Noninvasive ventilation in palliative care and near the end of life

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Summary

Introduction The onset of severe, life threatening respiratory failure in patients with an incurable illness may be an indication for the use of non-invasive ventilation (NIV).

State of the art Two approaches are associated with the use of NIV in palliative care settings. In the “strictly palliative” approach, NIV is proposed for patients with end stage, chronic respiratory failure and “do-not-tracheostomise” orders as a ceiling of care. In the “palliative and probably curative” approach, NIV may help patients with “do-not-intubate” orders or enable them to forego endotracheal intubation. This review provides some guidelines for clinical practitioners in charge of patients with incurable illnesses, to help to guide and anticipate their medical management if acute respiratory failure (ARF) develops.

Conclusions and perspectives NIV can alleviate symptoms in patients near the end of life. In the case of severe ARF in patients with “do-not-intubate” orders, NIV may also be used to avoid the need for endotracheal mechanical ventilation, usually in patients with COPD or cardiogenic pulmonary oedema. NIV may help some patients to forego endotracheal intubation. Future studies are needed to examine the attitude of patients and their families to this technique.

Key words: Non-invasive ventilation • Palliative care • Acute respiratory failure • COPD • Neuromuscular diseases.
Introduction

Non-invasive ventilation (NIV) is a form of ventilatory assistance that does not entail the use of an endotracheal device to connect the patient to the delivery line of the ventilator. Its advantages have recently been demonstrated in the treatment of acute respiratory failure (ARF) [1] and the non-invasive nature of the technique suggests that it may also have a role to play in a palliative setting.

Palliative care is administered to critically ill patients in a life-threatening condition with end-stage or terminal disease. Although palliative care usually concerns cancer patients, subjects with end-stage chronic respiratory failure (CRF) could also potentially benefit from this type of management because their quality of life is poor in the terminal phase of their illness [2]. In ARF, an entirely different life-threatening condition, palliative care may also be envisaged for subjects in a state of “extreme physiological distress” caused by decompensated CRF or heart failure or in very elderly patients with multiple comorbidities. These patients are often exposed to chronic physical and/or emotional distress and many refuse intubation or are considered as “do not intubate” (DNI) cases because of a adverse outcome has been announced [3]. Lastly, it is also important to raise the issue of critically ill patients with CRF who cannot be extubated.

The goal of palliative care is to make patients who are terminally ill as comfortable as possible and ensure that they enjoy a certain quality of life by alleviating any physical, social or moral distress whilst they are still in possession of their mental faculties, continually supporting them until they die [4-6]. Thus, in substance, palliative care is based on the concept of “gentle support” until the patient’s life draws to a close.

Although it is considered a “non-aggressive” technique, the use of NIV in a palliative care setting may be debateable for two reasons. Firstly, the patient may not tolerate NIV, which can sometimes cause undesirable side-effects such as skin lesions, irritation of the eyes, wind in the GI tract, orthodontic complications and in rare cases barotraumatic events [7-10]. An essential pre-requisite before using NIV is therefore to thoroughly assess the benefits for the patient and the skills and experience of the care-giving team in this type of treatment, making sure that it will do the patient no harm in a palliative care setting [11, 12]. Secondly, the curative aspect of NIV may not necessarily be suitable as a palliative measure for a patient with life-threatening ARF who has refused intubation or has been given a DNI order [12-17]. Since the end of the 80s NIV has developed substantially in the intensive care unit (ICU) and has now become one of the major treatments for ARF, in particular for acute decompensation in COPD patients [12-17] and in acute cardiogenic pulmonary oedema (PE) [18]. Since the end of the 90s further studies have suggested that NIV could be of benefit in other causes of ARF: on a previously healthy lung [19, 20], in immunocompromised patients [21-24], postoperatively in chest surgery [25] and after extubation [26-28]. Although NIV is now part of the therapeutic armamentarium for ARF, it is only used in 16 to 24% of the indications [29, 30] and is not successful in at least 36 to 40% of the cases [29, 30]. In a study carried out on 1033 COPD patients with acute exacerbation Confalonieri et al. [31] demonstrated that patients with impaired awareness and a Glasgow score < 11 were associated with a higher risk of failure when given NIV. Therefore, although NIV is a way of avoiding intubation and can decrease the morbidity and mortality during ARF in selected patients with well-trained care-giving teams, to date it remains a vulnerable alternative to invasive mechanical ventilation in its best indications [12]. For these reasons, NIV is now considered to be less effective than assisted ventilation with intubation. Therefore, patients who have refused intubation or ARF patients with DNI orders and the failure criteria for NIV or even intensive care patients who cannot be extubated and are given NIV rather than invasive mechanical ventilation may have less chance of survival. In these indications NIV is intended as a palliative measure to alleviate the subject’s physical or emotional distress without resorting to intubation. It is true that the patient’s condition may improve, but at the time the decision to use NIV is taken there is often little likelihood that it will succeed in achieving this.

In a palliative setting there are therefore two ways of approaching NIV, one is strictly palliative and the other “palliative and probably curative”. This article is an attempt to take stock of both aspects.

In the strictly palliative approach we will discuss two different settings: i) the case of a patient in the terminal phase of CRF who has already had NIV at home, and who has been given a “do not tracheostomise” order and ii) the case of a patient with end stage ARF who has never previously had long-term ventilatory assistance.

With respect to the second approach, aimed at “palliative and probably curative” action, we shall successively consider the cases of patients who have refused intubation, those with DNI orders and those who cannot be weaned off invasive mechanical ventilation. In a recent European study carried out in ICUs Nava S et al. Assessed that these categories of patients accounted for 21.5% of those admitted to hospital [32].

- In a palliative care setting NIV can be approached in two ways: the first is strictly palliative and the second “palliative and probably curative”.

Precautions to be taken in serious illness at an advanced or terminal stage

Whether NIV is used as a strictly palliative measure or as a “palliative and probably curative” approach in advanced or
end stage disease, the main issue is how to treat a patient in a life-threatening condition with dyspnoea. In short, the caregiving team is usually faced with an emergency and must manage a distressing situation involving several stakeholders (the patient, who may have already expressed his/her wishes, the patient’s family and the physician); their opinions may vary well differ, depending on their own personal, cultural, social, religious, ethical and sometimes philosophical beliefs. In this type of setting it is all too easy for the family to misunderstand why a medical procedure has been implemented, especially when it is often impossible to seek the patient’s consent before deciding which treatment is the most appropriate. In point of fact it has been shown that less than 5% of the patients in the ICU are sufficiently competent to participate in a discussion concerning the choice of treatment [33]. Making the right choice is paramount because the patient’s dignity is at stake. At this crucial time-point the patients’ dignity depends on whether the decision to treat fits with their own ideas of physical comfort and whether they feel the treatment is useful and both of these parameters are closely connected to their acceptance of the “grieving” process. This type of situation can be even more critical when an unknown patient is admitted to the A & E department and cannot express his/her wishes or consent to a treatment. In this type of setting, emergency merges with doubt and the urgency of the situation and the lack of time to talk to the patient will not be conducive to obtaining useful information or permit reflection of good quality. It has been demonstrated that at this crucial time in the ICU, families often find it very difficult to express the patient’s beliefs and values even when they have the relevant information [34]. Sometimes they even prefer to abstain from participating in the decision because they are afraid they might not have fully understood the patient’s wishes; they may also be anxious or depressive [35]. In this environment of extreme urgency it would seem reasonable to give preference to keeping the patient alive, implementing NIV whilst taking the subject’s medical history and asking the specialists for their opinion, then attempt to get more details of the patient’s wishes from the family once the situation is in hand. Once NIV has been set up, if any doubt persists and the patient’s condition becomes worse, intubation should be envisaged [36]. Later, once the patient’s case history has been taken if will be easier to decide whether NIV should be pursued or, conversely, if it is preferable to withhold active treatment.

Whenever possible, the senior physician should discuss these issues with the patients and their families when they come in for routine consultations and treatment during the course of their chronic illness in order to avoid these crisis situations arising. It is important to choose a quiet corner, sheltered from the busy environment of the hospital for these discussions. In a hospital setting it is also essential to involve the attending physician and the nursing staff in charge of the patient. Prior conversations with the family GP concerning the patient and family’s personal and/or spiritual sensitivity will be helpful to guide the discussion. The contents of these conversations is reported in Table I. Lastly, the patient’s attending physician must assume his/her responsibility and dutifully carry out the patient’s instructions at the appointed time. However, it is not always easy to verbalise these subjects. Sometimes this can be due to a cultural or spiritual barrier that makes it impossible for the physician to broach the subject of death with the patient’s family and close relatives or even in some cases because the patient uses denial as a means of emotional protection.

- Very frequently in intensive care units patients and families cannot fully participate in decisions because they do not know how to.
- In these cases NIV can be used as a temporary solution whilst the medical data is being collected, thereby gaining enough time to get specialist opinions and more details concerning the patient and family’s wishes.

The “strictly palliative” approach to NIV

In a strictly palliative setting the main goal is to manage severe respiratory distress in a patient whose life is drawing to a close. A distinction should be made between two different types of patient: firstly those with CRF in the terminal phase who have already had long-term NIV and who have been given “do-not-tracheostomise” orders and secondly end-stage ARF patients who have never been ventilated at home.

Table I.
Precautions to take in the case of patients at an advanced or terminal stage of a serious illness.

| I | Assess the patient and family’s understanding of the disease and its prognosis. |
| II | Explain the goals of the patient’s treatment and management in detail, stressing that the treatment is often designed to alleviate the symptoms. |
| III | Attempt to broach the issue of end-stage disease and understand the patient’s wishes concerning the appropriate choice when the time arises. |
| IV | When talking to the patient be extremely vigilant and make sure that if the patient (or the family) becomes emotional you respond as simply and humanely as possible. An emotional outburst will usually give the practitioner information concerning the impact of the discussion, enabling him/her to adapt the conversation according to the patient’s reaction. |
| V | Reassure the patient and family that the only goal of the treatment is to make the patient as comfortable as possible. |
| VI | Attempt to talk about possible medical options (anxiolytics, sedatives, morphine) and non-medical options (oxygen, mechanical ventilation). |
| VII | If appropriate obtain any information you can about whether the patient requires a priest to administer the last rites. |
The terminal phase

It is extremely difficult to diagnose when a patient’s life has entered the terminal phase; this process requires a multidisciplinary consultation between the ICU and A & E staff, chest specialists and mobile palliative care unit practitioners. The diagnosis must be made with great care because if it is not appropriate it may well mean that the patient loses his or her chances of survival. It is therefore paramount that any acute treatable condition should be eliminated.

Evaluation of end-stage dyspnoea

End-stage dyspnoea must be assessed as objectively as possible to provide a suitable treatment and make the patient comfortable [37]. The clinical and radiological anamnesis is fundamental and must include an evaluation of the clinical features of the patient’s dyspnoea: breathing rate, gasping, wheezing, coughing, mucus accumulating in the airways and details of expectorate. Any associated symptoms such as pain, anxiety and insomnia should also be assessed. In most cases a plain chest x-ray and a measurement of oxygen saturation by pulse oxymetry will be sufficient as complementary examinations. Depending on the patient, in some cases a bronchoscopy, an ultrasound examination or a CT-scan can also be envisaged if the patient’s general status allows and the complication can be cured. A quantitative self-evaluation using a visual analogue scale is essential. This evaluation should be repeated regularly, but is sometimes complex to interpret. The patient’s appearance (tachypnoea, sweating, agitation, inspiratory gasping) and subjective feelings can sometimes be discordant. Anxiety can make it even more difficult for the patient to breathe and this can often mislead the caregivers and family because anxiety is highly “contagious”. It is therefore often desirable to ask a psychologist to assess the patient’s degree of anxiety.

- It is essential to assess end-stage dyspnoea as objectively as possible.

The hospital department in charge of a terminally ill patient

Terminally ill patients who suffer from very severe dyspnoea are often cared for in the chest unit rather than in a palliative care unit, whether they are suffering from bronchopulmonary cancer or CRF. Although the teams in the chest unit may feel that they cannot do much, technically the patients are often better off in these facilities as long as the mobile palliative care units participate in their care because the chest unit is better suited to their particular case.

The case of patients who have already had NIV at home

Except for amyotrophic lateral sclerosis (ALS) patients, subjects on long-term ventilation and their families are familiar with their condition and its daily constraints. In this type of setting the patients rarely express their need for support in the terminal phase. The care-giving team and the patient are usually more intent on optimising the patient’s daily quality of life as best they can with the help of the mobile palliative care unit or home nursing facilities, regardless of whether the patient is cared for at home, in a chronic hospital or in a nursing home.

The picture can also be more marked in ALS patients for whom NIV is no longer effective. In France, the development of specialised reference centres has considerably improved the management of ALS patients. In most cases the eventuality of tracheostomy has already been discussed. Often the option is not selected but can still be scheduled. In such cases patients are usually admitted to hospital in an attempt to improve NIV, which has become a tool to support them in the terminal phase. The role of the intensive care and chest team in optimising and adjusting the equipment (mask, ventilator) is paramount. In some cases there may even be ways of improving the patient’s bronchial drainage with suction.

Whatever the case, any unnecessary treatment should be withdrawn and the number of blood tests must also be restricted to the minimum. It is important to be available to inform and support the patient’s relatives. This entails frequent conversations with the family; it can also be helpful to systematically explain the treatments used in real time, thereby decreasing the family’s anxiety and indirectly soothing the patient. It is also important to pay particular attention to how the patient tolerates NIV. The amount of oxygen the patient receives must be systematically adjusted to maintain SpO₂ at 90-92%. When NIV is administered the patient can in some cases be sedated to avoid undue anxiety. In return, when the patient is calmer the treatment very often becomes more effective. However it is important to avoid resorting to benzodiazepines just because the family cannot bear the patient’s anxiety. In this range of drugs midazolam (short duration of action) has a suitable sedative effect when administered sub-cutaneously or intravenously. Careful titration every fifteen minutes, assessing the patient’s awareness, breathing rate and anxiety on a visual analogue scale will help to alleviate the patient’s symptoms without any loss of consciousness. During the night the dose can be increased to allow the patient to sleep better.

Apart from decubitus complications that can be fatal, the only real limitation to NIV is the build-up of bronchial mucus, which gradually impairs gas exchange (despite suction) and eventually causes death.

- For patients treated by long-term NIV at home the main issue is to optimise their daily quality of life.
If NIV is ineffective in ALS patients the respirator should be adjusted to optimise the patient's breathing and sedatives can also be administered.

Bronchial mucus is one of the most frequent complications of NIV.

The case of patients who have never had NIV at home

The value of NIV in decreasing dyspnoea can be discussed in this type of setting. However, the straps and the pressure of the mask can be uncomfortable for a patient who is dying and the alarm devices are distressing and may make the family feel even more anxious. In addition, at this very critical stage the patient is often no longer able to cooperate. The real priority is to make sure the patient is comfortable by releasing the straps and turning off the alarms, although in some cases the caregivers do not understand why and this can also complicate matters; appropriate sedatives (benzodiazepines) and morphine based drugs can be administered if necessary.

In patients who have never been treated by NIV at home the technique can be useful to decrease dyspnoea, but NIV can often be uncomfortable for the patient and a source of anxiety for the family.

The “palliative and probably curative” approach to NIV

The expression “palliative and probably curative” applies mainly to NIV used in the case of life-threatening ARF in patients who have refused intubation or patients with a DNI order; it may also concern patients in intensive care who cannot breathe spontaneously without invasive mechanical ventilation. In this type of setting NIV is considered as a palliative measure in comparison to intubation and assisted ventilation because it is known to be less effective and the physician is aware of its limitations. In these indications the patients frequently have severe respiratory acidosis, are unconscious (or at the very least impaired awareness) and haemodynamic instability, which are the known failure criteria for NIV [8]. However, if the patient’s ARF is caused by a reversible condition and/or responds well to NIV, the event may well resolve.

The patient and family must be given adequate information regarding the procedure (if possible) and be told that NIV is not devoid of limitations and risks. The rationale on which the indication for NIV is based in this particular case must be fully understood by the family and an alternative treatment must be systematically envisaged in case of failure. The “palliative and probably curative” approach can be proposed in two very different settings: firstly to avoid intubation or, on the contrary to permit withdrawal of the catheter. Because the goal is to make the patient comfortable in both cases it is absolutely essential to respect the absolute contraindications for NIV. These are summed up in Table II [8].

The care-giving team in charge of the patient must be aware of the risks of intolerance and complications (especially skin lesions) caused by NIV that can be yet another source of distress for the patient. It is therefore it is absolutely essential to know which criteria are predictive of successful NIV and treat the patients who have the highest positive scores so that they get an effective treatment that they can tolerate as well as possible [8]. The criteria that are predictive of a successful NIV are summed up in Table III.

NIV is less effective than intubation but can be offered to patients who refuse intubation or who have been given a DNI order, or even to those who cannot breathe spontaneously without invasive mechanical ventilation.

However, if the cause of ARF is reversible and it responds well to NIV, the event may well resolve.

NIV can be proposed either to avoid intubation or to help wean patients off the ventilator.

The “Palliative and probable curative” approach to NIV to avoid intubation

Patients who have refused intubation

This subject is probably one of the most widely documented in the literature. Levy et al. (2004) [3] analysed the outcome of a prospective cohort of 1211 patients treated by NIV,

<table>
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<th>Table II. Absolute contraindications in non-invasive ventilation.</th>
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<td>– unsuitable surroundings</td>
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<td>– insufficiently skilled/experienced caregivers</td>
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<td>– uncooperative, agitated or non-compliant patients</td>
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<td>– immediately after cardio-respiratory arrest</td>
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<td>– respiratory exhaustion (bradypnoea &lt; 12 cycles/min, pauses, gasps)</td>
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<td>– non-drained pneumothorax</td>
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<td>– sibilant thoracic wound</td>
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<td>– upper airway obstruction (except for sleep apnoea, laryngotraechomalacia)</td>
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<tr>
<td>– coma (except for hypcapnic coma in CRF)</td>
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<tr>
<td>– unprotected upper airways</td>
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<tr>
<td>– patient in shock</td>
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<td>– serious ventricular rhythm disorders</td>
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<td>– serious craniofacial traumatic injury</td>
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<td>– facial lesions prohibiting the use of a suitable facemask</td>
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<td>– unreleenting vomiting</td>
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<td>– haemorrhage of the upper GI tract</td>
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<td>– acute traumatic tetraplegia with respiratory involvement</td>
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<td>– severe sepsis</td>
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<tr>
<td>– multiple organ failure (≥ 2 organs)</td>
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<td>– in paediatric care : some cases of congenital facial dysmorph</td>
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114 of whom (9.4%) had stated that they did not wish to be intubated. The goals of the study combined the short and medium term outcome and identified the best indications. The patients were ventilated preferentially with an adjustable pressure ventilator equipped with a facemask. The treatment was administered in the medical department. The mean age of the population was 77 ± 10 years. The main causes of acute respiratory failure were as follows: exacerbation of CRF (30%), acute cardiogenic PO (24%), pneumonia (20%), others (12%) (malignancy complicated by pneumonia, acute PO, sepsis). Most of the patients were hypercapnic before NIV was administered (74.3 ± 25 mmHg). Eighty-three percent of the patients tolerated NIV. Forty-three percent of the patients (49/114) survived and most were admitted to a chronic care unit or a nursing home. Fifteen percent (17/114) were able to go back home. Survival was statistically associated with the following criteria recorded when the patients were admitted: congestive heart failure, unimpaired awareness and effective coughing.

In another prospective comparative observation study Chu et al. (2004) [38] assessed the long-term outcome of 37 patients with COPD and hypercapnic ARF treated by NIV after refusing intubation. The main judgement criterion was survival. The outcome of these patients was compared to that of 43 COPD subjects with hypercapnic decompensation (control group) treated with NIV who had not refused intubation. The group of patients studied was significantly older, more critically ill, more anaemic, had a higher degree of dyspnoea and more co-morbidity and had spent more time in hospital during the previous year. The one-year survival in the group studied was 30% in the study group versus 65% in the control group.

Schettino et al. (2005) [39], reported the results of 137 NIV treatments administered, to 131 patients with ARF caused by various different conditions; their common feature was that all had short life expectancy and did not wish to be intubated. NIV was administered in different departments (A & E, ICU, medical and, surgical departments) of the same hospital. The average duration of the treatment was 3.5 days. Sixty-five percent of the patients died in hospital. The hospital mortality rate was significantly lower for patients with COPD exacerbation (37.5%) or acute cardiogenic PO (39%), the mortality rate in the other patient groups was: hypercapnic decompensation unrelated to COPD (68%), post-extubation ARF (77%), hyperaemic ARF (86%). The factors associated with an adverse outcome were: no improvement in tachycardia or Glasgow score, uncontrolled cancer (85% of deaths), albuminaemia < 25g/l and a high severity score (SAPS II > 41). The complications of NIV in 28 patients were: skin chafing, haeodynamic instability and GI tract distension.

Thus, NIV can be proposed and implemented during acute respiratory failure when the patient has refused to be intubated. Although the immediate success rate is not negligible, the physician must nevertheless keep in mind the fact that it will be higher if the patient’s respiratory failure can be corrected rapidly. Hypercapnic exacerbation of COPD and acute cardiogenic PO are certainly the best indications.

### Patients assessed to be poor candidates for intubation

These patients usually have cancer with the onset of ARF at an advanced stage of the disease. Sometimes they can also be subjects in a state of “extreme physiological distress” or even very elderly patients with multiple comorbidities affecting their vital organs.

In a prospective study, Cuomo et al. (2004) [40] assessed 23 cases of acute respiratory failure (hypoxaemic or hypercapnic ARF) treated by NIV in cancer patients at an advanced stage. The causes of acute respiratory failure were mainly exacerbation of COPD or pneumonia. Thirteen patients (57%) were successfully ventilated and were discharged from hospital. For ten patients (43%) the treatment failed (criteria: intubation or death). Only two of these patients accepted intubation. Nine out of ten patients (90%) died.

Once again, it is important to acknowledge that the patients whose outcome was positive had COPD exacerbation or acute cardiogenic PO. Thus, the fact that a patient is critically ill at an advanced or terminal stage of an incurable disease is no longer sufficient today to refuse intensive care in the case of ARF, especially if the cause is COPD or acute cardiogenic PO. We should also keep in mind the adverse outcome of ARF treated by invasive mechanical ventilation in advanced or terminal cancer with a mortality rate in intensive care at 1 year of respectively 39 and 87% [41].

If NIV is used as a “palliative and probably curative” measure to avoid intubation, the experience, skills and availability of the care-giving team are paramount to make it succes-

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**Table III.**

Criteria that are predictive of successful NIV in acute respiratory failure.

1. **The surroundings must be suitable for NIV**
   The environment must be suitable and offer surveillance and monitoring facilities.

2. **An experienced/skilled team of care-givers**
   - suitable care-giver/patient ratio
   - experienced staff
   - availability
   - practices must follow strict rationales

3. **Choice of equipment**
   The patient must tolerate NIV for it to be successful and this important criterion is largely dependant on the choice of equipment and how it is controlled. The facemask, the respirator, the ventilatory method and the way the equipment is adjusted all contribute to optimising the treatment.

4. **Early identification of adverse events** (particularly skin lesions)

5. **Aetiological diagnosis of acute or chronic respiratory failure**
   NIV is more likely to be successful if the patient has hypercapnic respiratory failure.
The “palliative and probably curative” approach to help withdraw intubation

The “palliative and probably curative” approach can be used to help withdraw the intubation catheter, but this can only be considered once the family and the care-giving team have acknowledged that further invasive measures will only result in limited survival and afford the patient a poor quality of life. This may be the case for: 1) a CRF patient who cannot be weaned off the ventilator 2) patients who have practically no ventilatory autonomy and severely impaired health. Before selecting this approach it is important to state that patients who cannot breathe spontaneously are sometimes in a transient state. Dependent patients are defined as those who have been dependent on the ventilator for more than 30 days despite attempts to wean them off [42]. This concerns almost 50% of the patients who have survived long periods of ventilation [42]. A large percentage of these patients have CRF. The aetiologies that are the most common in the CRF group that cannot be weaned off the ventilator are COPD and CRF patients with neuromuscular diseases, especially Duchenne’s muscular dystrophy and ALS. Other causes of CRF are due to a combination of different mechanisms (chest deformities/stiffness, parenchymatous sequelae, cardiac lung and iatrogenic central causes). Each is an aetiological entity in its own right and develops differently and the patient and family and the care-giving team should be aware of this. The survival, of patients with CRF due to chest wall involvement, secondary to tuberculosis or the sequelae of poliomyelitis can be improved with home ventilation by tracheotomy [43] or non-invasive measures [44] providing a quality of life that is judged to be acceptable by the patients. The outcome of COPD decompensation can sometimes disconcert, especially when patients are weaned off the ventilator at a late stage when they think all hope is lost and sometimes survive for long periods at home with ventilation by tracheotomy [43].

Conversely, in some forms of CRF when the patient cannot breathe spontaneously without the ventilator, in ALS for example, our considerations must be guided by the adverse outcome of the underlying disease. When an ALS patient has an episode of respiratory failure and is intubated and ventilated, often because the diagnosis is unknown, the issue of tracheotomy can be a problem in itself, requiring consultation between the care-givers (often a multi-disciplinary team), the patient and the family.

Since the last consensus conference [45], the indications for NIV in the post-extubation period seem to have been acknowledged, in particular in cases of underlying COPD. COPD is a difficult disorder to manage and often patients do not display all the criteria used by the intensive care specialists when they are extubated. The current data we have clearly show the benefit of NIV used immediately after extubation in reducing the morbidity and mortality of these patients when it is initially difficult – or continues to be difficult - to wean them off invasive respiratory assistance. If post-extubation ARF does arise, NIV seems to have the same clinical advantage as when it is used as a prophylactic strategy (eliminating the need to re-intubate) and can prevent this complication in selected “at risk” patients. However if this complication should occur, it presents no advantage and could even potentially have a deleterious effect on re-intubation when used as a curative strategy in a non-targeted population. Studies should be carried out specifically in COPD patients in this latter indication, but also in other selected medical populations in other potential indications for post-extubation NIV. In the immediate future it is essential to make sure that clinical practitioners know how to draw a distinction between the three time-points when NIV can be useful after intubation [46].

- In patients who have refused intubation NIV is more effective in cases of hypercapnic exacerbation of COPD or acute cardiogenic PO and will be even more effective if the patient’s respiratory failure responds quickly to treatment.
- In patients that are not judged to be good candidates for intubation NIV is once again especially effective in cases of COPD or acute cardiogenic PO.
- “Palliative and probably curative” NIV can be offered to patients who cannot be weaned off the ventilator or those who have virtually no ventilatory autonomy and are generally in very poor health.

Conclusions

NIV is now part of the therapeutical armamentarium in palliative care. In end-stage CRF it is a technique that can help the patient to die peacefully. The fatal outcome of an incurable disease or a patient whose general health status is poor is no longer sufficient to eliminate ventilatory assistance if the patient has ARF. Even in a severe case of ARF, NIV can be a salvation for patients who refuse intubation or patients who have been given a DNI order, especially if they have acute cardiogenic pulmonary oedema or an exacerbated episode of COPD. When it is difficult to wean patients off invasive mechanical ventilation, which applies mainly to CRF patients, we must keep in mind the fact that the survival of patients with chest wall involvement can improve with NIV. In case of failure the option of ventilation by tracheotomy at home remains possible, including for patients with COPD. Whatever NIV is used for its success largely depends on the specialised training of the team managing the patient and the surroundings in which NIV is administered that must be suitable for patients in a critical condition. Howe-
ver, each case must be analysed individually to make sure that every patient is suitably managed. A more detailed evaluation of the outcome of these patients and of the impact of this type of management on the patients and their families would yield further details on the best indications [47].

**KEY POINTS**

- NIV is generally of interest in respiratory failure and can be a therapeutical tool in palliative care, although it is sometimes not well tolerated.
- NIV can be purely “palliative” or “palliative and probably curative”.
- NIV is the major treatment for ARF, in acute decompensation of COPD and acute cardiogenic PO. It can also be offered in other cases such as: a previously healthy lung, in patients with compromised immune systems, postoperatively in chest surgery and after extubation (to facilitate the weaning-off process).
- Compared to invasive mechanical ventilation NIV is less effective.
- During palliative care the patient and family should participate in the decisions regarding therapeutic management whenever possible.

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