

Master Class Denmark 2014
 “Chronic Respiratory Failure – State of the Art/Trends”
PHILIPS
***Mouthpiece Ventilation for
Neuromuscular Disorders***







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 Porto, Portugal




M-IPPV first reported at a conference on post-poliomyelitis

- John E Affeldt of Rancho Los Amigos Hospital in Los Angeles observed that an intermittent positive-pressure ventilation machine with a mouthpiece circuit could be used to relieve dyspnea in ventilator dependent polio patients whose negative-pressure ventilation was interrupted for transfers, nursing care, or physical therapy.

Affeldt JE. Roundtable conference on poliomyelitis equipment. National Foundation for Infantile Paralysis- March of Dimes. White Plains, New York; 1953.



“...some of our physical therapists, in struggling with (iron lung) patients, noticed that they could simply take the positive pressure attachment, apply a small plastic mouthpiece..., and allow that to hang in the patient's mouth....We even had one patient who has no breathing ability who has fallen asleep and been adequately ventilated by this procedure, so that it appears to work very well, and I think does away with a lot of complications of difficulty of using (invasive) positive pressure. You just hang it by the patients and they grip it with their lips, when they want it, and when they don't want it, they let go of it. It is just too simple.....”

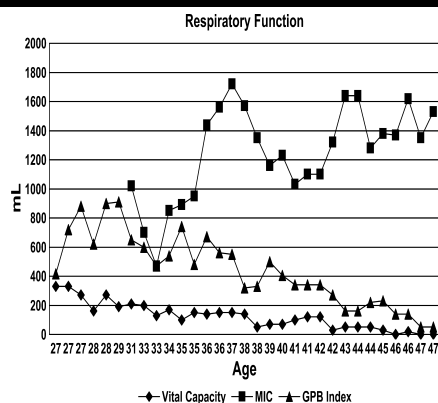
What is Mouth Piece Ventilation (MPV)?

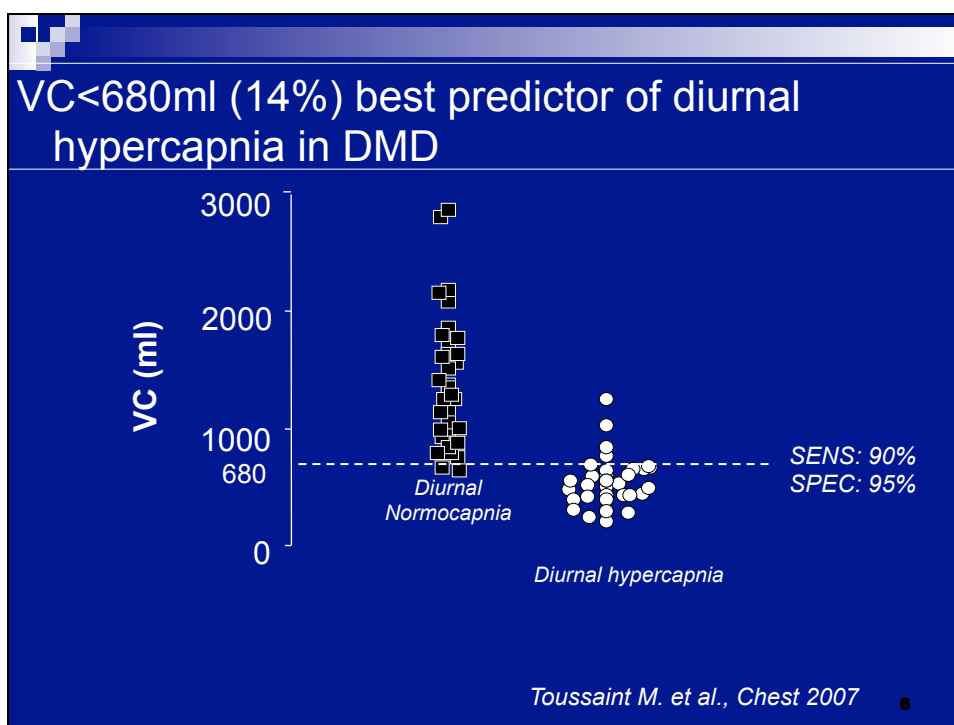
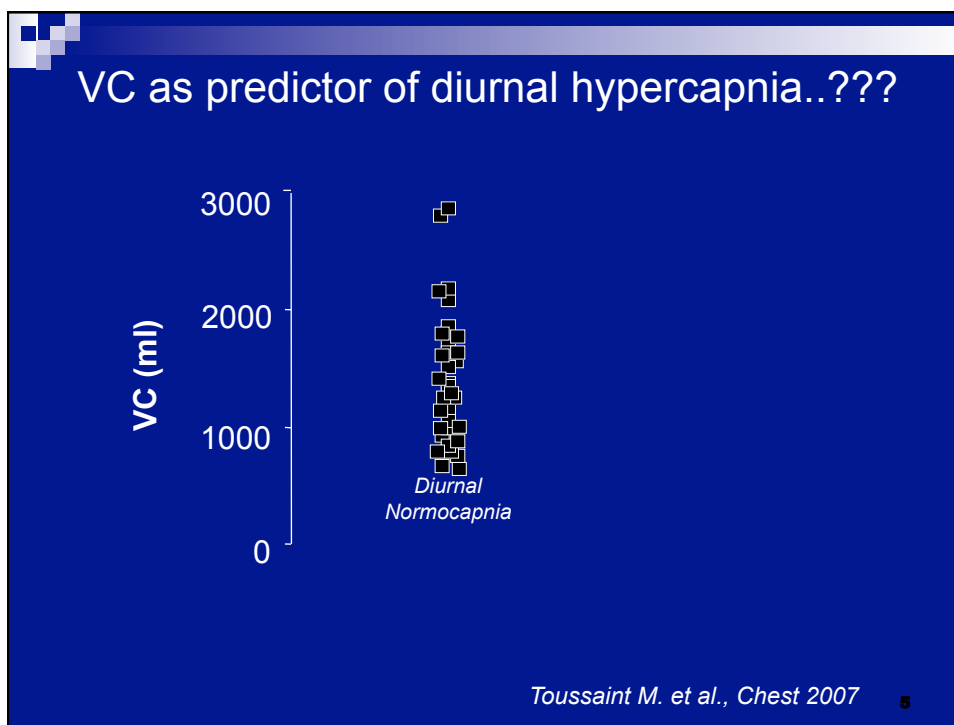
- MPV or “sip ventilation” was first described by Affeldt at a conference on Poliomyelitis in 1953
- Bach suggested mouth piece ventilation as an alternative to tracheostomy
Bach JR, . *Chest* 1993;103(1):174-182.
- It involves the patient taking breaths from a small mouth piece attached to a ventilator circuit. John R Bach, Miguel R Gonçalves 2006
- The patient is able to take supported breaths as required and in between breaths the patient is able to vocalise cough and eat normally John R Bach, Miguel R Gonçalves 2006 *Ventilator-Assisted Living*..Spring 2004.
- It can be combined with mask ventilation for those patients requiring 24 hour ventilation Bach JR, Alba 1994 *Chest*. 1994;106:1705-10

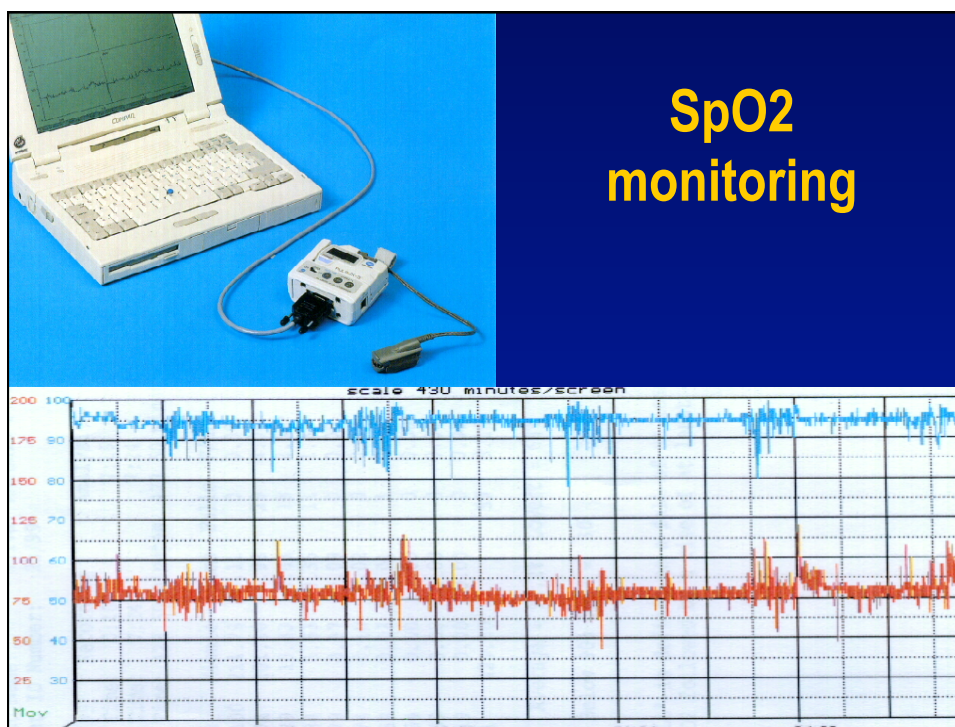
COMMENTARY

Forty-Eight Years with Duchenne Muscular Dystrophy

Bach JR, DeCicco A: Forty-eight years with Duchenne muscular dystrophy. *Am J Phys Med Rehabil* 2011;90:868–870.







Transcutaneous Capnography Materials



TCM400



TCM4 et TCM40



Digital Monitoring System

Radiometer



Tosca 500



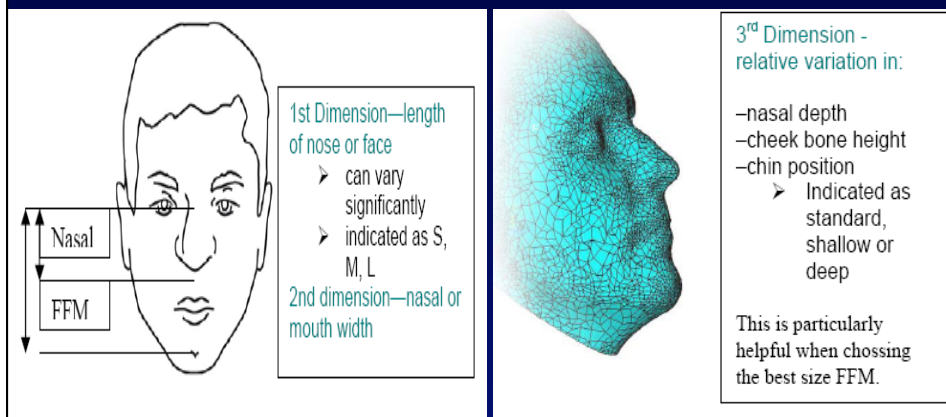
MicroGas 7650 rapid

Sentec



Digital Monitoring System (OEM solution)

Choosing the correct interface



Susan Sortor Leger, ERS school course 2004

MOUTH-PIECE



- **ADVANTAGES:**
- can be used intermittently breath by breath, according to patient's own needs.
- Better appearance (daytime use)
- Facilitates speech and cough
- Ideal for fulltime NIV

Schonhofer, Sortor Leger ERJ 2002; Bach, JR Chest 1987

- **DISADVANTAGES:**
- air leaks
- dry mouth
- dental and tempomandibular joint problems
- may elicit gag reflex
- stimulate salivation and eventually cause vomiting with risk of aspiration

Suitable patients.

- It is used most commonly in Neuromuscular, Duchenes Muscular Dystrophy Motor Neurone and Spinal disease.
- It can be used to treat dyspnea, increase Tidal Volume (VT), control hypercarbia and improve quality of life Boitano LJ, Benditt JO. *Respiratory Care*.2005 Nov;50(11):1457-61.
- It has been shown to be useful in the Intensive care unit (ICU) weaning from full mechanical ventilation. However, it did involve more nursing time than mask NIV. Schneider E, *Anesthesia*. 2006;61(1):20-3.
- Glerant et al (2007) has shown that MPV does have a place Chronic Obstructive Pulmonary Disease (COPD) Glerant JC, *Respiration*. 2007;74:632-639.
- In COPD patients with acute hypercapnic respiratory failure and can reduce the rate of endotracheal intubation in comparison to standard medical treatment.
- It has a place second line measure to Mask Non Invasive Ventilation (NIV). Schneider E, *Anesthesia*. 2006;61(1):20-3. Glerant JC, *Respiration*. 2007;74:632-639.
- The patient must be able to control their upper airway and have normal Bulbar function. John R Bach, Miguel R Gonçalves 2006 *Ventilator-Assisted Living*..Spring 2004

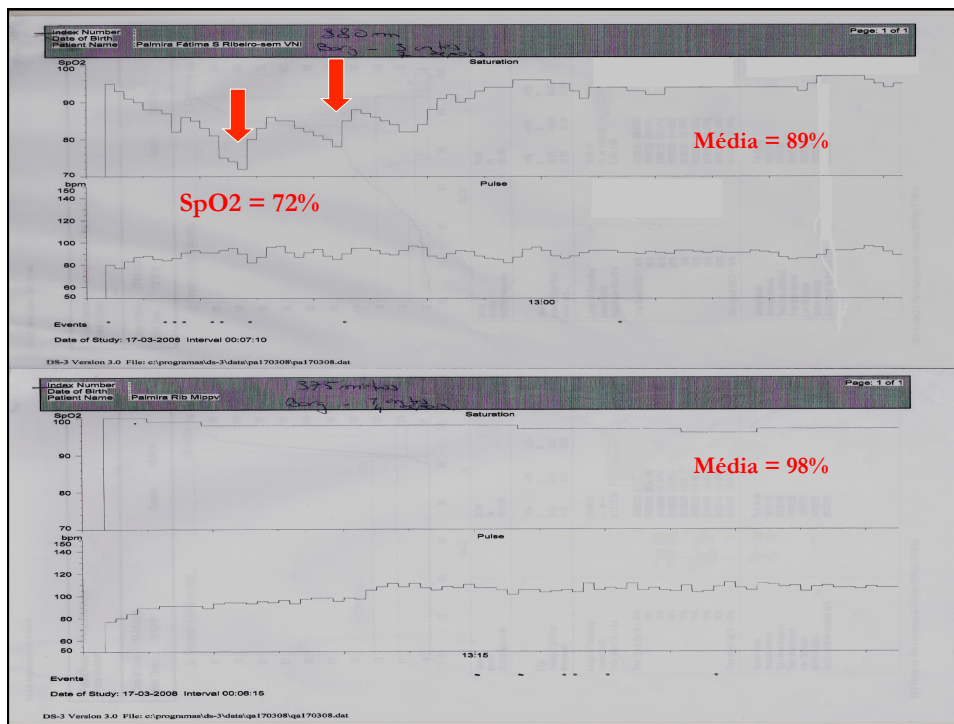
MOUTHPIECE INTERMITTENT VOLUME VENTILATION DURING WALKING IN PATIENTS WITH SEVERE RESTRICTIVE VENTILATORY SYNDROME.

T PINTO PT Msc, MR GONÇALVES PT PhD, JC WINCK MD PhD

Patologias	N = 18
Cifoescoliose	11
DNM	6
Paralesia Diafragmática	1

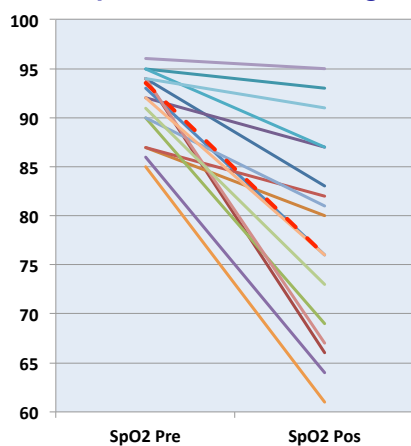
	N=18
FVC (ml)	880,6
FVC (%)	33,4
FEV1 (ml)	720
FEV1 (%)	32,9
IT	84,7
Tempo VNI (meses)	60,7

Am J Phys Med Rehab 2014 (in review)



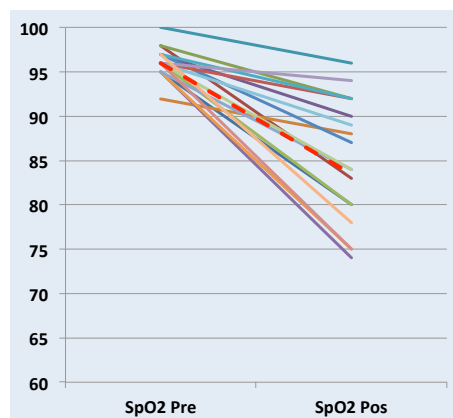
SpO2 during the 6 min Walk Test

Spontaneous Breathing

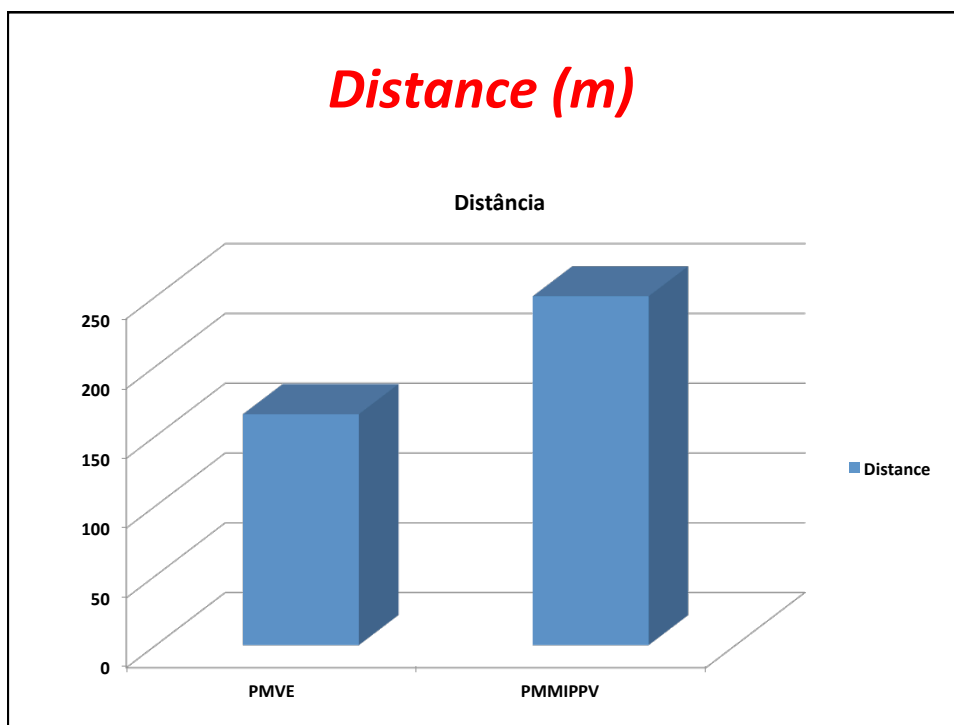


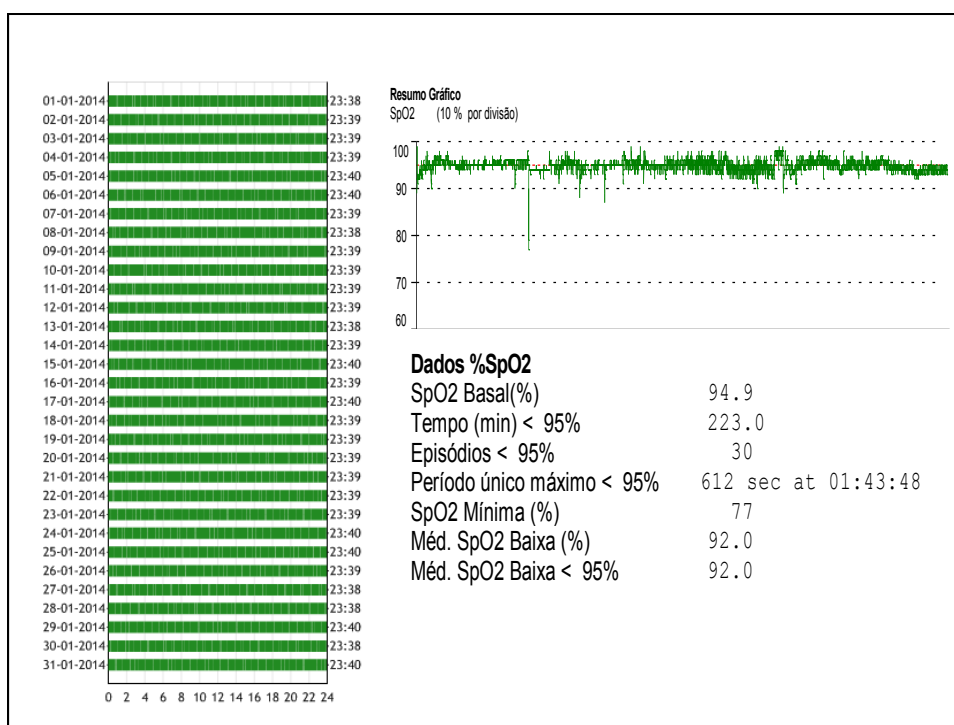
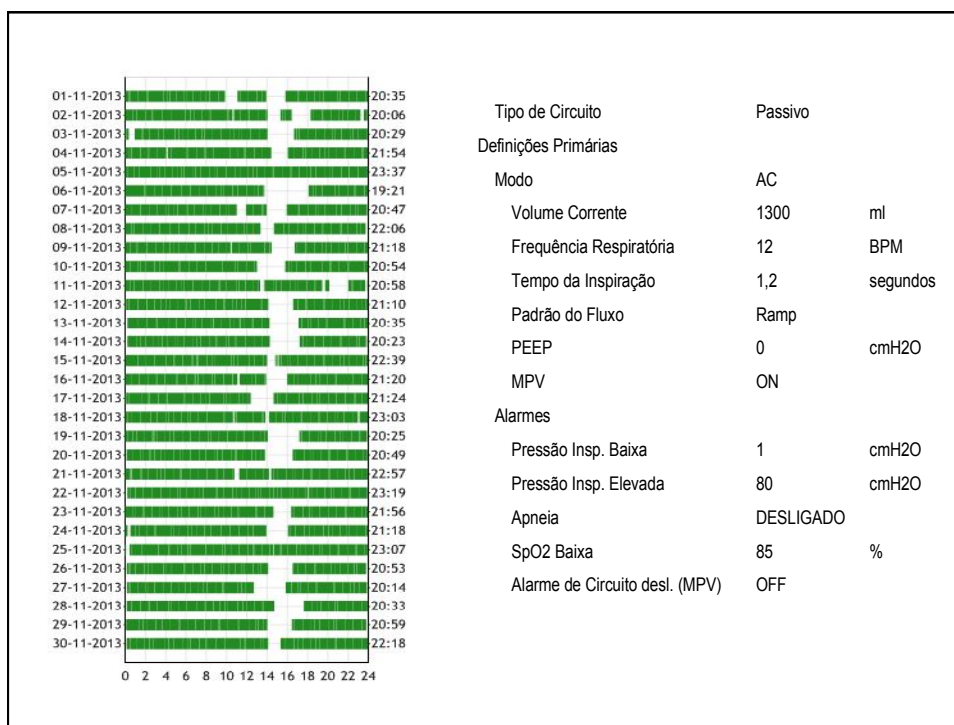
Média inicial de 93,5 e final de 76%

NIV with MIPPV



Média inicial de 96 e final de 83,5%





The «traditional» paradigm

Noninvasive ventilation for chest wall and neuromuscular disorders

J.M. Shneerson*, A.K. Simonds[#]

Tracheostomy ventilation

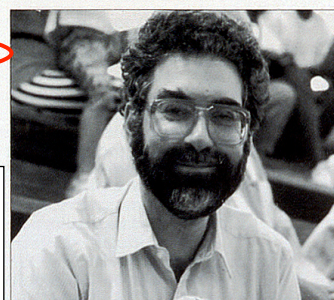
Tracheostomy-intermittent positive-pressure ventilation (T-IPPV) is more frequently used in some countries (*e.g.* France) than others (*e.g.* Italy and the UK). It should be considered in patients with a high level of ventilatory dependency (near 24 h).

Application Techniques

by John R. Bach, MD
Associate Professor of Physical Medicine and Rehabilitation
The New Jersey Medical School, UMDNJ, Newark, NJ

Do you suffer from intubation and tracheostomy paradigm paralysis?

Paradigm paralysis is the failure to learn new and superior approaches because they differ radically from the generally employed methods in which one has invested time and energy. It is the terminal disease of misplaced certainty.¹ Consider the following:



Eur Respir J 2004; 23: 651–654
DOI: 10.1183/09031936.04.00141604
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European Respiratory Journal
ISSN 0903-1936

CORRESPONDENCE

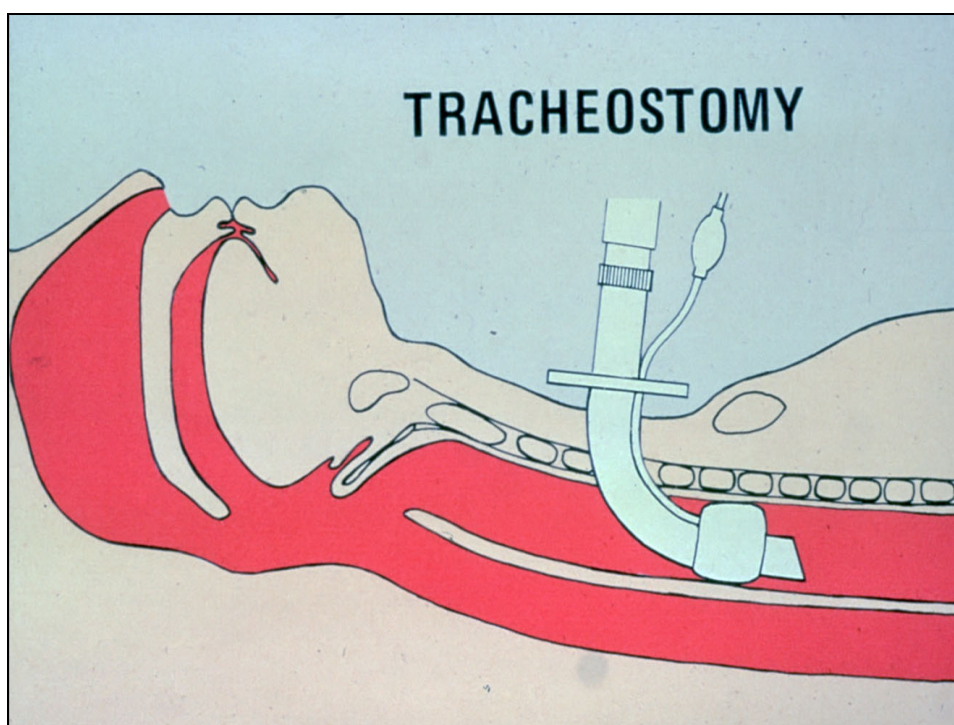
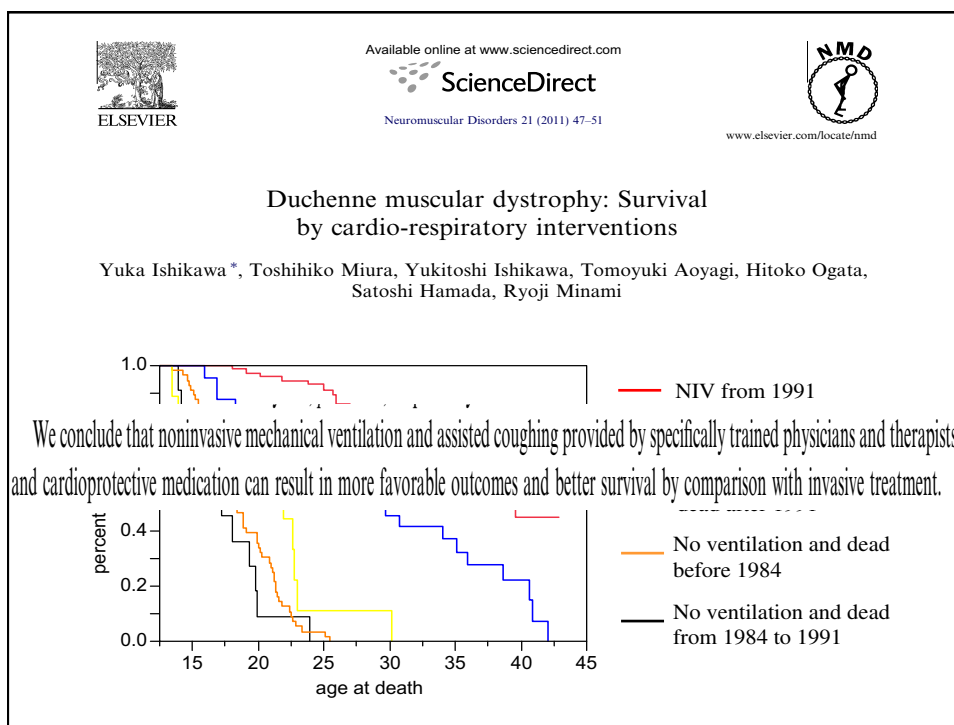
Noninvasive ventilation or paradigm paralysis?


To the Editor:

Current respiratory management paradigms recommend tracheotomy for ventilator-dependent patients. The review by SHNEERSON and SIMONDS [1] published in the *European Respiratory Journal* on the current use of noninvasive ventilation (NIV) in neuromuscular disorders does little to dispel this paradigm.

J.R. Bach*, M.R. Gonçalves[#]

*UMDNJ-New Jersey Medical School, Physical Medicine and Rehabilitation, Newark, NJ, USA. [#]Rehabilitation and Lung Unit, Pulmonary Medicine Dept, University Hospital of S. João, Porto, Portugal.



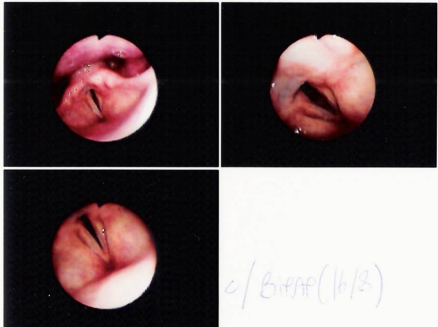


Oximetry and Indications for Tracheotomy for Amyotrophic Lateral Sclerosis*

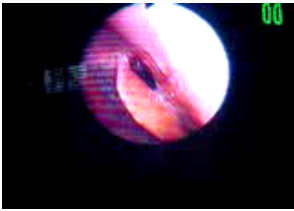
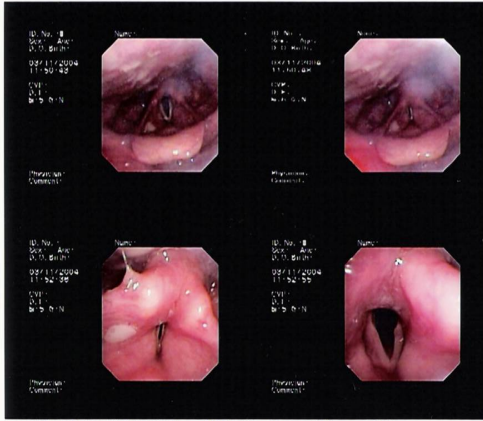
John Robert Bach, MD, FCCP; Carlo Bianchi, MD; and Elaine Aufiero, MD

- **Tracheotomy needs to be considered when the Baseline SpO₂ < 95% and cannot be normalized by NIV+ Assisted Cough**

Glottic Dysfunction in ALS



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Hospitalization days/pt

DMD

Legend: Hosp/VnPt (white bar), Pneu/VnPt (black bar)

Treatment Type*

Treatment Type*	Hosp/VnPt (days/pt)	Pneu/VnPt (days/pt)
No Treatment N=44	1.51	0.78
YrsPne3, N=3.7	1.62	1.21
Oxygen Therapy N=42	1.62	1.21
Biv-Mr N=239	0.38	0.18
YrsPne1.4, N=2.3	0.18	0.18
NPVn-VnPt N=18	0.18	0.18
YrsPne1.4, N=13.3	0.18	0.18
Biv-Mr N=220	0.18	0.18
YrsPne1.3, N=14.9	0.18	0.18
NPVn-VnPt N=47	0.18	0.18
YrsPne1.4, N=8.6	0.18	0.18
TbVn N=200	0.18	0.18
YrsPne1.4, N=10.2	0.18	0.18
Tracheostomy N=9	0.18	0.18
YrsPne1.2, N=6.6	0.18	0.18
T + NPVn N=3	0.18	0.18
YrsPne1.5, N=10.0	0.18	0.18

Non protocol tracheostomy

Part time non invasive

Full time non invasive

Bach et al., *Chest* 1997

Downfalls of tracheostomy

- Increase of secretions, bacterian colonization, and pneumonias.
- Difficulties to swallow
- Difficulties of phonation
- Mucus plugging, risk of cannula obstruction
- Haemorrhagic risk
- Degradation of the quality of life

Complications	Cases per 10,000 Procedures		P
	ST	PDT	
Serious			
Death	3	44	0.00114
Arrest	6	33	0.022
Pneumothorax	74	66	1.0
Pneumomediastinum	3	6	0.864
Total	86	149	0.049
Intermediate			
Desaturation/hypotension	23	77	0.0056
Tracheal wall injury	6	50	0.00163
Cannula misplacement	17	44	0.089
Convert to open	NA	83	NA
Aspiration	0	0	NA
Total	46	254	< 0.00001
Minor			
Hemorrhage	142	143	1.0
Difficult tube placement	6	220	0.00001
False passage	11	160	0.00001
Subcutaneous emphysema	20	105	0.00007
Total	179	628	< 0.00001

*Adapted from data in Reference 8.
ST = surgical tracheostomy
PDT = percutaneous dilational tracheostomy
NA = not applicable

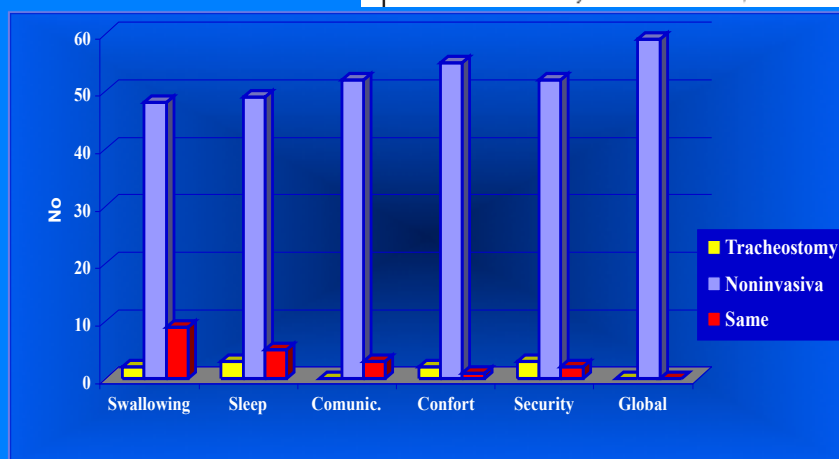
Dulguero P, et al Crit Care Med

A comparison of long-term ventilatory support alternatives from the perspective of the patient and care giver.

J R Bach
Chest 1993;104:1702-1706

Ventilator Weaning by Lung Expansion and Decannulation

Bach JR, Goncalves M: Ventilator weaning by lung expansion and decannulation. *Am J Phys Med Rehabil* 2004;83:560-568.



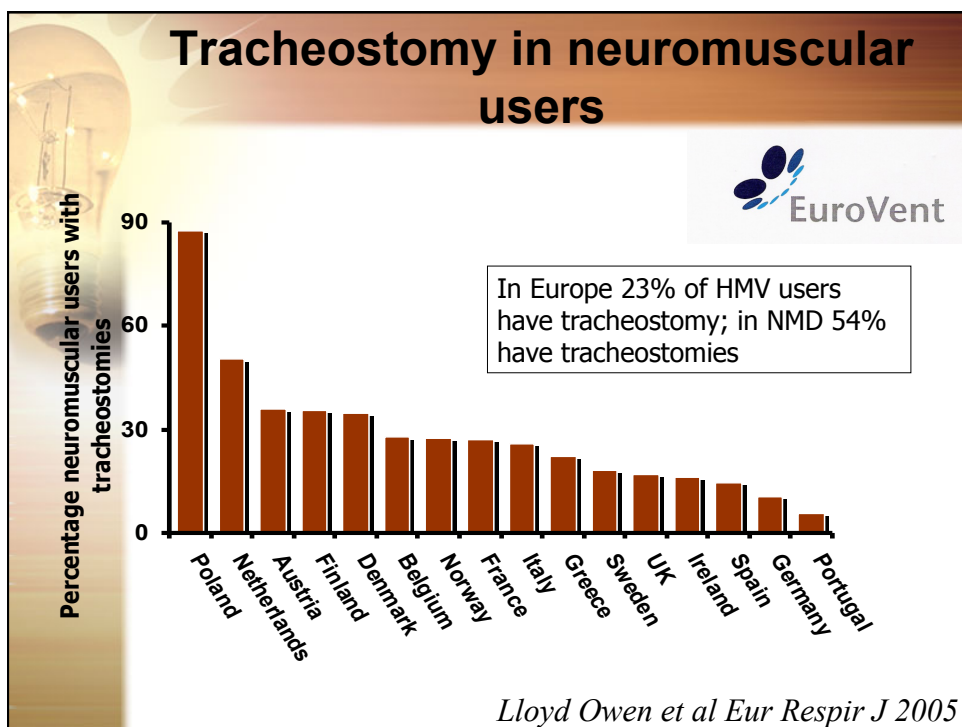
Preferences of patients switched from tracheostomy to NIV

Electrophrenic pacing and decannulation for high-level spinal cord injury: A case series

Priya Bolikal¹, John R. Bach¹, Miguel Goncalves²

Conclusion

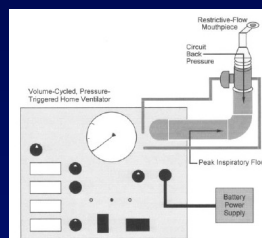
Thus, lack of all VFBA in SCI does not mandate tracheostomy or EPP/DP. Only severe glottis dysfunction that results in aspiration of saliva and oxyhemoglobin saturation below 95%, as it can in amyotrophic lateral sclerosis, may mandate the need for tracheostomy for survival for SCI.²⁸



An Evaluation of Home Volume Ventilators That Support Open-Circuit Mouthpiece Ventilation

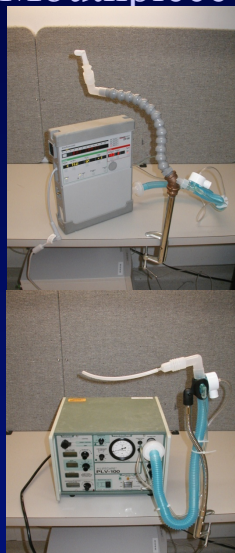
Louis J Boitano MSc RRT and Joshua O Benditt MD

RESPIRATORY CARE • NOVEMBER 2005 VOL 50 No 11



Ventilator	Weight (kg, pounds)	Dimensions (height, width, depth, in cm)	Alternating-Current Mode Apnea Duration (s)	Peak Inspiratory Flow Control	Minimum Pressure Alarm (cm H ₂ O)	Minimum Breaths per Minute
Respironics Lifecare PLV100	12.8, 28.2	23 × 31 × 31	15	Flow	2	4
Respironics PLV Continuum	10, 22.2	23 × 31 × 31	15	Flow	3	4
Mallinckrodt Achieva PSO2	14.5, 32	27 × 34 × 40	10	Inspiratory time	3	6
Pulmonetics LTV800	6.5, 14.2	30 × 25 × 8	60 (adjustable)	Inspiratory time	0 (adjustable)	1
Newport HT50	6.8, 15	26 × 27 × 20	30	Inspiratory time	2	3
Uni-Vent Eagle 754	5.9, 13	29 × 22.5 × 11.5	15	Inspiratory time	0 (adjustable)	4

Mouthpiece-Ventilator Alternatives



2013



The Trilogy “Kiss” Trigger

The Trilogy Mouth Piece Ventilation Mode detects when a patient touches a mouthpiece to deliver on-demand positive pressure ventilation without counterproductive expiratory pressure, the foundation of noninvasive intermittent positive pressure ventilatory support.

Trilogy

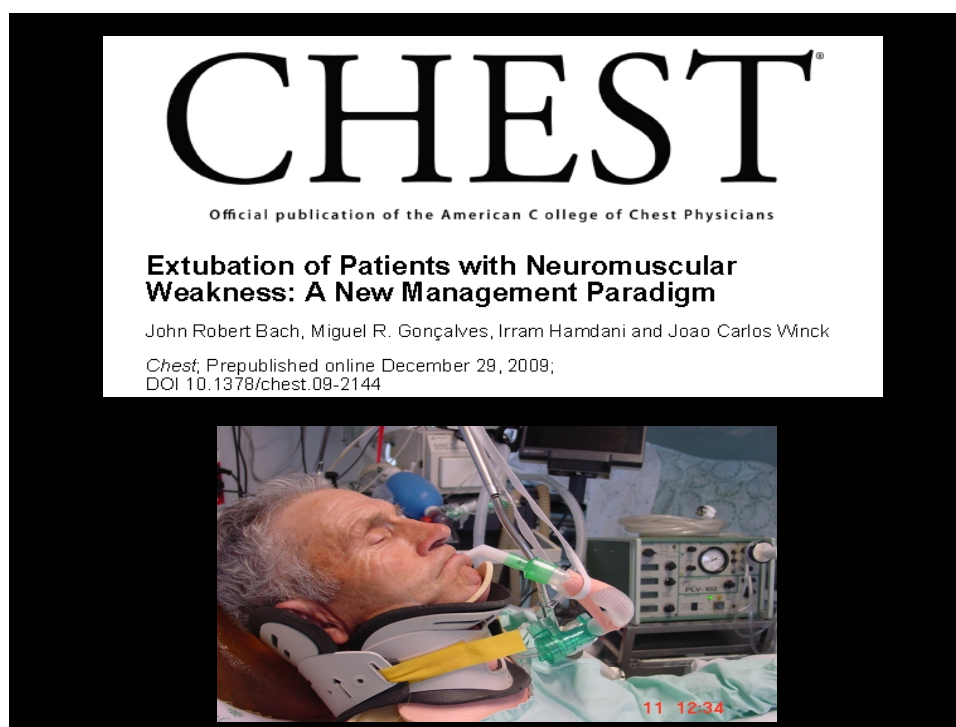
Mouth Piece Ventilation Mode

- PEEP <1 cm H₂O
- Touch sensitive “kiss” trigger, delivers then cuts off, saves battery charge, no air flow to the face/eyes
- Ideal for air stacking to maintain lung health
- Back-up rate option
- 11 lbs.
- Dual treatment modes
- Alarms: low pressure to 1, off; high pressure to 80 cm H₂O; apnea – off, 5 to 60 sec; disconnect – 1 to 15 min or off.
- Compatibility with CoughAssist – interface, battery, software menus
- Support arm and specific circuit for MPV available, cheaper.

Potential Side Effects

- Side effects of M-IPPV may include
 - excessive salivation,
 - abdominal distension,
 - mild orthodontic deformities in long-term users
- The former two, although initially a source of discomfort, generally improve and almost never constitute reason to discontinue M-IPPV

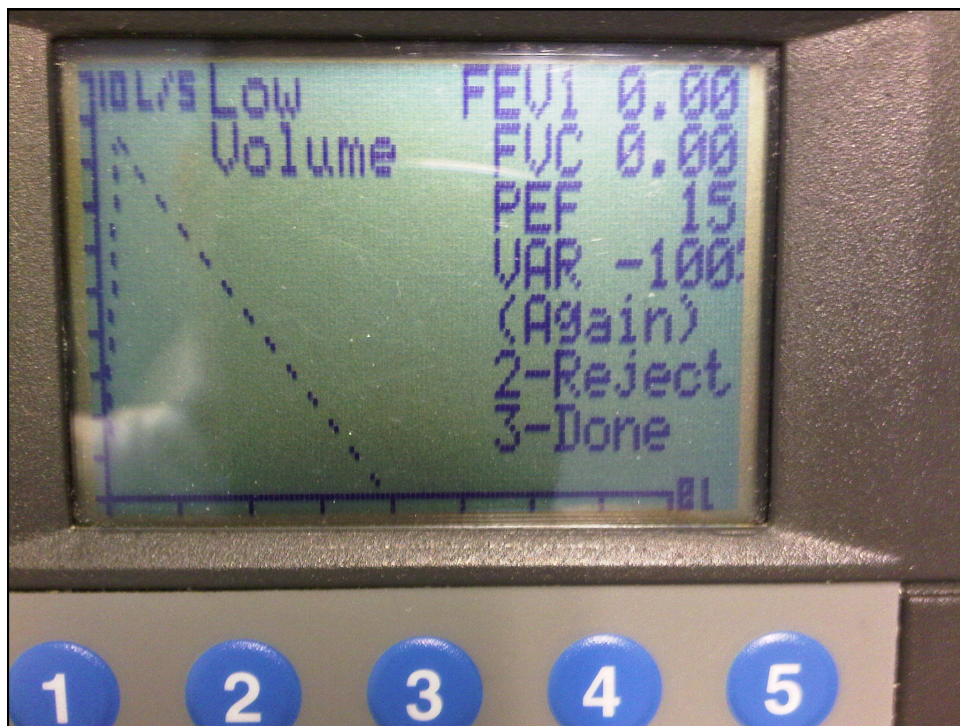
Bach, J.R. et al. (1987). Mouth intermittent positive pressure ventilation in the management of post-polio respiratory insufficiency. *Chest*, 91(6), 859-864.



**NIV 24 hours/day
for totally ventilatory
dependent patients
(VC=0)**

Is it possible.????

The image shows a patient lying in a bed, using a non-invasive ventilator (NIV). The patient is wearing a mask over their nose and mouth, connected to a tube that leads to a ventilator machine. The ventilator is a Philips Respironics model, with the brand name visible on the side. The patient is lying on a bed with a patterned blanket. A red timestamp '14 18 55' is visible in the bottom right corner of the photo.



Mouth Intermittent Positive Pressure Ventilation in the Management of Postpolio Respiratory Insufficiency*

John R. Bach, M.D.;† Augusta S. Alba, M.D.;‡ George Bohatiuk, M.D.;
Lou Saporito, R.R.T.; and Mathew Lee, M.D.§

Chest 1987;91:859-864

Table 1—Forty Three Postpolio Persons with no Tolerance off Respiratory Assistance on MIPPV Only

	Average	Range
Age	47.8 yrs	(21-66)
Age at onset of polio	14.9 yrs	(0-44)
VC, most current	607 ml	(0-1700)
(supine)	17.4% pred	
Age at death (11 persons*)	41.6 yrs	(2-29)
following MIPPV for	17.9 yrs	

Table 2—Twenty Three Postpolio Persons with no Tolerance off Respiratory Assistance on MIPPV and Body Respirators

	Average	Range
Age	48.0 yrs	(18-71)
Age at onset of polio	17.6 yrs	(3-37)
VC, most current	485 ml	(0-1600)
(supine)	12.3% pred	
MIPPV + chest shell (nine pts), + pneumobelt (seven points), + rocking bed (six pts), + iron lung (two pts), 24 hours/day	16.7 yrs	(2-30)
Age at death (seven persons)	44.3 yrs	(18-49)
following MIPPV for	14.6 yrs	

CHEST

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HOME HELP FEEDBACK SUBSCRIPTIONS ARCHIVE SEARCH TABLE OF CONTENTS

Chest, Vol 103, 174-182, Copyright © 1993 by American College of Chest Physicians

Intermittent positive pressure ventilation via the mouth as an alternative to tracheostomy for 257 ventilator users

JR Bach, AS Alba and LR Saporito



Ventilator-Assisted Living[©]

Spring 2004, Vol. 18, No. 1

(continued)

Mouth Intermittent Positive Pressure Ventilation: An old technique revisited for a “sip” of fresh air

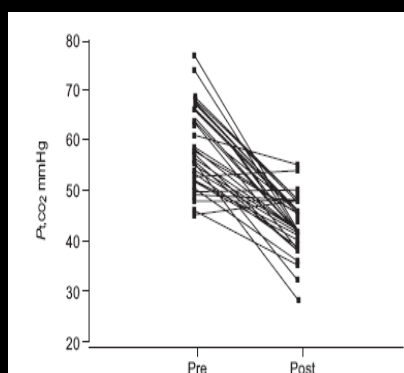
**Miguel R. Gonçalves, PT, and João Carlos Winck, MD, PhD,
Rehabilitation and Lung Function Unit, Pneumology Department,
Hospital São João, Faculdade de Medicina-Porto, Portugal**



Eur Respir J 2006; 28: 549–555
DOI: 10.1183/09031936.06.00004906
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Diurnal ventilation *via* mouthpiece: survival in end-stage Duchenne patients

M. Toussaint, M. Steens, G. Wasteels and P. Soudon



EDITORIAL

Ventilatory assistance in patients with Duchenne muscular dystrophy

F. Lofaso^{*,#}, D. Orlikowski^{*} and J-C. Raphael^{*}

Daytime noninvasive ventilation *via* a mouthpiece should not be viewed as an alternative to tracheostomy. There is wide-

Determining the best date for tracheostomy in patients with DMD remains a challenge. TOUSSAINT *et al.* [8] show that death

Eur Respir J 2007; 30: 1-2
DOI: 10.1183/09031536.00156206
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CORRESPONDENCE

Tracheostomy tubes are not needed for Duchenne muscular dystrophy

J.R. Bach^{*}, C. Bianchi[#], J. Finder[¶], T. Fragasso⁺, M.R. Goncalves[§], Y. Ishikawa[†], A.K. Ramlall^{**}, D. McKim^{##}, E. Servera^{¶¶}, A. Vianello⁺⁺, M. Villanova^{§§} and J.C. Winck[§]

Together we currently have in our centers **>1000 continuous NIV users, some for >50 yrs, and most using a simple mouthpiece during daytime hours**, but they are correct that there are “no controlled studies that demonstrate that NIV prolongs life”. Do they suggest that **we withdrawn the mouthpiece from ½ of the patients and let them asphyxiate to death to satisfy their criteria for a controlled study?**

Indeed, instead of the latter, **the challenge should be to remove trach tubes for continuous DMD ventilator users “if the patient desires it**, if there have been complications of tracheostomy, or if tube removal can facilitate social functioning like de-institutionalization.

Eur Respir Journal 2007

Outcomes of Continuous Noninvasive Ventilatory Support in Neuromuscular Disease: a Multicenter Retrospective Analysis

Miguel R. Gonçalves Ph.D.^A, John R. Bach M.D.^B, Yuka Ishikawa M.D.^C, Louis Saporito B.S.^B, João Carlos Winck Ph.D.^A, and the International Study Group on Continuous Noninvasive Ventilatory Support in Neuromuscular Disease.

The international study group on continuous noninvasive ventilatory support included: Eduardo Luis De Vito M.D.^D, Francisco Prado M.D.^E, Pamela Salinas RN, Mauro Vidigal-Lopes M.D.^F, Rita Guedes PT^F, Douglas McKim M.D.^G, Carole Leblanc RRT.^G, Marcello Villanova M.D.^H, Seong-Woong Kang M.D.^I, Emilio Servera M.D.^J, Jesús Sancho M.D.^J, Michel Toussaint Ph.D.^K, Philippe Soudon M.D.^K, Michelle Chatwin Ph.D.^L, Anita K. Simonds M.D.^L, Martin Bachmann M.D.^M, Michael Baumberger M.D.^N, Tsz-Kin Kwok M.D.^O, Konrad E. Bloch M.D.^P, Christian Lo Cascio M.D.^P, Malcom Kohler M.D.^P, Juan Isquierdo^Q, Ditzia Gross Ph.D.^R, Brian Weaver MSc^B.

(Thorax submitted 2013)

Authors:

John R. Bach, MD
 Miguel R. Gonçalves, PhD
 Alice Hon, MD
 Yuka Ishikawa, MD
 Eduardo Luis De Vito, MD
 Francisco Prado, MD
 Marie Eugenia Dominguez, MD

REVIEW & ANALYSIS

Changing Trends in the Management of End-Stage Neuromuscular Respiratory Muscle Failure

Recommendations of an International Consensus

Am J Phys Med Rehabil 2013;92:267–277.

Recommendation

Because of the limitations of bilevel PAP and the eventual need for CNVS, the panel unanimously recommended that assist-control volume-cycling NIV be used for patients capable of air stacking and that pressure-cycling NIV be used otherwise. The grade of recommendation is 1A for using ventilators for CNVS because of the extremely large and consistent magnitude of the treatment effect,²⁵ that is,

Risk management of the home ventilator dependent patient

A K Simonds

Who is responsible for minimising risks to patients receiving ventilatory support in the home?

Thorax 2006;61:369-71

- ✦ Power failure
- ✦ Ventilator malfunction
- ✦ Accidental disconnection
- ✦ Circuit obstruction
- ✦ Mask fit
- ✦ Tracheostomy:
 - Blocked
 - Falls out
 - Cannot be replaced after changing
- ✦ Medical problems

Risk exist

We can prevent risk

Tecnical service

Training (patient and caregiver)

Patient shared records

Table 1 Risk management considerations

Problem	Consequence	Risk management
Power failure, e.g. power cut	Ventilator failure	Mains power alarm. Battery back-up (internal or external battery in circuit). Ambu bag with connector for ventilator dependent patient.
Ventilator malfunction	Ventilator failure	Regular service and planned preventative maintenance. Emergency contact line to report problems. Back-up ventilator in patients with less than one night ventilator free time.
Accidental disconnection	Failure of ventilation	Low pressure and low minute volume alarms. Secure attachment of ventilator/circuitry connections. Support of ventilator tubing to prevent dragging on tracheostomy or mask.
Circuit obstruction	Failure, or suboptimal ventilation	High pressure alarm.
Mask fit	Too tight: pressure sore	Close attention to mask fit, variety of interfaces to alternate. Skin protective dressing.
Tracheostomy blocked	Too loose: leaks Failure of ventilation	Low pressure, low minute volume alarms Efficient suction with battery power or manual operation. Carers trained to change tracheostomy. Effective humidification. High pressure alarm.
Tracheostomy falls out or cannot be replaced after changing	Failure of ventilation	Improve fixation of tube. Carers trained to change tube, smaller size tracheostomy tube available. Ambu bag and mask available which carers can use.
Medical problems	Acute deterioration, settings no longer appropriate	Rapid access to advice. Carers and patients trained to recognise early signs of chest infection or ventilatory decompensation. Carers trained in basic life support. Immediate access to hospital care. Battery powered ventilator to use in transit.
General		Patients and carers competent in ventilator operation, basic maintenance, problem solving, and when to seek help. Written plan of action for predictable problems such as power cuts, chest infection, and equipment failure. Equipment problems notified to manufacturer and central agency where available, e.g. Medicines and Healthcare Products Regulatory Agency (MHRA).

Thorax 2006 Simonds AK

THE TIMES

August 14 2000

Power cut kills man on home ventilator

BY SAM TOWLSON

AN INVESTIGATION has been launched into the death of a disabled man whose life-saving equipment failed during a power cut.

Feb 15, 2001

A Fatal Complication of Noninvasive Ventilation

Lechtzin N., Weiner C. M., Clawson L.

N Engl J Med 2001;344:533

September, 1951

“Glossopharyngeal Breathing” by Paralyzed Patients

A Preliminary Report

CLARENCE W. DAIL, M.D., *Los Angeles*

Patient No.	Age, Sex	Onset of Paralysis	Date GPB* Started	Approximate Vital Capacity		Time Out of Respirator (As of June 1, 1950)	
				Without GPB	With GPB	Without GPB	With GPB
1	29M	5-9-44	About '46	150	600	Not known	All day
2	25F	8-10-49	10-12-50	100	1,000	25 min.	2 hrs.
3	37F	6-25-48	9-21-50	200	815	25 min.	2 hrs.
4	29F	10-24-49	10-12-50	200	1,710	2 min.	3 hrs.
5	28M	11-10-48	9-13-50	100	1,150	2 min.	1 hr.
6	29M	11-7-50	2-15-50	10±	1,200	Not out	1½ min.
7	21M	8-7-49	1950	1,500	2,700	†	
8	17M	10-10-48	April '49	500	1,500	†	
9	20M	8-29-48	May '50	600	1,600	†	
10	39F	11-15-48	9-22-50	100	300	1 min.	1 min.
11	24M	9-3-50	2-13-50	200	.....	1 min.	1 min.
12	44M	10-10-49	10-27-50	0	.....	1 min.	1 min.
13	24F	5-29-50	11-14-50	150	.....	1 min.	1 min.
14	25M	9-17-48	10-3-50	0	.....	1 min.	1 min.
15	47F	8-2-48	May '51	500	900	All day	.....

Noninvasive Options for Ventilatory Support of the Traumatic High Level Quadriplegic Patient*

John R. Bach M.D.,† and Augusta S. Alba, M.D.‡

(Chest 1990; 98:613-19)

Table 3—Vital Capacity and Maximum Glossopharyngeal Breaths: Patients on Noninvasive Ventilatory Assistance One Month or More

Patient	VC* Sit	% Pred.	VC Sup	% Pred	GPmaxSBC†	Free Time,‡ hr	
						Onset NVA	Currently
1	50	1	50	1	1700	>1||	<1
2	670	18	700	19	...	>12	3-4
3	604	8	664	9	900	<1	1988§
4	80	2	100	2	1300	>4||	Died 1985
5	263	6	412	9	2740	>4||	Died 1975
6	720	13	760	14	...	6	1986§
7	240	6	320	8	...	0	Off aid
8	720	14	740	15	...	0	Off aid
9	880	15	980	18	...	0	Off aid
10	480	8	490	8	...	0	Off aid
11	401	12	546	16	...	<1	8-10
12	730	21	585	17	...	>16	16
13	1400	24	1800	31	...	16	16
14	460	13	360	9	...	0	>16
15	460	9	500	10	...	>16	>16
16	1150	32	1510	37	...	>8	>8
17	800	18	1970	56	...	>12	1982§
18	700	15	910	20	1900	1	1983§
19	220	11	240	11	...	0	0
20	480	11	320	8	...	<1	<1
21	450	8	690	12	1500	4||	<1
22	250	5	250	5	1900	>1||	0
23	520	11	1000	22	...	>1	Died 1977
24	890	27	880	27	...	>1	1988§
25	1750	42	1750	42	...	>16	12-16

Follow-up assessment

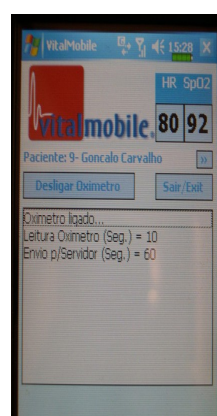
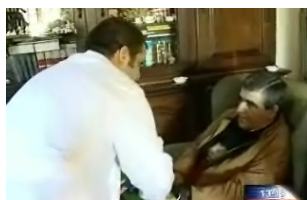
Pulsioximetry

- Home visits
- Outpatient clinic
- Hospital admission
- Phone call
- General practitioner
- Community resources
- e-mail

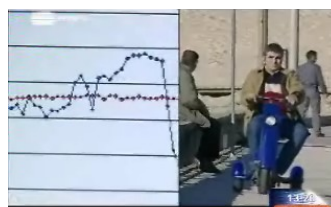


Pilot Study: Telemonitoring by real time «wireless» oximetry for ventilatory evaluation and prevention of respiratory failure in patients submitted to continuous mechanical ventilation

vitalmobile.net

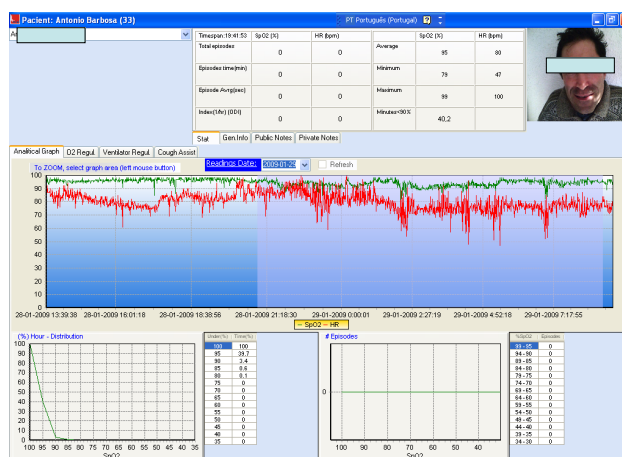


FACULDADE DE MEDICINA
DA UNIVERSIDADE DO PORTO



JC Winck, MR Gonçalves, T Pinto et al. 2009

spO2/HR day-night profile in a tetraplegic Muscular Dystrophy on 24h NIV



What patients request now ...

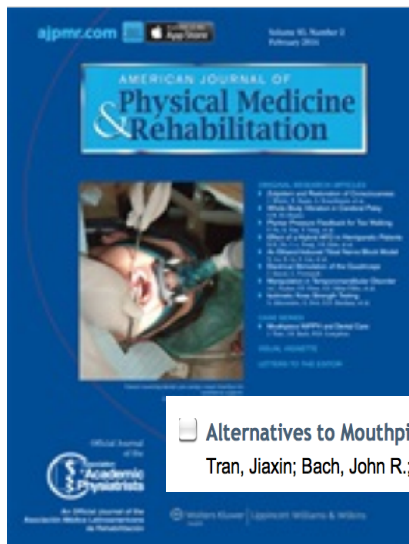
- ***"...Better portable systems to achieve and motivate activities with the ventilator outside of home..."***


Needs, perspectives and expectations of patients under HMV, 2008 Fundación Laporte, Barcelona

Main Goal
Improve Quality of life...!!!



...and LIFE EXPECTATIONS



 Alternatives to Mouthpiece Noninvasive Ventilatory Support to Permit Dental Care
Tran, Jiaxin; Bach, John R.; Gonçalves, Miguel R.

February 2014 - Volume 93 - Issue 2



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portuguese journal of pulmonology
www.revportpneumol.org



PHOTO

The sky is the limit...!!!☆

O céu é o limite...!!!

M.R. Gonçalves

Serviço de Pneumologia, Faculdade de Medicina e Centro Hospitalar S. João, EPE, Porto, Portugal



Oxygen or ventilation during flight for patients with neuromuscular disease?

J C Winck, M R Gonçalves and N Silva

Thorax 2010 65: 370-371

doi: 10.1136/thx.2009.121277

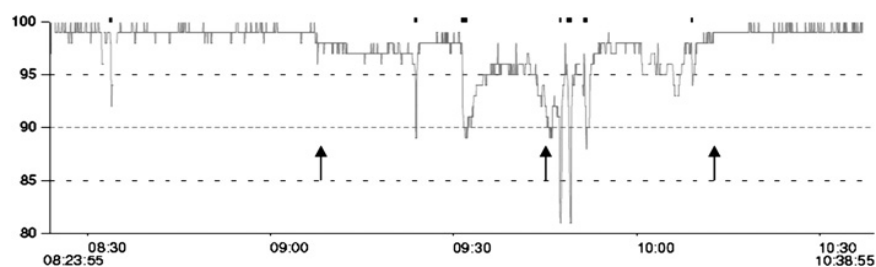


Figure 1 Changes in oxygen saturation with an oximeter (Wristox 3100, Nonin Medical, Plymouth, Minnesota, USA) of a woman with mitochondrial myopathy on continuous non-invasive ventilation during a flight from Porto to Barcelona. Baseline oxygen saturation (SaO_2) was 99%; after take-off (first arrow) there was a slight decrease to 97%. The first and second desaturation periods were due to eating and the third (second arrow) coincided with the disconnection of the ventilator (for battery change). At landing (third arrow) SaO_2 returned to baseline values.

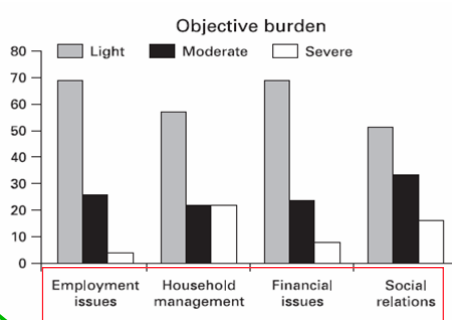
"Caregivers also need care !!"

When the Caregiver Needs Care: The Plight of Vulnerable Caregivers

Maryam Navaie-Walliser, DrPH, Penny H. Feldman, PhD, David A. Gould, P

Impact of intensity of care !

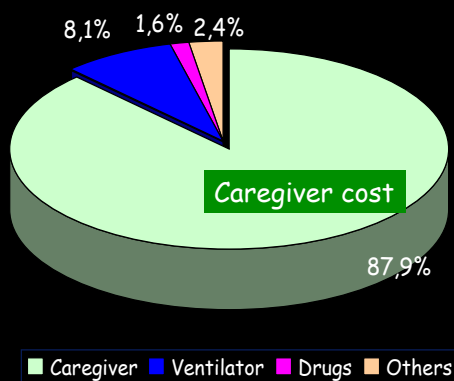
Am J Public Health 2002;92:409-13




Tsara V. Respiration 2006;73:61-7

The unpaid Caregiver

Estimation cost of HMV in USA



Bach J. Chest 1992;101:26-30.



“....All truth passes through three stages:

- First it is ridiculed.**
- Second, it is violently opposed.**
- Third, it is accepted as being self-evident...”**

Arthur Schopenhauer 1788-1860

