Con il patrocinio di

Associazione Italiana Pneumologi Ospedalieri

Ospedale San Giuseppe
MultiMedica S.p.A.

PNEUMOLOGIA 2016

Milano, 16 – 18 giugno 2016 · Centro Congressi Palazzo delle Stelline

PNEUMOLOGIA 2016

Milano, 16 – 18 giugno 2016

NIV per lo svezzamento del paziente cronico tracheotomizzato

Lara Pisani & Piero Ceriana

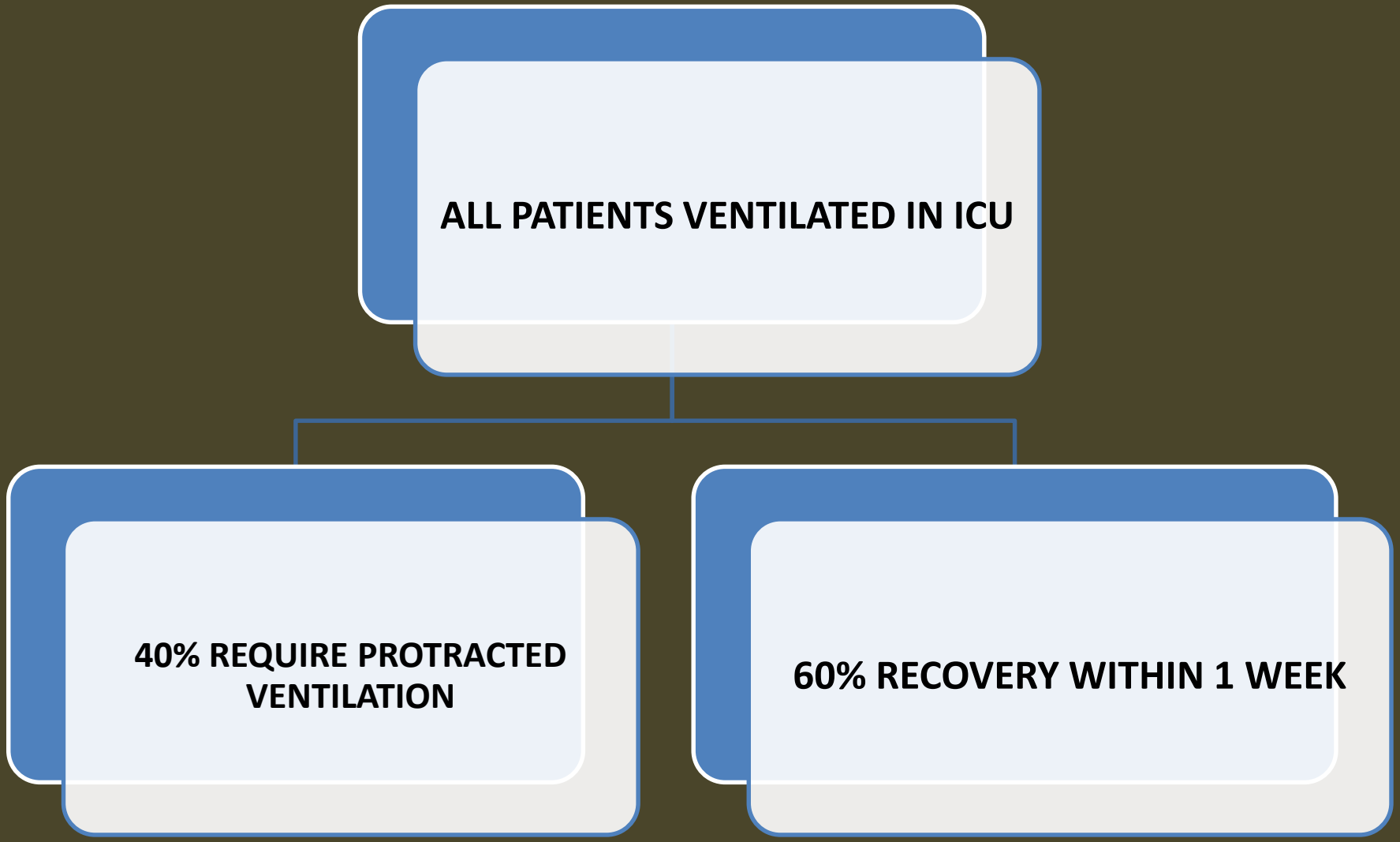
Policlinico S. Orsola - Bologna - Fondazione Maugeri - Pavia

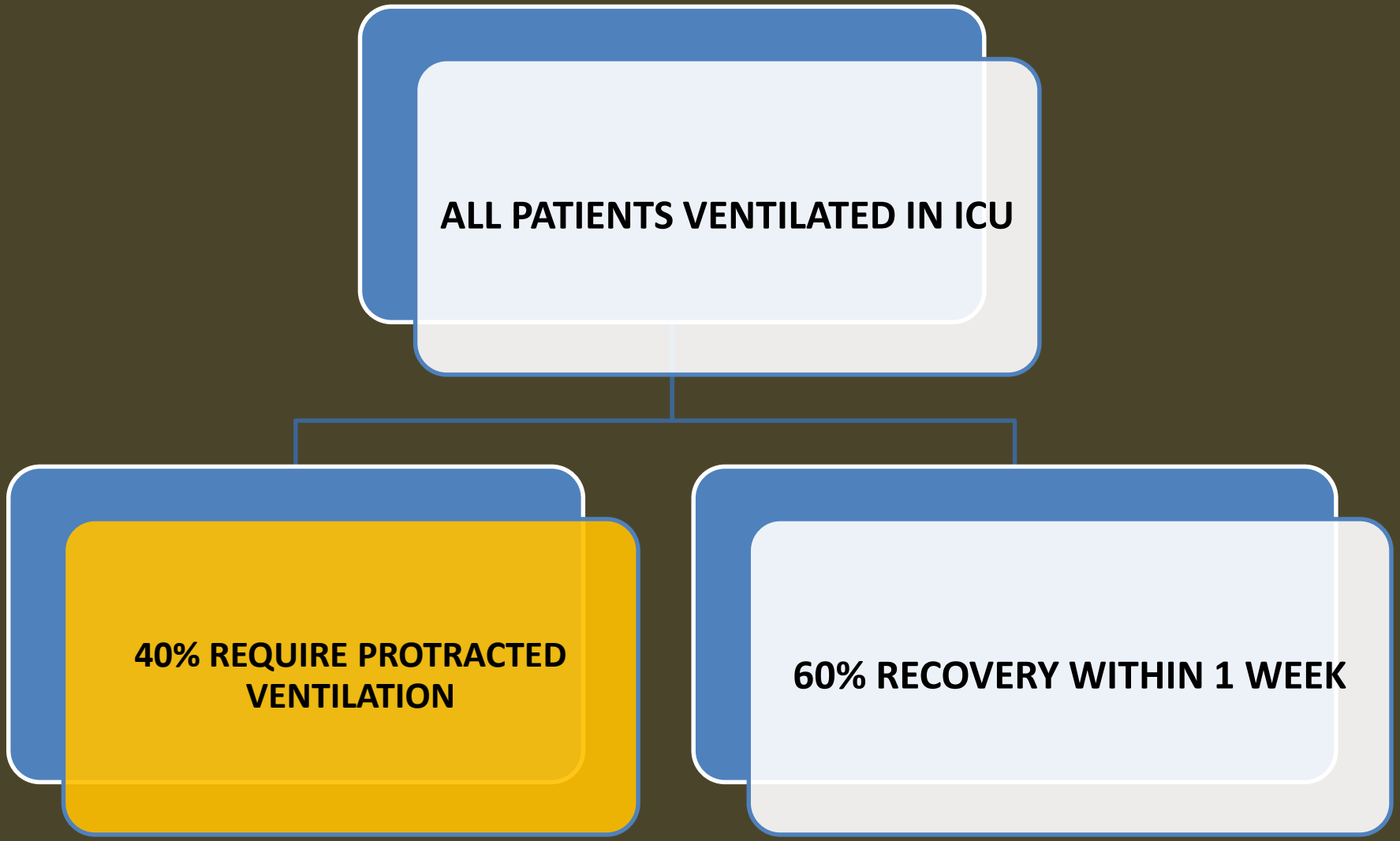
Characteristics and Outcomes in Adult Patients Receiving Mechanical Ventilation

A 28-Day International Study

JAMA. 2002;287:345-355

In the 361 ICUs, 15 757 patients were admitted during the study period and 5183 (33%) received mechanical ventilation for more than 12 hours.


ALL PATIENTS VENTILATED IN ICU
40% REQUIRE PROTRACTED VENTILATION
60% RECOVERY WITHIN 1 WEEK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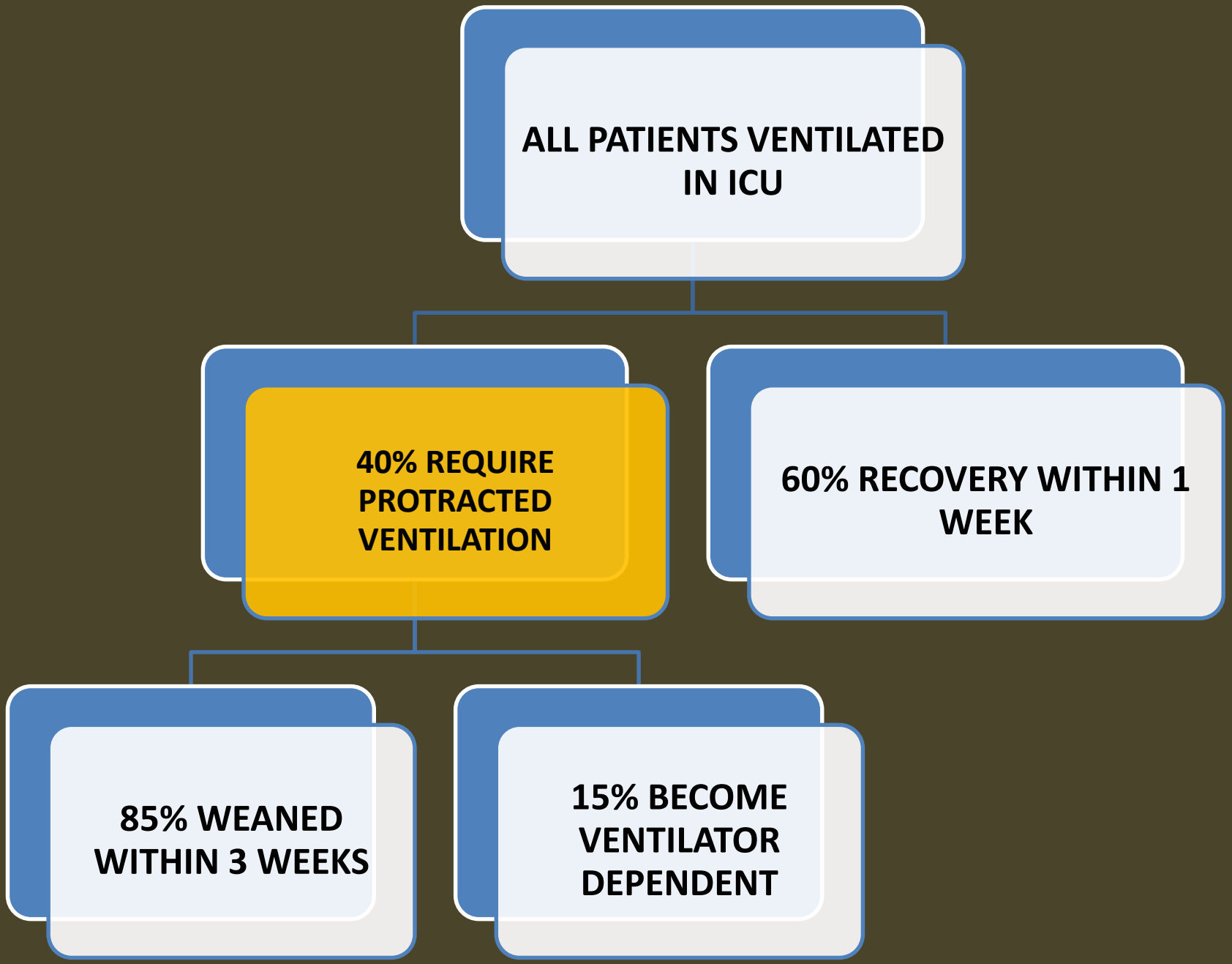
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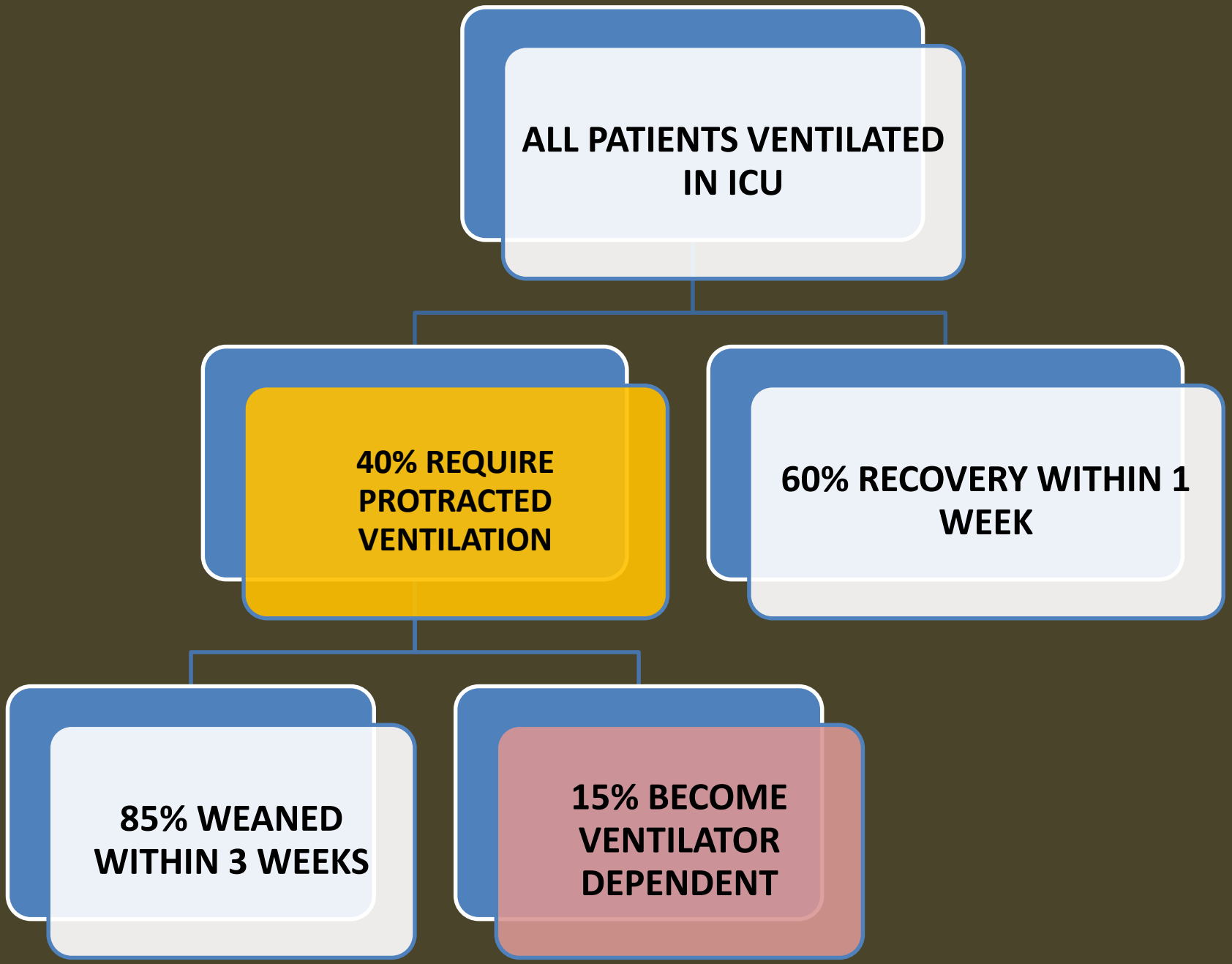
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Eur Respir J 2007; 29: 1033–1056
DOI: 10.1183/09031936.00010206

TASK FORCE

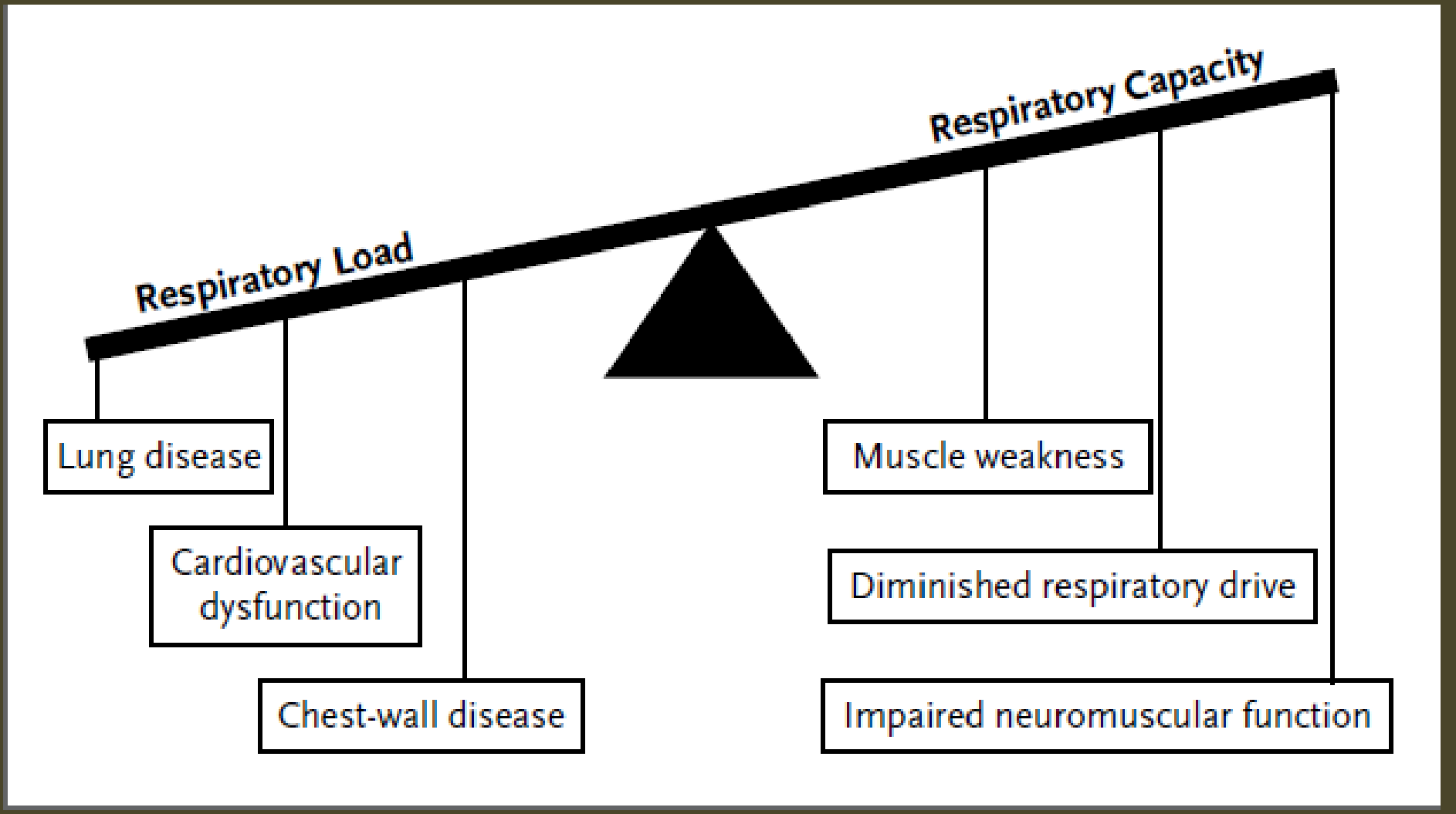
Weaning from mechanical ventilation

J-M. Boles*, J. Bion#, A. Connors¶, M. Herridge+, B. Marsh§, C. Melotƒ, R. Pearl**, H. Silverman##, M. Stanchina¶¶, A. Vieillard-Baron++, T. Welte§§

TABLE 3 Classification of patients according to the weaning process

Group/category	Definition
Simple weaning	Patients who proceed from initiation of weaning to successful extubation on the first attempt without difficulty
Difficult weaning	Patients who fail initial weaning and require up to three SBT or as long as 7 days from the first SBT to achieve successful weaning
Prolonged weaning	Patients who fail at least three weaning attempts or require >7 days of weaning after the first SBT

SBT: spontaneous breathing trial.



Pathologic states that result in an imbalance between respiratory muscle capacity and respiratory load

Managing the apparent and hidden difficulties of weaning from mechanical ventilation

Andreas Perren
Laurent Brochard

Intensive Care Med (2013) 39:1885–1895

Prolonged weaning	Severe chronic heart failure
	Severe chronic respiratory insufficiency
	Prolonged respiratory muscle weakness (neuromyopathy)
	Depression
	Poor sleep quality, severe constipation, persistent sepsis, etc.

Weaning from mechanical ventilation

J-M. Boles*, J. Bion#, A. Connors¶, M. Herridge+, B. Marsh§, C. Melotƒ, R. Pearl**, H. Silverman##, M. Stanchina¶¶, A. Vieillard-Baron++, T. Welte§§

Eur Respir J 2007; 29: 1033–1056

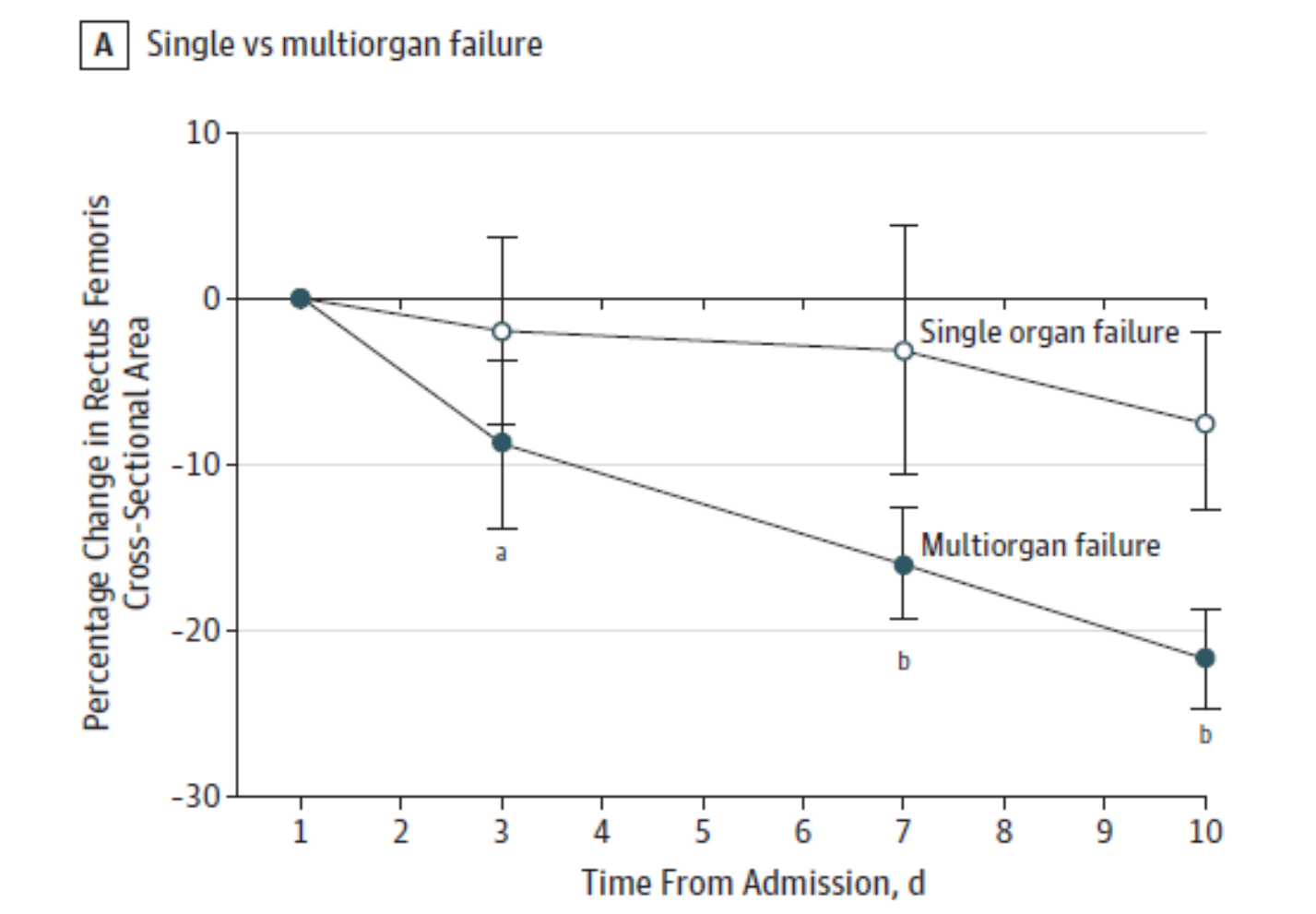
Pathophysiology	Consider
Respiratory load	Increased work of breathing: inappropriate ventilator settings
	Reduced compliance: pneumonia (ventilator-acquired); cardiogenic or noncardiogenic oedema; pulmonary fibrosis; pulmonary haemorrhage; diffuse pulmonary infiltrates
	Airway bronchoconstriction
	Increased resistive load
	During SBT: endotracheal tube
	Post-extubation: glottic oedema; increased airway secretions; sputum retention
Cardiac load	Cardiac dysfunction prior to critical illness
	Increased cardiac workload leading to myocardial dysfunction: dynamic hyperinflation; increased metabolic demand; unresolved sepsis
Neuromuscular	Depressed central drive: metabolic alkalosis; mechanical ventilation; sedative/hynotic medications
	Central ventilatory command: failure of the neuromuscular respiratory system
	Peripheral dysfunction: primary causes of neuromuscular weakness; CINMA
Neuropsychological	Delirium
	Anxiety, depression
Metabolic	Metabolic disturbances
	Role of corticosteroids
	Hyperglycaemia
Nutrition	Overweight
	Malnutrition
	Ventilator-induced diaphragm dysfunction
Anaemia	

NEUROMUSCULAR DYSFUNCTION

Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Acute Skeletal Muscle Wasting in Critical Illness

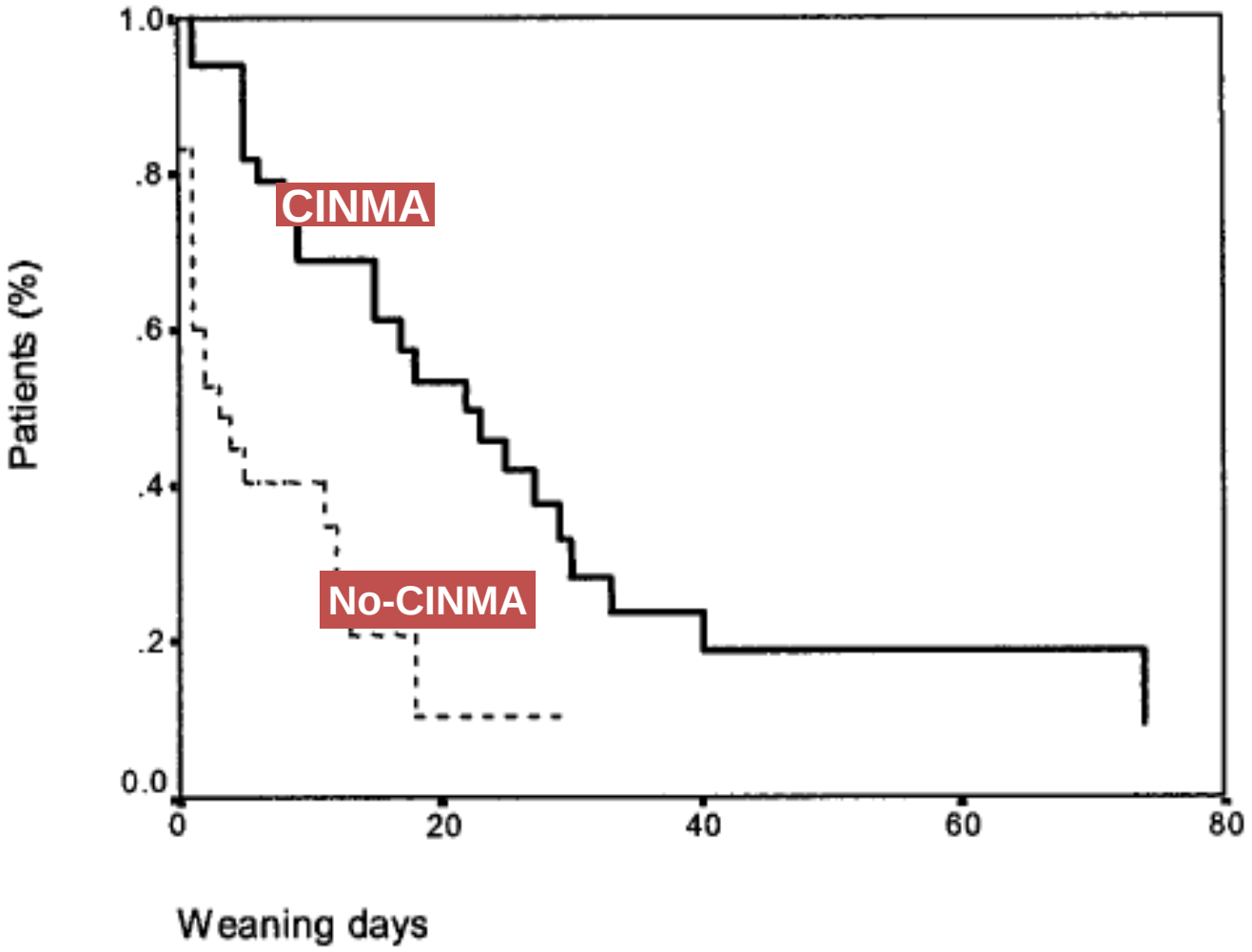
JAMA. 2013;310(15):1591-1600.



(Crit Care Med 2005; 33:349–354)

Effect of critical illness polyneuropathy on the withdrawal from mechanical ventilation and the length of stay in septic patients*

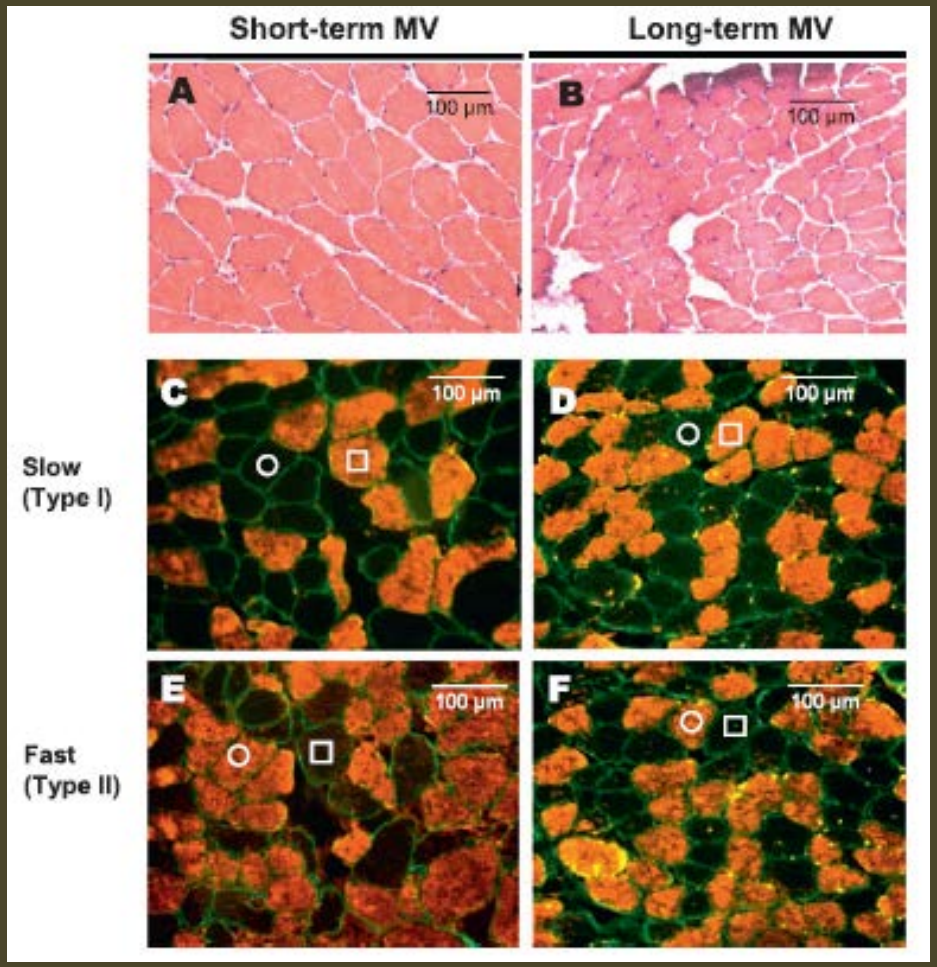
Jose Garnacho-Montero, MD, PhD; Rosario Amaya-Villar, MD; Jose Luis García-Garmendía, MD, PhD; Juan Madrazo-Osuna, MD; Carlos Ortiz-Leyba, MD, PhD

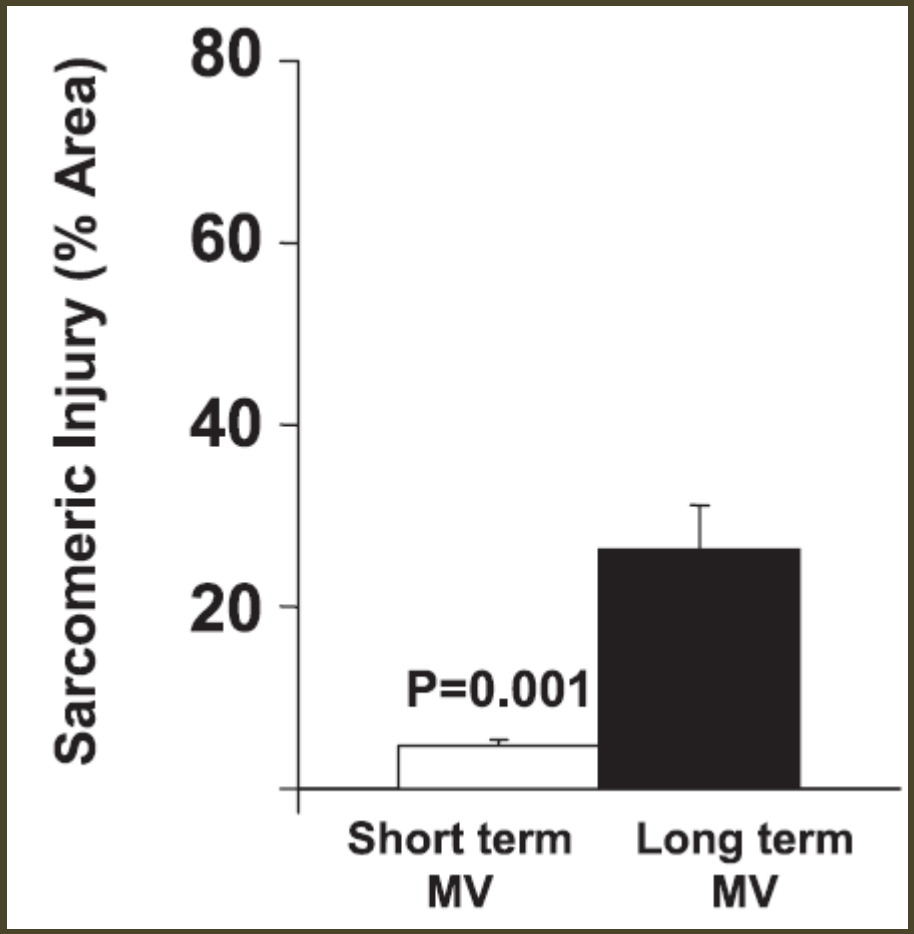


Rapidly Progressive Diaphragmatic Weakness and Injury during Mechanical Ventilation in Humans

Samir Jaber[1,2,6], Basil J. Petrof[3], Boris Jung[1,2], Gérald Chanques[1,2], Jean-Philippe Berthet[4], Christophe Rabuel[5], Hassan Bouyabrine[6], Patricia Courouble[1,2], Christelle Koechlin-Ramonatxo[7], Mustapha Sebbane[1,2], Thomas Similowski[8], Valérie Scheuermann[9], Alexandre Mebazaa[5], Xavier Capdevila[1,2], Dominique Mornet[2], Jacques Mercier[2,10], Alain Lacampagne[9], Alexandre Philips[2], and Stefan Matecki[2,10]

Am J Respir Crit Care Med Vol 183. pp 364–371, 2011





SEPSIS

Sepsis Is Associated with a Preferential Diaphragmatic Atrophy

A Critically Ill Patient Study Using Tridimensional Computed Tomography (ANESTHESIOLOGY 2014; 120:1182-91)

NO SEPSIS
-11 ± 13%

SEPSIS
-27 ± 12%

SEDATION

The Use of Continuous IV Sedation Is Associated With Prolongation of Mechanical Ventilation*

(CHEST 1998; 114:541–548)

Variable	p Value
Duration of mechanical ventilation, h	<0.001
Length of intensive care, d	0.007
Length of hospital stay, d	<0.001

DELIRIUM AND DEPRESSION

Intensive care unit syndrome/delirium is associated with anemia, drug therapy and duration of ventilation treatment

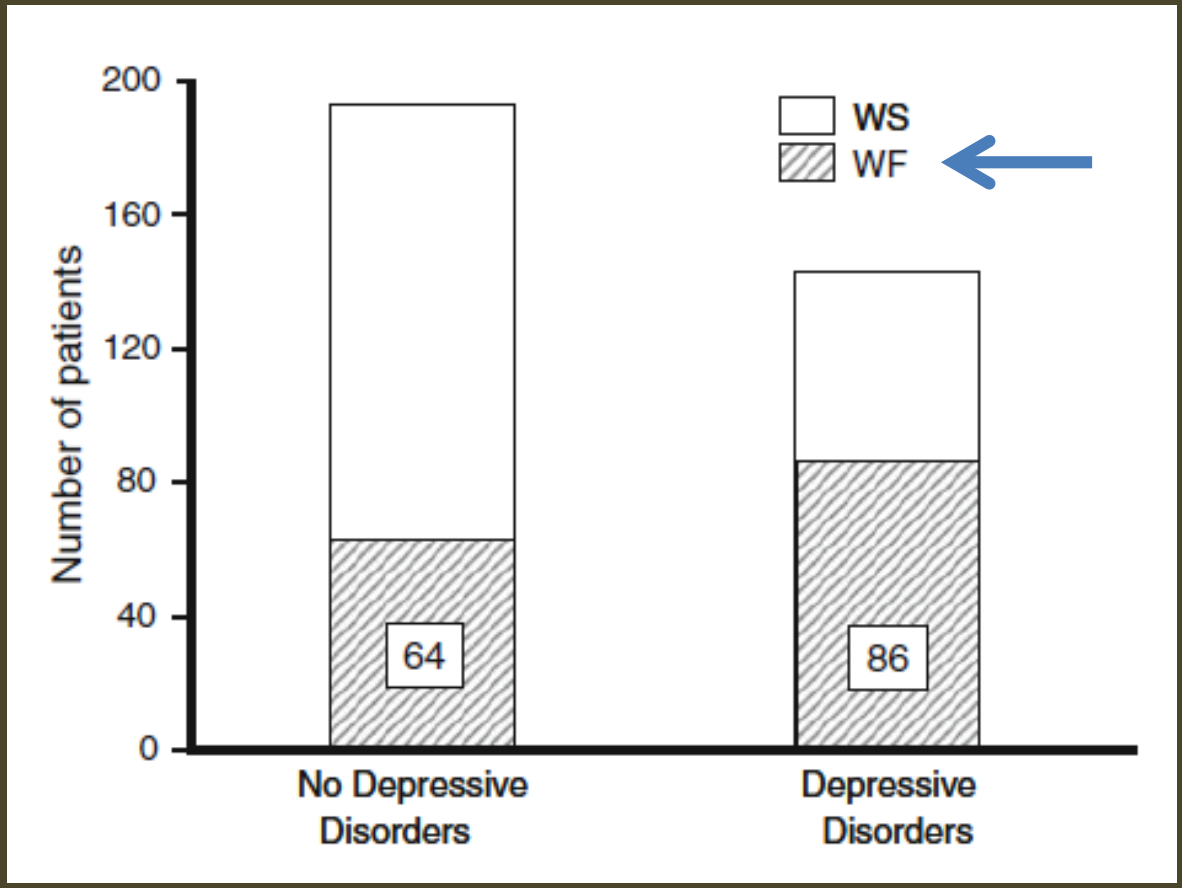
*Acta Anaesthesiol Scand 2002; **46**: 726–731*

	Severe delirium ($n=6$)	Significance level
Age (years)	70 (35–82)	NS
Gender (M/F)	4/2	$P=0.007$
Length of ICU stay (h)	324** (120–552)	$P=0.005$
Duration of ventilation (h)	222** (106–384)	$P=0.001$
TISS (points)	32	NS

Amal Jubran
Gerald Lawm
Joanne Kelly
Lisa A. Duffner
Gokay Gungor
Eileen G. Collins
Dorothy M. Lanuza
Leslie A. Hoffman
Martin J. Tobin

Depressive disorders during weaning from prolonged mechanical ventilation

Intensive Care Med (2010) 36:828–835

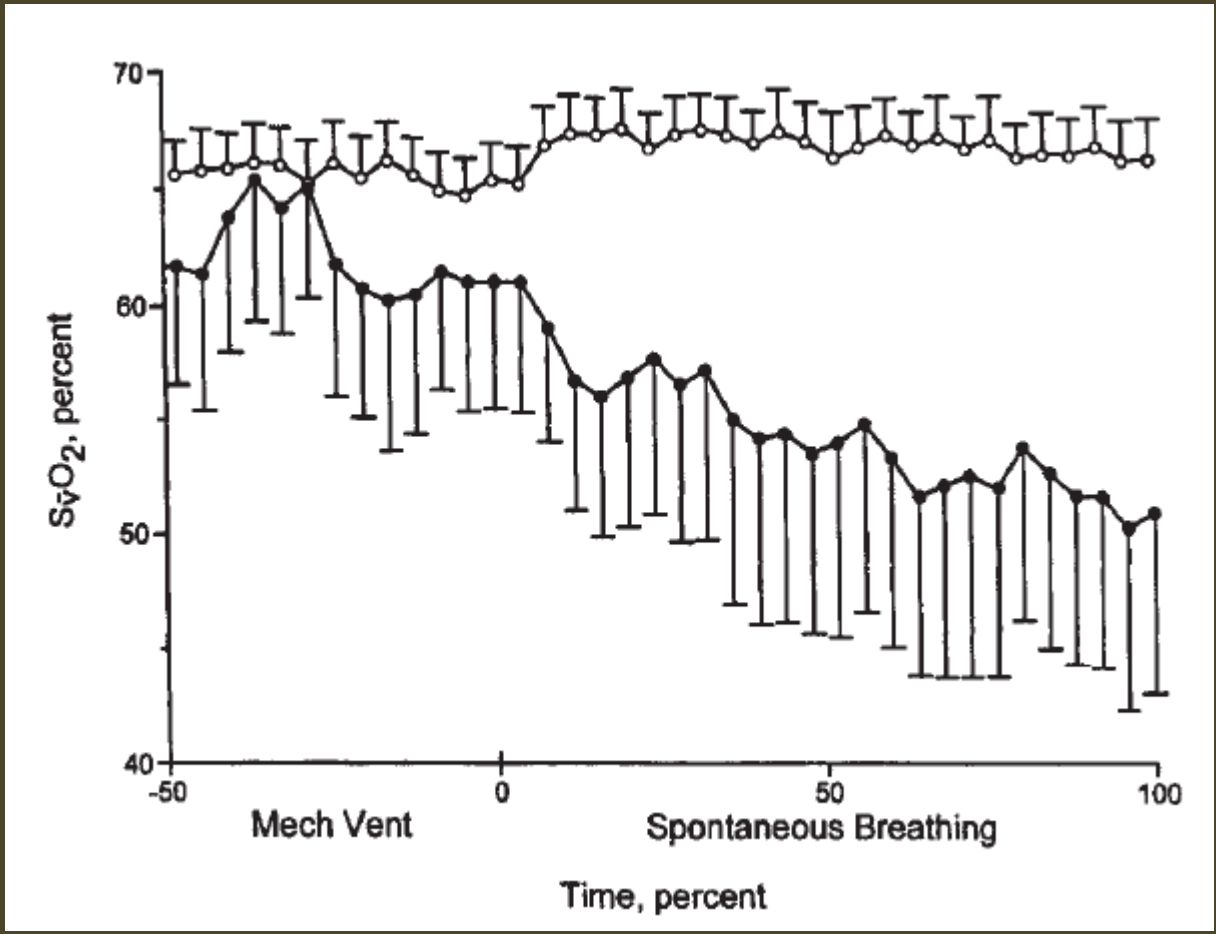


CARDIOVASCULAR DYSFUNCTION

Continuous Recordings of Mixed Venous Oxygen Saturation during Weaning from Mechanical Ventilation and the Ramifications Thereof

AMAL JUBRAN, MALI MATHRU, DAVID DRIES, and MARTIN J. TOBIN

AM J RESPIR CRIT CARE MED 1998;158:1763–1769.



WEAN SUCCESS

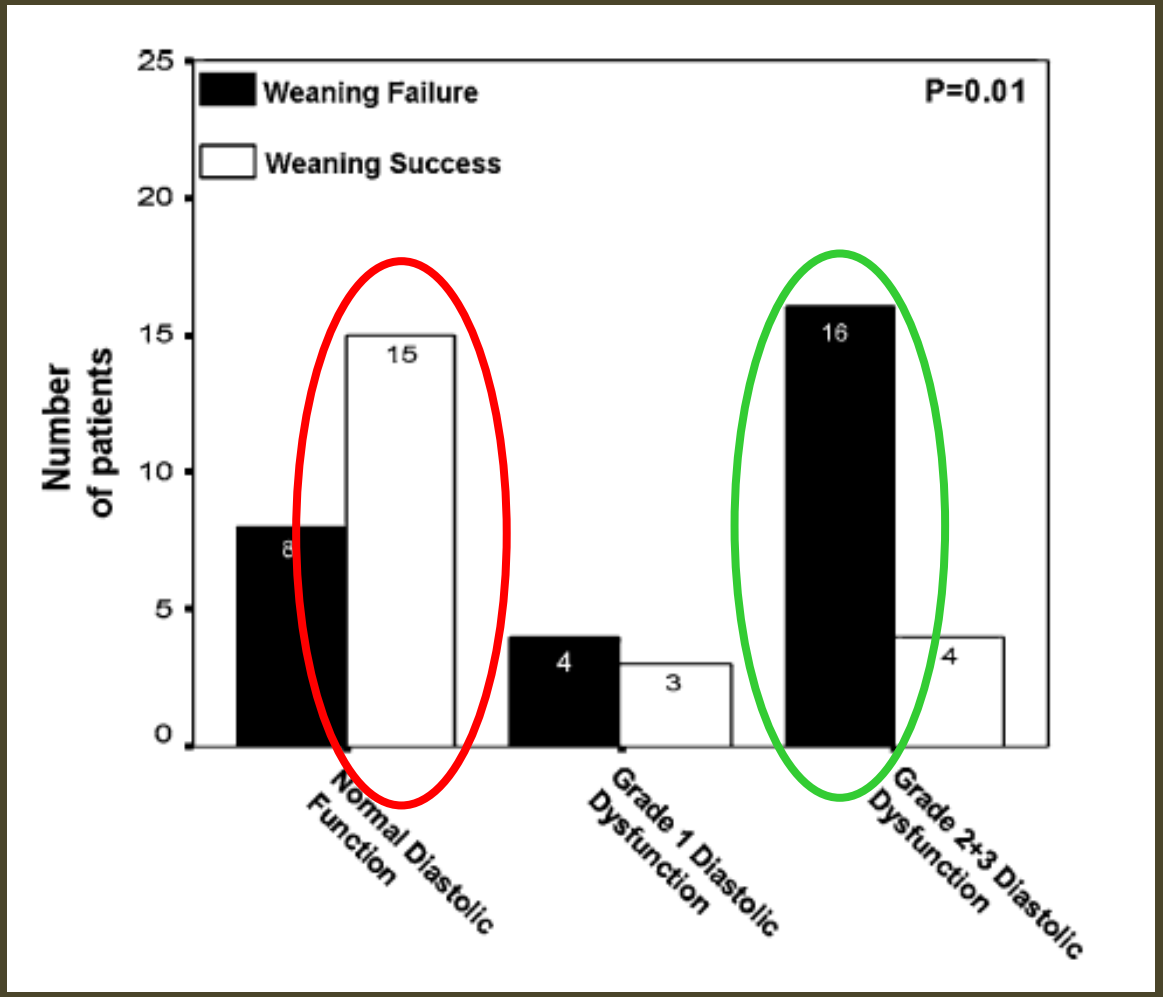
WEAN FAILURE

Intensive Care Med (2011) 37:1976–1985
DOI 10.1007/s00134-011-2368-0

ORIGINAL

John Papanikolaou
Demosthenes Makris
Theodosios Saranteas
Dimitrios Karakitsos
Elias Zintzaras
Andreas Karabinis
Georgia Kostopanagiotou
Epaminondas Zakynthinos

New insights into weaning from mechanical ventilation: left ventricular diastolic dysfunction is a key player



VENTILATOR SETTING

Intensive Care Med (2006) 32:1515–1522
DOI 10.1007/s00134-006-0301-8

ORIGINAL

Arnaud W. Thille
Pablo Rodriguez
Belen Cabello
François Lellouche
Laurent Brochard

Patient-ventilator asynchrony during assisted mechanical ventilation

Conclusions: One-fourth of patients exhibit a high incidence of asynchrony during assisted ventilation.

Intensive Care Med (2006) 32:1515–1522
DOI 10.1007/s00134-006-0301-8

ORIGINAL

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Pablo Rodriguez
Belen Cabello
François Lellouche
Laurent Brochard

Patient-ventilator asynchrony during assisted mechanical ventilation

	Asynchrony index < 10% ($n = 47$)	Asynchrony index ≥ 10% ($n = 15$)	p
Duration of mechanical ventilation (days; IQR)	7 (3–20)	25 (9–42)	0.005
Duration of mechanical ventilation ≥ 7 days	23 (49%)	13 (87%)	0.01
Tracheostomy	2 (4%)	5 (33%)	0.007
Mortality	15 (32%)	7 (47%)	0.36

TRACHEOTOMY

Possible Reasons Why Tracheostomy Might Facilitate Weaning

Reduced dead space
Less airway resistance
Decreased work of breathing
Better secretion removal with suctioning
Less likelihood of tube obstruction
Improved patient comfort
Less need for sedation
Better glottic function, with less risk of aspiration
Ability to move patient out of the intensive care unit
Changes in clinician behavior

The Role of Tracheotomy in Weaning*

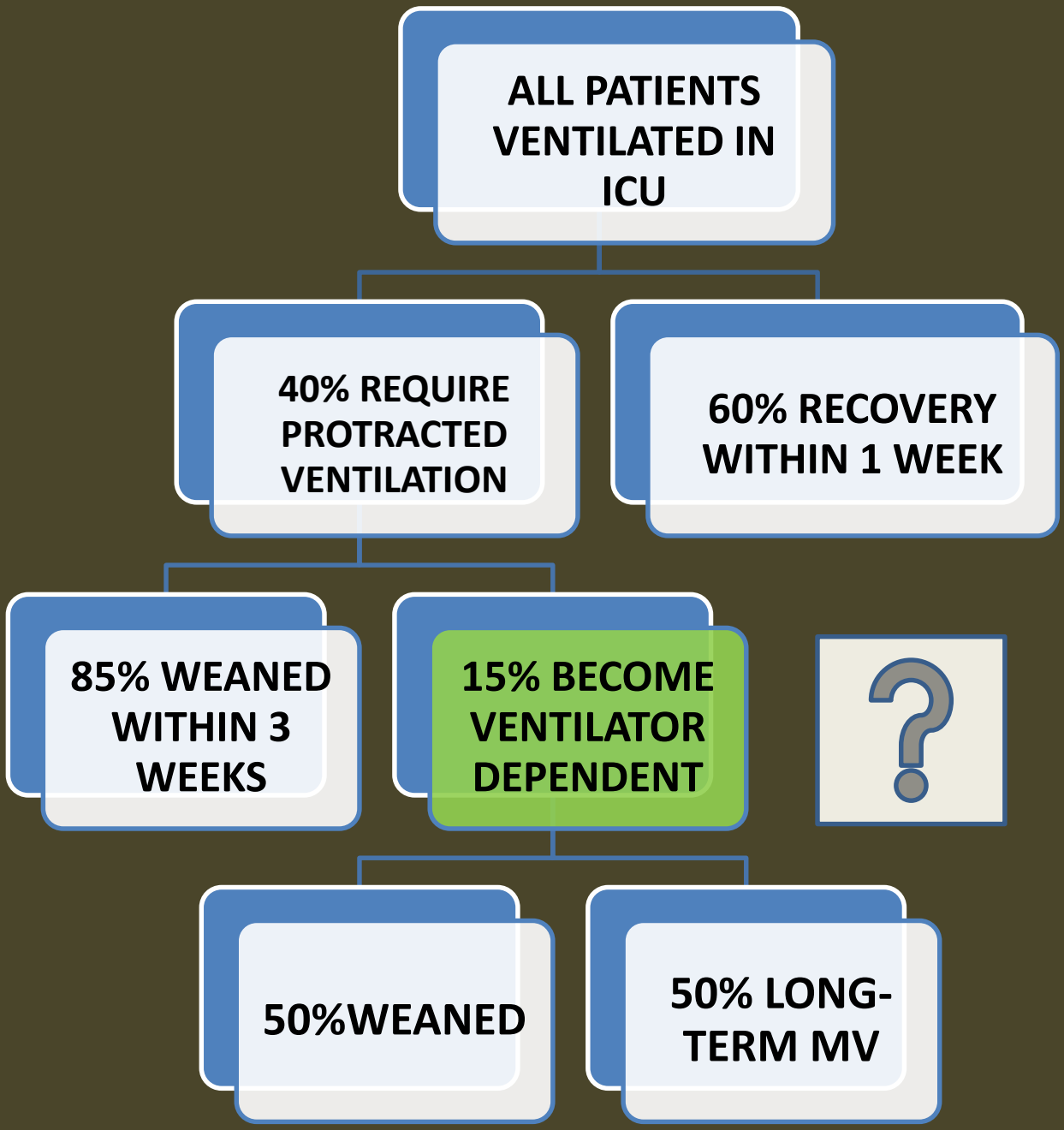
John E. Heffner, MD, FCCP

(CHEST 2001; 120:477S–481S)

Conclusion

Insufficient data support the impression that tracheotomy provides universal benefit in promoting weaning from mechanical ventilation in all ventilator-dependent patients. Subsets of patients, however, may benefit from the procedure.

Measures	Patients With Tracheostomy Malposition (n = 40)	Patients Without Tracheostomy Malposition (n = 363)	p Value†
Duration of mechanical ventilation following tracheostomy, d	25 (13–37)	15 (8–29)	0.016
Ventilator-free days following tracheostomy, d	2 (0–14)	11 (0–19)	0.028
ICU readmission	15 (25)	107 (29)	0.228
Length of stay, d	52 (36–67)	46 (31–64)	0.228
Length of stay following tracheostomy, d	33 (19–46)	26 (16–42)	0.258
Hospital mortality	10 (25)	68 (19)	0.458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15% BECOME VENTILATOR DEPENDENT
?
50%WEANED
50% LONG-TERM MV

Demographics and Clinical Outcomes of Patients Admitted to a Respiratory Intensive Care Unit Located in a Rehabilitation Center

Piero Ceriana MD, Monica Delmastro MD, Ciro Rampulla MD, and Stefano Nava MD

RESPIRATORY CARE • JULY 2003 VOL 48 NO 7

Baseline Disease	Patients (*n*)	Patients Weaned (*n*)	Patients Not Weaned (*n*)
Chronic pulmonary disease	18	9	9
Acute pulmonary disease	10	9	1
Post-operative respiratory failure	10	8	2
Neuromuscular disease	2	1	1
Total	40	27 (67.5%)	13 (32.5%)

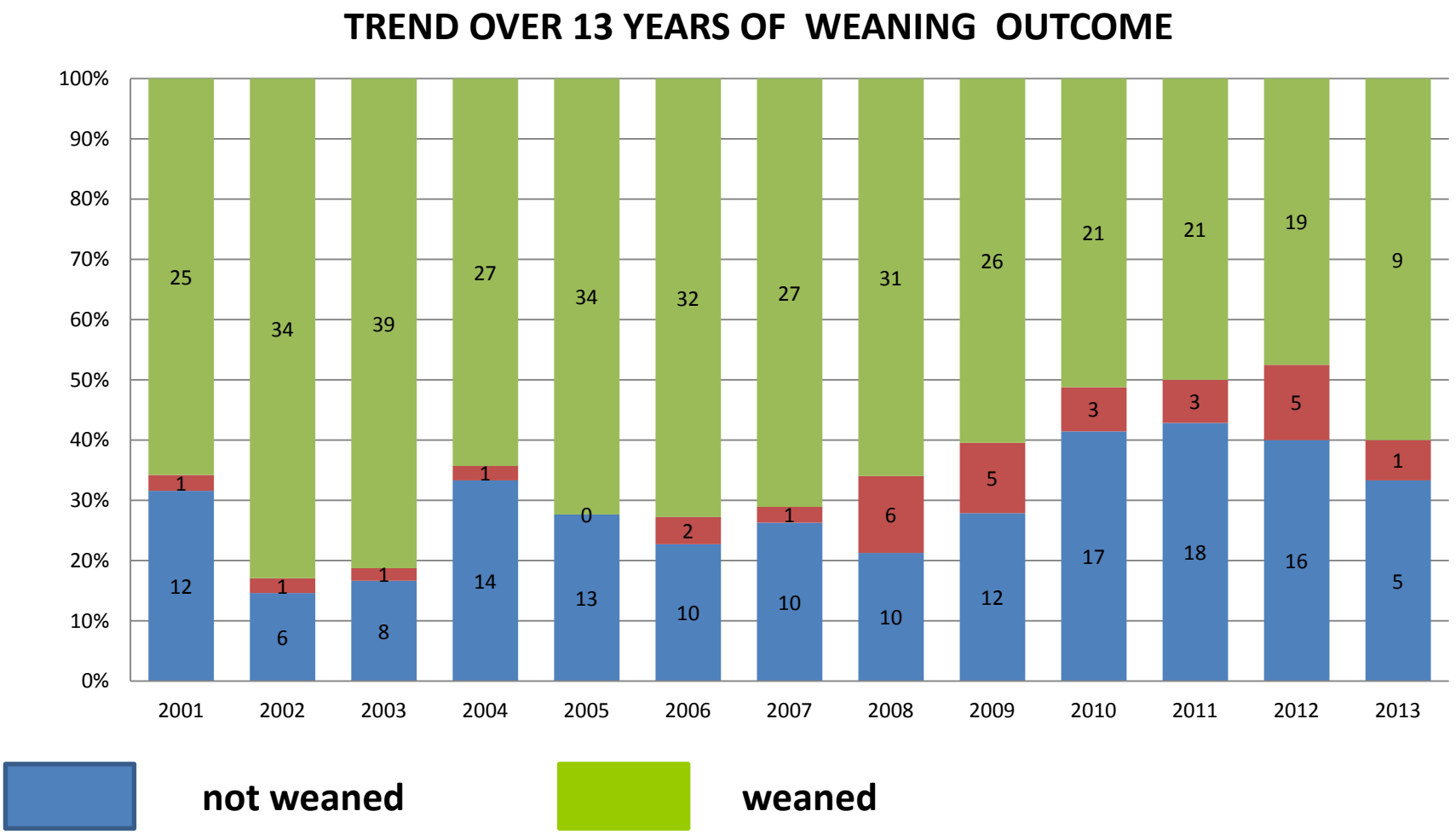
Eva Polverino
Stefano Nava
Miquel Ferrer
Piero Ceriana
Enrico Clini
Elisa Spada
Ercole Zanotti
Ludovico Trianni
Luca Barbano
Claudio Fracchia
Bruno Balbi
Michele Vitacca

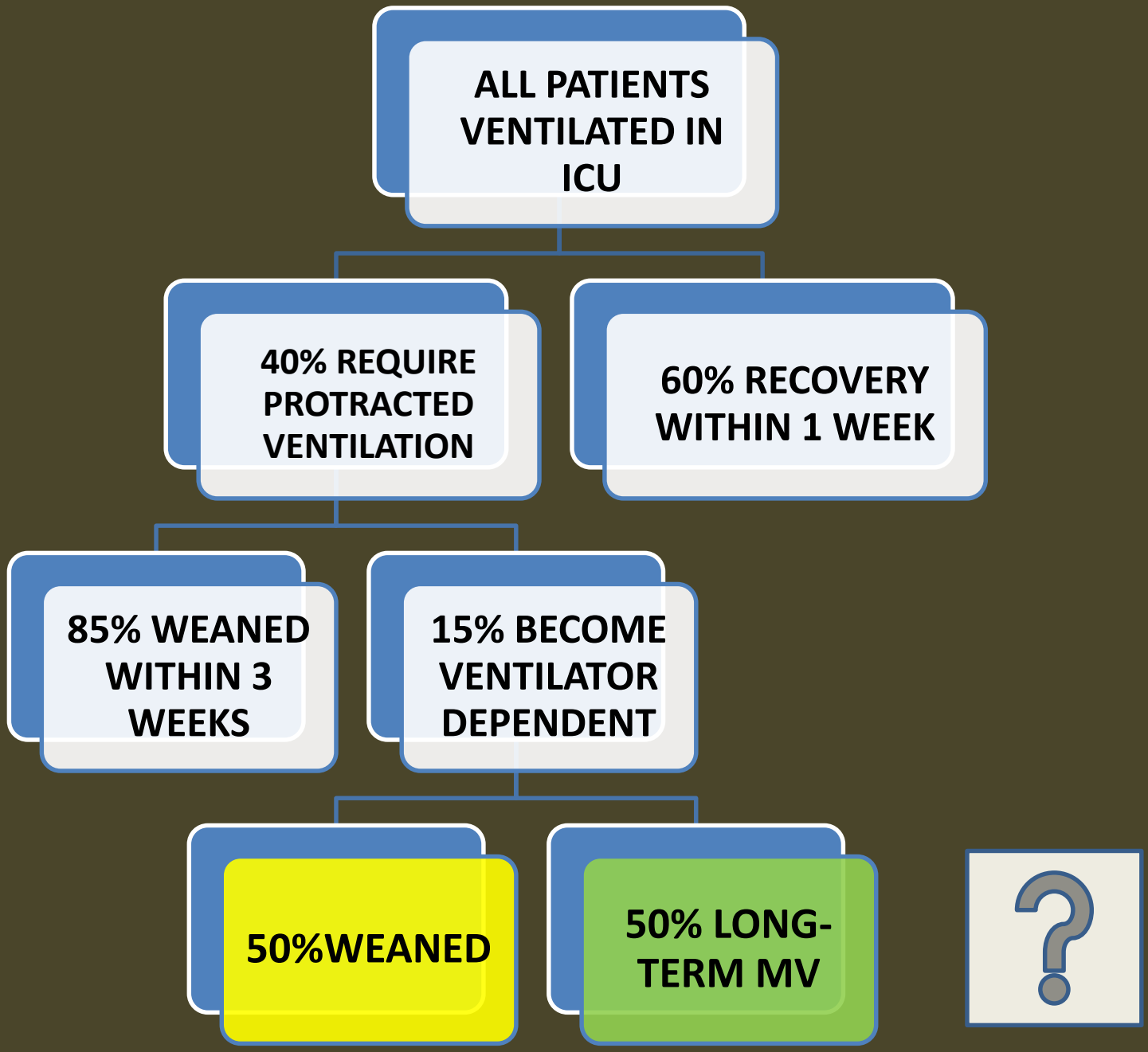
Patients' characterization, hospital course and clinical outcomes in five Italian respiratory intensive care units

Intensive Care Med (2010) 36:137–142

	1991–1995	1996–2000	2001–2005	*p* Value
Length of RICU stay (days)	23 ± 4	30 ± 4*	32 ± 3*	0.004
In-hospital mortality rate [*n* (%)]	82 (9)	138 (14)	184 (15)	0.049
Three-month mortality [*n* (%)]	90 (11)	119 (14)	152 (14)	n.s.
Weaning success rate [*n* (%)]	486 (87)	493 (74)	524 (66)	<0.001
Discharge destination [*n* (%)]				<0.001
Home	178 (22)	125 (15)	104 (10)	
Nursing home	21 (2)	36 (4)	48 (5)	
Acute Hospital	47 (6)	95 (11)	103 (10)	
Rehabilitative unit	573 (70)	591 (70)	780 (75)	
Respiratory status of patients discharged at home [*n* (%)]				<0.001
Home ventilation by tracheostomy	22 (12)	32 (25)	34 (33)	
Home NIV	8 (4)	7 (6)	11 (11)	
No ventilatory support	149 (84)	87 (69)	59 (56)	

RESPIRATORY INTENSIVE CARE - PAVIA
2000-2014 (1328 patients)

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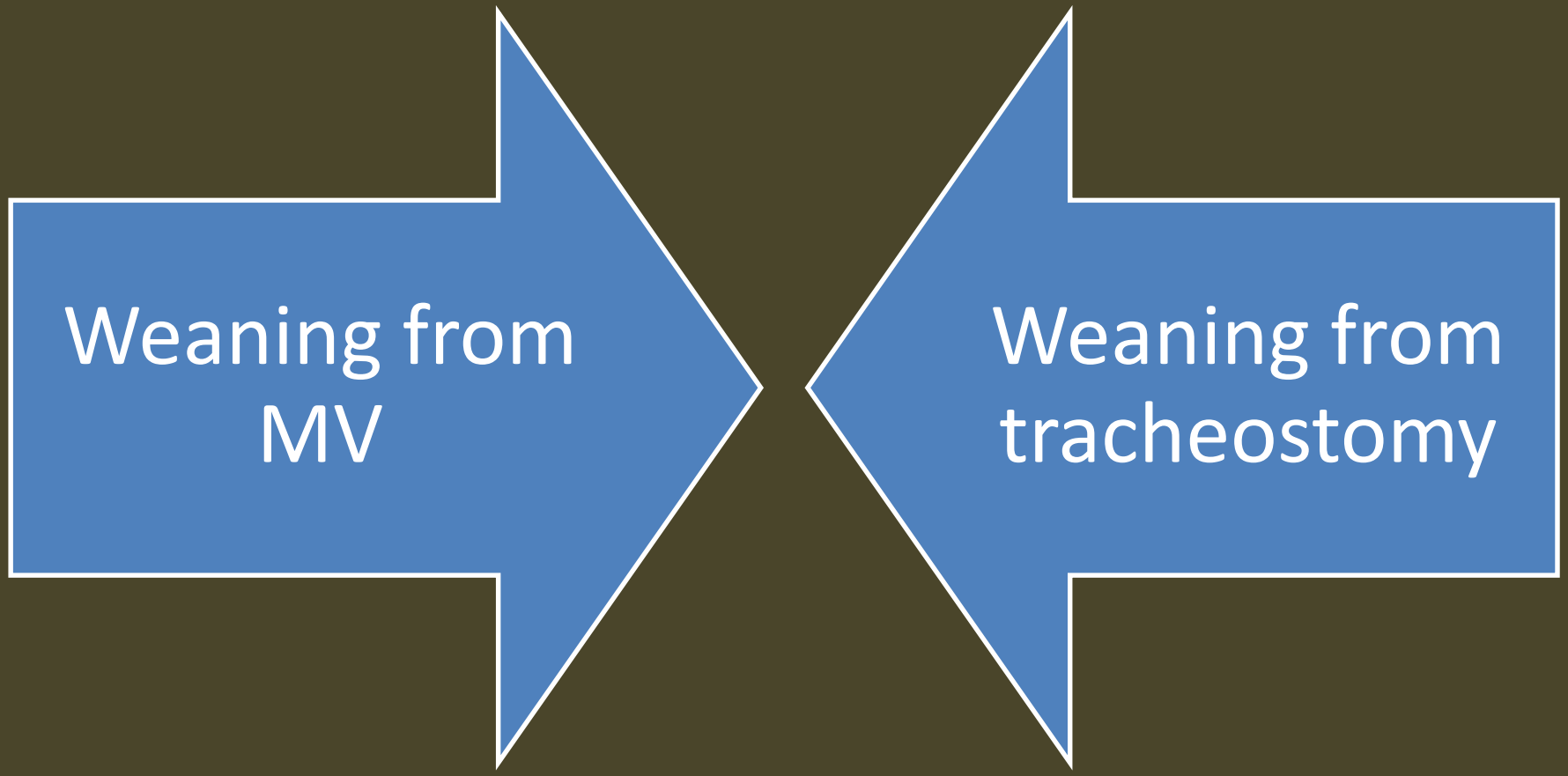
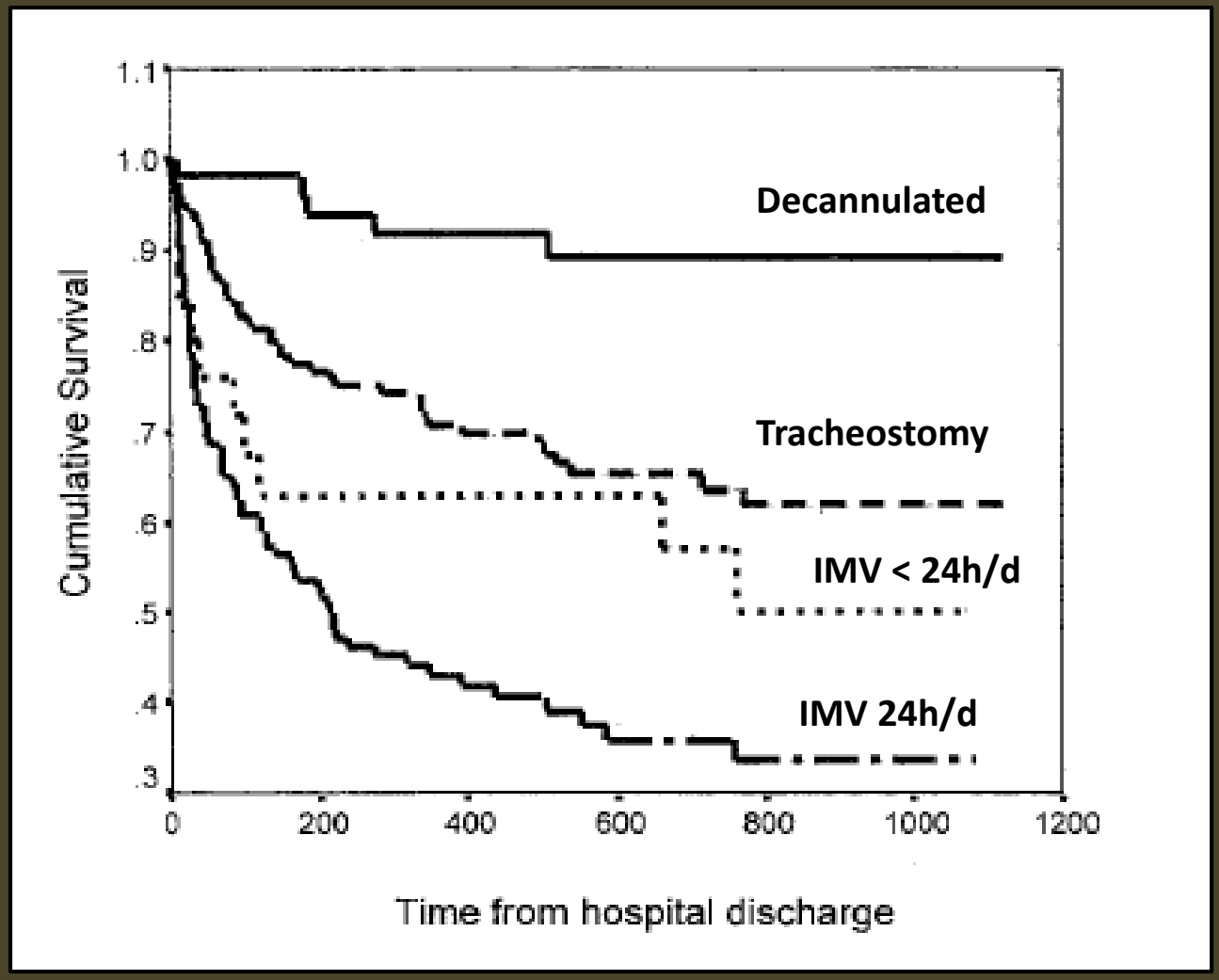
?


Weaning from MV
Weaning from tracheostomy

Hospital and Long-term Outcome After Tracheostomy for Respiratory Failure*

(CHEST 2004; 125:220–227)



Tracheostomy Decannulation

Heidi H O'Connor MD and Alexander C White MD

Respiratory Care • August 2010 Vol 55 No 8

Resolution of condition that necessitated tracheostomy tube

Adequate level of consciousness

Effective cough

Ability to manage secretions

Adequate oxygenation

Swallowing function

Ability to tolerate tracheostomy-tube occlusion

Intensive Care Med (2003) 29:845–848
DOI 10.1007/s00134-003-1689-z

BRIEF REPORT

Piero Ceriana
Annalisa Carlucci
Paolo Navalesi
Ciro Rampulla
Monica Delmastro
GianCarlo Piaggi
Elisa De Mattia
Stefano Nava

Weaning from tracheotomy in long-term mechanically ventilated patients: feasibility of a decisional flowchart and clinical outcome

- Clinical stability
- $PaCO_2 < 60$ mmHg
- Absence of delirium or other psychiatric dosorders
- Absence of tracheal or glottic stenosis
- Valid secretion removal and MEP ≥ 40 cmH2O
- Proper swallowing function
- Patient's consent

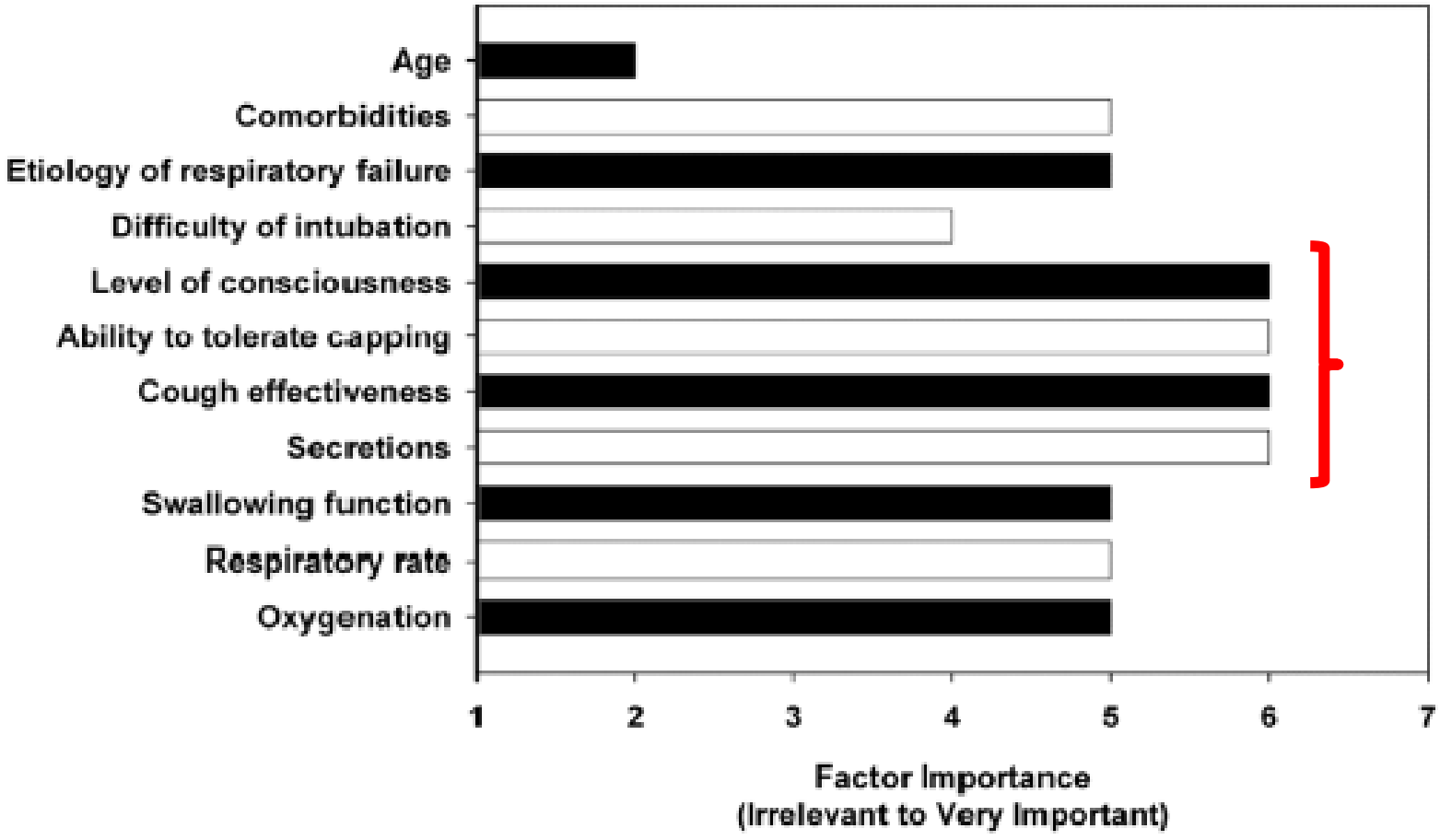
Research

Open Access

Determinants of tracheostomy decannulation: an international survey

Henry Thomas Stelfox[1], Claudia Crimi[2], Lorenzo Berra[2], Alberto Noto[3], Ulrich Schmidt[2], Luca M Bigatello[2] and Dean Hess[2]

Critical Care 2008, **12**:R26



Clinical Consensus Statement: Tracheostomy Care

Otolaryngology—Head and Neck Surgery Foundation 2013

Ron B. Mitchell, MD[1], Heather M. Hussey, MPH[2], Gavin Setzen, MD[3], Ian N. Jacobs, MD[4], Brian Nussenbaum, MD[5], Cindy Dawson, MSN, RN[6], Calvin A. Brown III, MD[7], Cheryl Brandt, MSN, ACNS-BC[8], Kathleen Deakins, RRT-NPS, FAARC[9], Christopher Hartnick, MD[10], and Albert Merati, MD[11]

Otolaryngology–Head and Neck Surgery 148(1)

Answer the following to determine readiness of patient for decannulation of tracheostomy tube:

- Have the indications for the tracheostomy placement resolved or significantly improved?
- Is the patient tolerating a decannulation cap on an appropriately sized uncuffed tracheostomy tube without stridor?
- Does fiberoptic laryngoscopy confirm airway patency to the level of the glottis and immediate subglottis?
- Does the patient have an adequate level of consciousness and laryngopharyngeal function to protect the lower airway from aspiration?
- Does the patient have an effective cough while the tracheostomy tube is capped?
- Have all procedures that require general endotracheal anesthesia been completed?

A systematic review on tracheostomy decannulation: a proposal of a quantitative semiquantitative clinical score

Pierachille Santus[1,7*], Andrea Gramegna[2], Dejan Radovanovic[1], Rita Raccanelli[1], Vincenzo Valenti[3], Dimitri Rabbiosi[4], Michele Vitacca[5] and Stefano Nava[6]

Santus et al. BMC Pulmonary Medicine 2014, 14:201

Table 2 QsQ score: Quantitative and semiquantitative parameters

Parameter	Cut-off	Missing	Fitting
	Objective quantitative parameters – Main criteria		
Cough	MEP ≥ 40 cmH2O PCF > 160 L/min	0	20
Tube capping	≥24 h	0	20
	Semi-quantitative parameters – Minor criteria		
Level of counsciousness	Drowsy/Alert	0	5
Secretion	(thick vs. thin)	0	5
Swallowing	Impaired/Normal	0	5
Capnia	paCO2 < 60 mmHg	0	5
Patent airway	Tracheal stenosis < 50% seen by bronchoscopy	0	5
Age	<70	0	5
Indication for tracheostomy	Others/Pneumonia or airway obstruction	0	5
Comorbidities	Present (≥1) or None	0	5

ROLE OF NON-INVASIVE VENTILATION

ACUTE SETTING

Non-invasive ventilation in acute respiratory failure

Stefano Nava, Nicholas Hill

Lancet 2009; 374: 250–59

Recommendations for NIV to treat acute respiratory failure

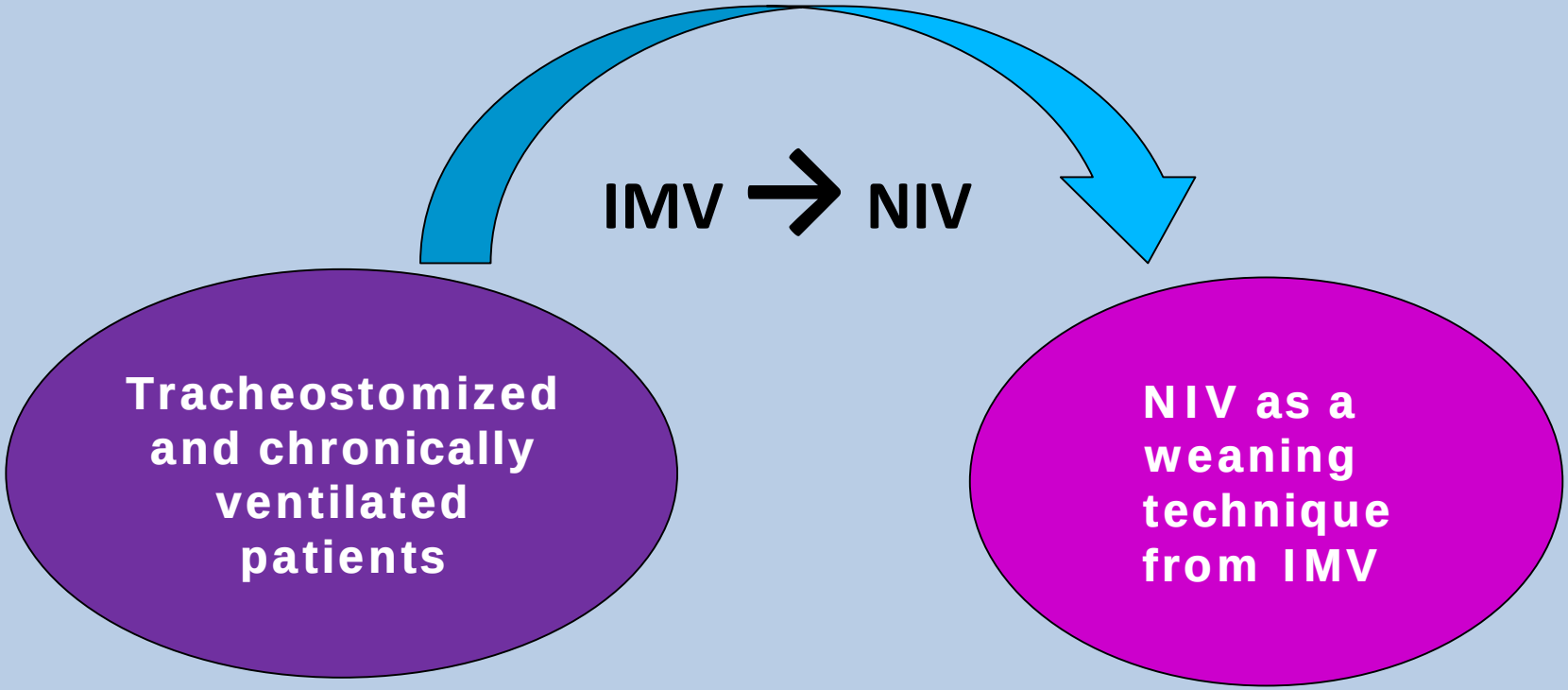
Level 1 evidence

Systematic reviews (with homogeneity) of RCTs and individual RCTs (with narrow CIs)

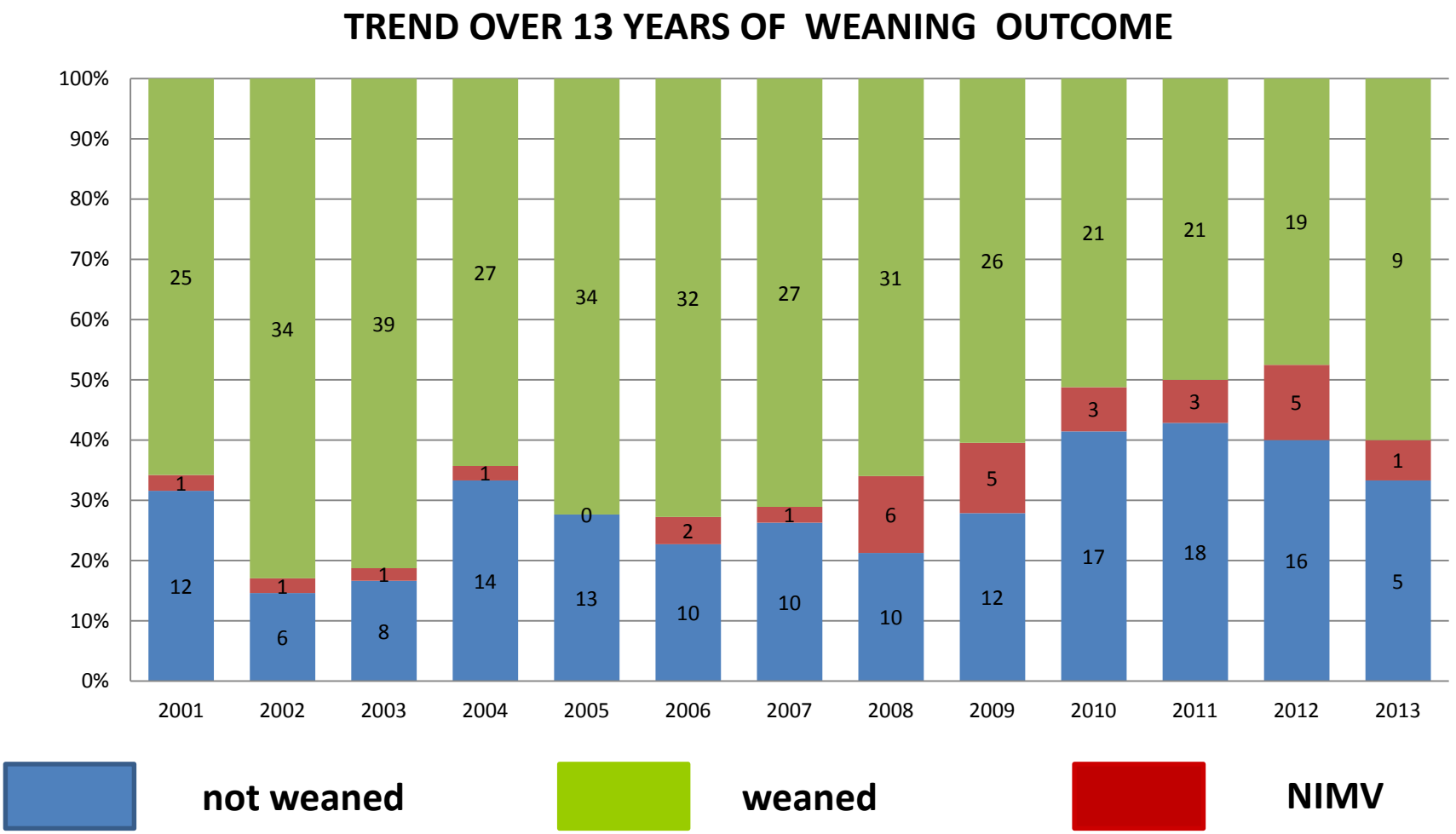
Evidence of use (favourable)

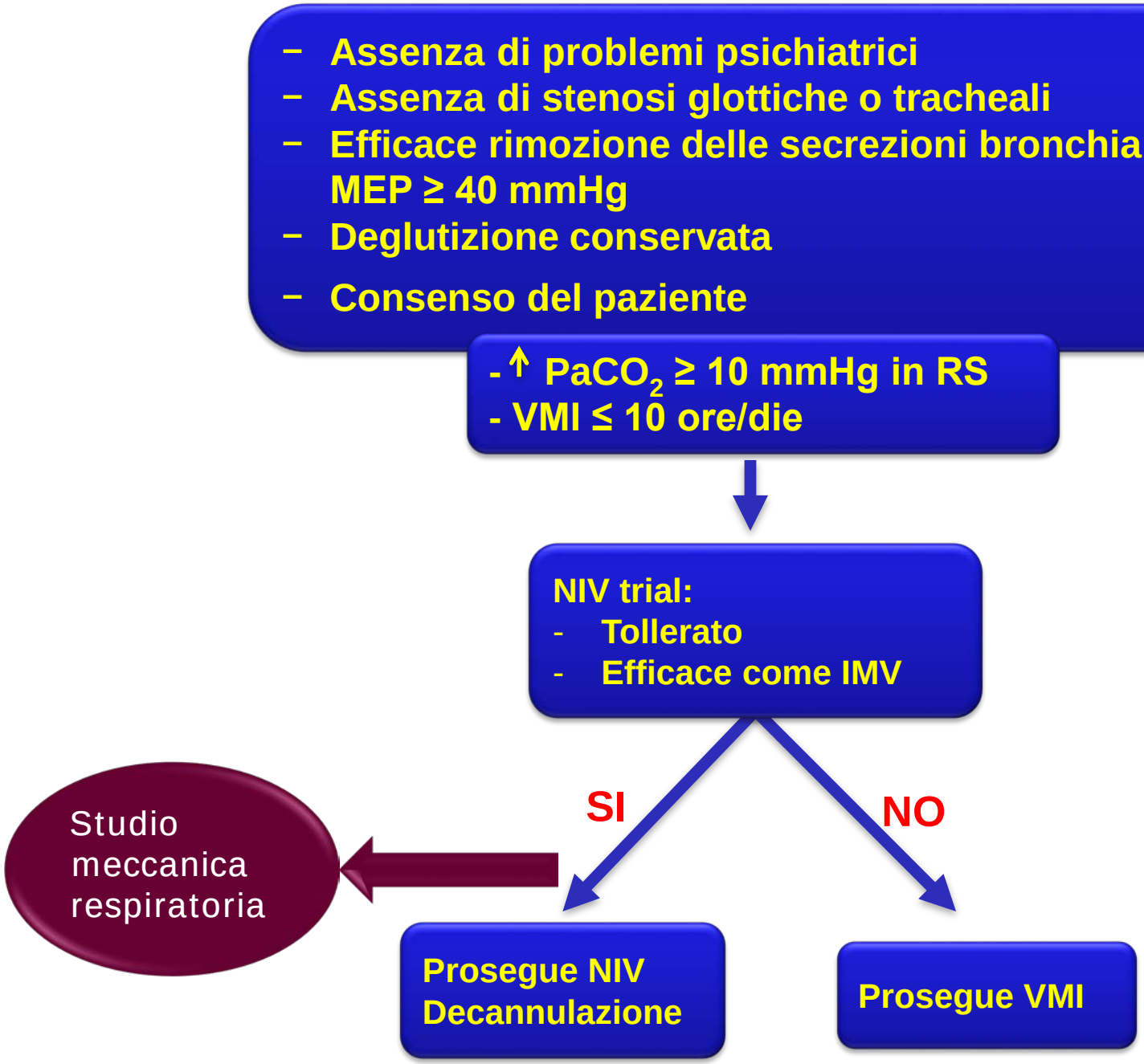
- COPD exacerbations
- Facilitation of weaning/extubation in patients with COPD
- Cardiogenic pulmonary oedema
- Immunosuppressed patients

CHRONIC SETTING ?

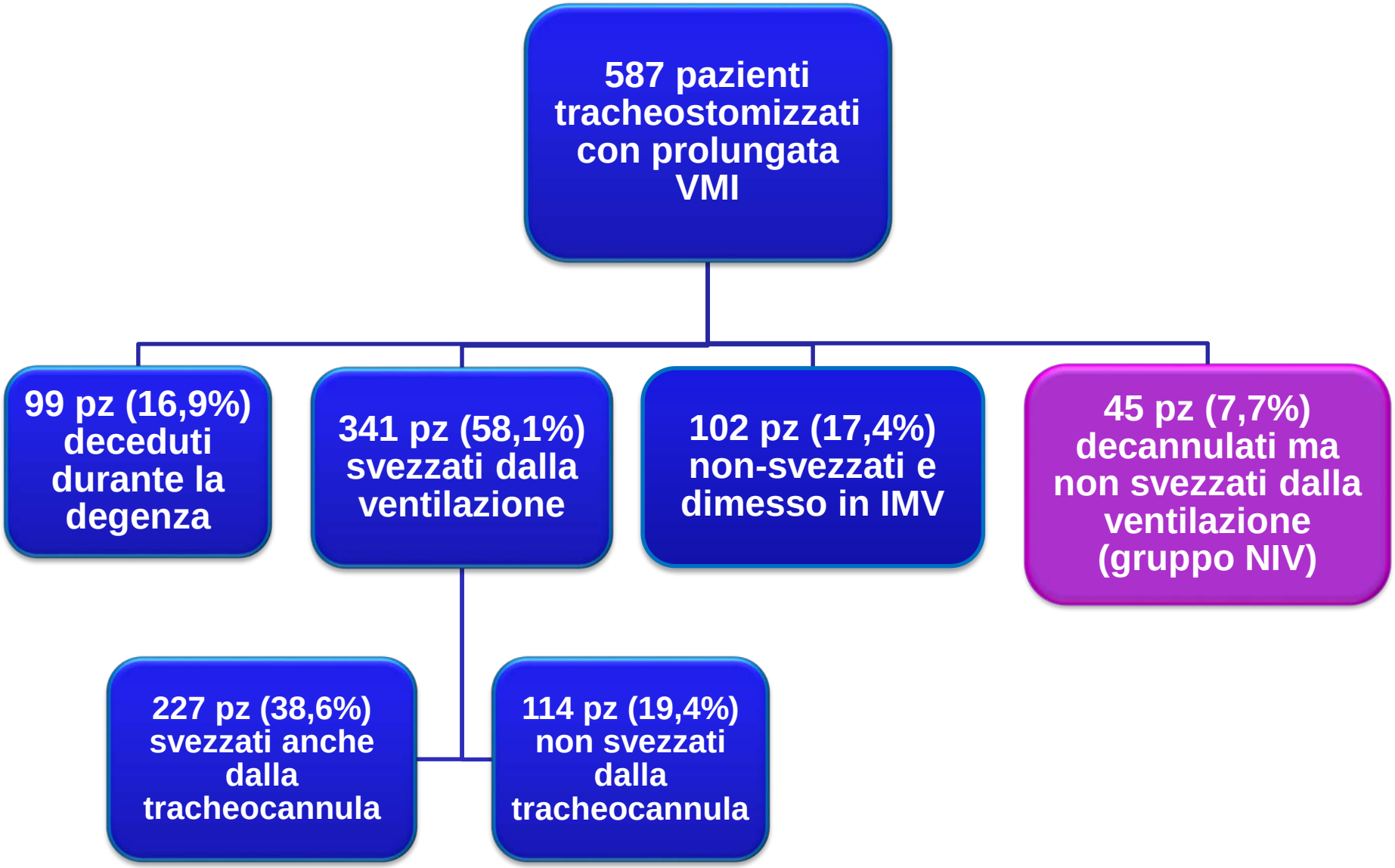

IMV → NIV
Tracheostomized and chronically ventilated patients
NIV as a weaning technique from IMV

RESPIRATORY INTENSIVE CARE - PAVIA
2000-2014 (1328 patients)

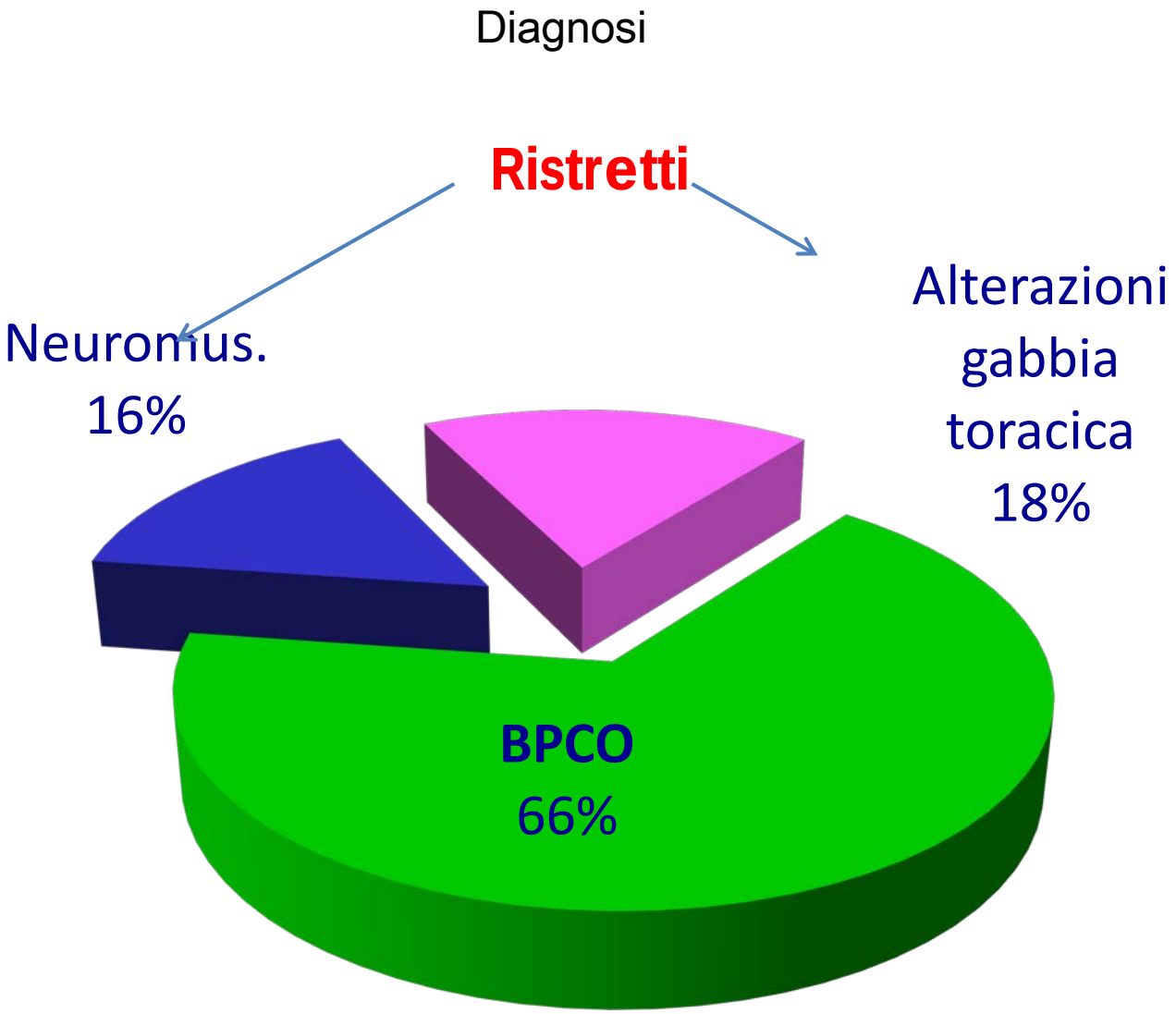




Modificato da: Ceriana et al. Inten. Care Med. 2003;29(5):845-8.


587 pazienti tracheostomizzati con prolungata VMI
99 pz (16,9%) deceduti durante la degenza
341 pz (58,1%) svezzati dalla ventilazione
102 pz (17,4%) non-svezzati e dimesso in IMV
45 pz (7,7%) decannulati ma non svezzati dalla ventilazione (gruppo NIV)
227 pz (38,6%) svezzati anche dalla tracheocannula
114 pz (19,4%) non svezzati dalla tracheocannula

Risultati

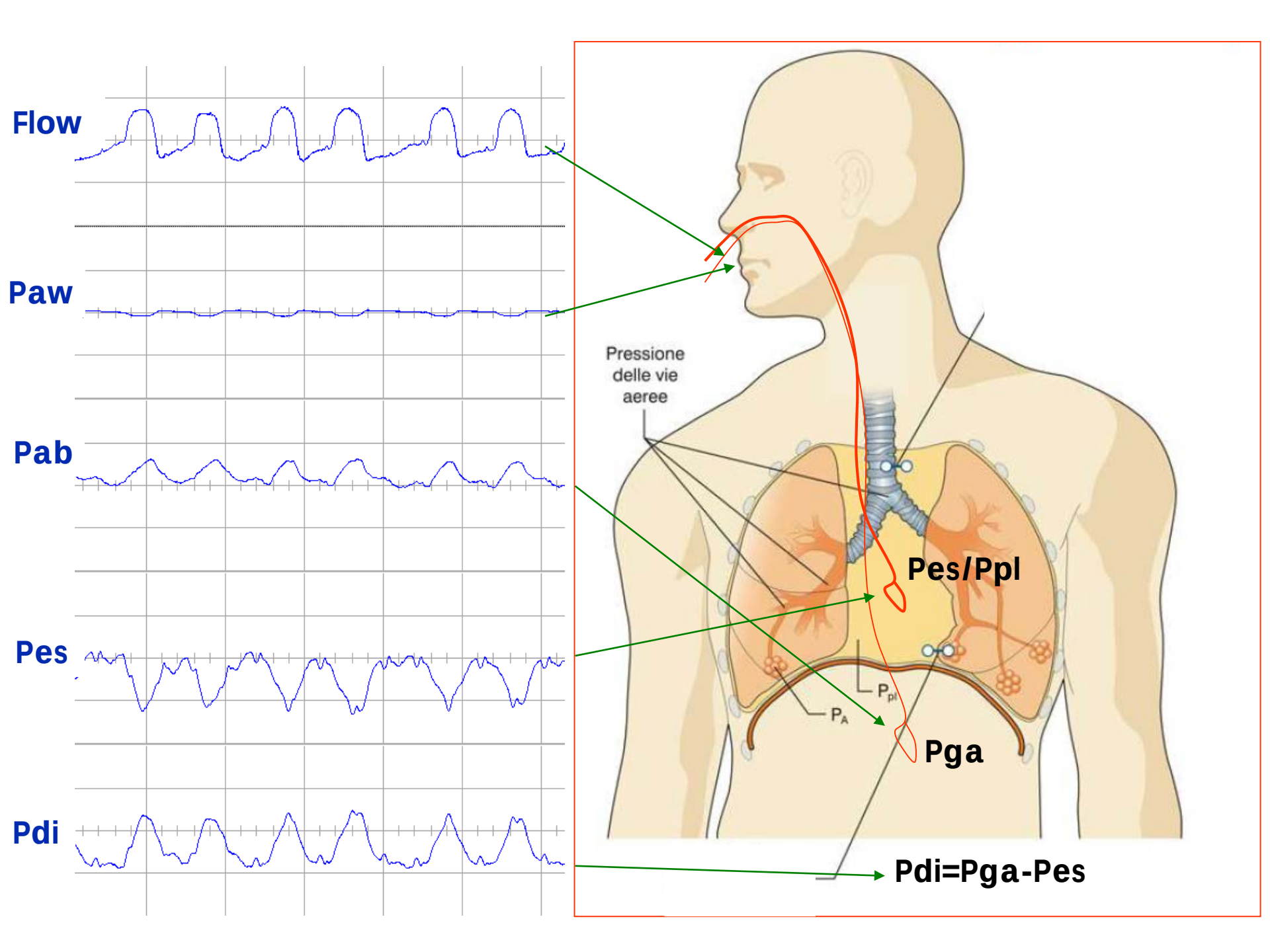

Diagnosi
Ristretti
Neuromus.
16%
Alterazioni
gabbia
toracica
18%
BPCO
66%

Risultati

Variabili	Mean ± SD	Median / Q1/ Q3
Età (anni)	68.6 ± 9.9	
Genere (M/F)	24/21	
SAPS II		27.5 / 24 / 30
Durata weaning		25 / 18 / 28
Durata ricovero RICU (gg)		34.0 / 26 / 41.5
Durata totale ricovero (gg)		35.0 / 30 / 43
Ore ventilazione/die alla dimissione		6 / 6 / 8
IPAP (cmH_2O)	17.1 ± 2.8	
EPAP (cmH_2O)	4.2 ± 1.4	
Co-morbidità (n)	2.27 ± 1.41	

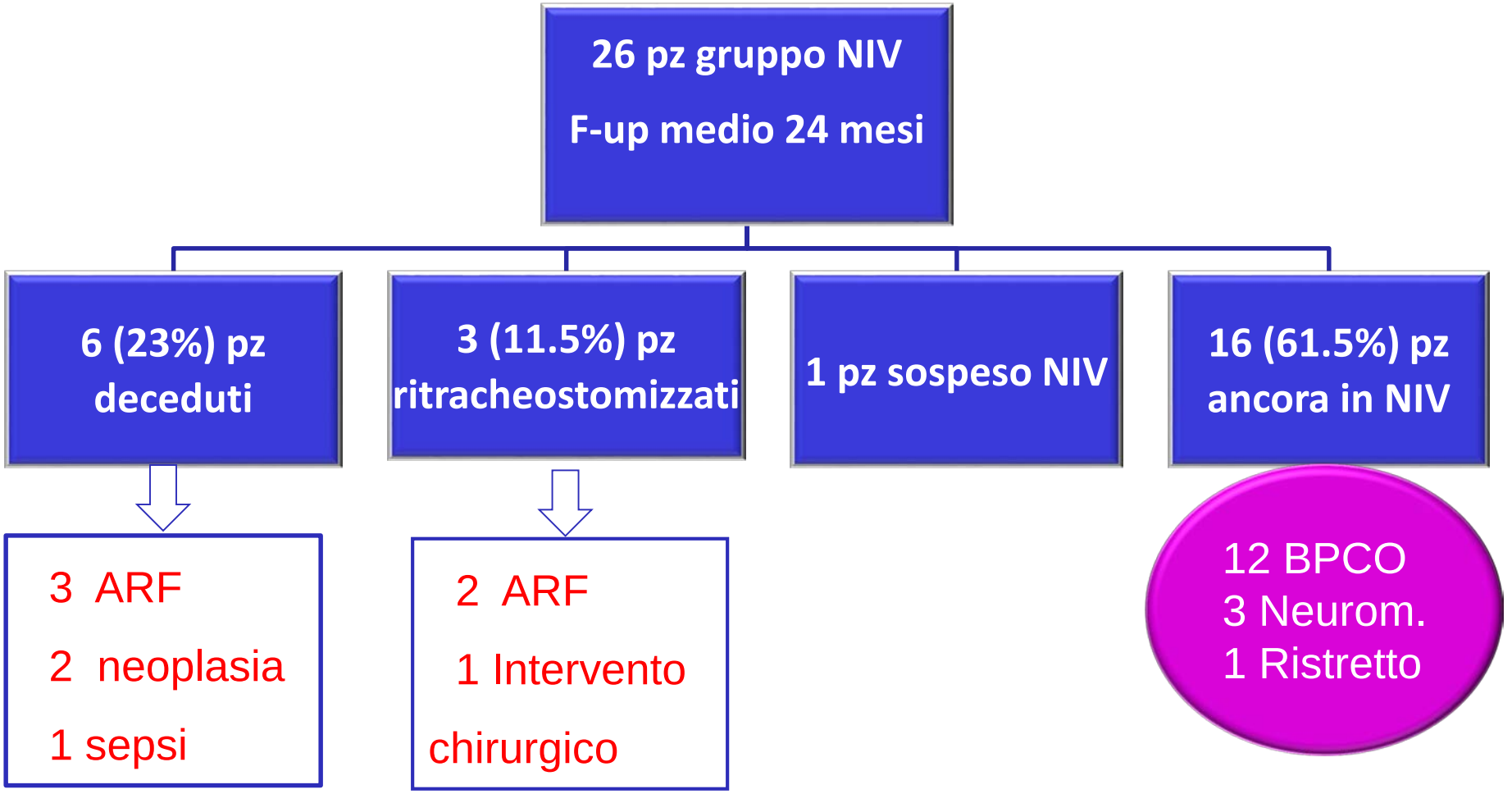
Risultati

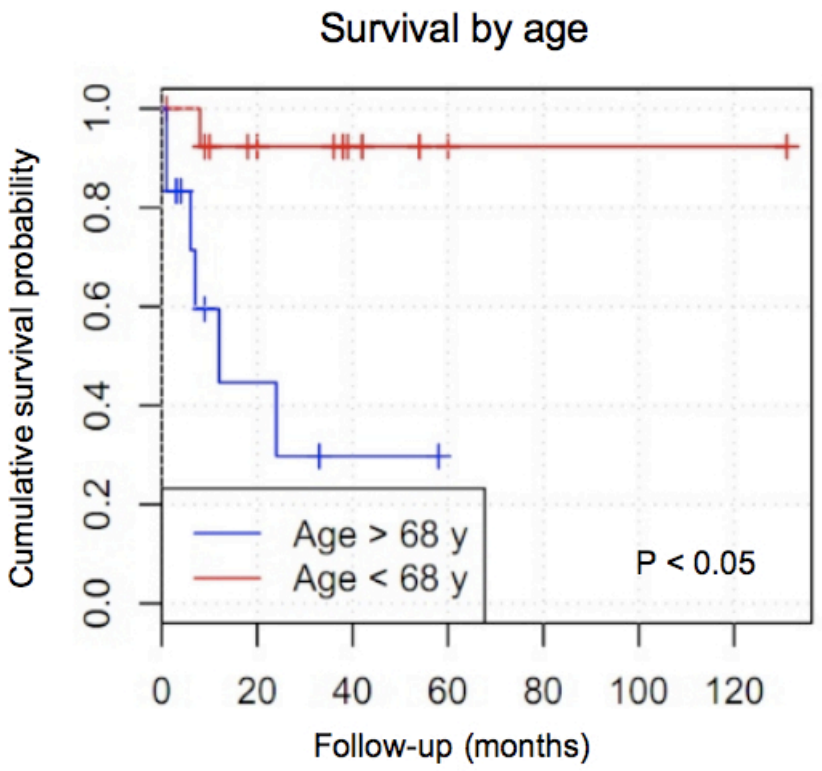
Variabili	Mean ± SD
EGA pre-NIV in RS	
pH	7.39 ± 0.04
PaO_2	78 ± 14.4
$PaCO_2$	53 ± 10.3
EGA alla dimissione in NIV	
pH	7.41 ± 0.04
PaO_2	77.3 ± 12.9
$PaCO_2$	45.2 ± 5.9

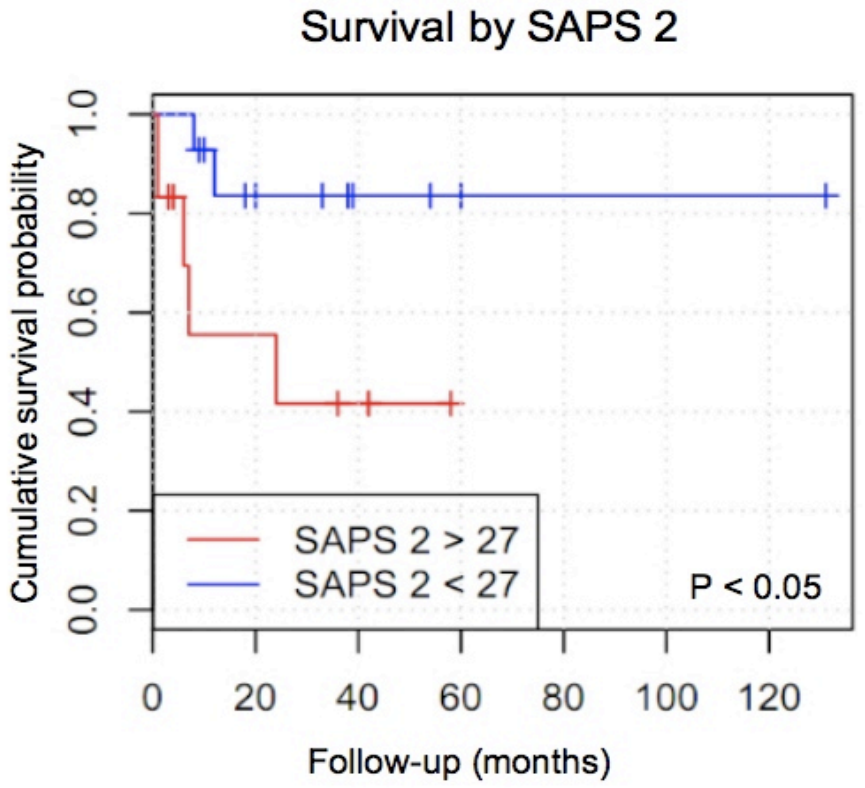

Flow
Paw
Pab
Pes
Pdi
Pressione delle vie aeree
Pes/Ppl
Pga
P_{pl}
P_A
Pdi=Pga-Pes

Respiratory Mechanics	Mean ± SD	Median-Q1-Q3
Tidal Volume (L)		0.31 / 0.25 / 0.41
Respiratory frequency (fr)	26.38 ± 6.99	
fr/VT		83 / 65 / 134
PEEPi.dyn (cmH_2O)		2 / 1.1 / 3
CL,dyn (L/cmH_2O)	0.06 ± 0.04	
RL ($cmH_2O/L/s$)	10.52 ± 4.99	
PTPdi (cmH_2O)		14.5/ 8 / 19.5
PTPpl (cmH_2O)		14 / 9.5 / 17.5
PTPdi/min (cmH_2O/s)	305.24 ± 167.1	
PTPpl/min (cmH_2O/s)	315.74 ± 108.39	
Pdi max (cmH_2O)	44.43 ± 19.5	
Ttdi	0.1 ± 0.04	
MIP (cmH_2O)	-51.62 ± 20.34	
MEP (cmH_2O)	94.63 ± 42.53	

Follow-up


26 pz gruppo NIV
F-up medio 24 mesi
6 (23%) pz deceduti
3 (11.5%) pz ritracheostomizzati
1 pz sospeso NIV
16 (61.5%) pz ancora in NIV
3 ARF
2 neoplasia
1 sepsi
2 ARF
1 Intervento chirurgico
12 BPCO
3 Neurom.
1 Ristretto





Kaplan-Meier survival analysis. Two variables were found to significantly predict survival: age and SAPS II at admission. In particular patients aged > 68 years showed a poor survival compared with patients aged < 68 years at admission ($p < 0.05$); moreover a SAPS II > 27 at admission was a strong predictor of mortality ($p < 0.05$).

Conclusioni

- La tracheostomia è una procedura eseguita di routine nelle UTI in pz con difficile svezzamento
- Attualmente circa il 20% di questi pz rimane ventilatore dipendente e dimesso con la tracheostomia
- In pazienti selezionati, giudicati svezzabili dalla tracheo-cannula tranne che per la necessità di ventilazione per al massimo 10 ore al giorno, il passaggio alla NIV è fattibile, sicuro e ben tollerato
- Non influisce sulla sopravvivenza a lungo termine né sulla probabilità di essere tracheostomizzati nuovamente