

## Study protocol

Acute hypoxemic respiratory failure due to parenchymal dysfunction is one of the main complications of immunocompromised hematological patients. In these cohort of patients mechanical ventilation is frequently needed in order to restore oxygenation and normocapnia. Since every positive-pressure ventilation regimen may potentially determine pulmonary complications, due to alteration in pressure and volume lung homeostasis and diaphragm activity, also diaphragm function has to be assessed not to worsen ventilator-induced lung injury (VILI). Main targets of VILI are pulmonary interstitium and diaphragm.

Pulmonary interstitium is frequently involved in different mechanism of injury, that derive both from induced tidal volume and positive end expiratory pressure (PEEP). Indeed, large tidal volumes generated during assisted spontaneous breathing may configure non-protective ventilation regimens and the so called “pendelluft phenomenon”, that is the intrinsic flow of air within the lung from nondependent to dependent regions without changes in tidal volume, may affect inadequate PEEP values.

Positive-pressure ventilation may also alter diaphragm activity. Recent data show that diaphragm dysfunction, considered as an enhanced or reduced thickening fraction, occurs in about 65% of patients undergoing mechanical ventilation.

For these reasons the evaluation of basal diaphragm activity, the choice of the device for oxygen support administration and the setting of ventilatory parameters become fundamental in defining hospital stay and outcome of patients affected by acute hypoxemic respiratory failure.

The aim of this study is to evaluate the basal diaphragm activity of acute hypoxemic respiratory failure patients admitted in Intensive Care Unit (ICU) and to record diaphragm activity modifications during the ICU stay in relation to the optimization of medical therapy and, if necessary, according to the need of ventilatory support. This study intends to register also daily diaphragm thickening fraction, daily arterial blood gas analysis, failure frequency of non-invasive ventilation, frequency of tracheal intubation, length of mechanical ventilation, length of hospital stay and hospital mortality.