



Withdrawing noninvasive ventilation at end-of-life care: is there a right time?

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Purpose of review

The purpose of this review is the 'when' and 'how' of the matter of withdrawing noninvasive ventilation (NIV) at end-of-life (EoL) setting, having in mind the implications for patients, families and healthcare team.

Recent findings

Several recent publications raised the place and potential applications of NIV at EoL setting. However, there are no clear guidelines about when and how to withdraw NIV in these patients. Continuing NIV in a failing clinical condition may unnecessarily prolong the dying process. This is particularly relevant as frequently, EoL discussions are started only when patients are in severe distress, and they have little time to discuss their preferences and decisions.

Summary

Better advanced chronic disease and EoL condition definitions, as well as identification of possible scenarios, should help to decision-making and find the appropriate time to initiate, withhold and withdraw NIV. This review emphasized the relevance of an integrated approach across illness' trajectories and key transitions of patients who will need EoL care and such sustaining support measure.

Keywords

advance care planning, end-of-life care, noninvasive ventilation, withdrawing treatment

INTRODUCTION

Contrasting available evidence supporting the use of noninvasive ventilation (NIV) in some forms of acute and chronic respiratory failure to start NIV at the end-of-life (EoL), although it is becoming increasingly common, remain controversial [1^{**}]. Moreover, limited information is available about how and when to withdraw NIV in those patients. The purpose of this review is the 'when' and 'how' of the matter of withdrawing NIV at EoL setting, having in mind the implications for patients, families and healthcare team.

NONINVASIVE VENTILATION AND RESPIRATORY FAILURE

Since the introduction of NIV into clinical practice a few decades ago, the number of patients receiving this treatment is steadily increasing. NIV showed efficacy in a broad range of acute and chronic settings [1^{**},2^{*},3,4]. Major reasons for this success are patient-related improved outcomes [3]. However, most of these investigations have focused on mortality as an endpoint rather than patient-reported outcomes.

One of the major objectives of palliative care is the relief of dyspnoea, highly prevalent in terminally ill patients [1^{**}]. Available evidence recommended 'offering NIV to dyspnoeic patients for palliation in the setting of terminal cancer or other terminal conditions' [2^{*}].

The use of NIV for patients with acute respiratory failure (ARF) or acute on chronic respiratory failure (CRF) can be classified into three categories (Table 1) [5^{**}]. This approach provides clinicians a conceptual framework for NIV uses in patients with acute cardiopulmonary diseases [2^{*},5^{**}]. However, a limit of this categorization is that it does not

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Curr Opin Support Palliat Care 2019, 13:000–000

DOI:10.1097/SPC.0000000000000471

KEY POINTS

- Withhold and withdraw NIV at the EoL remain controversial.
- Despite international recommendations, ACP is surprisingly uncommon in chronic respiratory disease.
- The provision of NIV for patients with DNI or CMO orders is ethical when provided within a framework built upon respect for patient preferences, values and priorities.
- Discussions about withdrawal NIV often include family members of critically ill patients and should address the essential components of the dying process, including expected time to death after withdrawal.
- Continuum of care framework for chronic progressive diseases may help in defining patients who will require NIV and reduce the risk of complex treatment interventions and decisions making in a 'crisis' event.

consider the former respiratory condition of the patient (i.e. presence or not of chronic respiratory disease, previous use of long-term oxygen or home ventilation). Those different scenarios prior to the acute event could additionally impact the decision to include patients in one or another category.

Table 1 may be an oversimplification of these complexities. These categories are not watertight compartments; they should be conceived in a dynamic way within a process with different

intervention options. In the same patient, scenarios may change. The goals of care must be continually assessed; risks, benefits and treatment preferences can change over time.

SHOULD NONINVASIVE VENTILATION BE USED IN PATIENTS WITH ACUTE RESPIRATORY FAILURE AT END-OF-LIFE CARE?

Although NIV use is accepted as an effective option when patients and/or families have decided to refuse invasive approach as endotracheal intubation (ETI), but still accept to try NIV therapy with the goal of surviving, the use of NIV as a palliative measure when their decision is to reject all life support measures is controversial [1²²]. Those patients (third category, Table 1) are those with a terminal disease (such as an underlying malignancy) or at the final stage of a chronic progressive disease such as chronic obstructive pulmonary disease (COPD), chronic heart failure or neuromuscular diseases (NMDs) [5²²].

It has been suggested that it is inappropriate to use NIV for patients who prefer to decline life support such as ETI and mechanical ventilation because NIV is still a form of life support delivered by mask and may cause discomfort while prolonging suffering and the dying process [6²²]. Moreover, the patient may not be comfortable with the mask on does not want to use it and cannot communicate. Table 2 resumes the main goals of use of NIV and the consequences of its inappropriate use when patients

Table 1. Overview of the three-patient category approach to using noninvasive ventilation for acute respiratory failure (modified from [2²²,5²²,6²²])

Approach	Type one patients	Type two patients	Type three patients
Patient characteristics	Patients in whom NIV is a life support with no preset limitation on life-sustaining treatments (e.g. ETI and mechanical ventilation)	Patients and/or families have decided to refuse ETI, but still want to receive NIV therapy with the goal of surviving the hospitalization	Patients and families have chosen to refuse all life support. NIV is a palliative measure that seeks to alleviate symptoms, mainly dyspnea
Survival goal	Yes	Yes	No
ETI	Yes	No	No
Primary goals of care	To restore health and relieve dyspnoea. Will use ETI if necessary and indicated	To restore health and relieve dyspnea without using ETI and without causing unacceptable discomfort	To relieve dyspnoea and maximize comfort while minimizing adverse effects of opiates
End point for NIV	Unassisted ventilation adequately supporting life. Intolerance of NIV		Patient is <i>not</i> more comfortable having NIV on or wants NIV stopped. Patient becomes unable to communicate
Response to NIV failure	Intubation and mechanical ventilation (if indicated)	Change to comfort measures only and to palliate symptoms without NIV	To palliate symptoms without NIV

ETI, Endotracheal intubation; NIV, Noninvasive ventilation.

Table 2. NIV use approach in the setting of palliative measure when have been chosen to reject all life support measures (modified from [5[■],6[■],7])

NIV would only be considered successful if it improves symptoms (dyspnoea or other distress) without causing additional burden or discomfort to the patients	
Main goals of NIV use	Consequences of inappropriate NIV use
Patient comfort, relief dyspnoea Maintain cognition and the ability to communicate To provide life support, delaying death for a few hours while the family member arrives to say goodbye To provide time for terminal patients to complete their last wishes	Unmet needs or conflicting expectations on the aim of care Inadvertent prolongation of the dying process Intensification of patient suffering and family duress Impossibility for communication Inappropriate use of medical resources
When goals of care cannot be met without compromising the patient's quality of life, withdrawal of NIV is ethically justified with subsequent enhancement of other means of comfort measures for symptom control In this context, there is no justification for providing NIV to patients who are unable to communicate about whether NIV has improved their symptoms	

NIV, Noninvasive ventilation.

and families have been chosen to reject all life support measures [5[■],6[■],7].

NONINVASIVE VENTILATION ACCORDING TO ADVANCED CHRONIC ILLNESS TRAJECTORIES FRAMEWORK

Providing care in patients with chronic progressive diseases includes three overlapping phases: from diagnosis to the beginning of supportive care, from this point to the beginning of EoL care and from EoL care until death [8[■],9[■]]. During this evolution, there are two turning points known as the first and the second transition (T1 and T2). These are key moments in which palliative measures can be progressively incorporated into the care plan to avoid unreasonable treatments and reduce unnecessary costs [10[■]]. The early identification and the multidimensional assessment of palliative needs have shown clear benefits in terms of symptom control, quality of life (QoL) and treatment goals and may reduce the intensity, frequency and need for crisis intervention [9[■]].

Figure 1 shows continuum of care framework that progress toward end-stage disease and might need NIV in acute scenarios. According to trajectories, it is possible to prioritize certain types of care such as survival, functionality and wellbeing and symptom control. Prognostic tools have been shown to be useful for defining the more appropriate therapeutic approach. Prognosis and prioritizing therapeutics should be of great help in defining the categorization of patients who will require NIV at the time of an acute event. In fact, one of the aims of prognostic tools is to reduce the risk of complex treatment and care decisions in a 'crisis' event [10[■]].

The small number of studies, the heterogeneity in trial design and the relatively low acceptance rate

of NIV in the scenario-type three patients prevent a firm recommendation regarding the use of NIV as a palliative tool. Official European Respiratory Society/American Thoracic Society (ERS/ATS) on NIV in patients with ARF emphasize the need for appropriate patient selection and staff training, especially where the use of the NIV is not usual practice (i.e. palliative care unit) [2[■]]. Alternative measures in the case of NIV failure need to be identified before the initiation of NIV [2[■]]. Ethical considerations gain increasing importance when making treatment recommendations to patients with advanced chronic conditions and this also need a critical discussion [3].

Facing EoL discussion is difficult, mainly in young patients. Guidelines suggest that 'patient's advance directives and a plan for the management of respiratory insufficiency should be established before respiratory complications occur' [11[■]]. Discussions regarding advanced palliative care are very rarely initiated. In a multicentre study concerning EoL communication in COPD patients, half of the physicians thought they had communicated detailed information. However, only 19% of the COPD patients thought the physicians did it [12]. Another important point is the identification of the timing of and when to raise the issue of EoL care. There are no studies that show the prevalence of these categories. Generalized application of prognostic tools in advanced care planning (ACP) may change this paradigm and facilitate care decision during acute events (Fig. 1).

WHEN SHOULD NONINVASIVE VENTILATION NOT BE USED OR WITHDRAWN IN PALLIATIVE CARE SETTING?

Wilson *et al.* [5[■]] provided the first systematic review and metaanalysis exploring the outcomes

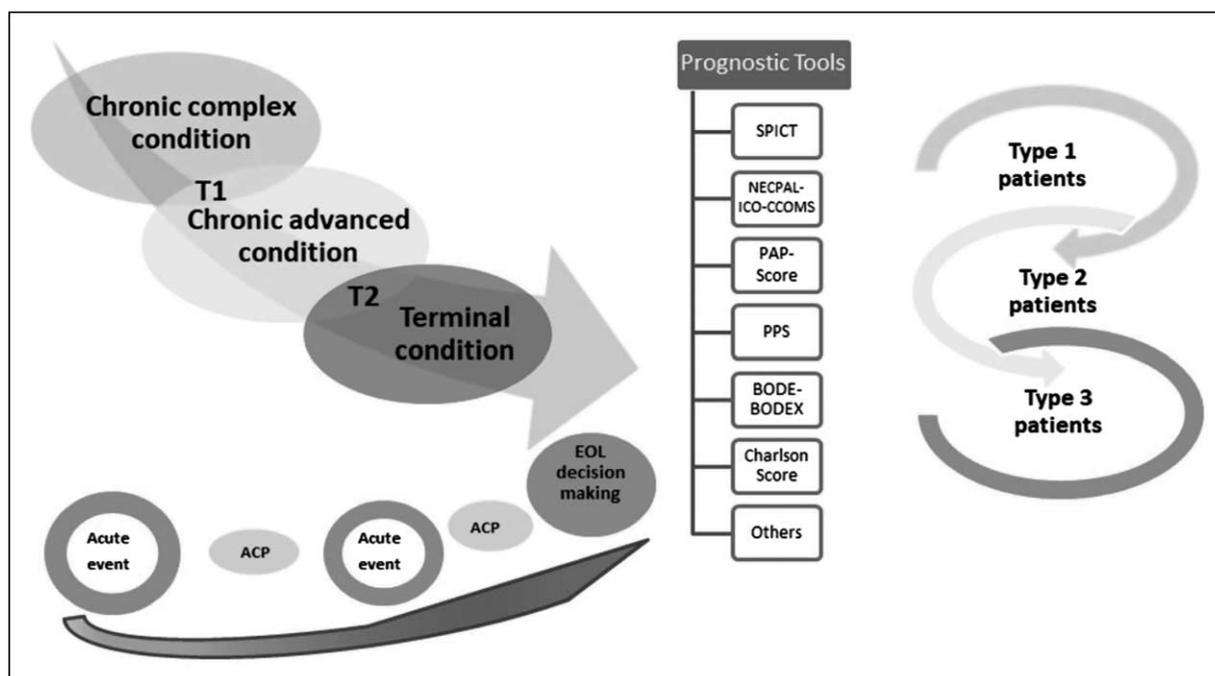


FIGURE 1. Continuum of care framework for chronic progressive diseases that progress toward end-stage disease and might need NIV in acute scenarios. Proposal of articulation, for chronic to terminal condition (trajectories), their transitions (T1 and T2), acute events and advance care planning (ACP), the prognostic tools and patient categories (Table 1) that might need NIV in acute scenarios (original from Tripodoro, Rabec and De Vito). BODE-BODEX, body-mass index, airflow obstruction, dyspnea, exercise capacity, exacerbation index in COPD patients; NECPAL CCOMS-ICO© (Necesidades Paliativas, The Quality Observatory, WHO Collaborating Centre for Palliative Care Public Health Programs, Catalan Institute of Oncology, Barcelona, Spain); PAP score, palliative prognostic score; PPS, palliative performance scale; SPICt, supportive and palliative care indicators tool.

of NIV in patients with ARF in the ICU or the hospital ward who have done not-intubate indications (DNI) or comfort measures only (CMO) orders. The authors emphasized that crucial questions regarding QoL in survivors, quality of death in non-survivors and the impact of NIV in patients with CMO orders remain largely unanswered.

Interestingly, relieving dyspnoea by NIV in patients with ALS/MND having CRF is associated with decreased pressure pain thresholds. Therefore, dyspnoea-related anxiety appears to be an important contributor to the overall anxiety and psychological distress of NMDs patients with CRF, and it is likely to play a dominant role in their QoL as it does in COPD patients [13²²,14]. Symptomatic treatments for dyspnoea such as opioids should be readily available, even fairly early in the course of the disease, if dyspnea is not fully relieved by NIV. High-flow nasal cannula (HFNC) is a relatively new therapy that also could be offered to patients at the EoL to help relieve dyspnoea [15]. However, any benefit of its use in the palliative setting is unknown at this time [1²²].

It must be emphasized that nowadays it is anachronistic to ignore the beneficial effects of NIV on survival in NMDs patients [16²²]. There is

little information in the literature about enabling Amiotrophic Lateral Sclerosis/ Motorneurone disease (ALS/MND) patients to make choices about their EoL care, particularly relating to the preferred place of death as an integral part of holistic care [16²²]. Survival improvement and relief of dyspnoea perhaps enable the patient to communicate verbally, and it may buy additional time for family to visit or to take care of EoL matters [3]. ALS/MND patients with CRF, even when treated by NIV, should be considered as suffering from the recently described ‘chronic breathlessness syndrome’ namely, persistent dyspnoea despite treatment. This may contribute to ‘physical limitations and/or a variety of adverse psychosocial, spiritual or other consequences’. Considering this, it is perhaps surprising that management of ALS/MND related dyspnoea has received little attention beyond NIV and EoL care. This can be viewed as an example of the ‘invisibility of breathlessness’ and provides a strong incentive for additional research on ALS/MND-related dyspnoea [13²²,14,17].

Despite international recommendations to involve patients and family members in discussions about whether to withdraw or withhold life support,

Table 3. Situations in which NIV should not be used in palliative care setting

- When the patient has some sort of facial deformity or injury that does not allow for a comfortable **mask fitting**, then something other than NIV should be considered
- When NIV fails to relieve **dyspnoea**, then it should be removed
- When the patient loses **consciousness**, then it would be more dignified for the patient to have NIV discontinued
- When the patient wants to **communicate** with loved ones at the EoL, then NIV may be inappropriate if it interferes with communication

NIV, Noninvasive ventilation.

Wilson *et al.* [5¹¹] review reported that patients' DNI statuses were frequently determined by physician assessment alone, without patient or family involvement. Given the impact of NIV on respiratory function to QoL and survival, understanding differences that influence NIV prescribing is critical [18]. Table 3 summarizes situations in which NIV should not be used in palliative care. Clear endpoints should be established before any NIV attempts so that futile NIV therapy is avoided [1¹¹].

Many crucial uncertainties remain regarding NIV in patients with DNI or CMO orders. However, the limited data presented by Wilson *et al.* [5¹¹] metaanalysis appear to confirm the widespread view among palliative care providers that NIV should not be considered as a first-line therapy for relieving dyspnoea in patients seeking CMO orders. Thus, for many of these patients, it is advisable to initiate low-dose opioids as well as nonpharmacologic measures prior to initiating a trial of NIV to relieve dyspnoea [19¹¹].

ADVANCED CARE PLANNING

In brief, 'ACP enables individuals to define goals and preferences for future medical treatment and care, to discuss these goals and preferences with family and health-care providers, and to record and review these preferences if appropriate' [20¹¹].

Jabbarian *et al.* showed that a majority of patients are interested in engaging in ACP, but despite this, it is rarely done [21¹¹]. ACP is surprisingly uncommon in chronic respiratory disease, possibly because of the complex disease course and ambivalence of both patients and healthcare professionals to engage in it [7,21¹¹]. Although NIV provides a good QoL and longer survival, life on NIV might be challenging for NMDs patients and early EoL discussion is mandatory as to put in place proper ACP [11¹¹]. This is a special group of patients because many of them are already chronically receiving full-setting NIV [17].

In 2014, Gifford pointed out some conflicting and still unmet issues: communication between clinicians and patients about the use of NIV to palliate dyspnoea frequently occurs late in the course of progressive illnesses, and healthcare professionals rarely solicit perspectives on NIV from patients and families until a crisis forces the issue. Resources should be mobilized to explain this inertia; otherwise, we will have to question whether negative or equivocal results of NIV research are simply the consequences of waiting too long to discuss its implementation [22].

In COPD patients, the difficulty to predict the prognosis and recognition of the final stage may represent one of the main causes of nonreferral to palliative care services [23¹¹]. Gainza *et al.* followed up a cohort of 60 COPD patients and noted that the main cause of death in their cohort was respiratory failure [23¹¹]. Dyspnoea was the main symptom listed at the first visit in a home-based care setting. None of those patients had performed ACP before referral. However, ACP was undertaken in half of the patients during the follow-up. Therefore, the main consensus guidelines for the management of COPD patients include the collection of prognostic criteria to identify EoL patients. Hence, authors recommend starting an early palliative care approach for the disease regardless of its prognosis.

DYING WITH OR WITHOUT NONINVASIVE VENTILATION

Some clinicians argue that palliative use of NIV may actually improve immediate survival in some cases and that it may be a valuable tool to help the patient communicate with family and perhaps complete some EoL tasks. In opposite, for others maintaining NIV in this setting actually cause harm and may delay the dying process [1¹¹]. No studies evaluated quality of dying in no survivors, but some studies suggested that NIV was associated with mild reductions in dyspnoea and opioid requirements as compared with oxygen [5¹¹,24].

The use of oxygen in patients who receive palliative care is widely prescribed. However, there is no evidence that supports this practice in terms of relief of dyspnea unless there is some degree of hypoxemic reversibility. However, oxygen may increase the comfort of the patient through the extraattention given, as well as the 'fan effect' (the simple gas flow to the face can provide comfort). It is important to take in mind that oxygen is not without cost, and, in some cases, superimpose a staff workload [1¹¹]. Pharmacological and nonpharmacological measures, perhaps including HFNC therapy should always be considered [15,25,26¹¹]. Regardless of which

NIV important questions need to be asked by patients, families and clinicians include the following: How long will it prolong life? Will it restore or maintain alertness? Will the therapy increase or relieve suffering? [1¹].

IS WITHDRAWING LIFE-SUSTAINING TREATMENTS AN ACT OR AN OMISSION?

It is relatively straightforward to call some cases of withdrawal of life-sustaining treatments an omission rather than an act [27¹]. As discontinuation of NIV will inevitably be accompanied by severe symptoms, or even true acute respiratory distress, the situation must be anticipated, and it necessitates rigorous and carefully appropriate drug treatment. As in any situation of EoL dyspnoea, opioids and benzodiazepines, possibly associated with the administration of oxygen, effectively relieve the symptoms induced by discontinuation of ventilatory support [13¹,14,26¹]. The provision of NIV for patients with DNI or CMO orders is ethical when provided within a framework built upon respect for patient preferences, values and priorities. In all cases, the patient's perception of benefits and burdens should be reassessed on an ongoing basis, and NIV should be discontinued when it is no longer achieving the patient's goals of care [19¹].

LETTING DIE

Close collaboration between ICU and palliative care teams enhances care for critically ill patients and their families by helping to clarify preferences, values and priorities; communicating prognosis and expected outcomes of therapy; providing symptomatic, spiritual and emotional support; assisting with complex medical decision-making; and, often, helping to ensure that treatment plans remain aligned with the patient's (or surrogates) overarching goals of care [19¹]. In patients facing ARF, with or without DNI or CMO orders, early integration of palliative care can be particularly helpful, given the complexities of the decisions involved and the need for frequent reassessment of treatment successes or failures as judged relative to the patient's goals, which may change over time. Discussions about withdrawal NIV often include family members of critically ill patients. These conversations should address the essential components of the dying process, including expected time to death after withdrawal [19¹].

CONCLUSION

Regarding a right time to withdraw NIV at EoL care, we analysed recent evidences and confirmed that many questions remain unanswered such as quality

of dying, timely decision-making according to palliative needs and ethical discussions faced to letting die with or without NIV. Suggestions inspired on chronic illness trajectories and key transitions, helped by prognostic tools, had been made. The 'chronic breathlessness syndrome' concept seems to require a holistic research approach. Future research should focus on patient and family-reported outcomes, and respect for preferences, values and priorities.

Acknowledgements

None.

Financial support and sponsorship

None.

Conflicts of interest

There are no conflicts of interest.

REFERENCES AND RECOMMENDED READING

Papers of particular interest, published within the annual period of review, have been highlighted as:

- of special interest
- of outstanding interest

1. Davies JD. Noninvasive respiratory support at the end of life. *Respir Care* 2019; 64:701–711.

This is a comprehensive review that examines evidence relating to the use of noninvasive respiratory support at the end of life.

2. Rochwerg B, Brochard L, Elliott MW, *et al.* Official ERS/ATS clinical practice guidelines: noninvasive ventilation for acute respiratory failure. *Eur Respir J* 2017; 50:.

This document summarises the current state of knowledge regarding the role of NIV in ARF. Evidence-based recommendations provide guidance to relevant stakeholders.

3. Randerath WJ, Bloch KE. Noninvasive ventilation for chronic hypercapnic respiratory failure. *Respiration* 2019; 97:1–2.

4. Simonds AK. Home mechanical ventilation: an overview. *Ann Am Thorac Soc* 2016; 13:2035–2044.

5. Wilson ME, Majzoub AM, Dobler CC, *et al.* Noninvasive ventilation in patients with do-not-intubate and comfort-measures-only orders: a systematic review and meta-analysis. *Crit Care Med* 2018; 46:1209–1216.

This systematic review assesses the effectiveness of NIV in patients with ARF and DNI or CMO orders. However, crucial questions regarding QoL in survivors, quality of death in nonsurvivors, and the impact of NIV in patients with CMO orders remain largely unanswered.

6. Curtis JR, Cook DJ, Sinuff T, *et al.* Noninvasive positive pressure ventilation in critical and palliative care settings: understanding the goals of therapy. *Crit Care Med* 2007; 35:932–939.

The Society of Critical Care Medicine charged this task force with developing an approach for considering use of NIV according to three categories of patients after careful discussion of the goals of care.

7. Spruit MA, Rochester CL, Pitta F, *et al.* Pulmonary rehabilitation, physical activity, respiratory failure and palliative respiratory care. *Thorax* 2019; 74:693–699.

8. Murray SA, Kendall M, Mitchell G, *et al.* Palliative care from diagnosis to death. *BMJ* 2017; 356:j878.

Evidence is growing that people can benefit from palliative care earlier in their illness, say Murray *et al.*, but care must be tailored to different conditions. By embracing the principles of palliative care in their routine practice, clinicians can meet the multi-dimensional needs of people with deteriorating health more effectively.

9. Tripodoro VA, Llanos V, De Lellis S, *et al.* Factores pronósticos en pacientes con cáncer y necesidades paliativas identificados con el instrumento NECPAL CCOMS-ICO(c) tool. *Medicina (B Aires)* 2019; 79:95–103.

The aim of this study was to identify prognostic factors of mortality in hospitalized and ambulatory patients with cancer and palliative needs according to the NECPAL tool. The major breakthrough was the systematic prospective identification of palliative needs.

10. Calsina-Berna A, Martinez-Munoz M, Bardes Robles I, *et al.* Intrahospital mortality and survival of patients with advanced chronic illnesses in a tertiary hospital identified with the NECPAL CCOMS-ICO((c)) tool. *J Palliat Med* 2018; 21:665–673.

This is a cross-sectional study with longitudinal cohort follow-up. It described hospital mortality, survival rates and related variables in a sample of inpatients identified with the NECPAL tool.

11. Crimi C, Pierucci P, Carlucci A, *et al.* Long-term ventilation in neuromuscular patients: review of concerns, beliefs, and ethical dilemmas. *Respiration* 2019; 97:185–196.

This article shows that long-term NIV is effective but challenging in NMD patients. Efforts should be made by healthcare providers in arranging a planned transition to home and EoL discussions for ventilator-assisted individuals and their families.

12. Fuseya Y, Muro S, Sato S, *et al.* Perspectives on end-of-life treatment among patients with COPD: a multicenter, cross-sectional study in Japan. *COPD* 2019; 16:75–81.

13. Morelot-Panzini C, Bruneteau G, Gonzalez-Bermejo J. NIV in amyotrophic lateral sclerosis: the 'when' and 'how' of the matter. *Respirology* 2019; 24:521–530.

This article pointed out that more advanced use of NIV also requires pulmonologists to master the associated EoL palliative care, as well as the modalities of discontinuing ventilation when it becomes unreasonable.

14. Morelot-Panzini C, Perez T, Sedkaoui K, *et al.* The multidimensional nature of dyspnoea in amyotrophic lateral sclerosis patients with chronic respiratory failure: air hunger, anxiety and fear. *Respir Med* 2018; 145:1–7; Epub 2018/12/05.

15. Zhu Y, Yin H, Zhang R, Ye X, Wei J. High-flow nasal cannula oxygen therapy versus conventional oxygen therapy in patients after planned extubation: a systematic review and meta-analysis. *Crit Care* 2019; 23:180.

16. Tripodoro VA, De Vito EL. What does end stage in neuromuscular diseases mean? Key approach-based transitions. *Curr Opin Support Palliat Care* 2015; 9:361–368.

This article revised the definition of end stage in the setting of NMDs to understand the implications for the patient, family and healthcare team and to address the obstacles involved in the lack of definition.

17. Tripodoro VA, De Vito EL. Management of dyspnea in advanced motor neuron diseases. *Curr Opin Support Palliat Care* 2008; 2:173–179.

18. Heiman-Patterson TD, Cudkovic ME, De Carvalho M, *et al.* Understanding the use of NIV in ALS: results of an international ALS specialist survey. *Amyotroph Lateral Scler Frontotemporal Degener* 2018; 19:331–341.

19. Esbensen KL. What matters most when considering noninvasive ventilation for patients with do-not-intubate or comfort-measures-only orders? *Crit Care Med* 2018; 46:1367–1370.

This interesting editorial suggests treatment algorithm for using NIV in patients with ARF who have DNI or CMO orders.

20. Rietjens JA, Sudore RL, Connolly M, *et al.* Definition and recommendations for advance care planning: an international consensus supported by the European Association for Palliative Care. *Lancet Oncol* 2017; 18:e543–e551.

This international consensus drafted the first unifying, transcultural, international consensus definition of ACP and recommendations for its application through a rigorous, large international Delphi study. The recommendations guide the way in which ACP should be done and integrated into healthcare and suggest outcome measures of ACP.

21. Jabbarian LJ, Zwakman M, van der Heide A, *et al.* Advance care planning for patients with chronic respiratory diseases: a systematic review of preferences and practices. *Thorax* 2018; 73:222–230.

Based on the literature, the authors outlined the current practice of ACP in chronic respiratory disease, identified barriers preventing and facilitators enabling engagement in ACP and formulated recommendations on how to overcome barriers related to patients, healthcare professionals and the healthcare system.

22. Gifford AH. Noninvasive ventilation as a palliative measure. *Curr Opin Support Palliat Care* 2014; 8:218–224.

23. Gainza-Miranda D, Sanz-Peces EM, Alonso-Babarro A, *et al.* Breaking barriers: prospective study of a cohort of advanced chronic obstructive pulmonary disease patients to describe their survival and end-of-life palliative care requirements. *J Palliat Med* 2019; 22:290–296.

This study was a prospective observational cohort study of advanced COPD patients referred to a palliative care home-based team. The HOLD study was one of the first cohort studies of patients with advanced COPD who were followed by a palliative care home-based team.

24. Nava S, Ferrer M, Esquinas A, *et al.* Palliative use of noninvasive ventilation in end-of-life patients with solid tumours: a randomised feasibility trial. *Lancet Oncol* 2013; 14:219–227.

25. Koyachi T, Hasegawa H, Kanata K, *et al.* Efficacy and tolerability of high-flow nasal cannula oxygen therapy for hypoxemic respiratory failure in patients with interstitial lung disease with do-not-intubate orders: a retrospective single-center study. *Respiration* 2018; 96:323–329.

26. Pisani L, Hill NS, Pacilli AM, Polastri M, Nava S. Management of dyspnea in the terminally ill. *Chest* 2018; 154:925–934.

This recent review focuses on the management of dyspnea in patients with advanced terminal illness, summarizing clinical trial evidence on pharmacologic and nonpharmacologic interventions available for these patients.

27. McGee A, Truog R. Withholding and withdrawing life-sustaining treatment and the relevance of the killing versus letting die distinction. *Am J Bioeth* 2019; 19:34–36.

The authors quoted different point of view from many sources focused on the killing versus letting die distinction.