



TestChest[™]

**FLIGHT SIMULATORS FOR
INTENSIVE CARE CLINICIANS**



CRITICAL CARE CHALLENGES

The equipment and devices intended for the care of critically ill patients make the ICU one of the most technologically sophisticated environments in any hospital. This technology aims to facilitate everyday practice by decreasing Workload but it may become a source of dilemma as it is difficult to handle and often not trustworthy. ICU is Likely the most error-prone environment in the hospital.

Mechanical Ventilation is a life-saving method used to assist the patient partially or totally regarding the severity of the respiratory failure. It is more a supportive intervention than a therapeutic one with considerable side effects and unwanted complications if not properly and timely used [1]. Given the abovementioned issues, specific training of physicians and nurses on mechanical ventilation is crucial for optimal outcomes. To date, most common ways for training include animal experiments to achieve realistic physiological and pathological conditions for advanced respiratory education.

With TestChest, we have created an innovative full physiologic artificial lung that provides a breakthrough in mechanical ventilation training. TestChest® promotes a safe and controlled environment free from risks of the clinical environment and eliminates the necessity of training on animals.

TECHNICAL SPECIFICATIONS

- TestChest® consists of two bellows driven by a linear motor. The large volume ensures a realistic replication of vital capacity and FRC of an ICU adult patient.
- TestChest® features a detachable calibration module, which makes it accurate for years of use. Options including intrapulmonary oxygen sensor, mass flow controller for CO₂ production, pulse oximeter simulator in form of an 'artificial finger', variable dead space and variable leakage are available.
- TestChest® contains alveolar, airway and ambient pressure sensors as well as a temperature sensor.
- TestChest® is loaded with highly accurate sensors which make it a reference to test ventilators, anesthesia machines home care ventilators, sleep apnea devices, and CPAP Systems.

RESPIRATORY FLIGHT SIMULATOR FOR INTENSIVISTS



[1] Tobin, M.J., *Advances in mechanical Ventilation NEngl J Med*, zo01. 344(26): p. 1g86-96.



Realistic TestChest® combines the simplicity of a physical model with the sophistication of advanced mathematical modelling to provide a complete solution for a real patient's conditions. TestChest® is capable of replicating pulmonary mechanics, gas exchange and hemodynamic responses of healthy and pathological adults.



Self-contained TestChest® dimensions fit on any bed and it is fully self-contained. It is a stand-alone skill training station and can be easily connected with an intubation head. The latter adds more realistic features to the respiratory simulation (NIV, intubation)..



Programmable TestChest® is programmable and can be remotely operated to simulate in an unprecedented way the evolution of diseases as well as the recovery process. It allows the operator to control respiratory rate and depth to simulate complex breathing patterns and thus allows the evaluation of specific pathological alterations.



Active Learning TestChest® is the key to modern learning concepts like Problem-Based Learning. It facilitates the active application of learning concepts of care and promotes deeper assimilation in a controlled environment.

KEY FEATURES

TestChest® has unique features in terms of representing complex breathing patterns. Physiological equations realize two modes of spontaneous activity: The driving pressure ($p_{0.1}$) for ventilator triggering and the loading of respiratory rate. Muscular activity, is an important criteria for weaning, can be easily simulated.

In contrast to mechanical lungs. TestChest® inspiratory compliance is a non-linear function that can be represented as S-shape curve. TestChest® allows the simulation of lung collapse and recruitment as well as hysteresis of the pressure-volume loop.

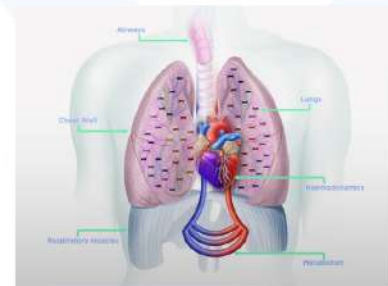
A variety of scenarios including ARDS, COPD and ALI are programmed for teaching.

A mass flow controller for the regulation of CO₂ production, as well as dead space, allows the generation of realistic capnograms. TestChest is compatible with humidified breathing gas mixtures. The internal bellows can be washed or even replaced if necessary.

TestChest® is not only limited to training as it is further intended to check the functionalities of ventilators, CPAP devices and other respiratory support devices in laboratory facilities.



An artificial finger allows the simulation of oxygen saturation (SpO₂). The variation of pulse amplitude according to different intravascular fillings allows the modeling of heart-lung interactions supporting the testing of the latest Smart ventilation modes.



The physiological model built into TestChest® was designed to simulate the human cardio-respiratory system for teaching and training purposes.

