



Original Article

Non-invasive Ventilation in an Elderly Population Admitted to a Respiratory Monitoring Unit: Causes, Complications and One-year Evolution[☆]

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ABSTRACT

Objective: To determine the usefulness of NIV in elderly patients (≥ 75) admitted to a Respiratory Monitoring Unit (RMU) during hospitalization and 1 year later in comparison with the results from the younger age group (< 75).

Materials and methods: Ours is a prospective observational study carried out at the Hospital Universitario La Princesa (Madrid). We recruited all patients who were ≥ 75 years old and were admitted to our RMU during the period 2008–2009 with respiratory acidosis ($\text{pH} < 7.35$ and $\text{PaCO}_2 > 45$ mmHg) requiring NIV. We gathered data for basic variables as well as sociodemographics, history of previous pathologies, reason for hospitalization and severity, analysis upon admission and the evolution of blood gases at the start of NIV (within the first hour and after 24 h), complications and evolution at the 1-year follow-up.

Results: Mean age of the sample was 80.6. The Charlson index was 3.27. About half of the patients had some limitation for performing daily activities. The main reasons for admission were chronic obstructive pulmonary disease (COPD) exacerbation and heart failure (HF). There were complications in 36% of the cases (11 renal failure and 6 atrial fibrillation). The survival rate at the 1-year follow-up was 63.21%.

Conclusions: NIV is a good alternative in elderly patients admitted to the hospital with respiratory acidosis. We did not detect differences in mortality during admission between the 2 groups. The elderly patients were more frequently re-admitted than the younger group in the 6–12 months after hospital discharge. This could be due to their poorer functional state after hospitalization requiring NIV.

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Ventilación mecánica no invasiva en una población anciana que ingresa en una unidad de monitorización respiratoria: causas, complicaciones y evolución al año de seguimiento

RESUMEN

Objetivo: Determinar la utilidad de la ventilación mecánica no invasiva (VMNI) en pacientes ancianos (≥ 75 años) que ingresan en una unidad de monitorización respiratoria (UMR) durante el ingreso y al año del alta. Comparamos los resultados con el grupo de pacientes de menor edad (< 75 años).

Material y métodos: Estudio prospectivo observacional realizado en el Hospital La Princesa (Madrid, España). Se reclutaron todos los pacientes ≥ 75 años que ingresaron en nuestra UMR en acidosis respiratoria ($\text{pH} < 7,35$ y $\text{PaCO}_2 > 45$ mmHg) y que recibieron tratamiento con VMNI. Se recogieron variables relativas a características sociodemográficas y de la vida basal, antecedentes patológicos previos, motivos de ingreso y gravedad, datos analíticos al ingreso y evolución gasométrica al inicio de la VMNI, en la primera hora y tras 24 h, complicaciones y evolución al año de seguimiento.

Resultados: La edad media fue de 80,6 años. El índice de Charlson fue de 3,27. Aproximadamente la mitad de los pacientes presentaban alguna limitación para las actividades de la vida diaria. Los principales motivos de ingreso fueron la agudización de la EPOC y la insuficiencia cardíaca. En 36 casos se registraron complicaciones (11 insuficiencia renal, 6 fibrilación auricular). La supervivencia al año del seguimiento fue del 63,21%.

Palabras clave:

Ancianos

Ventilación mecánica no invasiva

Enfermedad pulmonar obstructiva crónica

Insuficiencia cardíaca

Unidad de monitorización respiratoria

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Conclusiones: La VMNI es una buena alternativa en pacientes ancianos que ingresan en acidosis respiratoria. No detectamos diferencias en la mortalidad durante el ingreso con el grupo < 75 años. Los pacientes ancianos ingresan más entre los 6-12 meses posteriores al alta, y esto podría deberse a una peor situación funcional tras un ingreso que requiere VMNI.

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Introduction

With the progressive aging of the population, we are now treating older patients with a greater number of comorbidities and limitations in their daily lives. It is estimated that by the year 2020 48% of the population will have at least one chronic disease and 25% will have some type of associated comorbidity.¹ The greater number of comorbidities is mainly found in the over-65 age group.

This new situation leads us to reconsider the management of older patients with poorer baseline situation who are not candidates for aggressive therapeutic measures, such as tracheal intubation, who come to the emergency room with respiratory failure (RF).

In this regard, we feel that non-invasive mechanical ventilation (NIMV) plays a crucial role in the treatment of RF in these patients. Although the usefulness of NIMV has been demonstrated in cases of COPD exacerbation with hypercapnic RF (which is the main indication for NIMV in intermediate care units²), acute lung edema, pneumonia in immunosuppressed patients or for intubation weaning,³ its indication in patients with “Do Not Intubate” orders is more controversial, especially in older patient groups.

Currently, articles related with the utility of NIMV in the elderly have been published in respiratory intensive care units (RICU) and by international groups. There are no publications that answer the question of NIMV indication in this age group in our country which have not been done in an RICU, instead of in monitoring units that are more closely in line with the reality of our setting.

The objective of our study was to determine the utility of NIMV in acute situations in senior patients who are hospitalized in a RMU in respiratory acidosis, and to also compare the results with a younger population as well as the results from the 1-year follow-up.

Materials and Methods

Study Design

A prospective observational study was done in the RMU at Hospital Universitario de La Princesa (HULP) during our unit's first year of activity (2008–2009). HULP is a tertiary hospital in Madrid that provides care for a population of approximately 350 000 inhabitants. Our RMU has 4 beds and is integrated on the pulmonology floor of the hospital. It provides non-invasive monitoring of hemodynamic parameters (continuous blood pressure, heart and respiratory rate, oxygen saturation and electrocardiogram) and respiratory support with NIMV or invasive mechanical ventilation in tracheostomized patients. The unit has specialized nurses and a pulmonologist on duty during the morning shift. On afternoon–evening and weekend shifts, there is a pulmonologist on call, so the patients are under the continuous care of a pulmonologist.

Study Population

All patients over the age of 75 were consecutively selected for study—this age range was chosen due to the definition of elderly persons by the World Health Organization Mundial—who were admitted to the RMU in respiratory acidosis ($\text{pH} < 7.35$ and $\text{PaCO}_2 > 45$ mmHg) and needed NIMV. The total number of selected patients was 85. Excluded from the study were those patients who

were hospitalized in the RMU for monitoring, those who rejected NIMV or were not considered candidates for NIMV according to the criteria of the pulmonologist, patients who required intubation from the start and those in whom NIMV was initiated on other hospital floors and later were not transferred to the RMU.

The study met with the ethics requirements at our hospital and the patients or their main caretakers signed an informed consent. The patient data were collected from the HULP computer system, which provides access to the computerized medical files.

Study Variables

The variables collected for study included those related to sociodemographic and baseline characteristics (age, sex, presence of main caretaker, institutionalization, dyspnea according to MRC classification, number of drugs/day, limitations of daily life activities measured with the Barthel test) and previous pathologic history (comorbidities, Charlson index, home oxygen therapy, home nocturnal ventilation, previous hospitalizations, lung function [FEV_1] and echocardiographic data in patients with previous diagnosis for HF). We also recorded the reasons for hospitalization in our RMU and severity (APACHE II), analytical data at the time of hospitalization and blood gas evolution (pH and PaCO_2) at the start of NIMV and then after 1 h and 24 h of NIMV, evolution during hospitalization (need for intubation, complications, days of hospitalization and death) and 1 year after follow-up (number of hospitalizations and cause, need for NIMV and hospitalization in the ICU and death during that period).

During the study period, 13 patients were lost to follow-up, and in these cases the patients were contacted by telephone in order to collect information related with the study variables. Information was obtained for 100% of the sample, with no losses registered during the follow-up for causes other than the death of the patient.

Statistical Analysis

In the descriptive analysis, means, range (maximum and minimum) and standard deviation (SD) were used for the quantitative variables, while the qualitative variables were expressed as frequencies and percentages. In order to measure the association between the independent quantitative variables, the Student's *t* test was used, while for the qualitative variables the chi-squared test was used. With contingency tables, we obtained the correlation between 2 qualitative variables and relative risk. The level of significance was assumed with $P < .05$.

The statistical analysis was carried out with the version 15.0 SPSS program for Windows.

Results

85 patients were included for the study, 43 (50.6%) of whom were women. Mean age was 80.6 years (SD 5.93), with a maximum age of 92.

Data for baseline condition were collected (ability to perform activities of daily living, main caretaker, polymedication, degree of dyspnea according to the MRC scale and institutionalization), which are shown in Figs. 1 and 2 and in Table 1. The Barthel index score was 88.19 (moderate dependence).

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