



*Title:* Secretion management in the mechanically ventilated patient

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*Abstract*

**Purpose:** the aim of this work is to highlight the importance of a correct management of the secretions in the patient submitted to mechanical ventilation (MV).

**Methods:** analysis of the current bibliography related to respiratory infections and secretion in patients with mechanically ventilation. We focus on the use of in-ex suflator achine (cough machine) associated with High Frequency Chest Wall Oscillation (HFCWO).

**Results:** we observe a reduction of pulmonary infection and a better management of bronchial secretion in patient undergone to the use of in-ex suflator machine (cough machine) associated with High Frequency Chest Wall Oscillation (HFCWO).

**Conclusions:** the correct approach to patients submitted to mechanical ventilation (MV) expect the use of High Frequency Chest Wall Oscillation (HFCWO) (VEST) and in-ex suflator machine (cough machine) to decrease pulmonary infection thank to a reduction of permanence of bronchial secretions in the lungs .

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Mechanical ventilator - a device designed to support or replace spontaneous respiration - is used in patients with acute respiratory crises and/or in long-term therapy in chronic hypoventilation patients affected by respiratory or neuromuscular disease.

When noninvasive ventilation is not indicated, placement of an artificial airway is mandatory: endotracheal tubes for short-term use and tracheostomy tube for long-term use.

Mechanical ventilation (MV) facilitates alveolar ventilation and pulmonary gas exchange; most commonly, MV is provided in intensive care unit. The most of patients receive short-term MV therapy until the cause of respiratory crisis resolves or death occurs. However, some patients require long-term or permanent MV.

Thanks to the evolution of technology and the simplification of MV devices a significant number of long-term MV patients receive the treatment in residential centers or at home reducing hospital stays and costs.

In healthy subjects secretion clearance is primarily accomplished through mucociliary action and cough. However some patients, for heterogeneous causes, present an inadequate mucociliary action and cough.

For instance, during invasive MV, the presence of a foreign body - represented by the tube - is an important stimulus to increase secretions production.

Besides, frequently these patients are affected by COPD with a permanent increased secretion production and/or are motionless patients with inefficient cough.

Impaired airway clearance mechanisms with infection risks associated with bypassed upper airways and immobility effect increased risk of pulmonary infections.

From these clinical considerations emerges the importance of a correct management of the secretions in the patient submitted to mechanical ventilation.

We can distinguish the patients in 2 groups in view of the prevalence of obstructive bronchial illness (group A) or neuromuscular disease (group B) considering the different characteristics from our point of view.

It results moreover important to differentiate the invasive ventilation from the non invasive.

In patients submitted to invasive mechanical ventilation in the department of intensive care it is helpful to be able to have systems able to remove the deepest secretions, mostly if are present phenomena of atelectasia with stagnation of secretions that usually concern the deepest zones of lungs.

The VEST device is effective in this occasion also in patient not collaborating submitted to controlled ventilation.

In the patients submitted to domiciliary continuous mechanical ventilation for neuromuscular disease with a cough deficit the use of VEST is used with the purpose to reduce the incidence of respiratory infectious complications and to reduce the hospital refuges.

In these patients it is functional to make follow the treatment with VEST with the use of the MI-E.

The use of the MI-E it results particularly useful in the patients affected from neuromuscular disease both in case of NIV and in the subject with tracheostomy tube.

As a matter of fact the use of VEST is possible during the invasive and non invasive mechanical ventilation.

During the IMV we alternate brief treatments of VEST (2 minutes) to the use os MI-E (3-4 cycles) followed by aspiration with suction catheter.

The general treatment with VEST has a duration of about 10 minutes repeated at least 2 times a day.

During the NIV, in case of ineffective cough, we alternate VEST to MI-E with a particular attention to the secretions to avoid impediment of the big aerial streets.

It is correct to consider the possibility that the use of VEST during the ventilation interferes with the present systems of analysis of the pressure and the aerial flow of the ventilator. The data of these parameters could be altered.

Fig 1. Alterations of the survey of the aerial flow

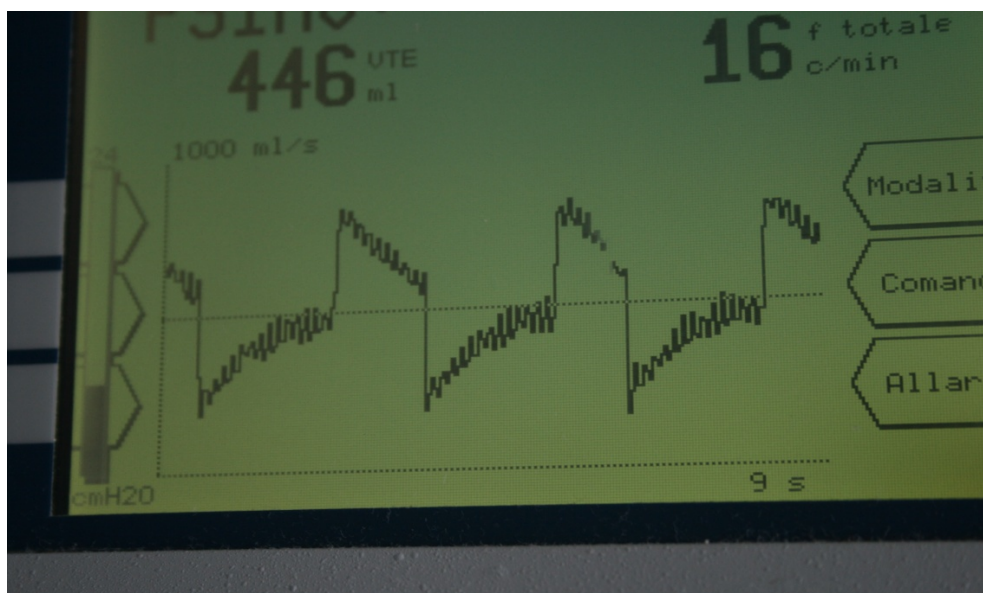
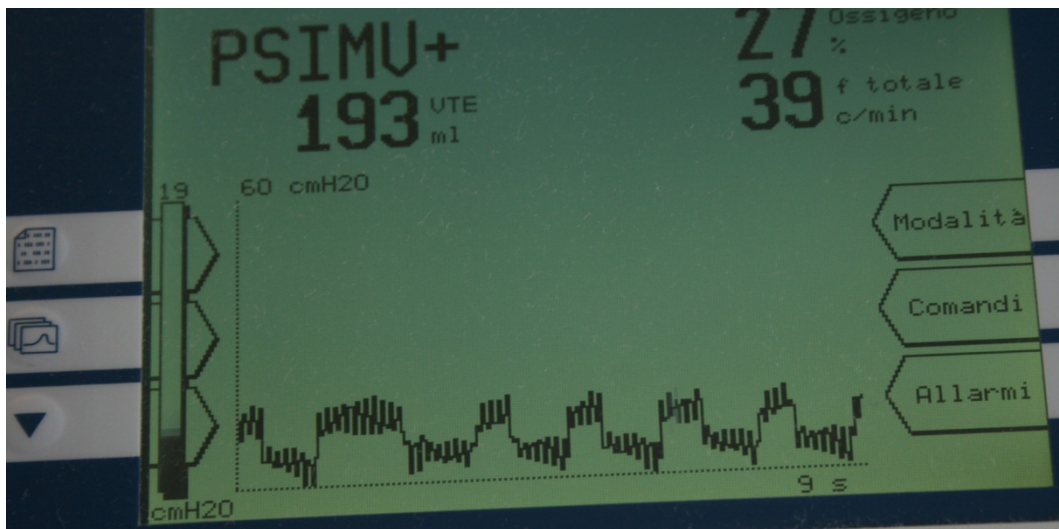


Fig 2. Alterations of the survey of the pressure in the aerial streets



We use habitually the VEST with a frequency of 10-15 Htz for 10 minutes 2-3 times a day in patients with atelectasia, bronchial ipersecrections and difficulty to the weaning from the mechanical ventilation.

The mobilization of the secretions in these patients reduces the incidence of infections and the use of the respiratory muscles thanks to the reduction of the resistances of the aerial ways; it allows, in addition, the reduction of the necessary time to get the weaning from the VM.

Fig. 3 Complete atelectasia of left lung

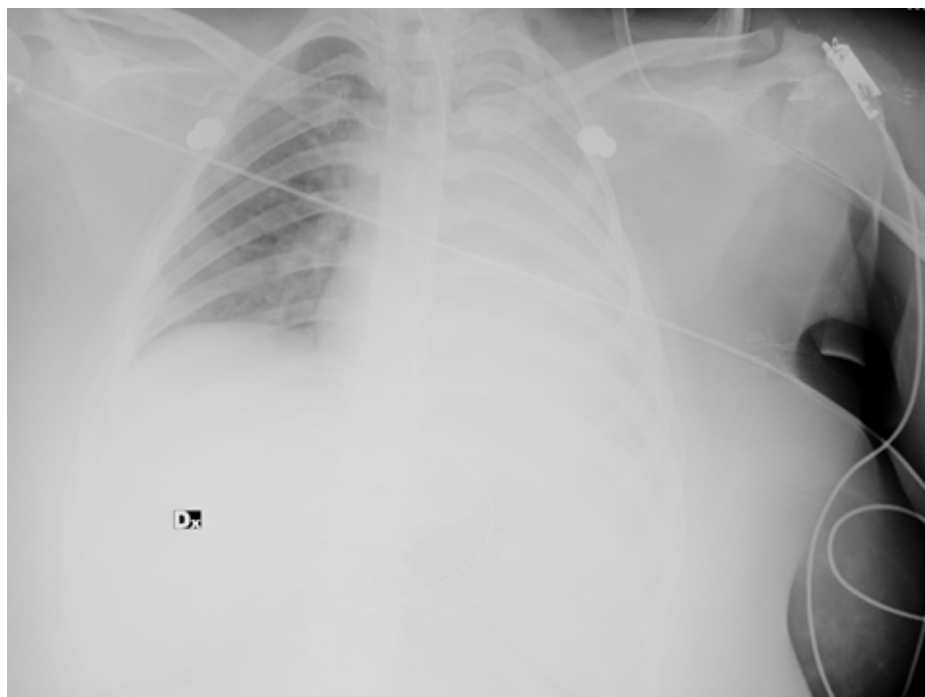


Fig. 4 Chest RX after treatment with VEST



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