

PROTOCOL STUDY

Clinical trial in adults hospitalized patients in Respiratory Intermediate Care Unit (RICU) of *University Germans Trias i Pujol Hospital*.

Admission in RICU

The patient is included in the study after to signing informed consent. In this moment, a blood sample is obtained and vital constants of patient like respiratory rate (RR), hearth rate (HR), EKG signal, Oxygen Saturation (SaO₂) and blood pressure start to be monitored continuously. Barthel index and dyspnoea grade of MRC scale are registered.

Standard support with Oxygen High Flow (OHF)

Day 1

All patients start respiratory support with oxygen high flow system (AIRVO₂ or V60 plus), if it doesn't exist contraindications.

Initial parameters: Temperature 34-37°C, flow 30 l/min and FiO₂ 100%. Then the flow will be progressively increased until the respiratory rate is less than 35, and the FiO₂ will be progressively reduced until the minimum concentration to maintain SaO₂ greater than 96%.

Arterial blood gas analyses and record of vital constants will be performed at 1h, 4h, 6h and 12h after starting high flow therapy.

Day 2

24h after starting high flow therapy a new arterial blood gas analyses and record clinical parameters will be performed. If the therapy parameters like FiO₂ or flow have been modified it will also be recorded.

Day 3

48h after starting high flow therapy control includes arterial gasometry, blood analyses and record clinical parameters, vital constants and therapy parameters.

Last day of therapy

Control includes blood analyses and record clinical parameters, vital constants and therapy parameters.

Completion criteria to treatment with OHF:

- Respiratory improvement that it leaves to change a conventional oxygen system.
- Lack of tolerance of oxygen high flow system.
- Worsening of respiratory failure defined by a sustained increase in respiratory rate above 30, SaO₂ < 90% and distress.
- Death of the patient.

Treatment with non-invasive ventilation (CPAP or BIPAP)- Interventional group

Day 1

Patients with lack of tolerance to OHF or worsening of respiratory failure with oxygen high flow support are switched to treatment with non-invasive ventilation. Patients are randomized to CPAP or BiPAP ventilatory mode.

The treatment duration is at least 18 hours a day. Initial pressure is 8-10 cmH₂O in CPAP group and 16/10 cmH₂O in BiPAP group, although it will be increased progressively (from 10 to 12 or 15 cmH₂O in cpap group and from 16/10 to 18/12, 20/15 and 22/16 in BIPAP group) until the respiratory rate is lower than 30, and SaO₂ > 93%. Initial FiO₂ is 100% in both groups, and it will be progressively reduced until the minimum concentration to maintain SaO₂ greater than 96%.

Arterial blood gas analyses and record of vital constants will be performed at 1h, 4h, 6h and 12h after starting high flow therapy specifying ventilation parameters.

Day 2

24h after starting non-invasive ventilation a new arterial blood gas analyses and record clinical parameters will be performed. If the therapy parameters have been modified it will also be recorded.

Day 3

48h after starting non-invasive ventilation control includes arterial gasometry, blood analyses and record clinical parameters and vital constants specifying ventilation parameters.

Last day of therapy

Control includes blood analyses and record clinical parameters, vital constants and ventilation parameters.

Completion criteria to treatment with CPAP/BIPAP:

- Respiratory improvement that it leaves to change a conventional oxygen system or OHF.
- Lack of tolerance of non-invasive ventilation.
- Worsening of respiratory failure defined by PaO₂/FiO₂ < 100, 20% increase from baseline (if basal pCO₂ > 40 mmHg), sustained signs of distress, SaO₂ < 90% or Glasgow < 15, in patients without non-intubation orders.
- Death of the patient.

Follow-up to discharge

Day 30

It will be verified if the patient has been discharged, absence of complications and readmissions, recording residual dyspnoea and Barthel index by telephone control.

Day 90

It will be verified if the patient has been discharged, absence of complications and readmissions, recording residual dyspnoea and Barthel index by telephone control.

STATISTICS ANALYSIS

A part of analysis is carried out using IBM SPSS 25.0 software (SPSS, Chicago, Ill) and the other part by Butler Scientifics, an external statistical company.

Qualitative variables are expressed as a percentage and are compared using a chi-square study. The quantitative ones are expressed as means or medians with interquartile range and statistical studies are carried out using parametric and non-parametric tests. Demographic and clinical variables are analysed at admission, while analytical, blood gas variables and vital signs are analysed in each of the controls comparing non failure of high flow therapy group with non-invasive ventilation group (CPAP/BIPAP). The same analyses are performed between the CPAP and BIPAP treatment subgroup. A predictive model of OHF failure and non-invasive ventilation failure will be developed using logistic regression or multivariate Cox regression, depending on the case.