

## Editorial

# Noninvasive ventilation (advanced): course report

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### Faculty

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The most relevant topics for future debate were new horizons in ventilator development, how the field might look in 2085, the use of NIV in pandemics, and the practical use of cough assist devices. Also, how to manage more severe and complex patients on respiratory wards and in high-dependency units.

### Overview

The noninvasive ventilation (NIV) course has been one of the most successful European Respiratory Society (ERS) courses for well over a decade, and more recently, the subject area has been divided into basic and advanced NIV courses to more comprehensively meet the needs of the multidisciplinary team. The advanced NIV course held in Milan in November 2018 aimed to provide participants, who already had some experience with NIV, with practical advice on acute and chronic NIV, an update on new techniques and on controversial and growing areas of practice.

The course covered the debate about home ventilation in chronic hypercapnic chronic obstructive pulmonary disease (COPD) patients, the timing of NIV in neuromuscular disorders, how to manage patients fighting the ventilator, the role of high-flow nasal cannulae (HFNC) oxygen therapy, sedation during NIV, and how to assess the efficacy of ventilatory support, among other areas. All of these are evolving topics and generated much interest, discussion and useful sharing of practice.

### Rohit Kumar, India, a participant

I am a pulmonologist currently working in a central tertiary care hospital with a large number of respiratory patients. I realise that NIV is an important tool in the armamentarium of the pulmonologist and is the standard of care for many different acute and chronic diseases. Over the past few years, I have realised that the benefits of NIV may at times be extended to other patients, while at the same time there are patients who may worsen if NIV is used for the “wrong” indication or applied at a “wrong” time. I wanted to attend this advanced course to learn the art of applying NIV, the indications and contraindications, and how to monitor a patient while on NIV.

My ERS membership gave me an opportunity to apply for support to attend the advanced course on NIV and I was fortunate to receive a partial bursary. The course was conducted in the cosmopolitan city of Milan, with a faculty comprised of eminent experts and authorities in the field of pulmonology



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Participants attending the recent ERS course on advanced noninvasive ventilation share their experiences <http://ow.ly/RiTH30odWuX>

and critical care ventilation. The opportunity to learn from these experts was invaluable.

The atmosphere at the course was warm and the sessions were academic in addition to being of practical interest. The course was an academic feast, the schedule was designed to cover numerous topics over 2 days. The course materials were shared ahead of the course by the organisers and were very helpful in preparing for the course. The topics were not strictly limited to NIV; they were comprehensive and discussed the holistic management of a patient on NIV. Topics included the use of HFNC, techniques to assist in airway clearance, the role of airway humidification, and the possible use of extracorporeal carbon dioxide removal as a means of preventing intubation if NIV is not effective. The speakers began by discussing the evidence for use of NIV and at the same time discussed its possible limitations. When there were unresolved issues, the presenters shared their experience and also talked about future studies which are likely to help in resolving these issues. The use of NIV in neurological patients was also discussed along with other emerging applications. The first day ended with case presentations by the participants which showed the potential uses of NIV for nonconventional indications along with the possible limitations of NIV. The course also discussed the new horizons in ventilator development, with friendly interfaces and hybrid modes, and the potential of artificial intelligence for monitoring.

I also learnt about the identification of asynchrony while on NIV and the importance of its amelioration to ensure acceptability of NIV for patients. The importance of applying the interface and straps so as to allow a balance between leak, improper cycling and ineffective NIV on one hand, and the risk of patient discomfort and skin breakdown on the other hand was also discussed, along with the possible use of sedation to improve the patient's acceptability for this modality. The talks on the possible role of NIV in the future along with the innovations in medical devices were thought provoking. The lectures were followed by workshops where participants got ample opportunity to interact with the faculty and learn and revise what had been discussed during the talks.

By the time of conclusion of these workshops, I had a significant understanding of not just the science behind the use of NIV, but also the art of applying it. This course will help me in expediting the commencement of effective NIV for an appropriate patient in a timely manner in a proper setting, avoiding the unnecessary burden of shifting all patients to the intensive care unit (ICU). Since I am working in an academic centre, I will be in a position to disseminate this knowledge by sharing it with my colleagues. I now understand the rational application of this tool; the proper selection of patients and the timely institution of this modality are instrumental in its success. Overall, the course

was a memorable experience and I thank the ERS for conducting such an activity and for giving me an opportunity to attend it.

## **Hanna Fadieieva, Ukraine, a participant**

The atmosphere of the course was friendly. Participants had the opportunity to hear the updated views of specialists from different European countries, ask questions from their own practice and participate in the discussions.

Lectures and case reports were devoted to mask mechanics and leak dynamics during noninvasive pressure support ventilation, effects of different interfaces during NIV for acute respiratory failure, humidification devices and their impact on intubation rate, predictors of intubation in patients with acute respiratory failure, ventilator-induced lung injury ("Interfaces and mode of ventilation in the acute setting: what is new?", A. Thille, France), and how high-flow oxygen and NIV ventilators work (A. Carlucci, Italy).

The issues of rational therapy and rehabilitation of patients with COPD using long-term application of NIV were among the key issues facing the first day of the event. In addition, the topic of home NIV was reflected in lecture "Interfaces and mode of ventilation in the home setting: what is new?" (C. Rabec, France). A large choice of masks allows the interface to be changed easily, to personalise treatment and reduce skin complications in ventilator-dependent patients. A. Simonds explained the necessity of setting up a long-term NIV programme including competency training.

The organisers of the course did not overlook the actual aspects of managing patients with respiratory muscle weakness: cough strength should be assessed and proximal airway clearance techniques will improve cough efficacy. Secretion removal and sedation during NIV were discussed by A. Thille, M. Chatwin and L. Pisani.

On the first day the practical seminar where clinical cases were discussed was particularly attractive to the audience.

According to the scientists the future belongs to the built-in integrated polygraphy and software-based detection of asynchronies in NIV that can provide analysis of a large amount of data and find the most effective individualised treatment. Device-based telemonitoring was mentioned in the lecture on "New horizons in ventilator development".

The course ended with a series of workshops. These practical sessions included the development of skills in selection of interfaces, application of cough machines, and home and hospital ventilators.

Thank you very much for the opportunity to attend the course!

## Petar Milchev Chipev, Bulgaria, a participant

Milan, the city of advanced economics, advanced fashion and advanced architecture, and also the venue for the ERS advanced course in NIV. It's a city full of life, oriented towards promoting ecology and flourishing nature. The life of people in Milan is dedicated to work and development. Just like Milan, NIV is made to boost physiological ways of breathing and sustain life through hard work. So, the heart of Lombardy was the perfect place for us, individuals once craving advancement in our NIV knowledge and skills, to further develop our expertise and learn from the best in the field.

And "the best" were there, Anita Simonds, Mark Elliot, Peter Wijkstra, Stefano Nava, Paolo Navalesi, *etc.* All the names we see so often when opening articles and chapters on the topic of NIV. The ERS had brought them all together for us and we had the chance not only to hear, but also to ask and receive the most competent response one could wish for. Topics discussed were numerous, but maybe the most interesting were those revealing tips and tricks regarding the application of NIV in COPD, obesity hypoventilation syndrome (OHS) and neuromuscular diseases (NMD); those giving recommendations about secretion removal; application of HFNC; dealing with patient-ventilator asynchrony; assessing efficacy of night-time NIV; and those talking about new horizons and future perspectives for NIV.

A novel thing was the decision of the organisers to add a clinical case discussion session at which participants were able to present a few interesting cases from their own clinical practice. The case reports inspired an eager discussion and colleagues participating in the session were able to receive valuable recommendations regarding their patients.

At the end of the second day of the course there was also a workshop session. Participants were able to gain hands-on experience of different devices and interfaces. A cough-assist show room was set up on site, where Anita Simonds and Michelle Chatwin taught participants how to handle cough-assist machines and also manual techniques for improving expectoration of patients retaining secretions. Devices used in acute ICU and chronic settings were presented by Arnaud Thille, Miquel Ferrer and Peter Wijkstra. In a separate room the Italian masters of NIV, Stefano Nava, Paolo Navalesi, Lara Pisani and Annalisa Carlucci, presented to course participants the different interfaces used in different clinical scenarios.

Two techniques I had never used and I had the opportunity to learn about in theory and in practice were HFNC and cough-assist devices. A few take-home messages I found most memorable and useful were:

- 1) Carbon dioxide is not a reliable marker of survival in COPD, and patients with and without hypercapnia die with similar rates.

- 2) Patients with hypercapnic respiratory failure due to an exacerbation of COPD should have reassessment of their blood gases, because if they normalise hypercapnia, they should not receive long-term home-NIV.
- 3) Studies comparing NIV with HFNC have discrepancies, because in most of them HFNC is used for longer periods (12–14 h per day) than NIV (6–7 h per day).
- 4) In studies of NIV in acute respiratory distress syndrome (ARDS), patients with moderate and severe ARDS are usually not excluded, which is a mistake because in practice they are usually contraindicated for NIV.
- 5) In OHS, the higher the body mass index, the higher the carbon dioxide tension.
- 6) If there is good first night response to continuous positive airway pressure (CPAP) in OHS, CPAP could be maintained as a therapeutic mode of ventilation.
- 7) Patients with OHS should be treated with higher positive end-expiratory pressure.
- 8) Patients with OHS usually need more time to be stabilised on NIV.
- 9) The best prognostic markers for OHS are comorbidities and rate of acute infections.
- 10) The sooner NIV is started in OHS, the better the prognosis.
- 11)  $\text{HCO}_3^-$  and base excess will be included in the diagnostic criteria for OHS soon.
- 12) Sedation is still not recommended in NIV.
- 13) Cough-assist techniques should be included in the therapy of NMD patients when peak expiratory flow falls below 50% of predicted.
- 14) Lower rise time and longer time for inspiration should be preferred in NMD patients on NIV needing cough-assistance.
- 15) Full-face masks could induce obstructive apnoea by pressing the lower jaw backwards when tightening the head gear.

NIV is still a key method for supporting breathing when the respiratory system fails to compensate the damage done by diseases affecting ventilation. It is safe and applicable in different settings: in the general ward, ICU and the patient's home. There are still pros and cons regarding the use of long-term NIV in COPD, but arguments supporting it seem to prevail. In other diseases, where the method is anyhow broadly applied, there is a need for larger scientific basis for the recommendation. New guidelines for NIV in acute respiratory failure are well used and evidence-based. Physicians around the globe find NIV more and more appropriate, and search for ways to learn how to technically implement it in their practice. It seems that with this outbreak of interest and acknowledgement of the future of NIV is well on the horizon of respiratory medicine 10 years from now.

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**Affiliations**

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**Conflict of interest**

None declared.