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TestChest®: Respiratory Flight Simulator for Anaesthesia and Intensive Care

The use of simulation-based training provides safe and effective procedures for the practice and acquisition of clinical skills needed for patient care. Medical education is required for the learning and training period in order to ensure patient safety especially in ICU. Artificial respiration education and proper setting of mechanical ventilation modes is primordial before application to the patient. The training necessitates the use of realistically simulated patients in order to prepare to a variety of real scenarios. The latter are limited when using mechanically lungs or animal-based training.



Figure 1

The simulator consists of two bellows system driven by a linear motor. A large volume ensures the simulation of a real human lung with realistic FRC and vital capacity. A basic control software created by AQAI Simulation Center (Mainz, Germany) allows the control of the motor and the setup of the artificial lung parameters.



Figure 2

The motor realizes nonlinear S-shape of the pressure-volume loop, recruitment and collapse of the lungs.



Figure 3

TestChest® includes sensors for alveolar pressure, airway pressure, and environmental pressure as well as an oxygen and temperature sensors. It is compatible with wet gases and it is equipped with a mass flow controller for CO₂ production, which together with an adjustable dead space permit the generation of realistic capnograms.



Figure 4

An artificial finger allows the simulation of oxygen saturation curves. The variation of pulse amplitude according to different intravascular fillings model heart-lung interactions supporting the testing of most advanced closed-loop ventilation modes. The flight simulator offers for its pilots (healthcare professionals) a realistic training environment to ensure the safety of patients.

TestChest®, the physiologic controlled lung, provides a breakthrough in respiratory training and has the CE marking. It was developed by experts in mechanical ventilation and respiratory physiology and is manufactured by Organix GmbH (Landquart, Switzerland) for worldwide distribution.

The simulation of human cardio-respiratory system is extremely realistic and thus makes animal experiments for teaching purposes unnecessary. It can be used as stand-alone skill training station by easily connecting an intubation head for realistic respiratory simulation (intubation, NIV). It can also be easily connected with a complete human body simulator.

The respiratory flight simulator combines high-end technical design and mathematical modeling to create a complete solution for optimized learning of basic and advanced artificial respiration. It is the ultimate training tool for anesthesiologists, intensive care physicians and nurses.

Through a variety of preconfigured scenarios

and spontaneous breaths, the simulation of acute and chronic lung diseases is possible and real time experience is guaranteed. TestChest® realistically replicates pulmonary mechanics (resistance, non-linear compliance), gas exchange and hemodynamic responses. It has a programmable FRC and allows the simulation of different types of spontaneous breathing to severely diseased lungs with operator-adjustable respiratory rate and occlusion pressure (P0.1).

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