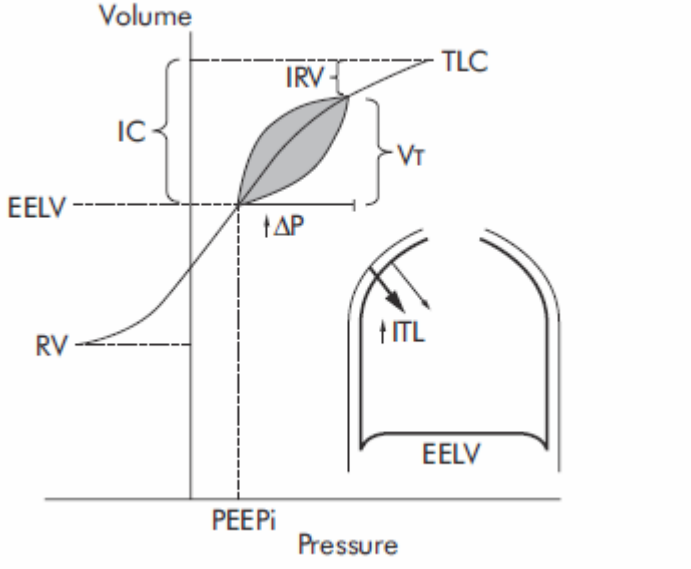


Παθοφυσιολογία της παρόξυνσης ΧΑΠ

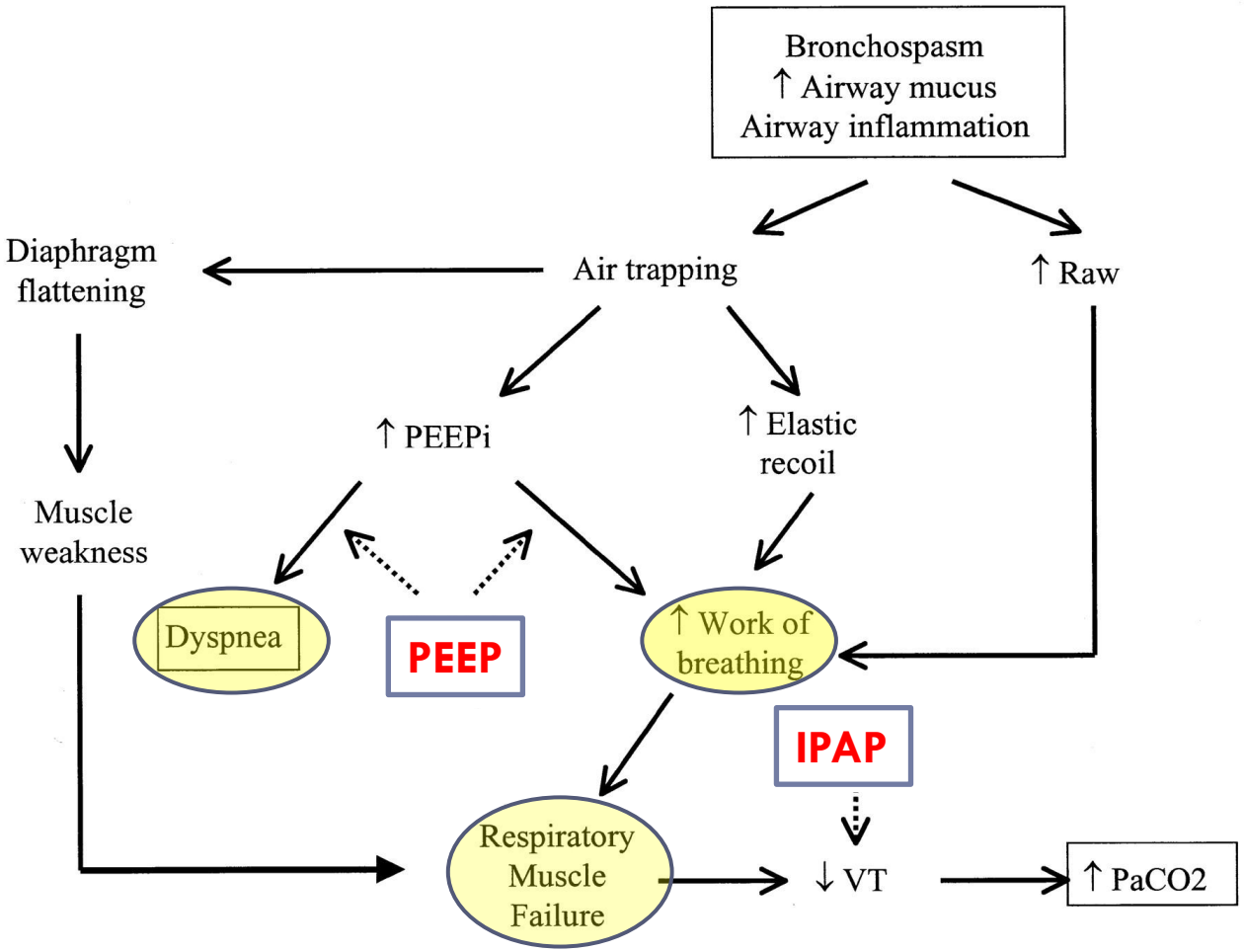
Stable COPD



COPD exacerbation

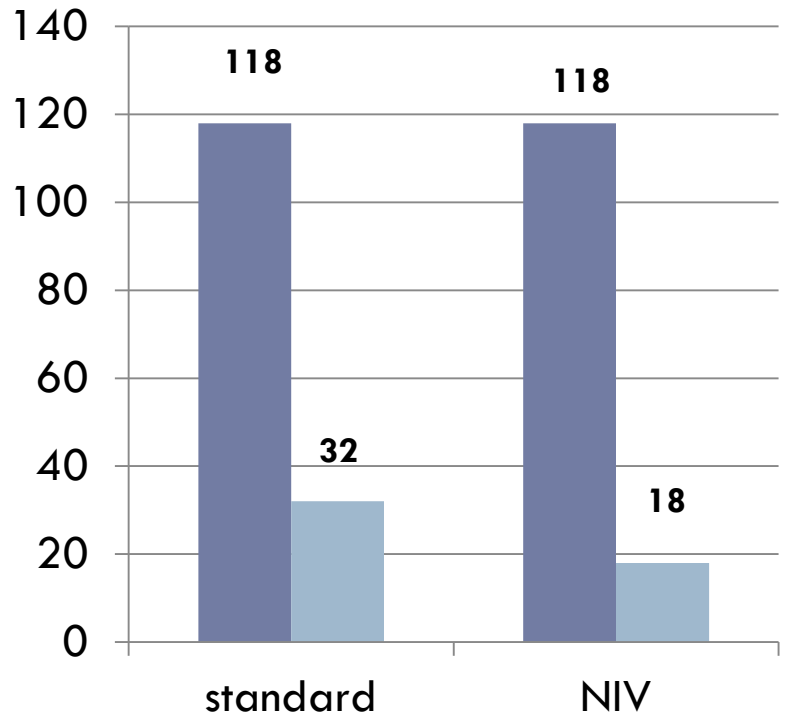


Παθοφυσιολογία

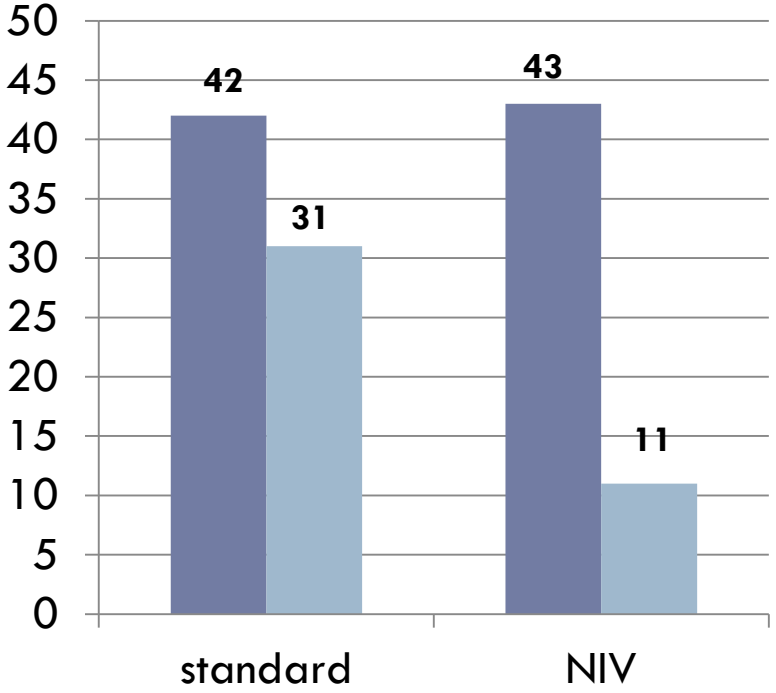


Είναι αποτελεσματικός ;

Plant et al (2000)



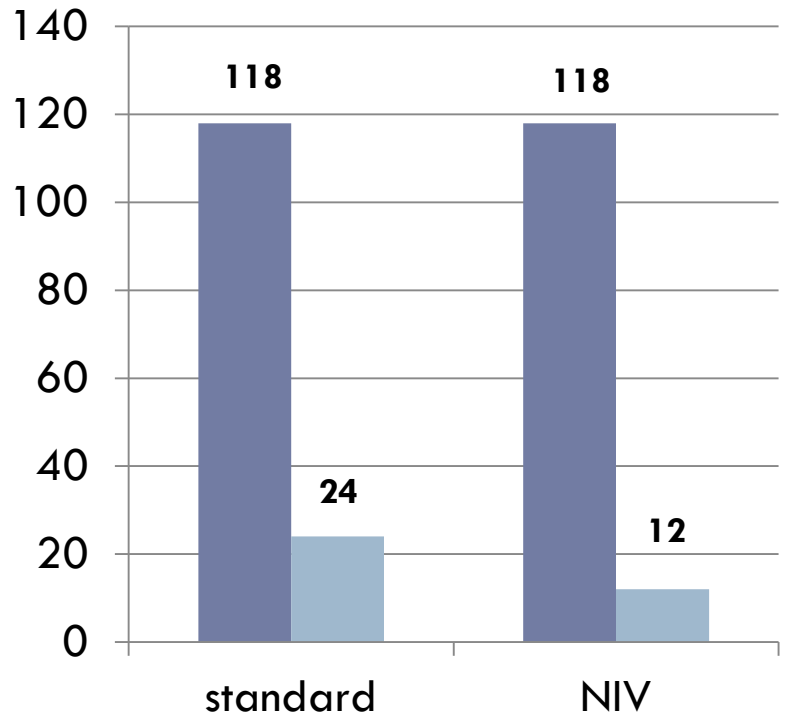
Brochard et al(1995)



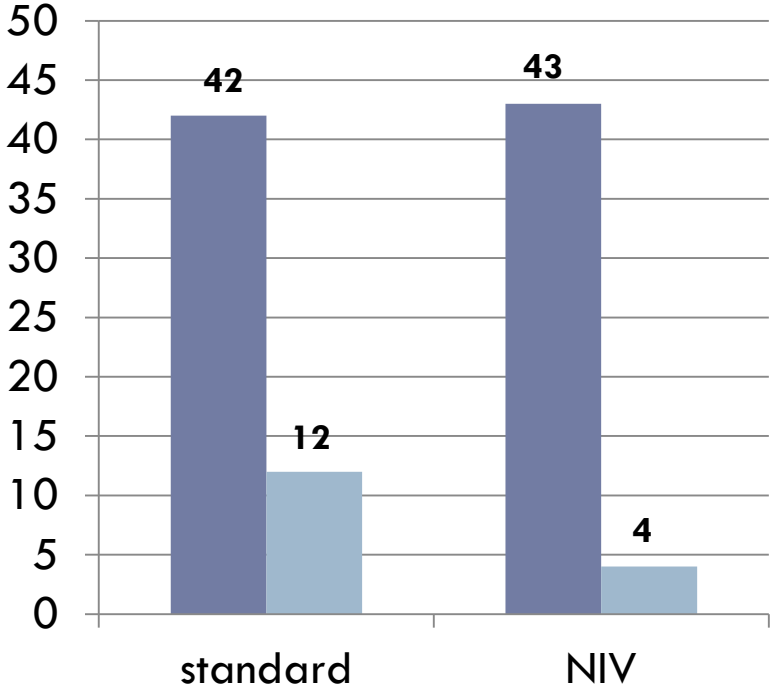
Intubation rate

Είναι αποτελεσματικός ;

Plant et al (2000)

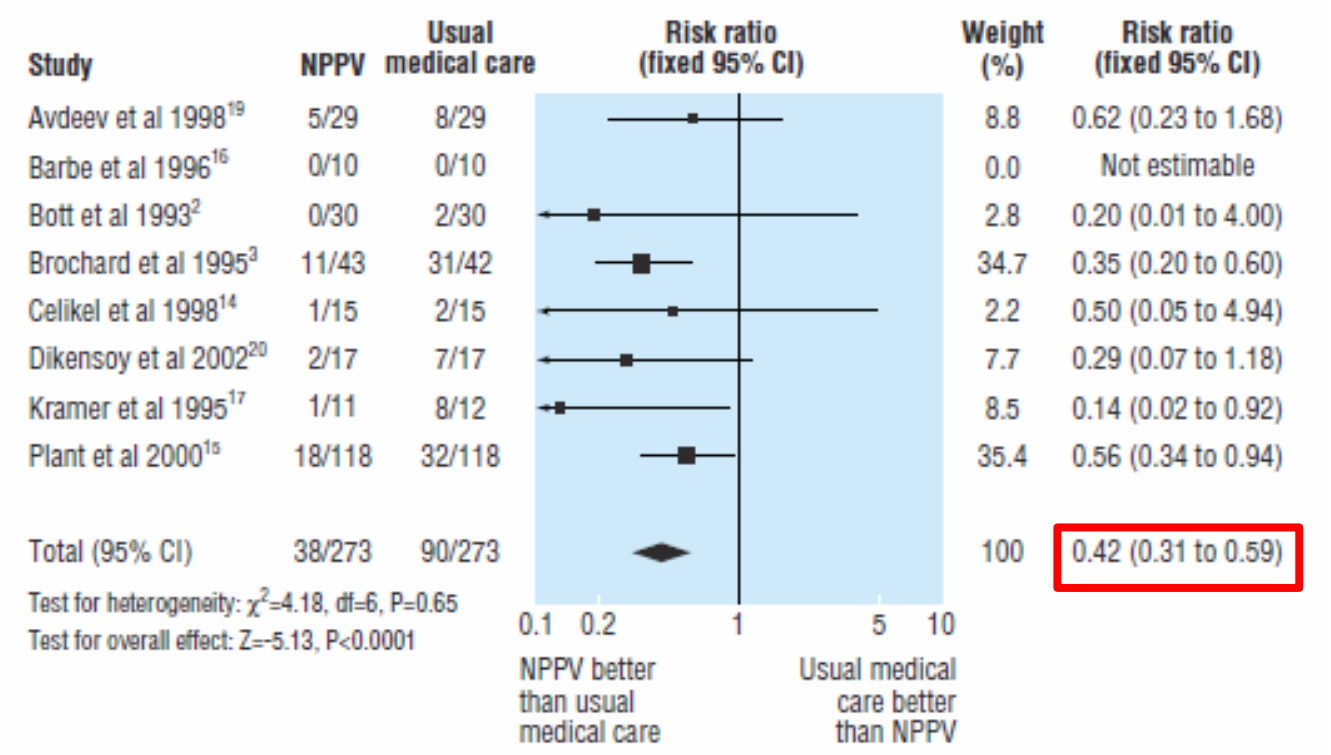


Brochard et al (1995)



Mortality

Meta-analysis



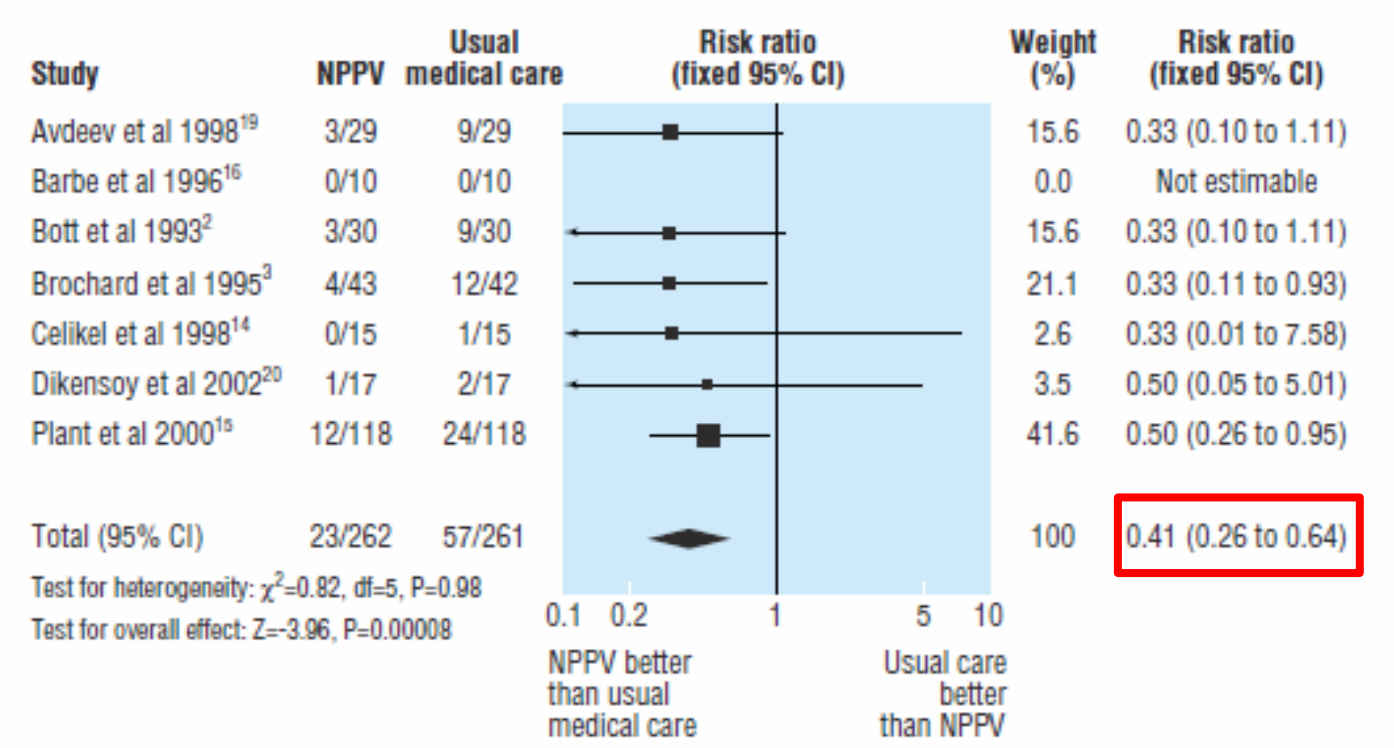
BMJ VOLUME 326 25 JANUARY 2003

Non-invasive positive pressure ventilation to treat respiratory failure resulting from exacerbations of chronic obstructive pulmonary disease: Cochrane systematic review and meta-analysis

Josephine V Lightowler, Jadwiga A Wedzicha, Mark W Elliott, Felix S F Ram

Intubation rate

Meta-analysis



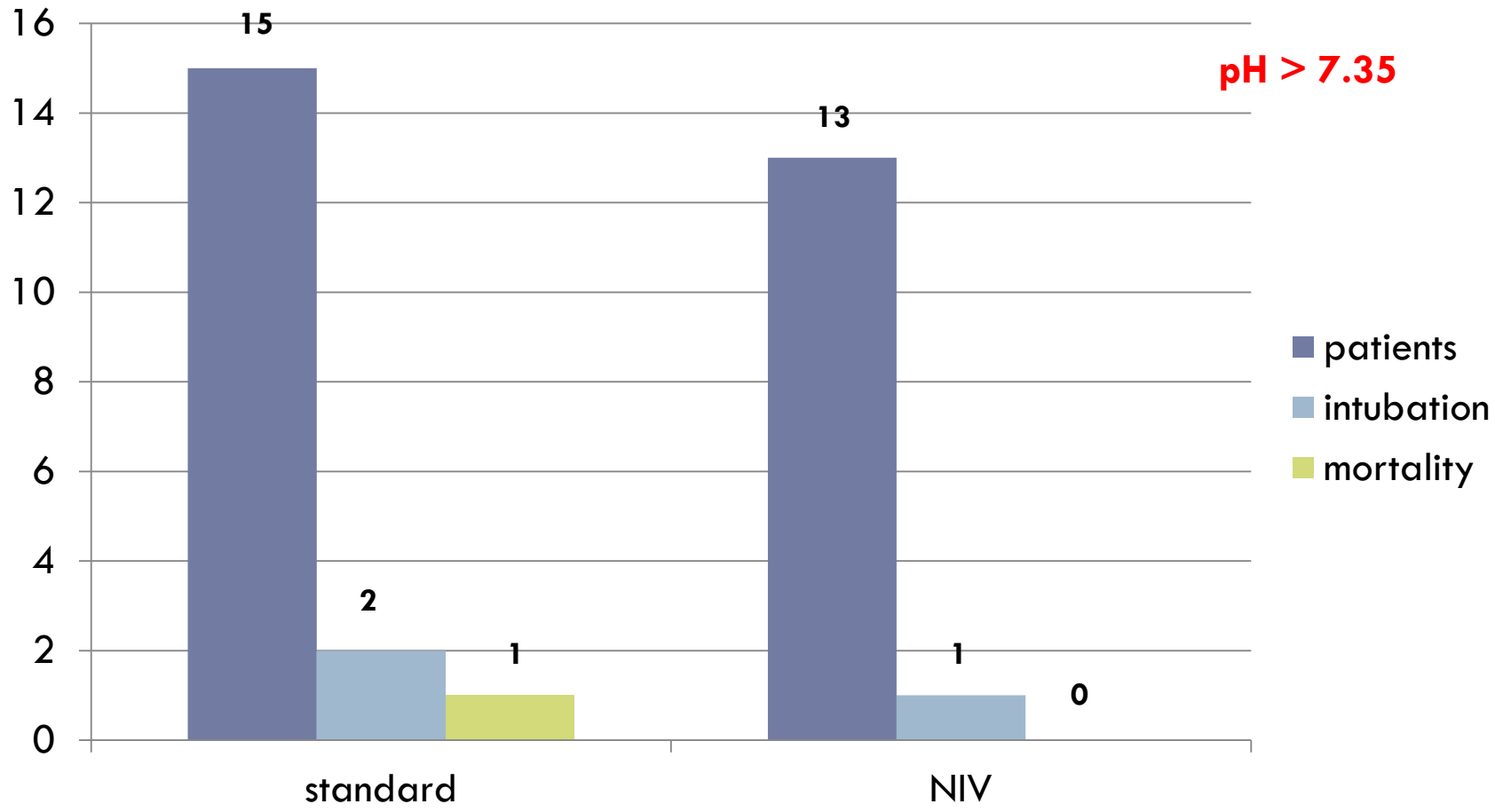
BMJ VOLUME 326 25 JANUARY 2003

Non-invasive positive pressure ventilation to treat respiratory failure resulting from exacerbations of chronic obstructive pulmonary disease: Cochrane systematic review and meta-analysis

Josephine V Lightowler, Jadwiga A Wedzicha, Mark W Elliott, Felix S F Ram

Mortality

Οι ασθενείς χωρίς οξυαιμία ωφελούνται από την εφαρμογή ΜΕΜΑ ;



Nasal ventilation in COPD exacerbations: early and late results of a prospective, controlled study

G. Bardi, R. Pierotello, M. Desideri, L. Valdisserri, M. Bottai, A. Palla

Eur Respir J 2000; 15: 98–104

Ποιοι ασθενείς με παρόξυνση ΧΑΠ ωφελούνται από την εφαρμογή ΜΕΜΑ ;

	Standard	NIV	p
Intention-to-treat			
Failed	32/118 (27%)	18/118 (15%)	0·02
Died	24/118 (20%)	12/118 (10%)	0·05
Subgroup analysis			
pH<7·30			
Failed	16/38 (42%)	13/36 (36%)	0·64
Died	13/38 (34%)	8/36 (22%)	0·31
pH>=7·30			
Failed	16/80 (20%)	5/82 (6%)	0·01
Died	11/80 (14%)	4/82 (5%)	0·06

Table 2: **Primary outcome and in-hospital mortality**

Lancet 2000;355:1931-35

NIV vs IMV

Intensive Care Med (2002) 28:1701–1707
DOI 10.1007/s00134-002-1478-0

ORIGINAL

pH = 7.20

G. Conti
M. Antonelli
P. Navalesi
M. Rocco
M. Bufi
G. Spadetta
G. U. Meduri

Noninvasive vs. conventional mechanical ventilation in patients with chronic obstructive pulmonary disease after failure of medical treatment in the ward: a randomized trial

	Noninvasive ventilation group (*n*=23)		Conventional ventilation group (*n*=26)		*p*
	n	%	*n*	%	
Number of survivors	17	74	14	54	0.24
Number of survivors readmitted to the hospital during the follow-up	11	65	14	100	0.016
Number of hospital readmissions	18	–	22	–	0.8
Number of hospital readmissions per survivor	1.05	–	1.6	–	
Number of ICU readmission	3	–	2	–	
Number of patients requiring permanent O_2 supplementation at home	0	0	5	36	0.01
Number of patients with open tracheostomy	2	12	6	42	0.16

NIV vs IMV

Intensive Care Med (2004) 30:1303–1310
DOI 10.1007/s00134-004-2320-7

ORIGINAL

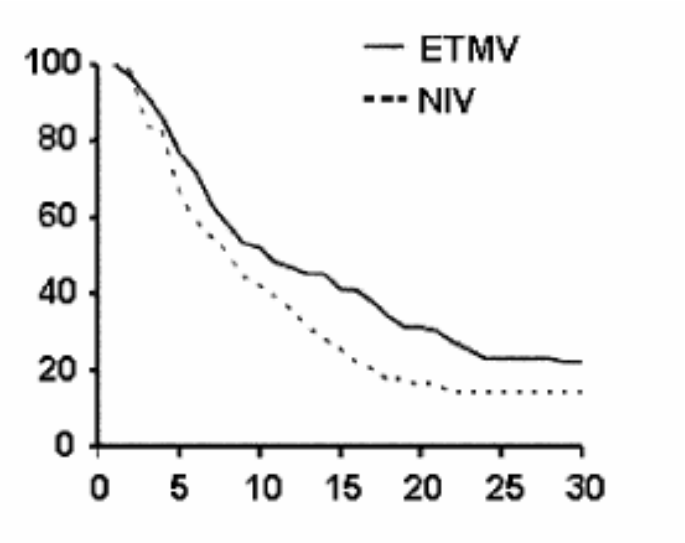
Enzo Squadrone
Pamela Frigerio
Claudio Fogliati
Cesare Gregoretti
Giorgio Conti
Massimo Antonelli
Roberta Costa
Paola Baiardi
Paolo Navalesi

Noninvasive vs invasive ventilation in COPD patients with severe acute respiratory failure deemed to require ventilatory assistance

	NIV (n=64)	ETMV (n=64)	P value
OUTCOMES			
ICU mortality, n (%)	5 (8)	11 (17)	.14
Post-ICU hospital mortality, n (%)	6 (9)	5 (8)	.74
Duration of ventilation, days	10 (8)	12 (3)	.39
ICU stay, days	13 (8)	15 (3)	.43
Post-ICU hospital stay, days	10 (3)	11 (4)	.34
Patients with serious complications,	26 (41)	42 (66)	.012

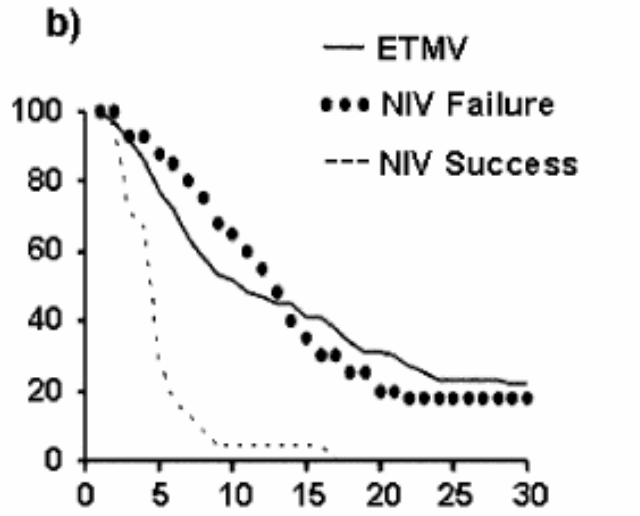
Ποιοι ασθενείς με παρόξυνση ΧΑΠ ωφελούνται από την εφαρμογή ΜΕΜΑ (ΜΕΘ) ;

Days on Mechanical Ventilation



p = 0.056

Days on Mechanical Ventilation



p < 0.001

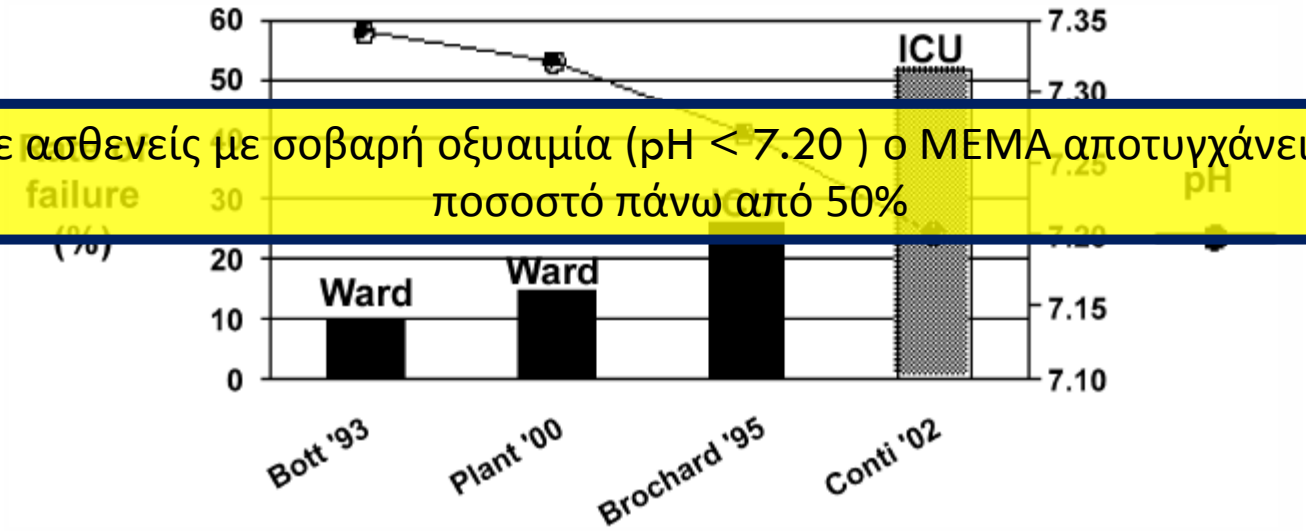
Ποιοι ασθενείς με παρόξυνση ΧΑΠ ωφελούνται από την εφαρμογή ΜΕΜΑ ;

Intensive Care Med (2006) 32:361–370
DOI 10.1007/s00134-005-0050-0

CLINICAL COMMENTARY

Stefano Nava
Paolo Navalesi
Giorgio Conti

Time of non-invasive ventilation



Σε ασθενείς με σοβαρή οξυαιμία (pH < 7.20) ο ΜΕΜΑ αποτυγχάνει σε ποσοστό πάνω από 50%

NIV vs IMV

JAMA Internal Medicine
Formerly Archives of Internal Medicine

Original Investigation

Outcomes Associated With Invasive and Noninvasive Ventilation Among Patients Hospitalized With Exacerbations of Chronic Obstructive Pulmonary Disease

Peter K. Lindenauer, MD, MSc; Mihaela S. Stefan, MD; Meng-Shiou Shieh, PhD; Penelope S. Pekow, PhD; Michael B. Rothberg, MD, MPH; Nicholas S. Hill, MD

- Retrospective cohort study
- 420 US hospitals
- 25628 patients with AECOPD
- 17978 (70%) with NIV
- Propensity adjusted analysis

JAMA Intern Med. doi:10.1001/jamainternmed.2014.5430
Published online October 27, 2014.

Results

JAMA Internal Medicine
Formerly Archives of Internal Medicine

	NIV vs IMV
mortality	0.54 (0.48-1.65)
HAP	0.53(0.44-0.64)
cost	0.68(0.67-0.69)
length of stay	0.81(0.94-1.15)

Older
↓ comorbidity
↓ pneumonia

JAMA Intern Med. doi:10.1001/jamainternmed.2014.5430
Published online October 27, 2014.

Προγνωστικοί δείκτες αποτυχίας του ΜΕΜΑ

- pH, pCO2
- pH και RR δε βελτιώνονται τις πρώτες ώρες
- APACHE II score
- Διαφυγές
- Εκκρίσεις
- Συγχρονισμός ασθενούς αναπνευστήρα
- Πνευμονία
- Επίπεδο συνείδησης
- Performance status

Ambrosino et al Thorax 1995
Soo et al Crit Care Med 1994
Moreti et al Thorax 2000

Προγνωστικοί δείκτες αποτυχίας της θεραπείας

Κατά την εισαγωγή

Table 2 Variables at enrolment associated with failure of treatment

Variable	*Univariate analysis p value*	*Multivariate analysis*	
		Odds ratio	*p value*
Age	0.569		
Sex	0.526		
H^+	<0.001	1.22 (1.09 to 1.37) per nmol/l	<0.01
PaO_2	0.035		
$PaCO_2$	<0.001	1.14 (1.14 to 1.81) per kPa	<0.01
Respiratory rate	0.330		
Radiographic consolidation	0.136		
Allocation to NIV	0.038	0.39 (0.19 to 0.80)	<0.01

Thorax 2001;56:708–712

Non-invasive ventilation in acute exacerbations of chronic obstructive pulmonary disease: long term survival and predictors of in-hospital outcome

P K Plant, J L Owen, M W Elliott

Προγνωστικοί δείκτες αποτυχίας του ΜΕΜΑ

4 ώρες μετά την εισαγωγή

Table 4 Variables at 4 hours associated with failure of treatment

Variable	*Univariate analysis p value*	*Multivariate analysis*	
		Odds ratio	*p value*
At enrolment			
H^+	<0.001	1.23 (1.05 to 1.43) per nmol/l	<0.01
Pa_{O_2}	0.035		
Pa_{CO_2}	<0.001	1.77 (1.28 to 2.45) per kPa	<0.01
Allocation to NIV	0.038		
At 1 hour			
Fall in H^+	0.119		
Change in Pa_{O_2}	0.193		
Change in Pa_{CO_2}	0.276		
Change in respiratory rate	0.209		
At 4 hours			
Fall in H^+	0.035	0.89 (0.82 to 0.97) per nmol/l	<0.01
Change in Pa_{O_2}	0.896		
Change in Pa_{CO_2}	0.104		
Change in respiratory rate	0.009	0.92 (0.84 to 0.99) per breath/min	0.04

Thorax 2001;56:708–712

Non-invasive ventilation in acute exacerbations of chronic obstructive pulmonary disease: long term survival and predictors of in-hospital outcome

P K Plant, J L Owen, M W Elliott

Τα επίπεδα του PCO2 προβλέπουν την αποτυχία της θεραπείας

Relative Risk of treatment failure

		$PaCO_2$			
pH	*Treatment*	6 kPa	*8 kPa*	*10 kPa*	*12 kPa*
7.35	Standard	1.00	1.30	1.69	2.19
	+ NIV	0.39	0.51	0.66	0.86
7.30	Standard	2.96	3.84	5.00	6.49
	+ NIV	1.15	1.50	1.95	2.53
7.25	Standard	9.98	12.97	16.85	21.90
	+ NIV	3.89	5.06	6.57	8.54

Thorax 2001;56:708–712

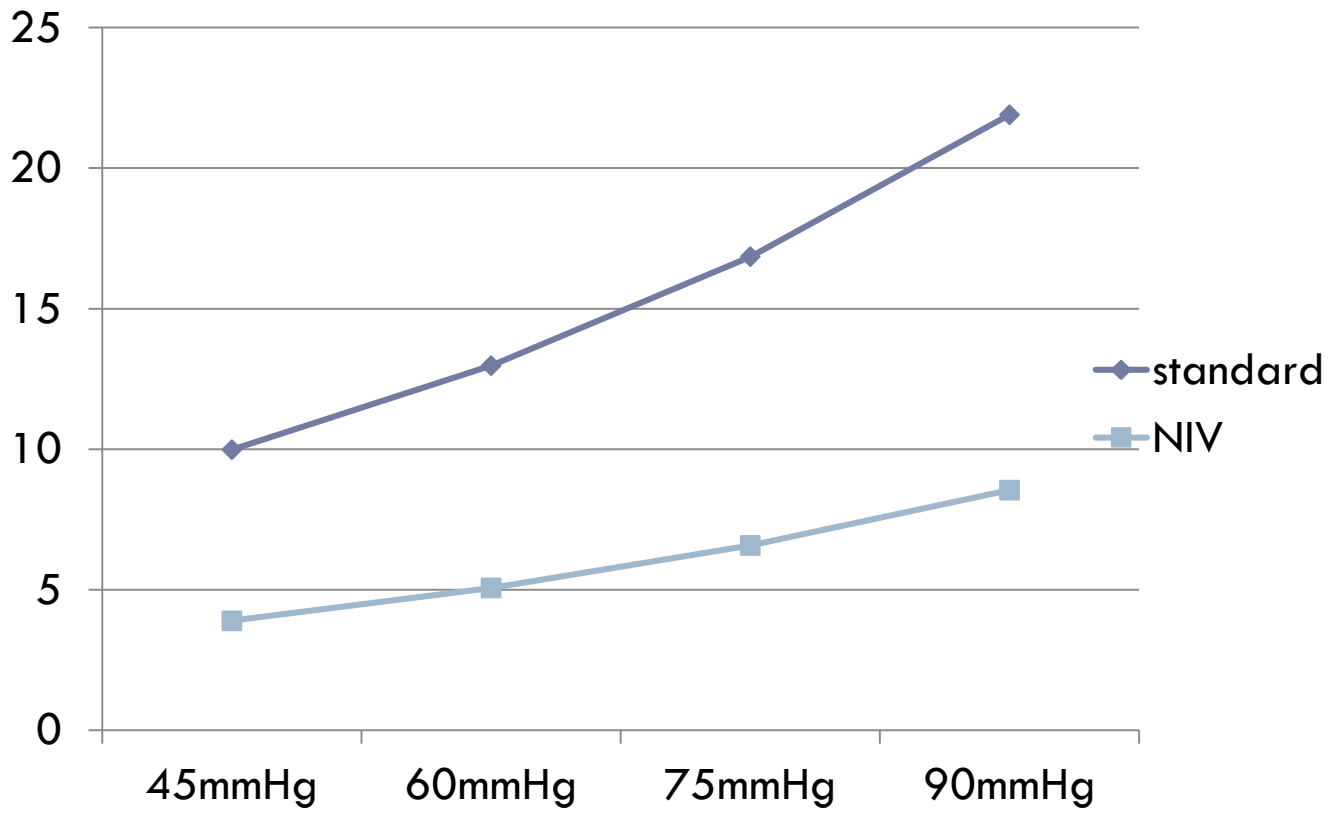
Non-invasive ventilation in acute exacerbations of chronic obstructive pulmonary disease: long term survival and predictors of in-hospital outcome

P K Plant, J L Owen, M W Elliott

Risk of intubation

Προγνωστικοί δείκτες αποτυχίας του ΜΕΜΑ

Relative risk of treatment failure, pH=7.25



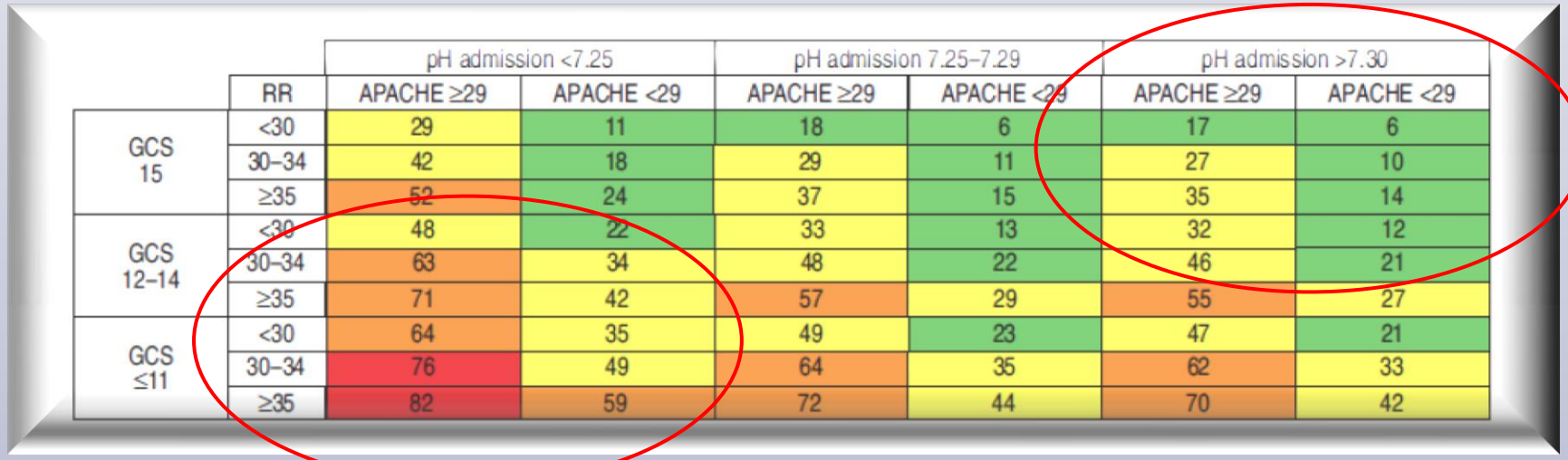
Προγνωστικοί δείκτες αποτυχίας του ΜΕΜΑ

Eur Respir J 2005; 25: 348–355
DOI: 10.1183/09031936.05.00085304

A chart of failure risk for noninvasive ventilation in patients with COPD exacerbation

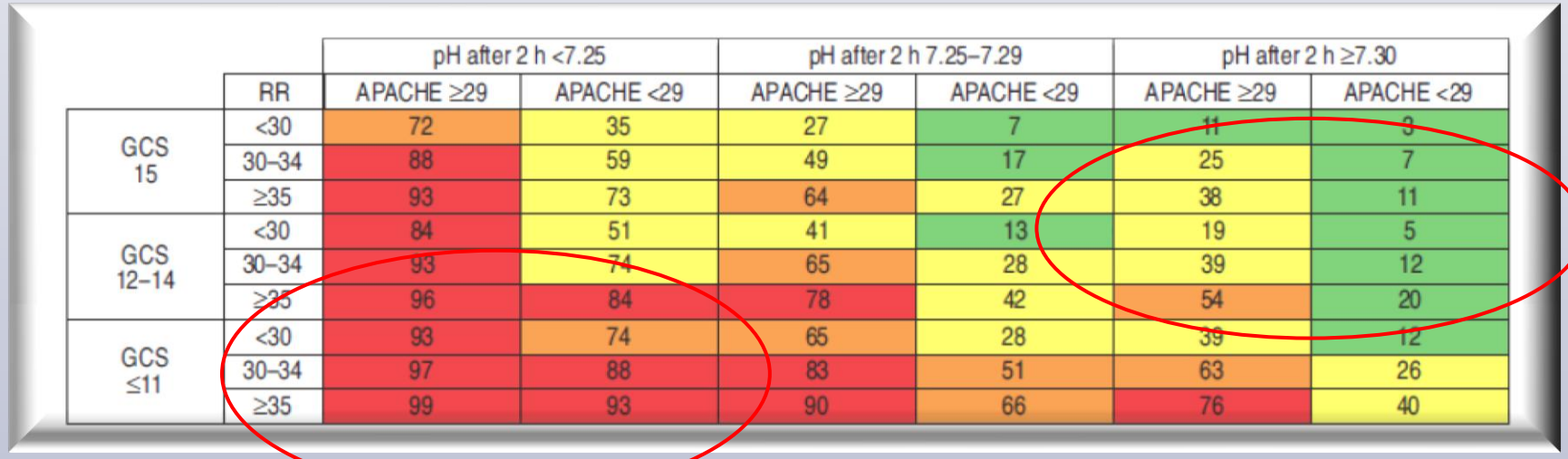
M. Confalonieri*, G. Garuti[#], M.S. Cattaruzza[¶], J.F. Osborn[¶], M. Antonelli[+], G. Conti[+], M. Kodric*, O. Resta[§], S. Marchese[ƒ], C. Gregoretti** and A. Rossi, on behalf of the Italian noninvasive positive pressure ventilation (NPPV) study group[##]

Failure risk chart of NIV on admission



		pH admission <7.25		pH admission 7.25–7.29		pH admission >7.30	
	RR	APACHE ≥29	APACHE <29	APACHE ≥29	APACHE <29	APACHE ≥29	APACHE <29
GCS 15	<30	29	11	18	6	17	6
	30–34	42	18	29	11	27	10
	≥35	52	24	37	15	35	14
GCS 12–14	<30	48	22	33	13	32	12
	30–34	63	34	48	22	46	21
	≥35	71	42	57	29	55	27
GCS ≤11	<30	64	35	49	23	47	21
	30–34	76	49	64	35	62	33
	≥35	82	59	72	44	70	42

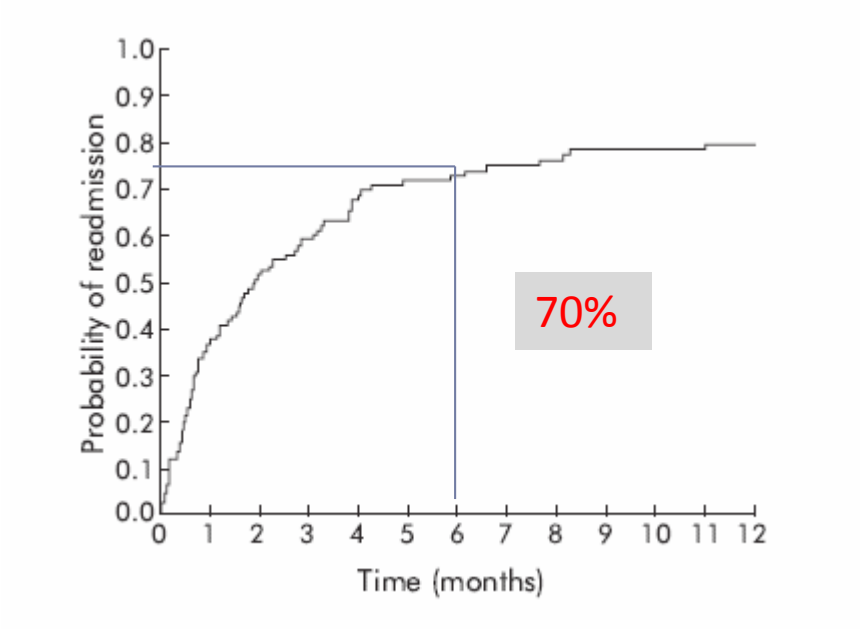
Failure risk chart of NIV on admission



		pH after 2 h <7.25		pH after 2 h 7.25–7.29		pH after 2 h ≥7.30	
	RR	APACHE ≥29	APACHE <29	APACHE ≥29	APACHE <29	APACHE ≥29	APACHE <29
GCS 15	<30	72	35	27	7	11	3
	30–34	88	59	49	17	25	7
	≥35	93	73	64	27	38	11
GCS 12–14	<30	84	51	41	13	19	5
	30–34	93	74	65	28	39	12
	≥35	96	84	78	42	54	20
GCS ≤11	<30	93	74	65	28	39	12
	30–34	97	88	83	51	63	26
	≥35	99	93	90	66	76	40

Ποια είναι η πρόγνωση των ασθενών μετά την έξοδο τους από το νοσοκομείο ;

Πιθανότητα επανεισαγωγής



Readmission rates and life threatening events in COPD survivors treated with non-invasive ventilation for acute hypercapnic respiratory failure

C M Chu, V L Chan, A W N Lin, I W Y Wong, W S Leung, C K W Lai

Thorax 2004;**59**:1020–1025. doi: 10.1136/thx.2004.024307

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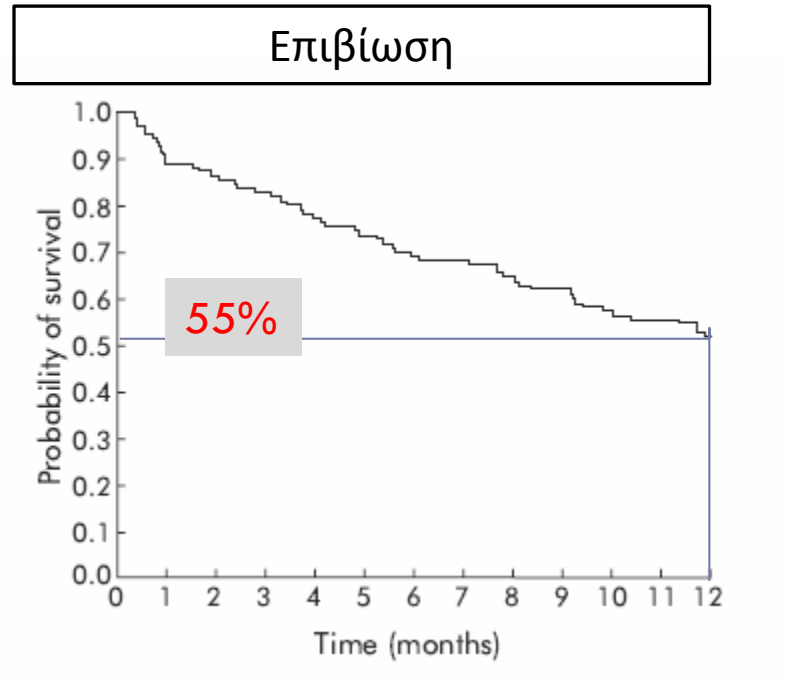

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C M Chu, V L Chan, A W N Lin, I W Y Wong, W S Leung, C K W Lai

Thorax 2004;**59**:1020–1025. doi: 10.1136/thx.2004.024307

Εφαρμόζεται τελικά σωστά ο ΜΕΜΑ σε ασθενείς με παρόξυνση ΧΑΠ ;

- 232 κλινικές, 9716 ασθενείς, 70 ετών, 50% άνδρες
- μόνο το26% των ασθενών είχαν οξυαιμία
- το 30% των ασθενών με οξυαιμία χωρίς ΜΕΜΑ
- 11% των ασθενών με μεταβολική οξέωση αντιμετωπίσθηκαν με ΜΕΜΑ
- 25% θνητότητα ασθενών με ΜΕΜΑ
- Μόνο το 5% των ασθενών με οξυαιμία διασωληνώθηκε.
- Μόνο το 4% των ασθενών που πέθαναν με ΜΕΜΑ διασωληνώθηκαν

Acidosis, non-invasive ventilation and mortality in hospitalised COPD exacerbations

C M Roberts,[1,2] R A Stone,[1,3] R J Buckingham,[1] N A Pursey,[1] D Lowe,[1] On behalf of the National Chronic Obstructive Pulmonary Disease Resources and Outcomes Project (NCROP) implementation group

Thorax 2011;**66**:43–48.

Σε ποιους ασθενείς με AECOPD και που θα πρέπει να εφαρμόζεται ο ΜΕΜΑ

	Ward	ICU/HDU	Standard	NIV	IMV
pH> 7.35	X		X		
7.30<pH < 7.35	X			X	
7.25<pH<7.30	X	X		X	
pH<7.25		X		X	X

Συμπεράσματα

- Ο ΜΕΜΑ αποτελεί θεραπεία της παρόξυνσης ΧΑΠ που πολλές φορές αγνοείται
- Ασθενείς με παρόξυνση ΧΑΠ και ήπια οξυαιμία ωφελούνται από το ΜΕΜΑ
- Ασθενείς με σοβαρή οξυαιμία (pH<7.30) διαταραχή του επιπέδου συνείδησης και οργανικές ανεπάρκειες θα πρέπει να αντιμετωπίζονται σε ΜΕΘ
- Εκτός από το pH και τα PaCO2, GCS, APACHE II, RR είναι προγνωστικά της έκβασης του ΜΕΜΑ

ΜΗ ΕΠΕΜΒΑΤΙΚΟΣ ΜΗΧΑΝΙΚΟΣ ΑΕΡΙΣΜΟΣ ΣΕ ΑΣΘΕΝΕΙΣ ΜΕ ΚΑΡΔΙΟΓΕΝΕΣ ΠΝΕΥΜΟΝΙΚΌ ΟΙΔΗΜΑ

rational

- Μείωση προφόρτιου αριστεράς κοιλίας
- Μείωση μεταφόρτιου αριστεράς κοιλίας
- Μείωση του έργου της αναπνοής
- Αποφόρτιση αναπνευστικών μυών
- Βελτίωση της δύσπνοιας

Meta-analysis

THE LANCET

Lancet 2006;367:1155-1163

Effect of non-invasive positive pressure ventilation (NIPPV) on mortality in patients with acute cardiogenic pulmonary oedema: a meta-analysis

JAMA®
The Journal of the American Medical Association

JAMA 2005;294:3124-3130

Noninvasive Ventilation in Acute Cardiogenic Pulmonary Edema
Systematic Review and Meta-analysis

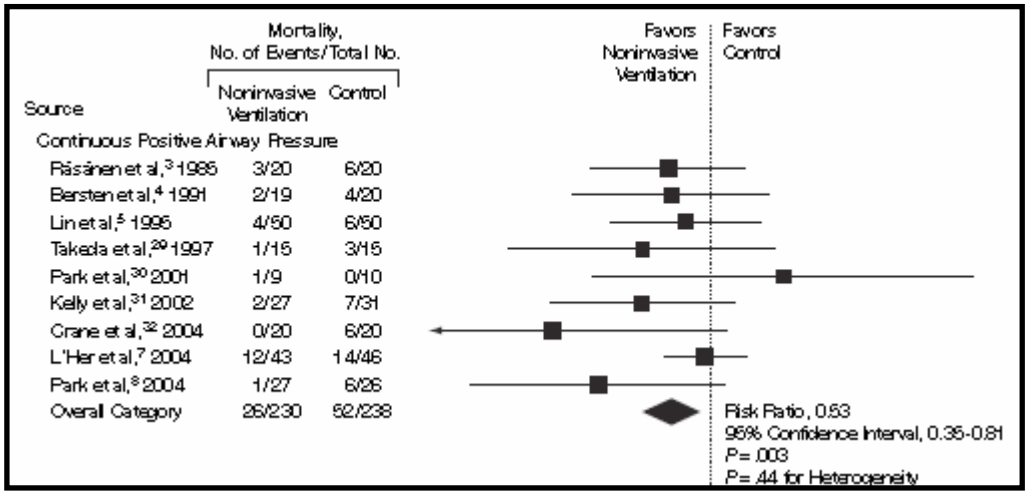
JAMA®
The Journal of the American Medical Association

Noninvasive Ventilation in Acute Cardiogenic Pulmonary Edema

Systematic Review and Meta-analysis

Mortality

CPAP vs STD



RR=0.53 (0.35-0.81)

JAMA 2005;294:3124-3130

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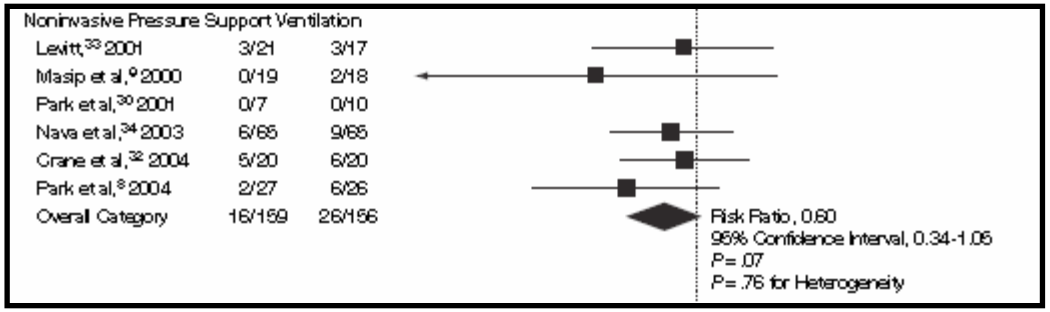
Noninvasive Ventilation in Acute Cardiogenic Pulmonary Edema

Systematic Review and Meta-analysis

Mortality

BiPAP vs STD



RR=0.60 (0.34-1.05)

JAMA 2005;294:3124-3130

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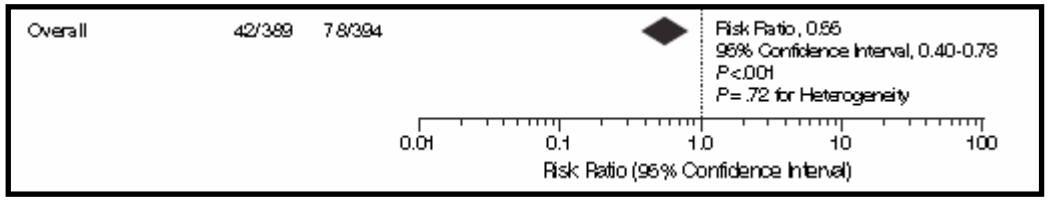
Noninvasive Ventilation in Acute Cardiogenic Pulmonary Edema

Systematic Review and Meta-analysis

Mortality

CPAP/BiPAP vs STD



RR=0.55 (0.40-0.78)

JAMA 2005;294:3124-3130

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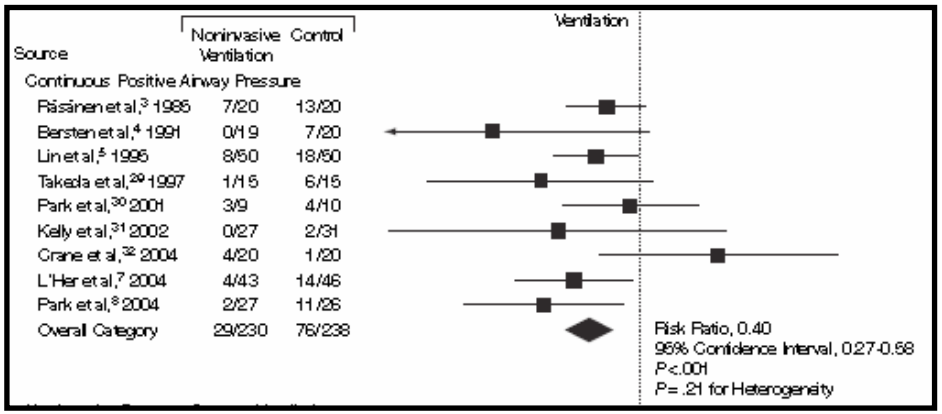
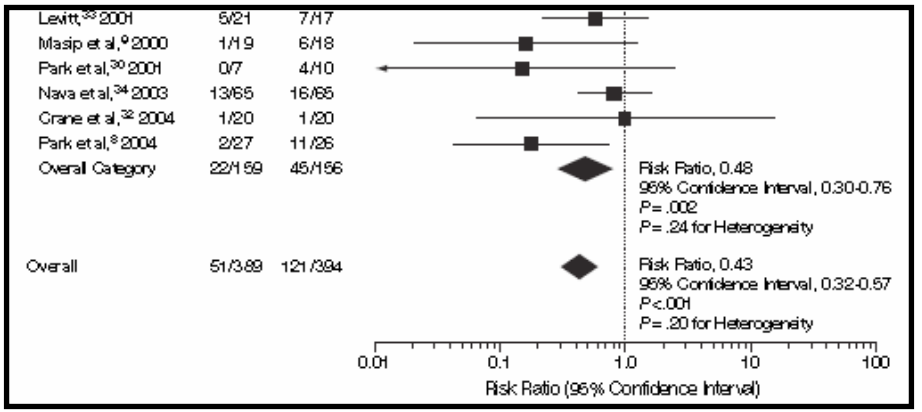
Systematic Review and Meta-analysis

Intubation Rate





CPAP

RR=0.40 (0.27-0.56)

BiPAP

RR=0.48 (0.32-0.57)

JAMA 2005;294:3124-3130

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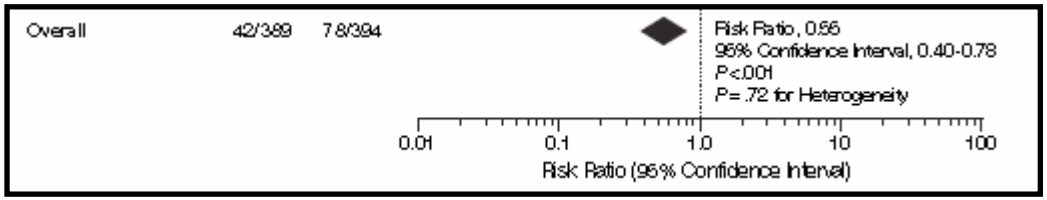
Noninvasive Ventilation in Acute Cardiogenic Pulmonary Edema

Systematic Review and Meta-analysis

Mortality

CPAP, BiPAP



RR=0.55 (0.40-0.78)

JAMA 2005;294:3124-3130

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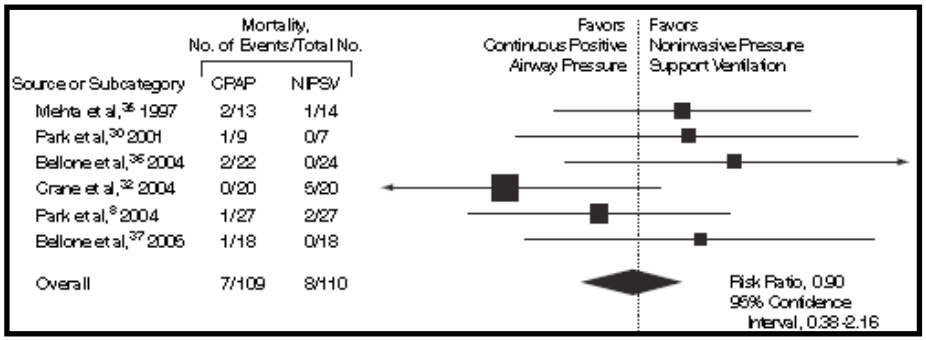
Noninvasive Ventilation in Acute Cardiogenic Pulmonary Edema

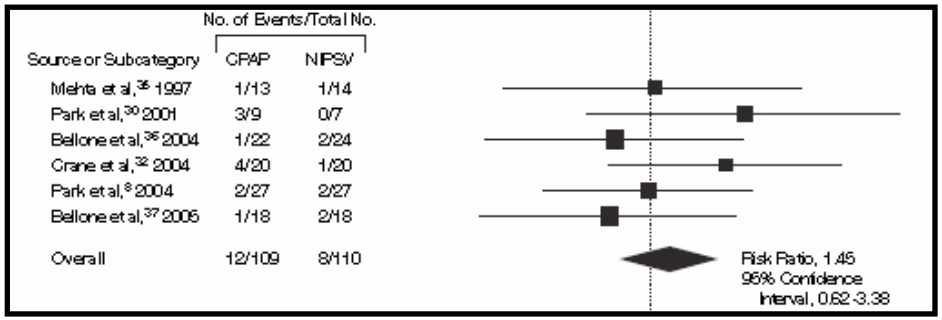
Systematic Review and Meta-analysis

CPAP vs BiPAP

Mortality



Intubation Rate



RR=0.90 (0.36-2.16)

RR=1.45 (0.62-3.38)

JAMA 2005;294:3124-3130

THE LANCET

Effect of non-invasive positive pressure ventilation (NIPPV) on mortality in patients with acute cardiogenic pulmonary oedema: a meta-analysis

Mortality						
CPAP vs standard therapy	11	263/269	0·59 (0·38–0·90)	0·015	11	10
Bilevel ventilation vs standard therapy	7	174/171	0·63 (0·37–1·10)	0·11	0	n/a
Bilevel ventilation vs CPAP	9	203/203	0·75 (0·40–1·43)	0·38	0	n/a
Need for mechanical ventilation						
CPAP vs standard therapy	12	288/295	0·44 (0·29–0·66)	0·0003	12	6
Bilevel ventilation vs standard therapy	7	174/171	0·50 (0·27–0·90)	0·02	21	7
Bilevel ventilation vs CPAP	9	175/178	0·94 (0·48–1·86)	0·86	0	n/a
Composite failure rates						
Incidence of new myocardial infarction						
CPAP vs standard therapy	3	74/77	0·83 (0·43–1·61)	0·58	0	n/a
Bilevel ventilation vs standard therapy	4	133/128	1·19 (0·68–2·10)	0·50	0	n/a
Bilevel ventilation vs CPAP	8	174/172	1·49 (0·92–2·42)	0·11	0	n/a

Lancet 2006;367:1155-1163

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κριτική

THE LANCET

- Αριθμός περιστατικών
- Οι περισσότερες μελέτες single center
- Αριθμός event
- Ποσοστό recruitment

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Noninvasive Ventilation in Acute Cardiogenic Pulmonary Edema

Alasdair Gray, M.D., Steve Goodacre, Ph.D., David E. Newby, M.D., Moyra Masson, M.Sc., Fiona Sampson, M.Sc., and Jon Nicholl, M.Sc., for the 3CPO Trialists*

N Engl J Med 2008;359:142-51

Study design

- Open multicenter randomized controlled trial
- 1100 patients
- CPAP vs NIPPV vs Standard oxygen therapy
- Acute cardiogenic Pulmonary edema, RR>20bpm, pH<7.35
- CPAP 5 to 15cmH2O
- NIPPV from 4/8cmH2O to 10/20cmH2O
- Primary end point : mortality, intubation rate
- Secondary end points : Dyspnea, LOS, admission to ICU, physiological variables

N Engl J Med 2008;359:142-51

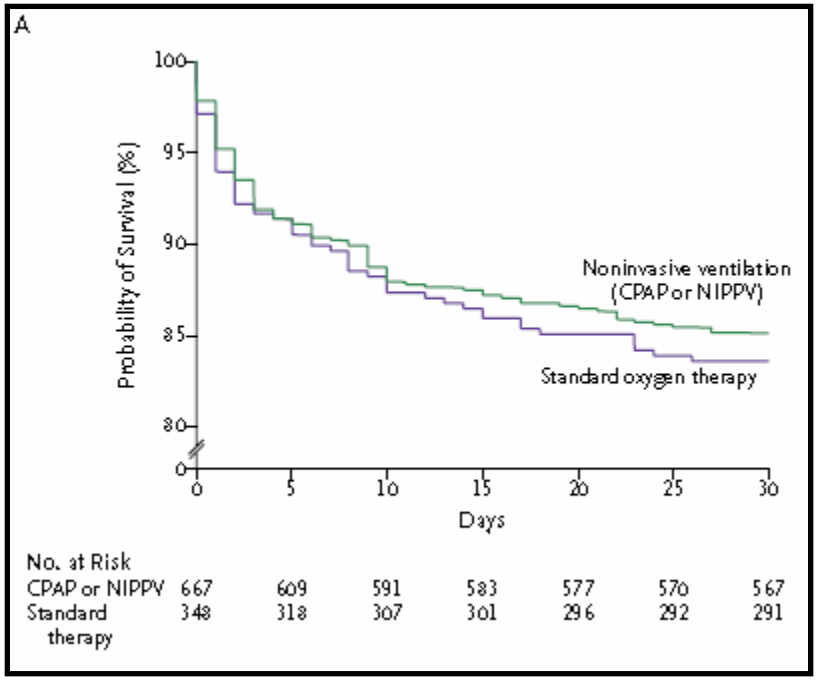
Baseline Characteristics

Characterisic	Standard Oxygen Treatment (N= 367)	CPAP (N= 346)	NIPPV (N= 356)
Age (yr)	79±9	78±10	77±10
Male sex (%)	42	45	43
Symptoms of myocardial infarction at presentation (%)	22	22	22
Ischemic heart disease (%)	64	64	60
Congestive heart failure (%)	45	42	47
Valvular heart disease (%)	12	11	9
Chronic obstructive pulmonary disease (%)	19	15	21
Respiratory rate (breaths/min)	33±7	32±7	32±7
Peripheral oxygen saturation (%)	91±8	90±8	90±8
Arterial pH	7.22±0.08	7.21±0.09	7.22±0.09
PaO_2 (kPa)	13.1±7.6	13.5±7.7	13.4±8.6
$PaCO_2$ (kPa)	7.6±2.5	7.5±1.9	7.7±2.3
Serum bicarbonate level (mmol/liter)	21±4	21±4	21±5
Dyspnea score†	8.9±1.5	8.9±1.8	8.8±1.6

Arterial pH	7.22±0.08	7.21±0.09	7.22±0.09
PaO_2 (kPa)	13.1±7.6	13.5±7.7	13.4±8.6
$PaCO_2$ (kPa)	7.6±2.5	7.5±1.9	7.7±2.3
Serum bicarbonate level (mmol/liter)	21±4	21±4	21±5
Dyspnea score†	8.9±1.5	8.9±1.8	8.8±1.6

Kaplan-Meier survival curves

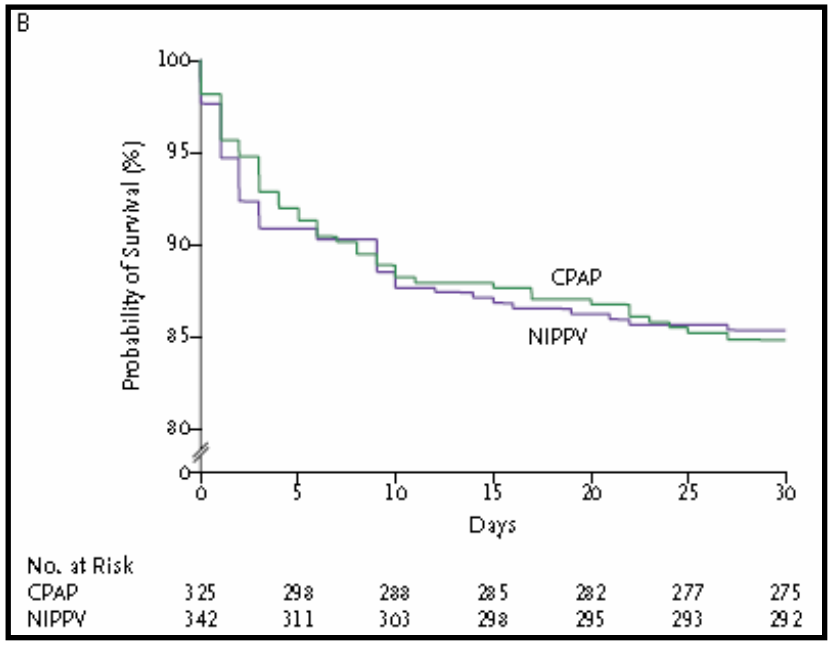
NIV vs standard oxygen therapy



N Engl J Med 2008;359:142-51

Kaplan-Meier survival curves

CPAP vs NIPPV



N Engl J Med 2008;359:142-51

Primary and secondary outcomes

Variable	Standard Oxygen Treatment (N= 367)	CPAP or NIPPV (N= 702)	Odds Ratio (95% CI)	P Value
Death within 7 days (% of patients)	9.8	9.5	0.97 (0.63 to 1.48)	0.87
Admission to critical care unit (% of patients)	40.5	45.2	1.21 (0.93 to 1.57)	0.15
Myocardial infarction (% of patients)				
WHO criteria	24.9	27.0	1.12 (0.84 to 1.49)	0.46
Intubation within 7 days (% of patients)	2.8	2.9	1.05 (0.49 to 2.27)	0.90
Mean length of hospital stay (days)	10.5	11.4	0.9 (−0.2 to 2.0)	0.10
Dyspnea score§	3.9	4.6	0.7 (0.2 to 1.3)	0.008
Pulse rate (beats/min)	13	16	4 (1 to 6)	0.004
Blood pressure (mm Hg)				
Systolic	34	38	3 (−1 to 8)	0.17
Diastolic	22	22	0 (−3 to 3)	0.95
Respiratory rate (breaths/min)	7.1	7.2	0.2 (−0.8 to 1.1)	0.74
Arterial pH	0.08	0.11	0.03 (0.02 to 0.04)	<0.001
Arterial PaO_2 (kPa)	0.7	−0.6	−1.2 (−2.6 to 0.1)	0.07
Arterial $PaCO_2$ (kPa)	0.8	1.5	0.7 (0.4 to 0.9)	<0.001
Arterial $PaCO_2$ (kPa)	0.8	1.5	0.7 (0.4 to 0.9)	<0.001

Conclusion

In conclusion, noninvasive ventilatory support delivered by either CPAP or NIPPV safely provides earlier improvement and resolution of dyspnea, respiratory distress, and metabolic abnormalities than does standard oxygen therapy. However, these effects do not result in improved rates of survival. We recommend that noninvasive ventilation (CPAP or NIPPV) be considered as adjunctive therapy in patients with acute cardiogenic pulmonary edema who have severe respiratory distress or whose condition does not improve with pharmacologic therapy.

ΜΗ ΕΠΕΜΒΑΤΙΚΟΣ ΜΗΧΑΝΙΚΟΣ ΑΕΡΙΣΜΟΣ ΣΕ ΑΝΟΣΟΚΑΤΑΣΤΑΛΜΕΝΟΥΣ ΑΣΘΕΝΕΙΣ

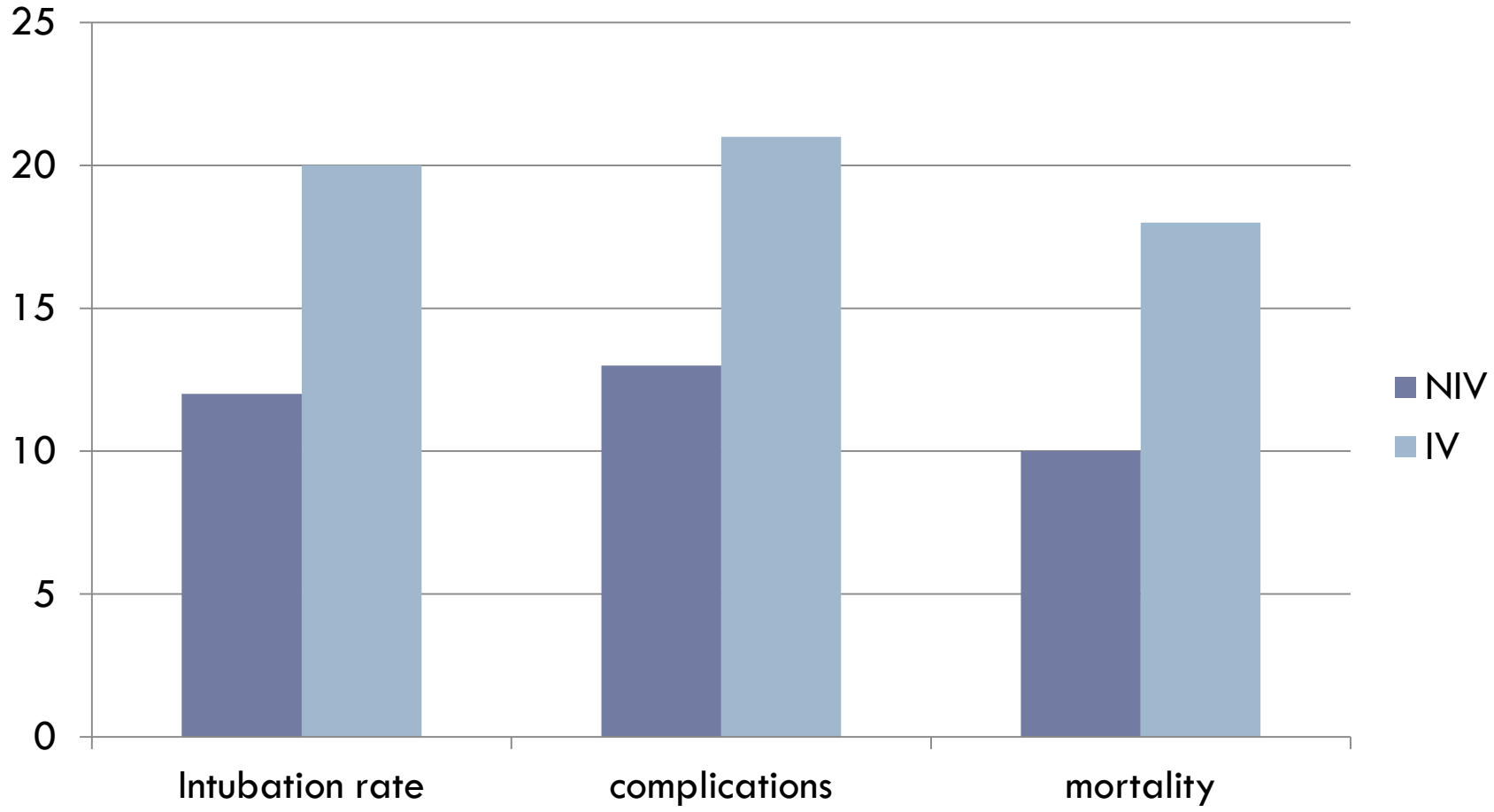
NONINVASIVE VENTILATION IN IMMUNOSUPPRESSED PATIENTS WITH PULMONARY INFILTRATES, FEVER, AND ACUTE RESPIRATORY FAILURE

GILLES HILBERT, M.D., DIDIER GRUSON, M.D., FRÉDERIC VARGAS, M.D., RUDDY VALENTINO, M.D., GEORGES GBIKPI-BENISSAN, M.D., MICHEL DUPON, M.D., JOSY REIFFERS, M.D., AND JEAN P. CARDINAUD, M.D.

- Prospective randomized trial
- Single center
- 52 immunosupressed patients
- 60% hematologic cancer and neutropenia
- Primary outcome Endotracheal Intubation

N Engl J Med, Vol. 344, No. 7 · February 15, 2001

Αποτελέσματα



N Engl J Med, Vol 344, No. 7 · February 15, 2001

JAMA®
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Noninvasive Ventilation for Treatment of Acute Respiratory Failure in Patients Undergoing Solid organ Transplantation
A randomized Trial

- Single center
- Prospective randomized trial
- 40 patients
- Solid organ transplantation
- Need for intubation

JAMA 2000;283:235-241

JAMA®
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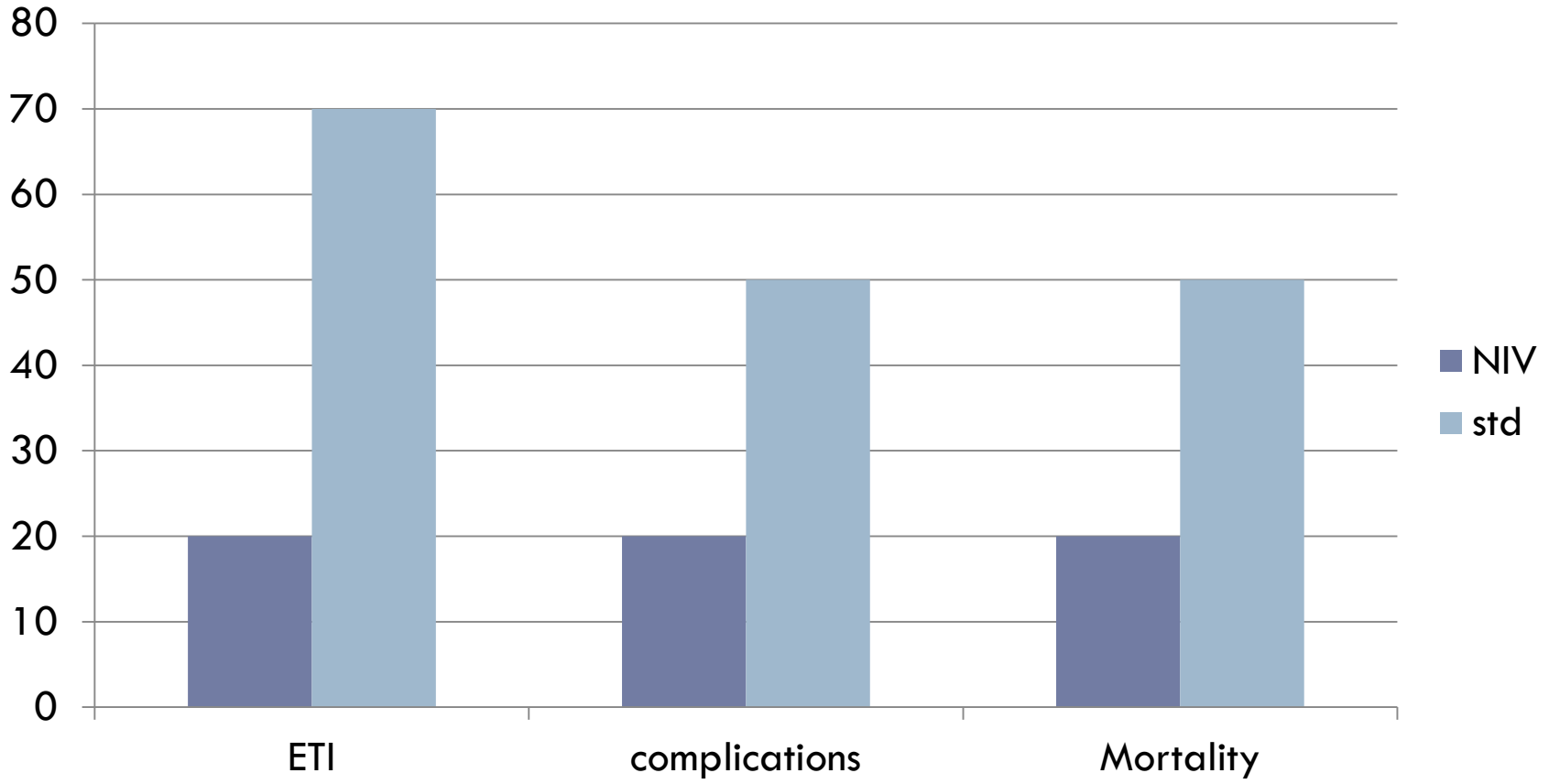
Αποτελέσματα



JAMA 2000;283:235-241

Συμπέρασμα

Η εφαρμογή Μη Επεμβατικού Μηχανικού Αερισμού σε ανοσοκατασταλμένους ασθενείς μειώνει την ανάγκη για ενδοτραχειακή διασωλήνωση και μηχανική υποστήριξη της αναπνοής, τις εισαγωγές στη μονάδα Εντατικής Θεραπείας και τελικά τη Θνητότητα (?)

WEANING FROM MECHANICAL VENTILATION

AMERICAN JOURNAL OF
Respiratory and
Critical Care Medicine®

Noninvasive Ventilation during Persistent Weaning Failure

A Randomized Controlled Trial

Miquel Ferrer, Antonio Esquinas, Francisco Arancibia, Torsten Thomas Bauer, Gumersindo Gonzalez, Andres Carrillo, Robert Rodriguez-Roisin, and Antoni Torres

Single center
Prospective randomized controlled trial
Mixed population
42 patients
Weaning failed for 3 days

Am J Respir Crit Care Med Vol 168. pp 70–76, 2003

Baseline characteristics

TABLE 1. BASELINE CHARACTERISTICS OF PATIENTS AT ENTRY INTO THE STUDY

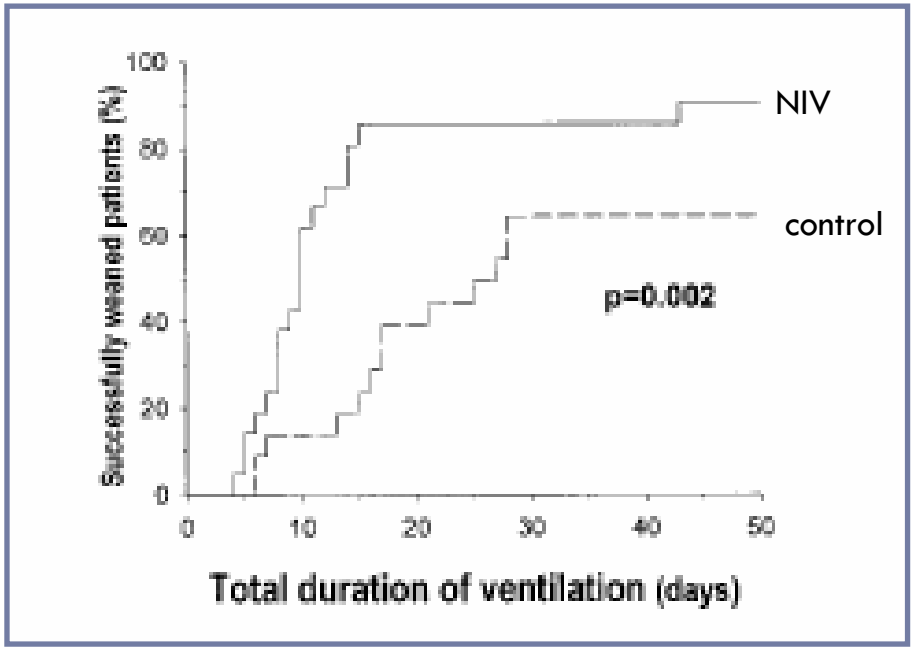
	NIV Group (*n* = 27)	Conventional-Weaning Group (*n* = 22)	p Value
Age, yr	70.3 ± 7.5	71.0 ± 7.2	0.767
Sex, M/F	13/8	17/5	0.444
Current or former smoker, n (%)	13 (62)	17 (77)	0.444
Current or former alcohol abuse, n (%)	4 (19)	2 (9)	0.412
APACHE-II on admission	17.8 ± 4.6	18.5 ± 3.9	0.589
Duration of ICU stay, d	7.3 ± 2.8	7.5 ± 3.9	0.801
Duration of mechanical ventilation, d	7.1 ± 2.8	7.0 ± 3.4	0.959
Number of comorbidities per patient	1.8 ± 0.9	1.8 ± 0.9	0.894
White blood cells, $\times 10^9$/L	12.1 ± 4.3	12.4 ± 3.0	0.794
Hematocrit, L/L	0.38 ± 0.07	0.35 ± 0.05	0.170
Patients with chronic pulmonary disorders, n (%)	16 (76)	17 (77)	1.000
Causes of mechanical ventilation, n			0.545
Exacerbation of chronic pulmonary disorders	10	9	
Congestive heart failure	4	5	
Community-acquired pneumonia	2	4	
Hospital-acquired pneumonia	1	1	
Postoperative respiratory failure	–	2	
Acute lung injury	1	1	
Thoracic trauma	1	–	
Hemoptisis	1	–	
Cardiac arrest	1	–	

Definition of abbreviations: APACHE-II = acute physiology and chronic health evaluation-II score; ICU = intensive care unit; NIV = noninvasive ventilation.

Values are means ± SD.

Am J Respir Crit Care Med Vol 168. pp 70–76, 2003

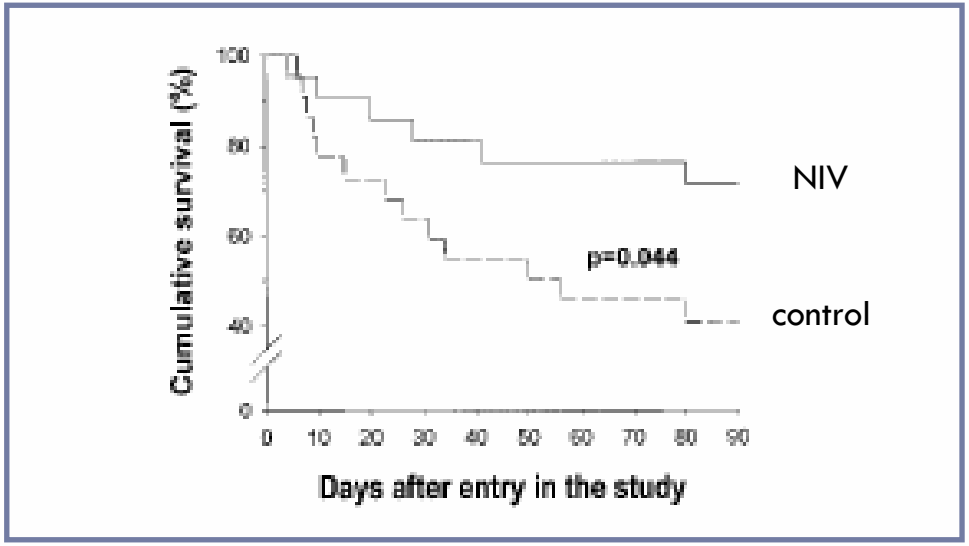
Total duration of ventilation



Am J Respir Crit Care Med Vol 168. pp 70–76, 2003

survival

Η μελέτη διακόπηκε μετά την interim ανάλυση



Am J Respir Crit Care Med Vol 168. pp 70–76, 2003

επιπλοκές

TABLE 4. SERIOUS COMPLICATIONS DIAGNOSED IN THE INTENSIVE CARE UNIT AFTER ENTRY INTO THE STUDY

	NIV Group (*n* = 27)	Conventional-Weaning Group (*n* = 22)	p Value
Total number of patients	5	16	0.004
Nosocomial pneumonia	5	13	0.042
Catheter-related sepsis	–	2	–
Sacrum-infected ulcer	–	1	–
Urinary tract infection	–	1	–
Chest wall abscess	–	1	–
Gastrointestinal bleeding	1	–	–
Pneumothorax	–	1	–
Septic shock	2	9	0.045

Am J Respir Crit Care Med Vol 168. pp 70–76, 2003

Multivariate analyses

TABLE 5. UNIVARIATE AND MULTIVARIATE ANALYSES OF INTENSIVE CARE UNIT AND 90-DAY SURVIVAL

	Adjusted Odds Ratio	95% CI	p Value	Adjusted Odds Ratio	95% CI	p Value
Decreased ICU survival	Univariate analysis			Multivariate analysis		
Conventional-weaning approach	6.6	1.2–35.6	0.029	6.6	1.1–38.8	0.035
Age > 70 yr	5.8	1.1–31.3	0.041	–	–	NS
Decreased 90-d survival	Univariate analysis			Multivariate analysis		
Conventional-weaning approach	–	–	0.044	3.5	1.2–9.6	0.018
Age > 70 yr	–	–	0.012	5.1	1.7–15.0	0.003
Pa_{CO_2} during spontaneous breathing > 45 mm Hg	–	–	0.018	5.8	1.8–18.7	0.003

Definition of abbreviations: CI = confidence interval; ICU = intensive care unit; NS = not significant.

Am J Respir Crit Care Med Vol 168. pp 70–76, 2003

Neuroanesthesia and Intensive Care

A meta-analysis of noninvasive weaning to facilitate liberation from mechanical ventilation

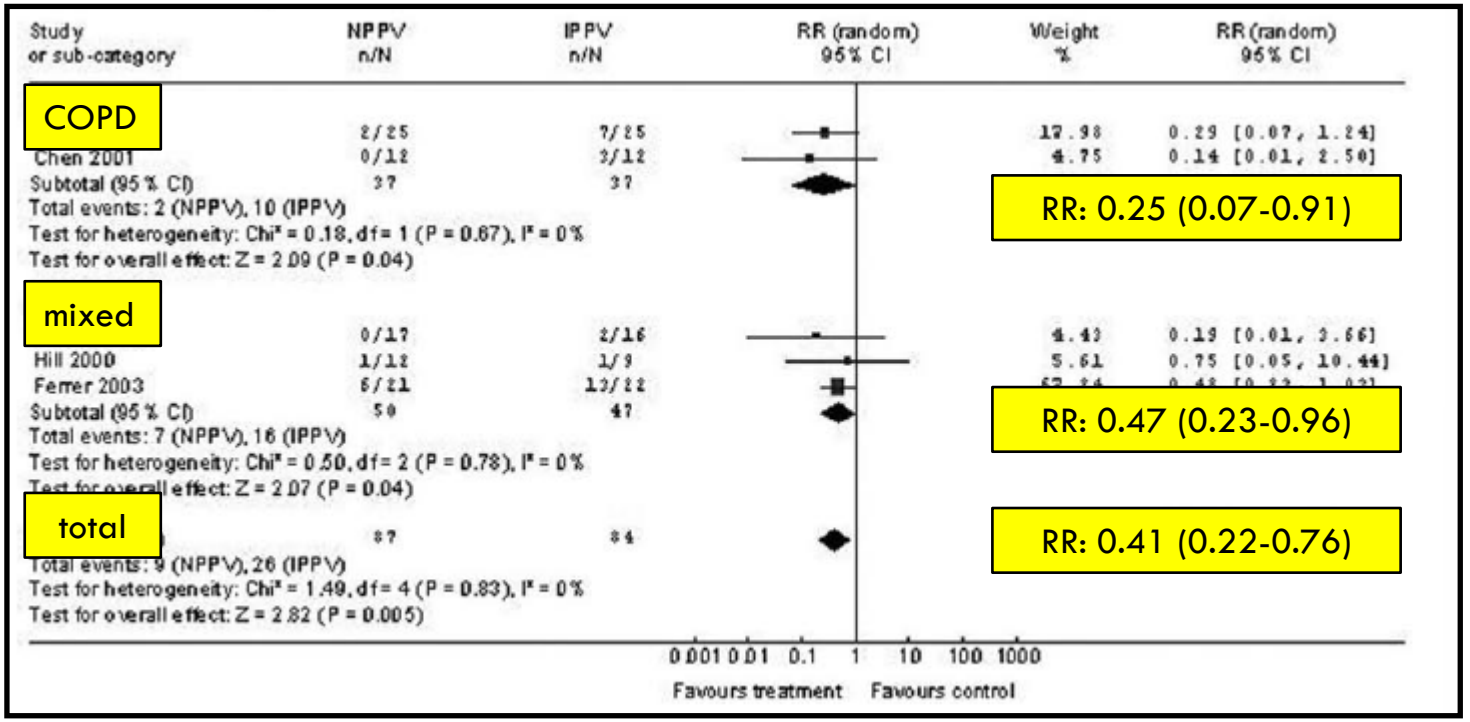
[Une méta-analyse d'un sevrage non effractif pour faciliter le retrait de la ventilation mécanique]

Karen E.A. Burns MD MSc FRCPC,*§ Neill K.J. Adhikari MD FRCPC,†§ Maureen O. Meade MD MSc FRCPC‡§

Can J Anesth 2006; 53: 222–5.

αποτελέσματα

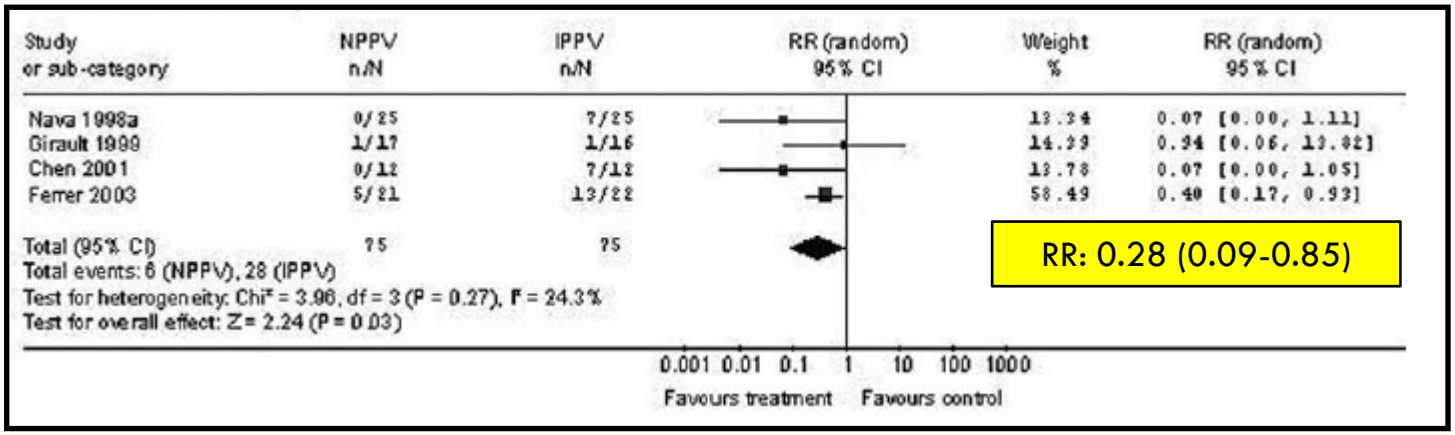
mortality



Can J Anesth 2006; 53: 222–5.

αποτελέσματα

VAP



Can J Anesth 2006; 53: 222–5.

HOW TO APPLY NIV DURING FIRST FEW HOURS

- Explain technique to patient
- Choose correct interfaces and size
- Set low levels pressures(IPAP:10 – 12, EPAP: 4)
- Place interface gently over face, holding it in place and start ventilation
- Set alarms
- Try to optimize patient comfort
- Reset pressures (PS increased to get tidal volume > 6ml/kg)
- PEEP increase to achieve SpO2>90%
- PEEP increase to achieve patient ventilator synchrony
- Protect site of skin pressure
- Consider use of mild sedation
- Monitor comfort, RR, Spo2 and dyspnea every 20 min
- ABGs at baseline, 30min, 1 hour, 2 hours
- Humidification advised for applications longer than 6 hours

Ασθενής 68 ετών με ιστορικό ΧΑΠ, προσέρχεται στο ΤΕΠ με εμπύρετο και αναπνευστική δυσχέρεια

- Ταχύπνοια (RR=35bpm)
- Ταχυκαρδία (HR = 115bpm)
- BP=175/85mmHg
- Θ=38.8
- ABG's: PO2=60mmHg (5lt/min), PCO2=85mmHg, pH:7.23
- GCS:14/15

Ποια από τις παρακάτω θεραπευτικές στρατηγικές είναι σωστή;

1. Αρχικά μόνο Φαρμακευτική θεραπεία. Με τη βρογχοδιαστολή και τα κορτικοστεροειδή μπορεί να βελτιωθεί.
2. Μεταφορά στην κλινική και άμεση εφαρμογή NIV
3. Μεταφορά στη Μονάδα Εντατικής, διασωλήνωση και μηχανική υποστήριξη της αναπνοής
4. Μεταφορά στη ΜΕΘ, άμεση εφαρμογή NIV και επί αποτυχίας διασωλήνωση.

Σε ποιες από τις παρακάτω περιπτώσεις είναι βιβλιογραφικά τεκμηριωμένη η εφαρμογή του ΜΕΜΑ για την αντιμετώπιση της αναπνευστικής ανεπάρκειας

1. Ασθενής με παρόξυνση ΧΑΠ και ήπια οξυαιμία (pH >7.20) στην κλινική
2. Ασθενής με Καρδιογενές πνευμονικό οίδημα και σοβαρό αναπνευστικό distress
3. Ασθενής με ΧΑΠ και λοβώδη πνευμονία με pH 7.30
4. Ασθενής ανοσοκατασταλμένος ουδετεροπενικός με αναπνευστική ανεπάρκεια και pH 7.28

ΕΥΧΑΡΙΣΤΩ