

# BREAS | NEWSLETTER

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**BREAS**  
**25**  
**YEARS**  
OF INNOVATION

## Mouthpiece Ventilation: The newest mode available in Vivo 50 and Vivo 60.

At Breas Medical we are dedicated to make patient treatment as comfortable as possible. We know that it has been a desire for many patients to be able to eat and carry on a conversation whilst being ventilated. That's why we have introduced the new mouthpiece ventilation mode on the Vivo 50 and Vivo 60 ventilators, to provide a much desired freedom and comfort.

### **Introduction:**

In 1953 Dr. John Affeldt pointed out at a Round Table Conference on Poliomyelitis Equipment, Roosevelt Hotel, New York City, "you can simply attach this (mouthpiece), hang it by the patient, he grips it by his lips, and thus it allows for the excess to blow off which he doesn't want. It works very well. 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." Thus, intermittent positive pressure ventilation (NIV) via a mouthpiece was used as an alternative to tracheostomy ventilation for patients requiring continuous ventilatory support over 60 years ago.

While nasal and oro-nasal interfaces are useful for NIV use during sleep and in critical care, they are usually not practical for daytime support. Currently, because mouthpiece NIV is rarely tried, tracheostomy is widely proposed for patients requiring more than nocturnal plus daytime support. Tracheostomy, however, can increase health care costs, complications, has social disadvantages and when given the choice, patients never prefer it to NIV.

During waking hours, mouthpiece ventilation is the logical, more cosmetic and comfortable alternative but requires more active participation than the use of facemasks. It has the following

advantages: less negative impact on the patient, no risk of skin breakdown, facilitates speech, facilitates eating and swallowing and gives a better appearance.

### Key learnings from the Literature on MPV:

The usage of MPV for patients with Duchenne Muscular Dystrophy has been recommended by the American Thoracic Society<sup>2</sup> in their consensus statement which was published about 10 years ago. More recently the Canadian<sup>3</sup> and the British Thoracic Society<sup>4</sup> have also advised to consider the use of MPV as a potential tool for NIV in these patient populations.

One of the first articles describing the use of intermittent positive pressure ventilation via the mouth was published in the early 90's by John Bach<sup>5</sup>. In this large patient review Dr Bach concludes that MPV can be an effective alternative to tracheostomy for individuals with adequate bulbar muscle function but chronic respiratory muscle insufficiency. He also points out that access to reliable and effective manually assisted cough or mechanical in-exsufflation is key for long-term success.

Another important paper was published by a Belgian group in the European Respiratory Journal<sup>6</sup> in 2006. In this publication Michel Toussaint and co-workers studied 42 Duchenne patients and looked after the long-term impact of daytime MPV on survival and lung function and also at the impact of daytime MPV on daytime CO<sub>2</sub> tension and related symptoms. In this rather large group of Duchenne patients they were able to show that CO<sub>2</sub> levels improve with the usage of MPV in a similar way as with other NIV techniques. And also long-term survival rates that are reported after 1, 3, 5 and 7 years of MPV reached values from 88 to 51%. Overall this study shows that mouthpiece ventilation during the day as an extension of nocturnal ventilation is safe and provides reliable survival in end-stage Duchenne muscular dystrophy patients. The authors conclude that daytime ventilation via a mouthpiece can be recommended on the condition that patients are equipped with a self-supporting harness around the neck, and that they have access to non-invasive techniques for airway clearance.

In 2013 Douglas McKim<sup>7</sup> and his team in Canada reported their experience of 12 Duchenne patients who combine night-time NIV with daytime mouthpiece ventilation and present the benefits to patients and the safety of using 24 h NIV. Adding MPV rather than continued daytime nasal ventilation allows the face to be free from an interface, to engage in normal verbal communication and to breath stack for airway clearance as desired. MPV offers the patient and family effective management without the surgical risk, the long-term complexity and the additional nursing care required with tracheostomy management. It is to be noted that the authors also mention that the consistent use of Lung Volume Recruitment techniques and the usage of Mechanical In-Exsufflation has contributed to the long-term success of NIV and the small number of hospital admissions. McKim and his team conclude that while tracheostomy ventilation may be necessary in patients with DMD with severe bulbar impairment or with cognitive impairment, most Duchenne patients are quite

capable of using MPV. And that for Duchenne patients a strong consideration should be given to 24 h NIV/MPV rather than routine recommendation for tracheostomy.

In a very recent publication<sup>8</sup> from 2016 that looked at the effectiveness of mouthpiece ventilation in real life situations it was shown that disconnections from the ventilator occur frequently. And, as you can see on figure 1, the disconnections during activities such as eating, making a phone call or watching TV are associated with an increase in CO<sub>2</sub> and a decrease in SpO<sub>2</sub>. These findings support the usefulness of educating patients about behaviours that can induce hypercapnia or oxygen desaturation and also indicate the importance of using an external warning system or ventilator alarm based on the minimal minute ventilation in order to prevent blood gas abnormalities.

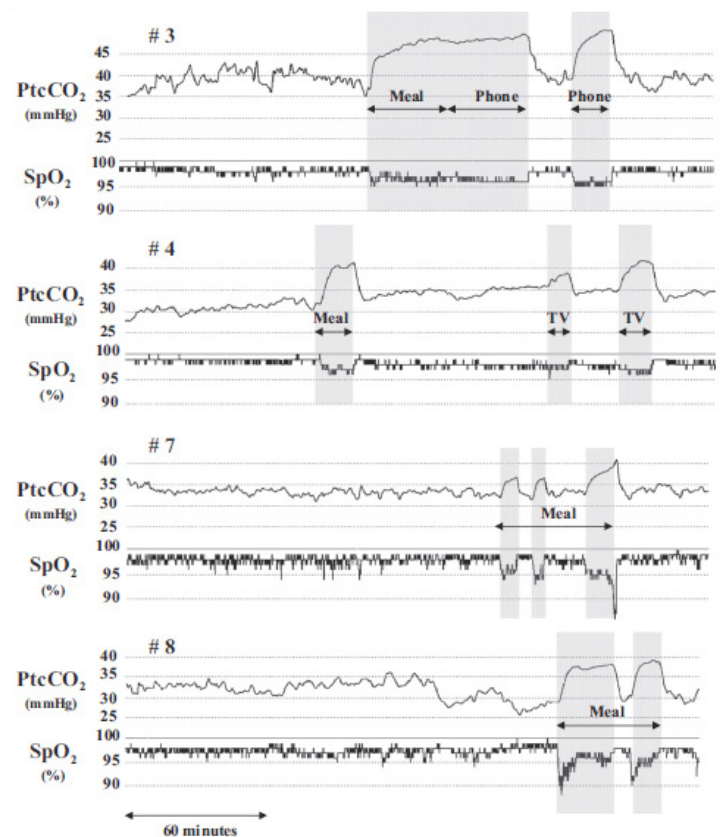


Figure 1.

In a paper published in 2014 in Respiratory Care<sup>9</sup>, Sonia Khirani analyses the practice of mouthpiece ventilation. The publication consists of two parts, a bench test which looks at the technical performance of 6 ventilators available on the French market and a clinical survey and questionnaire including 209 patients with a neuromuscular disease. Out of these 209 patients, 30 patients (or 14%) are using MPV. For this overview we will focus on the feed-back and answers from the patients rather than on the technical specifications of each of the tested ventilators. The patients report (Figure 2) the reduction in dyspnea as the most important benefit, followed by reduction in fatigue.

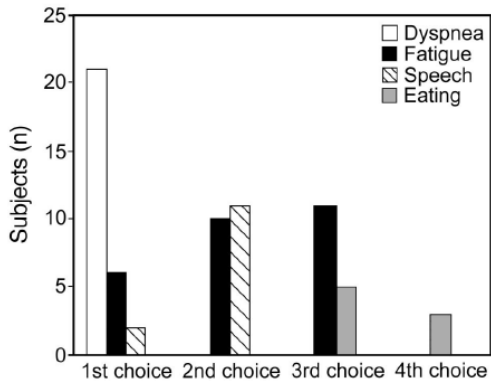


Figure 2.

Facilitation of speech and eating were rated as the third and fourth most important benefits, respectively. Other reported advantages were better vision, reduction in skin injury and facilitation of swallowing. When one analyses the patient characteristics it is clear that this study shows that mouthpiece ventilation is used in highly ventilator-dependent subjects. As the daily mean duration of NIV was 19 plus/minus 6 hours with 15 out of 30 patients using NIV for more than 20h a day and 11 subjects using the ventilator 24/7. And as the authors state, the results of the survey confirm that mouthpiece ventilation is effective in postponing invasive ventilation by tracheostomy.

In another article from Respiratory Care<sup>10</sup> Dr Carlucci and Dr Gregoretti give guidance to the reader on how to make the appropriate settings on different commercially available ventilators when using MPV and how to avoid nuisance alarms during MPV. They also stress some important facts on how to improve and make MPV more comfortable for the patient. One of the key factors which they point out is the necessity of a very low flow in between the breaths as both the noise from the flow as well as the flow itself may create discomfort for the patient. An element where the Vivo 50 scores really highly compared to some of the competitive devices tested in this paper. It is also important to mention that for this bench test the authors used a Vivo 50 without MPV mode as this mode was not available at the time of the study. Therefore the limitation of the I:E ratio of the Vivo 50 was still applicable and caused some limitations around the actual setting range that could be used. Of course this has now been resolved with the launch of the MPV mode in the latest version of the Vivo 50 and 60 and the ventilator allows now for an independent setting of breath rate and inspiratory time.

In 2014 Antonello Nicolini and co-workers<sup>11</sup> published their results of the usage of MPV in 50 Subjects with COPD Exacerbation and Mild to Moderate Acidosis. As you can see in Figure 3 they found that both groups had similar trends in arterial blood gases over the first 48 hours of NIV application. Furthermore no differences in breathing frequency, duration of NIV or hospital stay were noted. However, a significant difference in acceptability was found: the patients clearly preferred mouthpiece ventilation. As the study is only looking at short term application of MPV one should not extract the results to promote long-term MPV for COPD patients at this stage, yet the study by Nicolini gives us an important clinical message: mouthpiece ventila-

tion may be considered as another tool in our armamentarium and as an alternative to other interfaces in case failure of NIV is caused by poor tolerance of the mask.

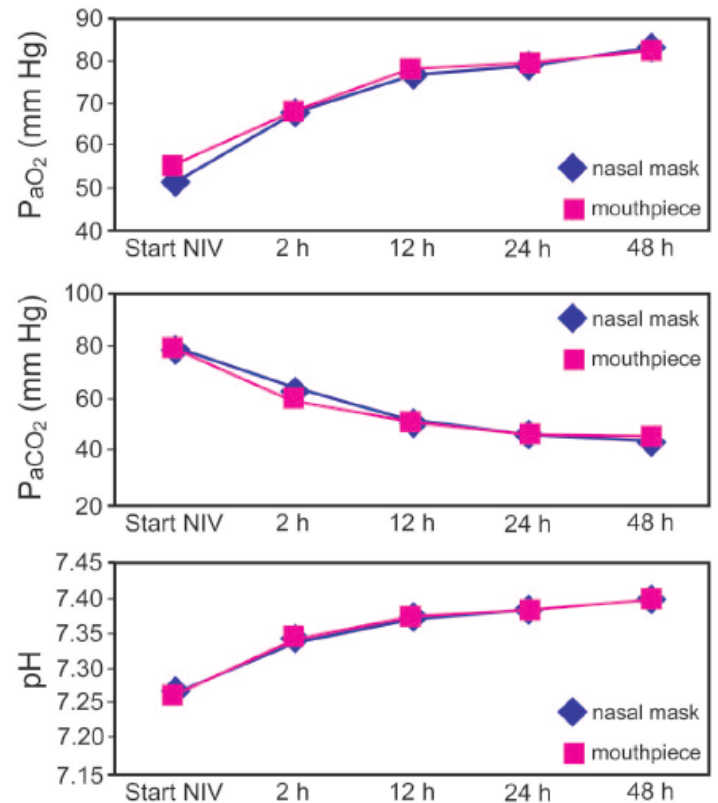


Figure 3.

For the last part of this review we will take a closer look at two<sup>1,12</sup> review articles which have been published recently and mainly point out the advantages and disadvantages of MPV.

Let's look at the disadvantages first. The most important disadvantage of MPV is that it is predominantly to be used during the day and is harder to use at night. Both review articles contain important information on when not to use mouthpiece ventilation and state that: Mouthpiece NIV is not successful when patients are uncooperative, cannot access the interface or when a severe bulbar dysfunction causes aspiration of saliva such that the O<sub>2</sub> saturation baseline remains below 95%

When we look at the advantages of MPV it is clear that both articles point out that MPV delivers good quality of ventilation with the benefit that it;

Has less negative impact on the patient's social life

Has no risk for skin breakdown

And facilitates speech, eating and drinking

And so should be considered for patients who require daytime ventilation.

### Conclusion:

Daytime mouthpiece ventilation in a regime of continuous NIV support is a safe and acceptable alternative to tracheostomy. There is widespread agreement that NIV is preferable to invasive ventilation during the early stages of DMD ventilatory insufficiency, but there continues to be widespread ignorance of its



benefits over invasive management for more dependent patients when daytime ventilation is needed. The swallowing and speech difficulties associated with tracheostomy are avoided by mouth-piece NIV. Patients with DMD and other NMDs should be offered diurnal NIV via a mouthpiece when nocturnal-only NIV becomes inadequate.<sup>1</sup>

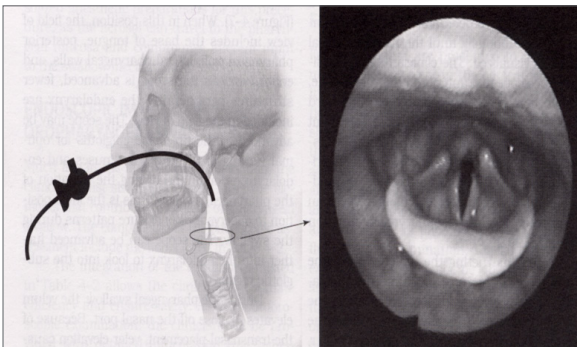
### Summary of Advanced Acute Respiratory Study Day, November 2015 – London

The objectives of the one day course, intended for senior AHPs, Clinical Specialists and medics working in the field of acute respiratory medicine, were to;

- present advanced evidence based lectures on acute respiratory management
- encourage interaction between senior AHP's and medics
- enable an ask the experts session to allow difficult and challenging topics to be discussed
- debate complex case studies 69 delegates attended from across the UK, including specialist critical care nurses, physiotherapists, and medics (up to consultant level).

The day started with an excellent talk presented by Neresha Maistry – Clinical and Professional Lead Speech and Language Therapist, Royal Brompton Hospital, London. Her talk titled, 'Dysphagia – A Difficult pill to swallow', looked at structural and mechanical alterations within the upper airway due to intubation, risk factors associated with post-extubation dysphagia and covered research findings regarding post-extubation dysphagia.

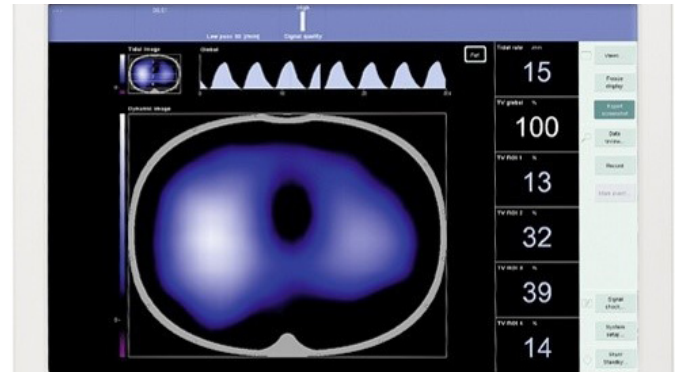
Neresha shared some great videos looking at assessments with both videofluoroscopy and FEES. She also discussed assessing risk and the management of these complex patients post extubation, to ensure the risk of aspiration, pneumonia and respiratory complications are avoided. A very thought provoking talk.



The second talk, 'Mechanical In-Exsufflation: Tube in, Tube out Who needs a trachea?' presented by Rachael Moses, Consultant Respiratory Physiotherapist, Ventilation Services, Respiratory & Emergency Medicine, Lancashire Teaching Hospitals, focussed on the need for effective use of MI-E in intubated patients to ensure maximum clinical outcome. Rachael also presented a theory that perhaps it is sometimes easier to manage patients with a tracheostomy, but at what cost? Due to risks associated with long term tracheostomies. She went on to present the TracMan data, as well as present the benefits of delaying tracheostomy in ICU admission as well as presenting a recommended weaning pathway for these patients. Rachael is leading a project to create

a guideline for the use of MI-E in intubated patients that will be published later this year.

Dr Luigi Camporota, Consultant Intensivist, St Thomas' Hospital, London then presented two amazing talks. The use of Electrical Impedance Tomography (EIT) in ICU and Assessment of Readiness to wean. These talks were truly focussing on innovative practice, where Luigi and his team use EIT within an ICU setting. The talk provided a great introduction to the use of EIT, as well as how it can be used in clinical application.



nally, Dr Nick Hart, Clinical & Academic Director, Lane Fox Respiratory Service, St Thomas' Hospital, London presented The Acute Management of NMD Patients. Focussing on how the Lane Fox Unit manages acutely ill complex NMD patients, preventing intubation or managing intubation and extubation effectively in these patient groups, to prevent long ICU admissions and failed weaning attempts.



Both the Ask the expert session and case discussions were very lively and challenged current clinical practice and thinking. The feedback for the day was fantastic, with an average of 4.55.

As ever we would like to thank the excellent international speakers for giving their time to support this education event, without their support these days would not be possible.

The Respiratory Education Programme will shortly be advertising the 2016 calendar of events, which looks to deliver further exciting advanced respiratory education.

For further information please follow us on:



@NippyVentilator and



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**Calendar:**

12 March	Airway Clearance Study Day, Bristol, UK
21 April	Advanced Paediatric Respiratory Study Day, London, UK
23 April	Airway Clearance Study Day, London, UK
2 - 4 June	DIGAB, Bamberg, Germany
3 - 7 September	ERS, London, UK

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