CHEST™

AMERICAN COLLEGE of CHEST PHYSICIANS

SimVA

Ventilation Artificielle Virtuelle

June 2020

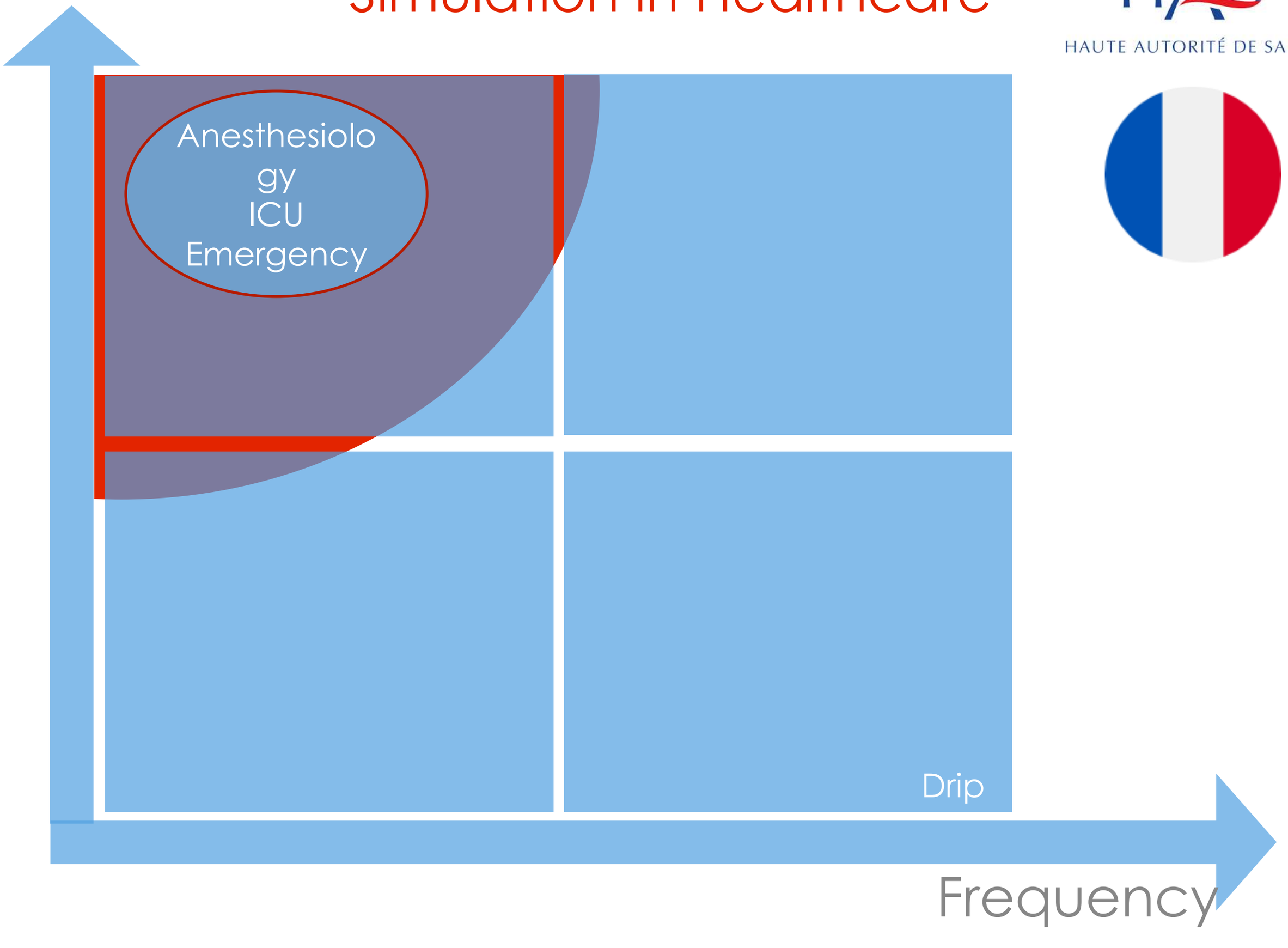
Hadrien Rozé, MD,PhD, head of Thoracic ICU, co-inventor of SimVA

Ventilation in France

- >9 millions people ventilated per year in France

Simulation in Healthcare

HAUTE AUTORITÉ DE SANTÉ

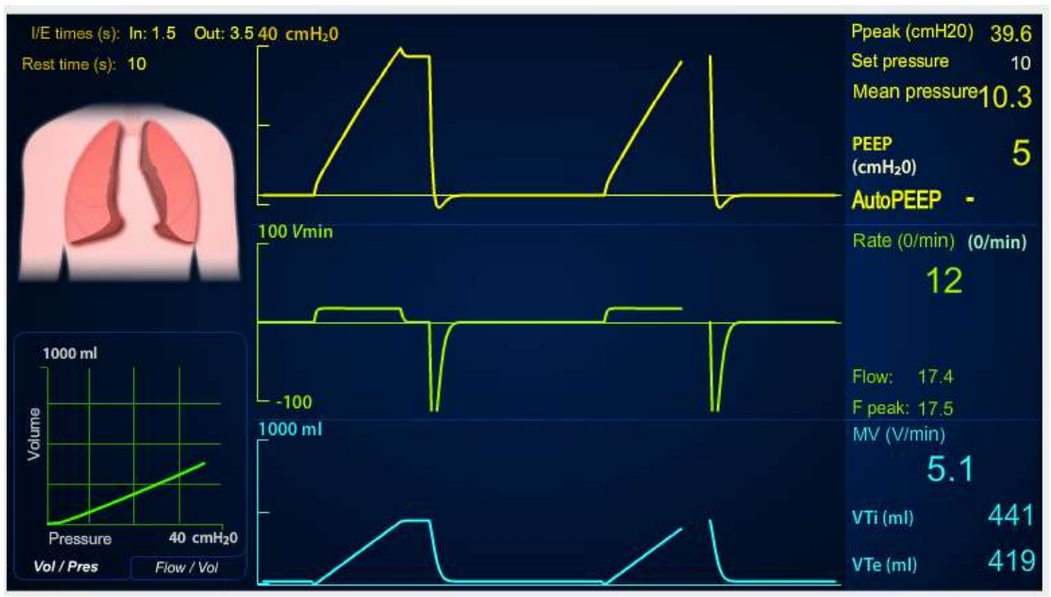


>50000€

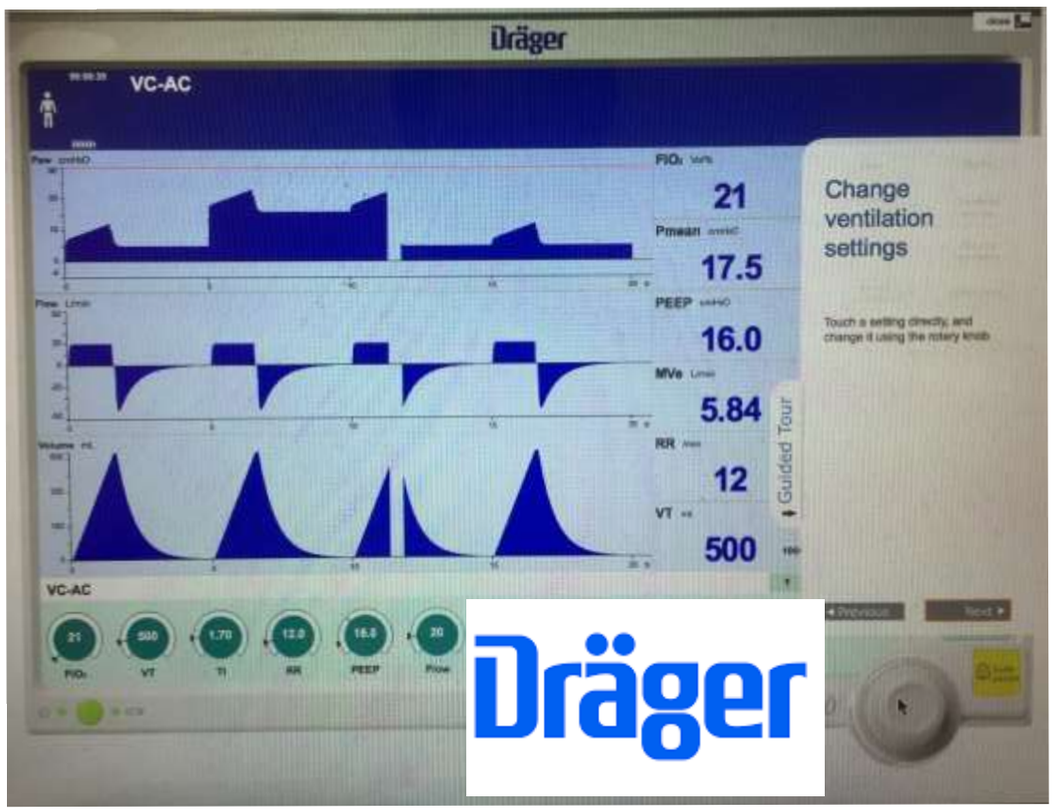
SimVA
Ventilation Artificielle Virtuelle

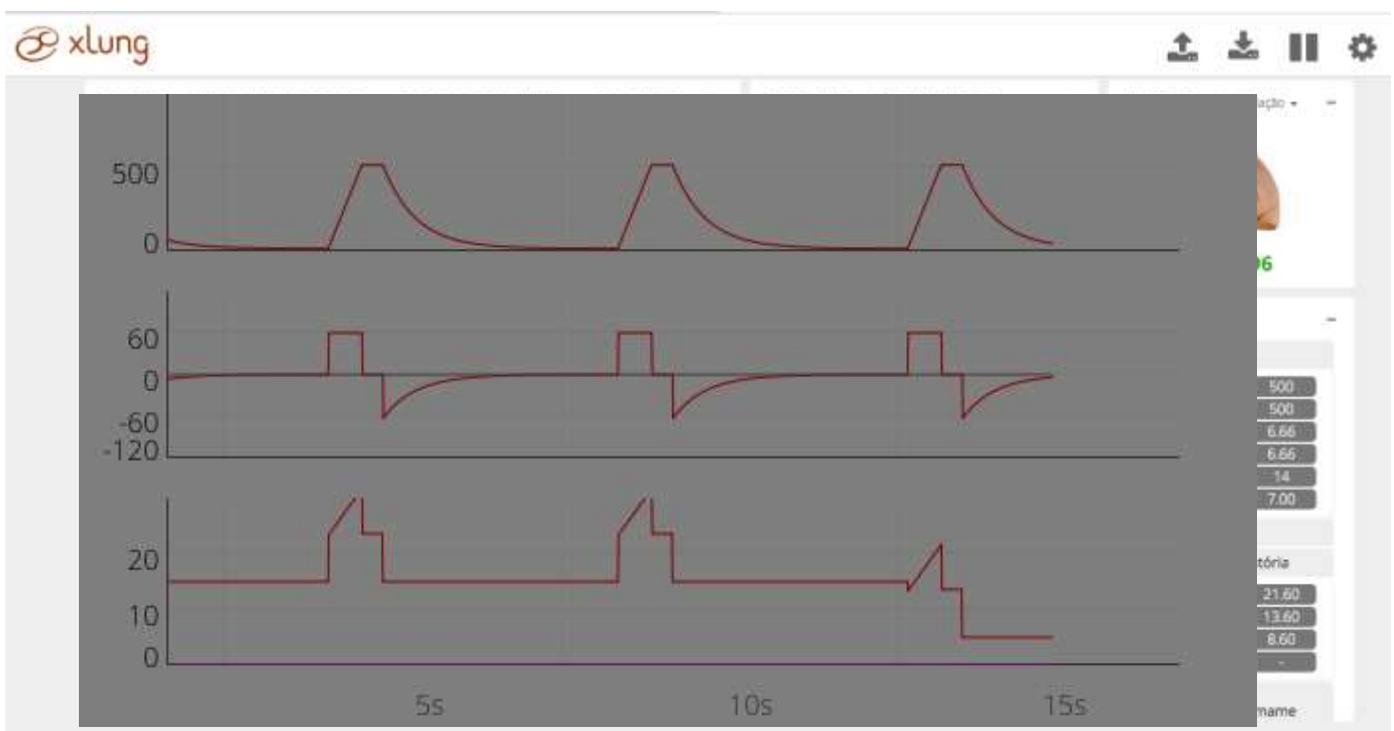

HAMILTON MEDICAL
Simulation Software
HAMILTON MEDICAL
Simulation Software

Softwares

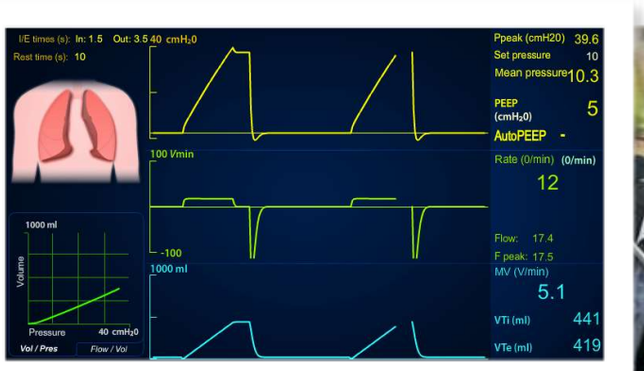

I/E times (s): In: 1.5 Out: 3.5
Rest time (s): 10
40 cmH2O
100 V/min
-100
1000 ml
1000 ml
Volume
Pressure
40 cmH2O
Vol / Pres
Flow / Vol
Ppeak (cmH20) 39.6
Set pressure 10
Mean pressure 10.3
PEEP (cmH2O) 5
AutoPEEP -
Rate (0/min) (0/min)
12
Flow: 17.4
F peak: 17.5
MV (V/min)
5.1
VTi (ml) 441
VTe (ml) 419


HAMILTON MEDICAL
Intelligent Ventilation since 1983
Patient
Options
Mode
VAC
20
10
6.8
422
16
64
0.6
0.6
15
500
10
PEP
50
Contrôles
Alarmes
Monitorage
Graphiques
Outils
Événements
Système


Dräger
VC-AC
FiO2
21
Pmean
17.5
PEEP
16.0
MVe
5.84
RR
12
VT
500
Change ventilation settings
Touch a setting directly, and change it using the rotary knob
Guided Tour
VC-AC
Dräger


xlung
500
0
60
0
-60
-120
20
10
0
5s
10s
15s

SimVA Project

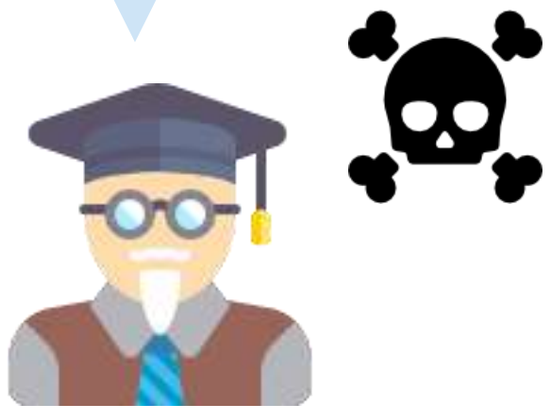


L'INSTITUT DE RYTHMOLOGIE ET MODÉLISATION CARDIAQUE BORDEAUX

CHU Hôpitaux de Bordeaux

What is SimVA

«A tool to teach, train and improve knowledge on mechanical ventilation from baseline to expert levels»



SimVA Background

- The synergy of 2 experts
  - 1 clinical expert in Mechanical Ventilation (Bordeaux Hospital, France)
  - 1 expert in mathematics *(Bordeaux University, Liryc Institute)*
- 2 years of development
- 2 patents & Copyright on SimVa app

UNITED STATES PATENT AND TRADEMARK OFFICE

uspto

Europaisches Patentamt
European Patent Office
Office européen des brevets

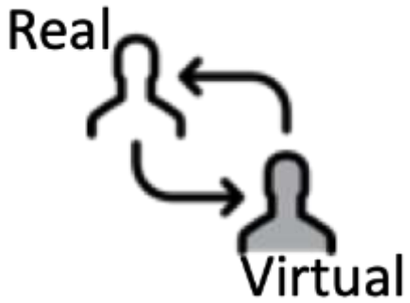
SimVA Principles

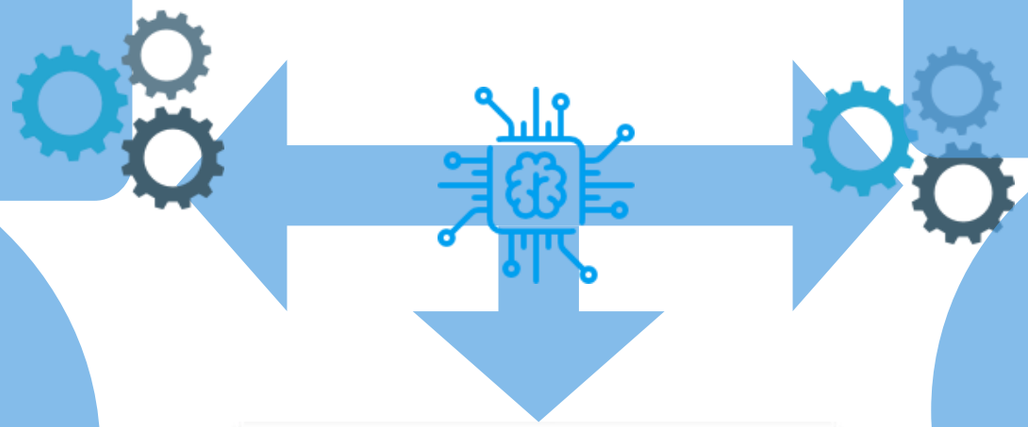
Patient model

Control of Breathing

Normal
ARDS
COPD
Obese…

Spontaneous breathing
Adaptive effort





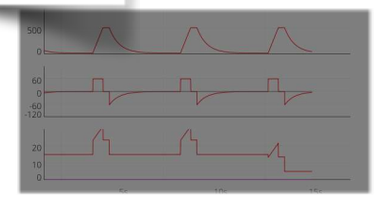
Ventilator models

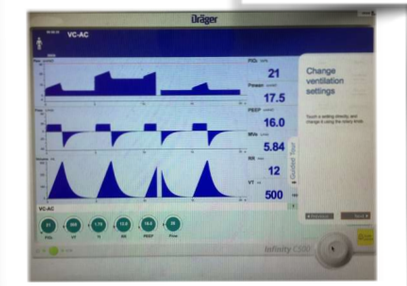
VAC
PAC
PSV

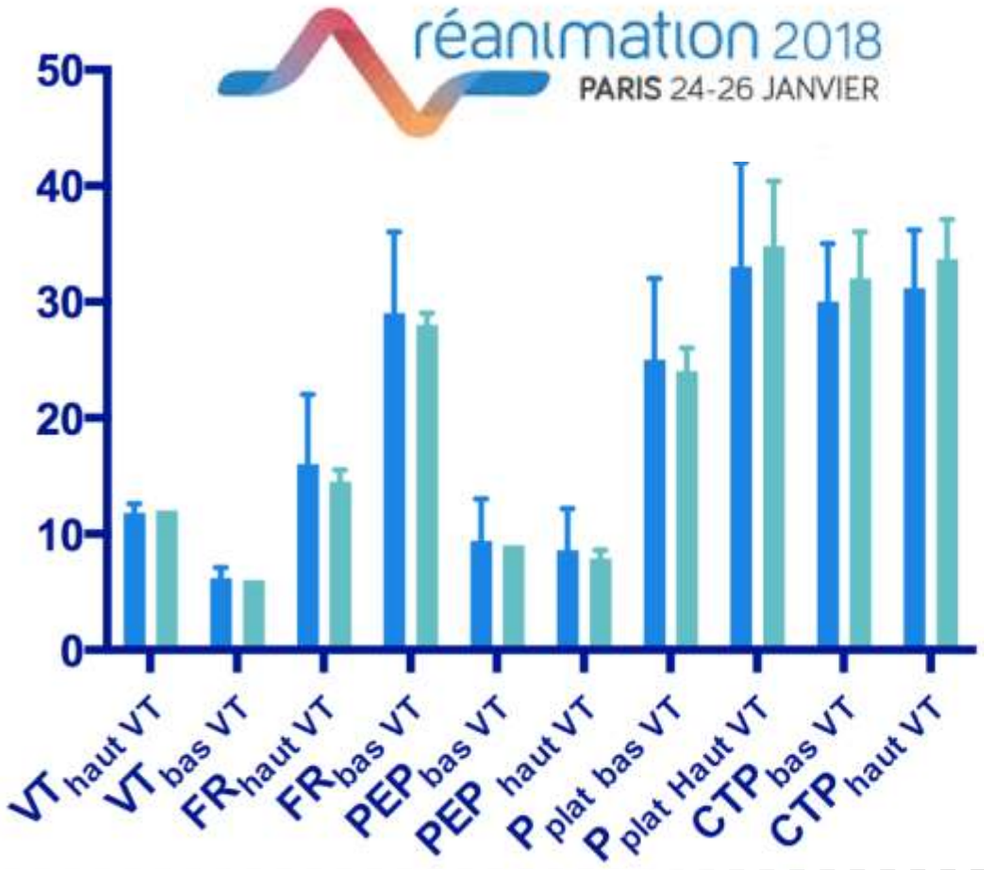
Monitoring of patients
EELV,Pmus,Palv, Ptp, PEEPi, PV curves

Simulators functionalities

	Others	SimVA
VAC	✓	✓
PAC	✓	✓
PSV	✓	✓
Pmus	✓	✓
EELV		✓
Recruitment		✓
Trans Pulmonary		✓
Palv		✓
Adaptive Effort		✓
Control of Breathing		✓
Asynchronies		✓
PAV+/NAVA		







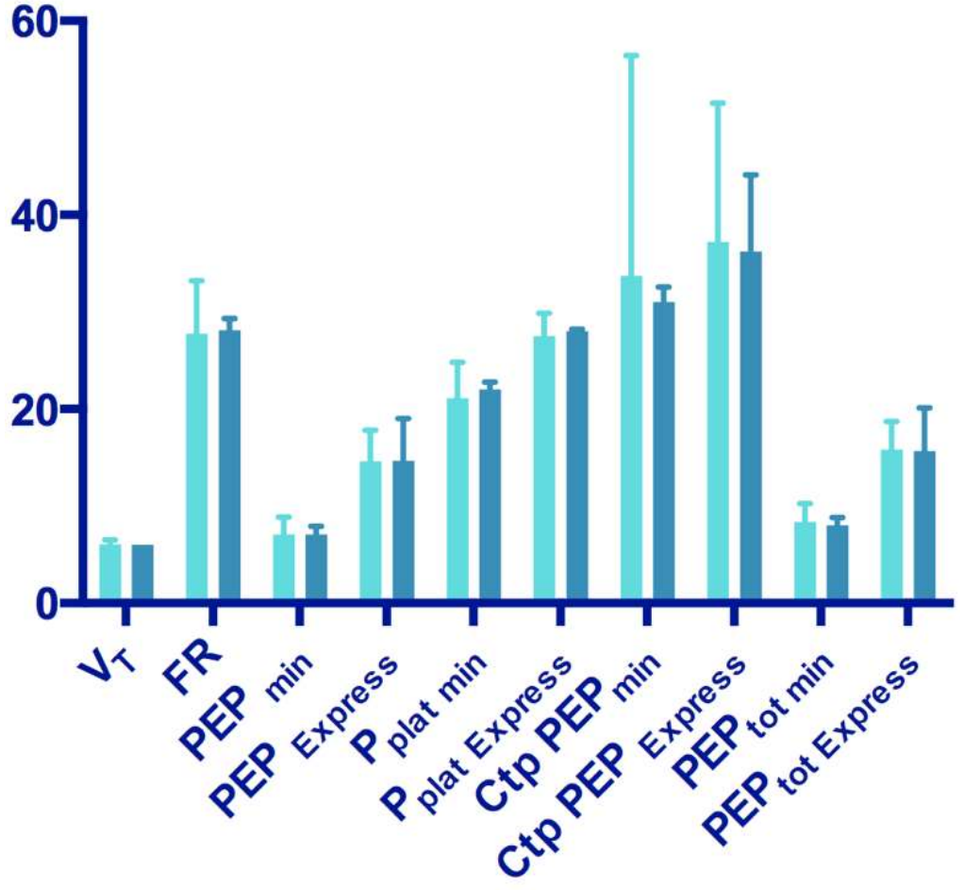
ARMA n=783
SimVA

Arma Study

High vs Low VT

ARDS

N Engl J Med 2000;342:1301-8



Express n=743
SimVA

Express Study

High vs Low PEEP

JAMA®
The Journal of the American Medical Association

JAMA. 2008;299(6):646-655

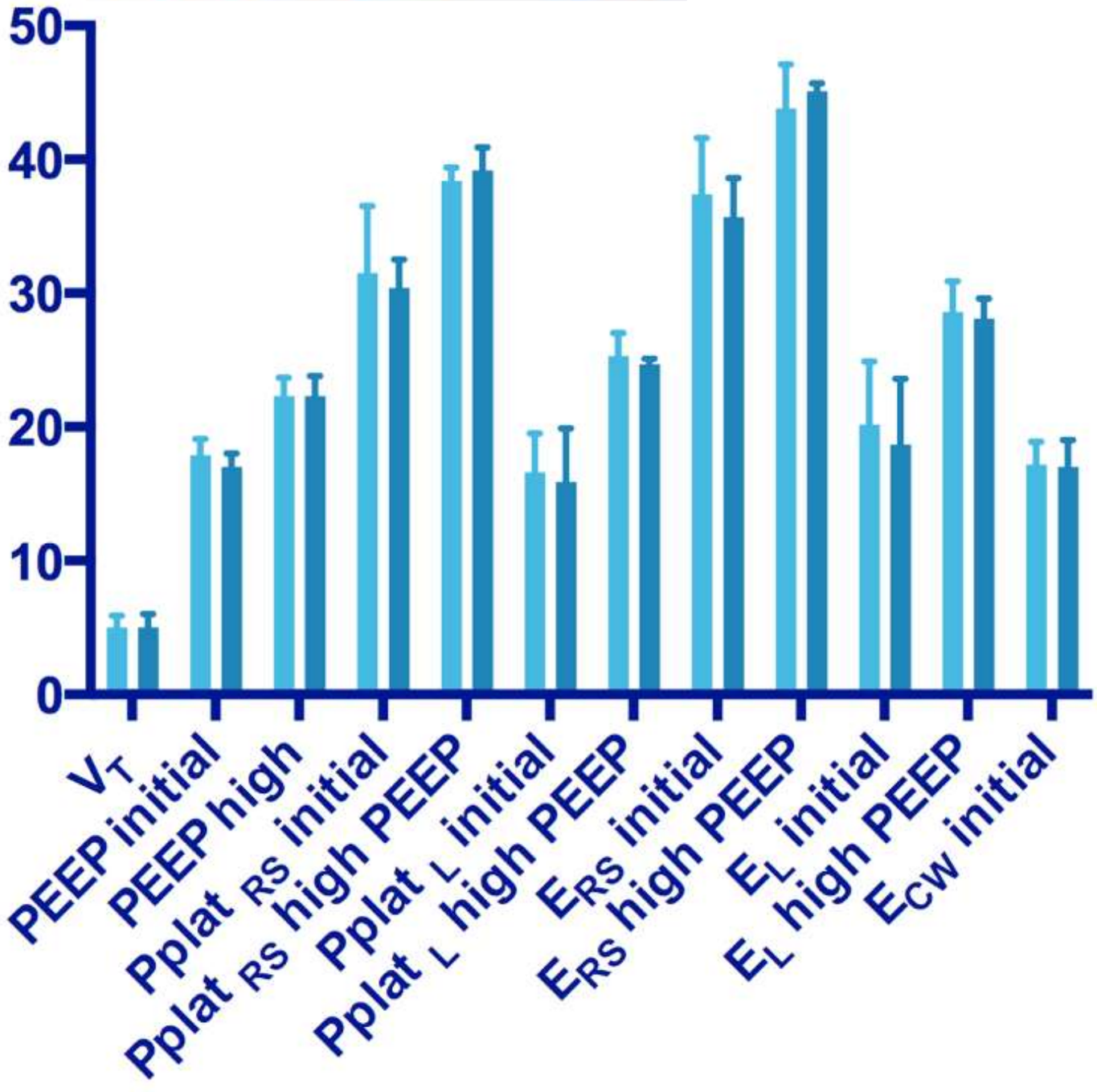
SimVA
Ventilation Artificielle Virtuelle

ECMO criteria for influenza A (H1N1)-associated ARDS: role of transpulmonary pressure

Salvatore Grasso
Pierpaolo Terragni
Alberto Birocco
Rosario Urbino
Lorenzo Del Sorbo
Claudia Filippini
Luciana Mascia
Antonio Pesenti
Alberto Zangrillo
Luciano Gattinoni
V. Marco Ranieri

INTENSIVE CARE MEDICINE

Transpulmonary pressure



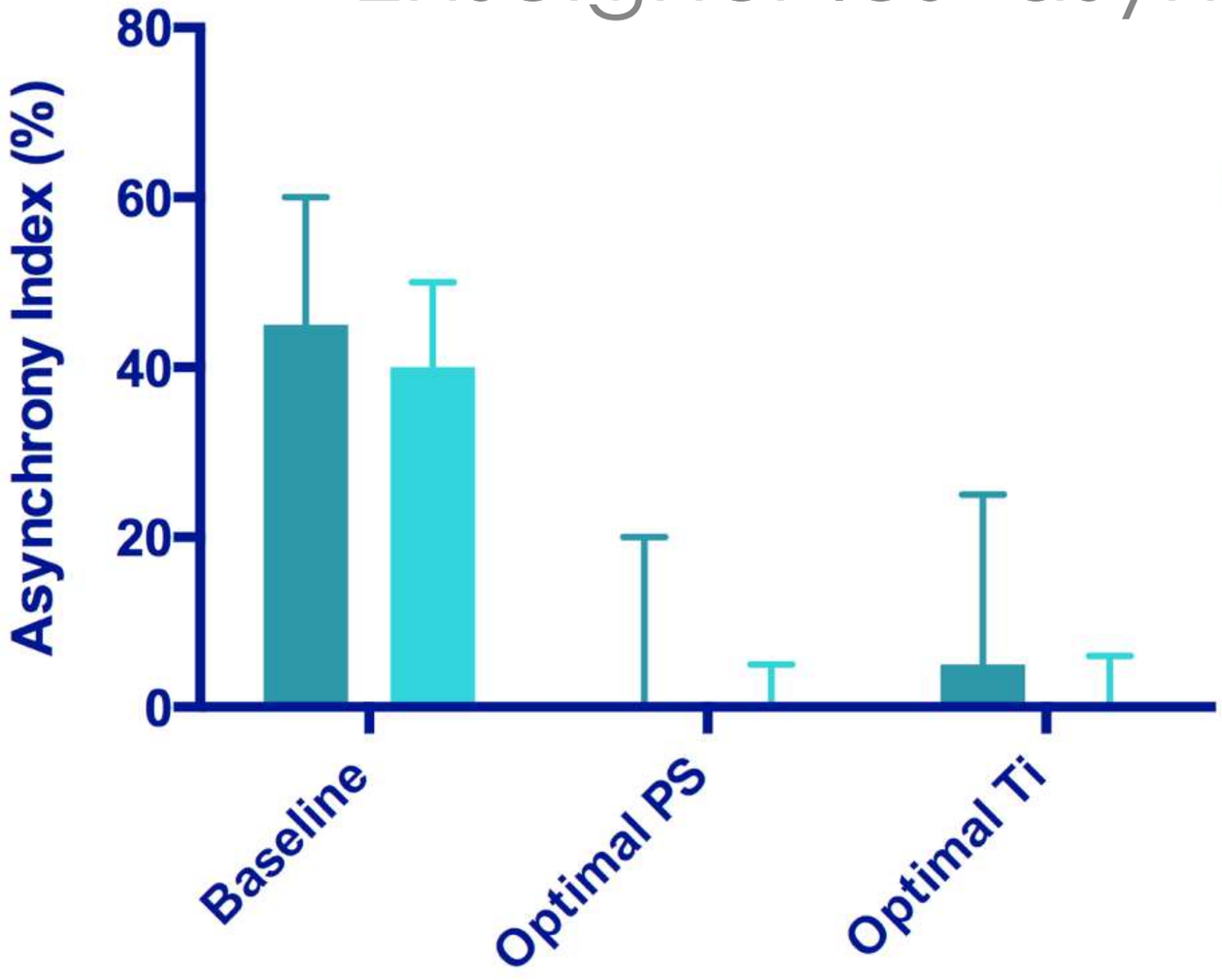
Reduction of patient-ventilator asynchrony by reducing tidal volume during pressure-support ventilation

Arnaud W. Thille
Belen Cabello
Fabrice Galia
Aissam Lyazidi
Laurent Brochard

INTENSIVE CARE MEDICINE

PSV
COPD

Enseigner les asynchronies



Intensive Care Med (2008) 34:1477–1486

Per operative ventilation

Improve Study

High VT ZEEP vs Low VT PEEP

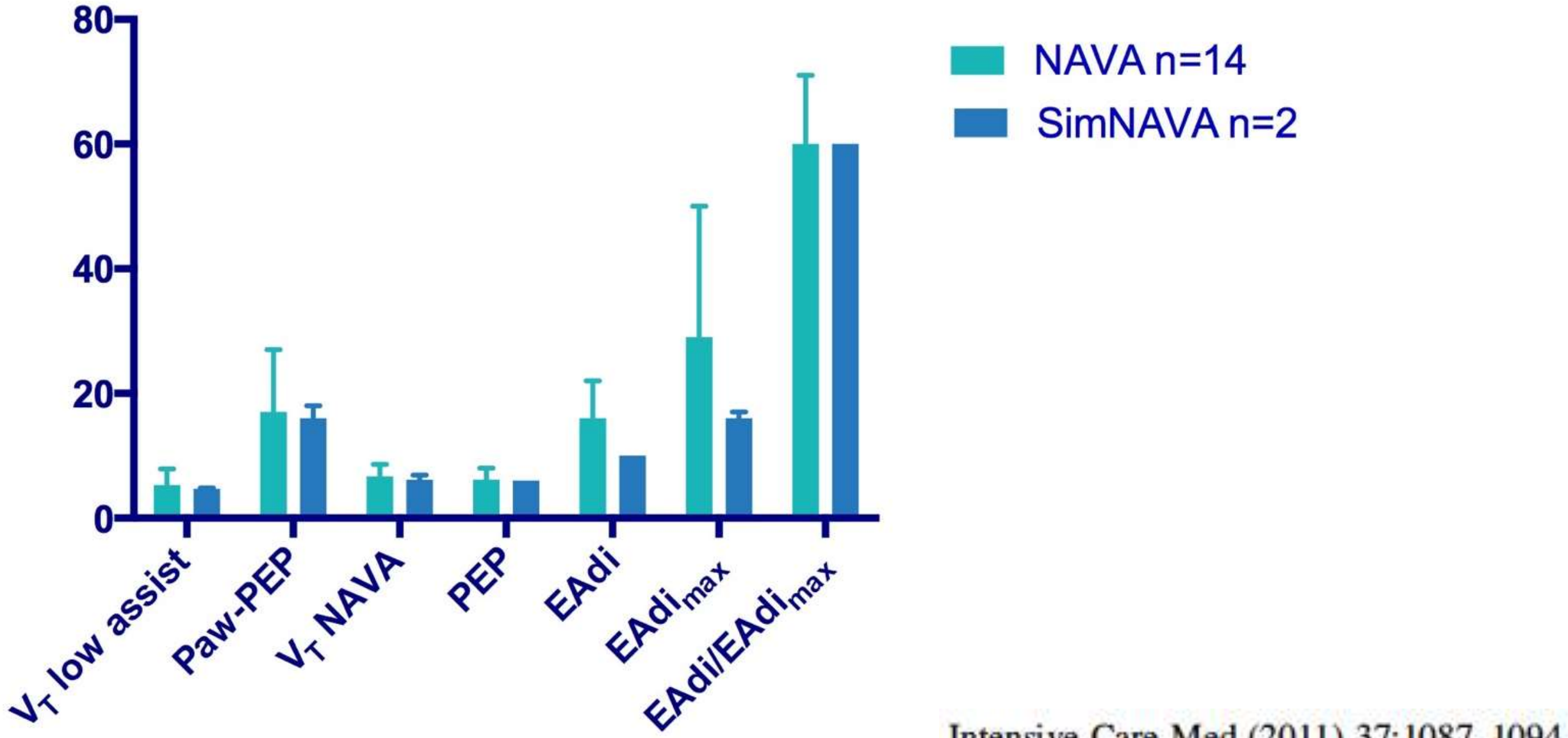
NEJM 2013; 369:428-37

Daily titration of neurally adjusted ventilatory assist using the diaphragm electrical activity

NAVA

Hadrien Rozé
Abdelghani Lafrikh
Virginie Perrier
Arnaud Germain
Antoine Dewitte
Francis Gomez
Gérard Janvier
Alexandre Ouattara

ICM INTENSIVE CARE MEDICINE



Intensive Care Med (2011) 37:1087–1094

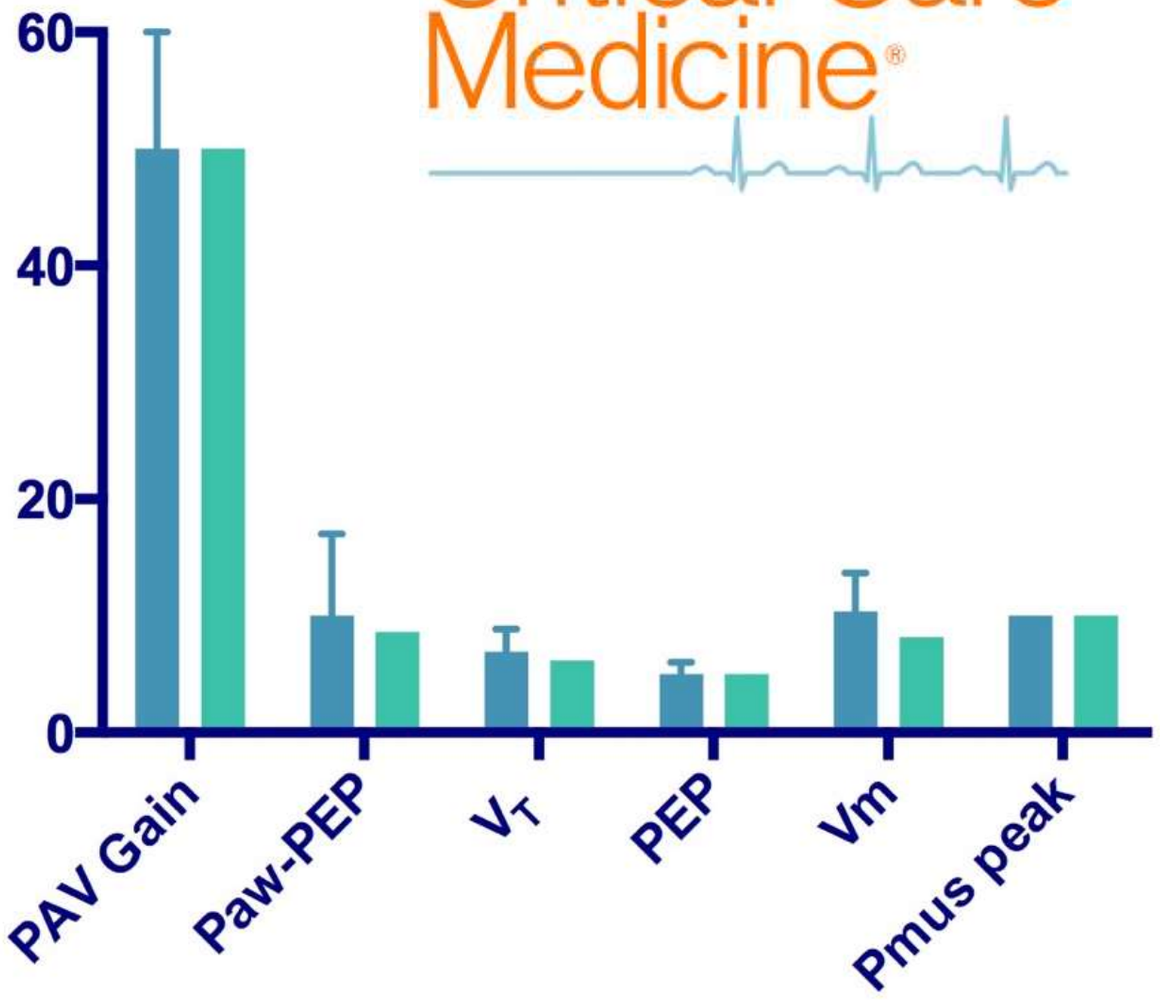
Bedside Adjustment of Proportional Assist Ventilation to Target a Predefined Range of Respiratory Effort

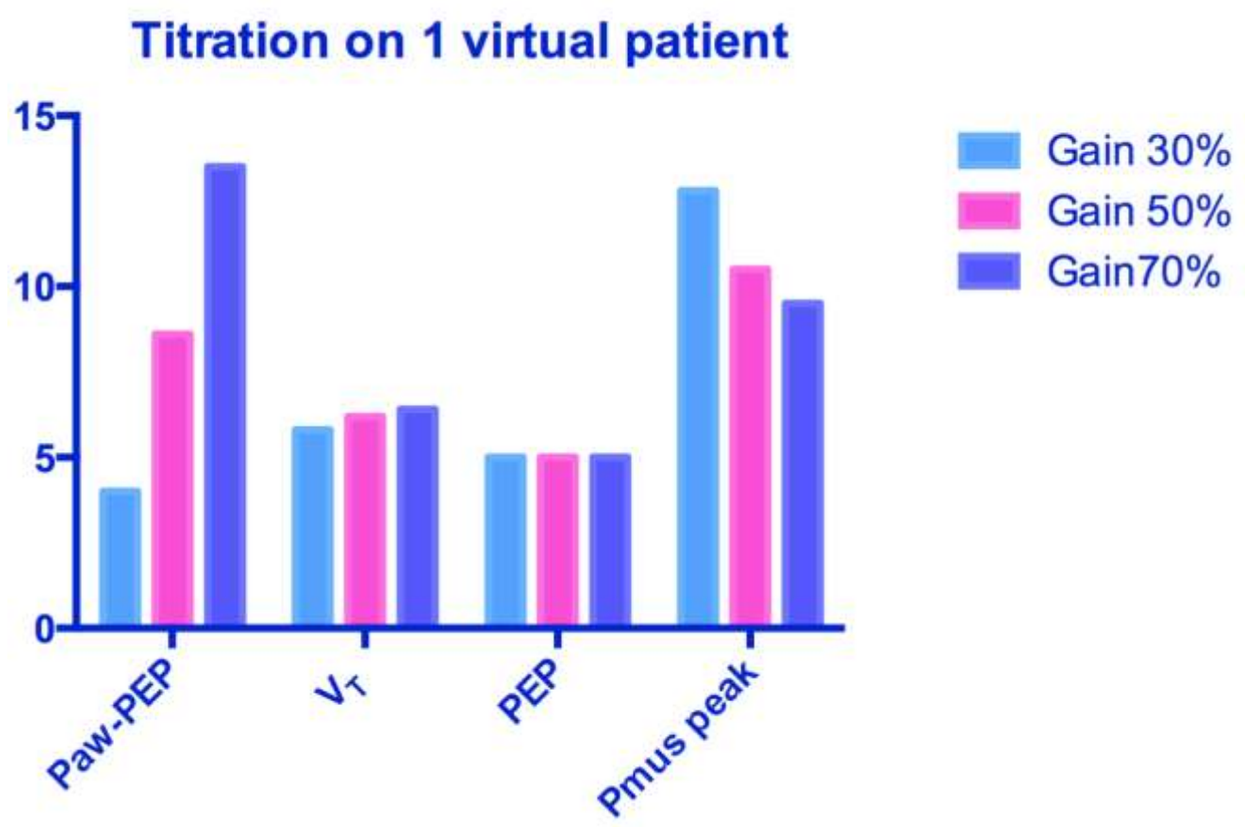
Guillaume Carteaux, MD[1,2]; Jordi Mancebo, MD, PhD[3]; Alain Mercat, MD, PhD[4]; Jean Dellamonica, MD, PhD[5,6]; Jean-Christophe M. Richard, MD, PhD[7,8]; Hernan Aguirre-Bermeo, MD[3]; Achille Kouatchet, MD[4]; Gaetan Beduneau, MD[7,9]; Arnaud W. Thille, MD, PhD[8]; Laurent Brochard, MD[10,11]

PAV+

Critical Care Medicine®

Medtronic





Crit Care Med 2013;41:0–0

Educational study SimVA

Teaching Mechanical Ventilation for Residents in Intensive Care
A randomized Trial Using Traditional Lectures VS Computer-Based Simulation (SimVA©)

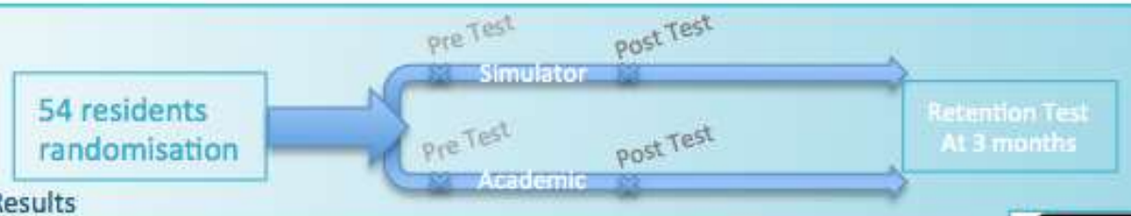
H. Rozé, MD PhD (1) ; E.Rivière, MD,PhD, R.Dubois PhD (2), A.Ouattara, MD,PhD
(1) SAR Sud, Thoracic Intensive Care Unit & Lung Transplantation, Bordeaux University Hospital, Pessac-Bordeaux
(2) Internal Medicine Department, Bordeaux University Hospital, Pessac-Bordeaux
(3) IHU LIRYC, Electrophysiology and Heart Modeling Institute, Foundation Bordeaux University, Pessac-Bordeaux

Introduction

During educational process, trainees apply their knowledge to treat patient in intensive care before achieving full clinical competency. Moreover, advances in knowledge regarding mechanical ventilation in particular lung protective ventilation and asynchronies have been shown to be associated with mortality. For these reasons we developed a simulator of controlled and spontaneous artificial ventilation (SimVA) and virtual breathing patients. Mathematical model resolved differential equations of chest and lung movements according to inspiratory effort or not in order to match with a clinical database. The aim of this study was to compare two teaching modalities on mechanical ventilation: traditional lectures versus virtual simulation.

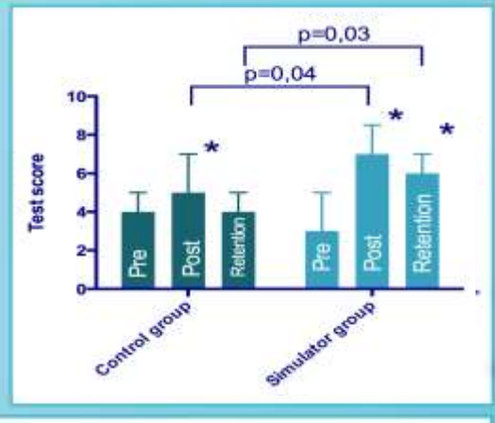
Method

This randomized controlled study involved 54 residents. One group of 23 participants attended the same didactic lecture on mechanical ventilation (3 hours) whereas the other 28 were in the simulator group (3 hours). Performance was measured using a pre and post-test evaluation of knowledge on respiratory settings and pressure flow time curves monitoring. A retention test was done at 3 months (The same questioner was used for pre, post and retention test). Comparison was individual in each group (ANOVA, multiple comparison) and between groups (Mann-Whitney), p<0,05 was considered significant.



Results

Baseline knowledge was not different between groups; post-test was significantly improved in both groups (figure) but was significantly higher in the simulator group. Retention test was only significantly different from the pre-test in the simulator group.



Discussion

A computer-based simulation with a modelisation of controlled and spontaneous mechanical ventilation has the potential to improve knowledge and skills in ventilator settings in comparison to traditional didactic lectures.

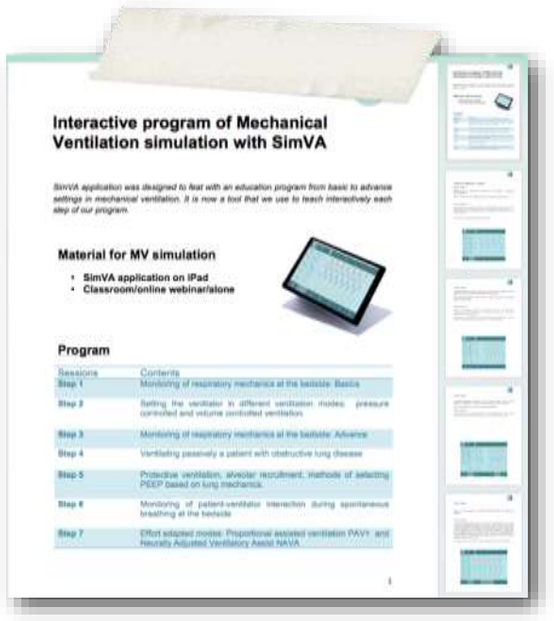
Simulator Course

VS

Hadrien.roze@chu-bordeaux.fr
www.sim-va.com

SimVA Learning Program

Sessions	Contents
Step 1	Monitoring of respiratory mechanics at the bedside: Basics
Step 2	Setting the ventilator in different ventilation modes: pressure controlled and volume controlled ventilation
Step 3	Monitoring of respiratory mechanics at the bedside: Advance
Step 4	Ventilating passively a patient with obstructive lung disease
Step 5	Protective ventilation, alveolar recruitment, methods of selecting PEEP based on lung mechanics.
Step 6	Monitoring of patient-ventilator interaction during spontaneous breathing at the bedside
Step 7	Effort adapted modes: Proportional assisted ventilation PAV+ and Neurally Adjusted Ventilatory Assist NAVA



1 year of tests (feedback & orders)

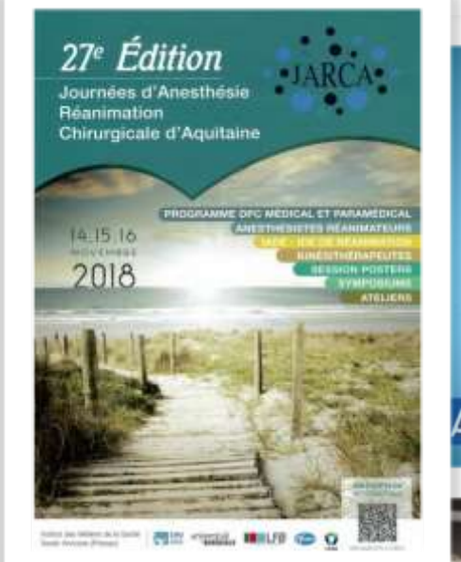
Education through congresses, conferences, presentations, symposiums, seminars, webinars, continuous training programs, simulation centers meetings and workshops.

Training relating to the medical or paramedical field

Pr Laurent Brochard

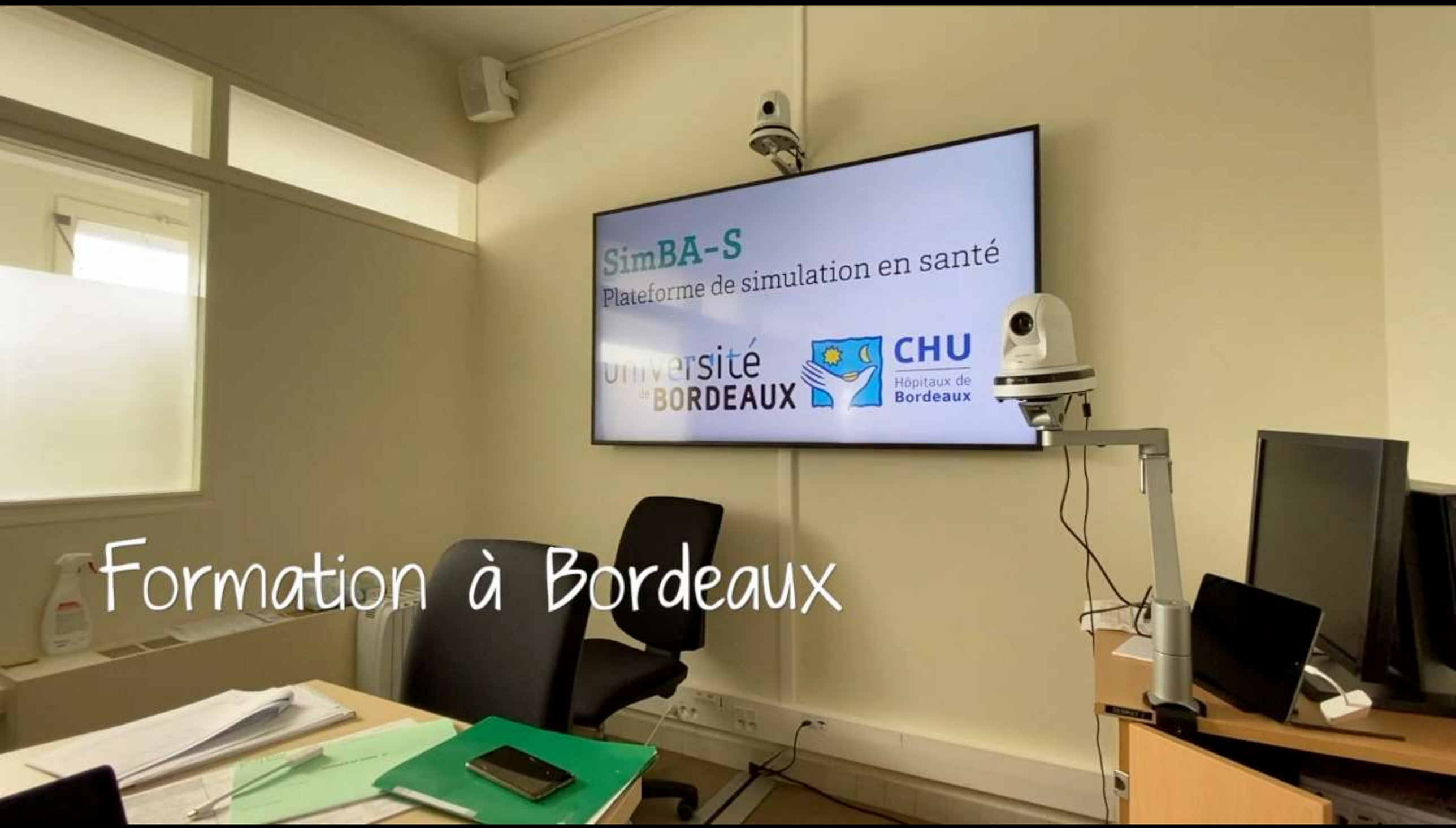
Scientific board

ESICM WEBINAR 2019

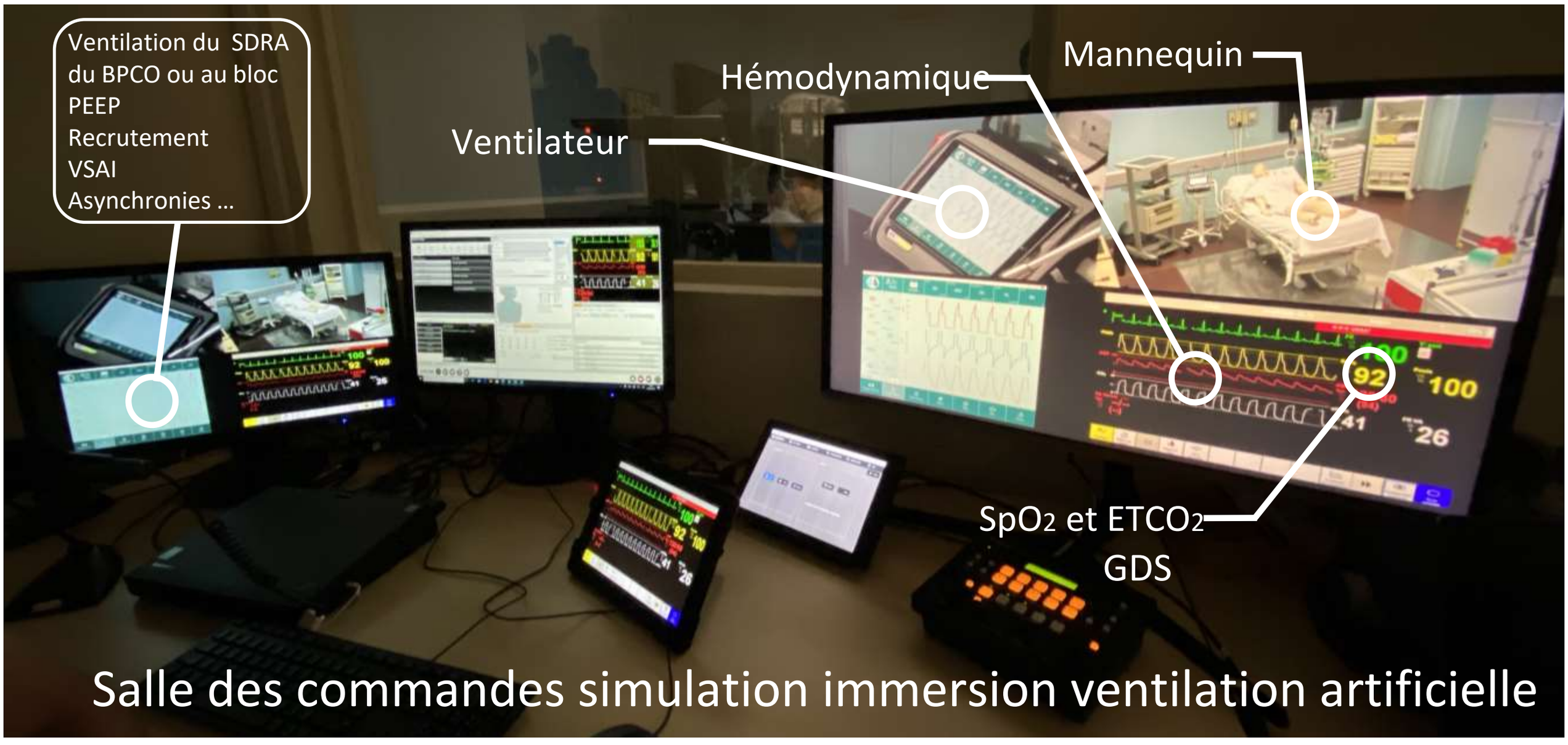


SKR
Société de Kinésithérapie de Réanimation

réanimation 2019
PARIS 23-25 JANVIER


SimBA-S
Plateforme de simulation en santé
Université de BORDEAUX
CHU
Hôpitaux de Bordeaux
Formation à Bordeaux

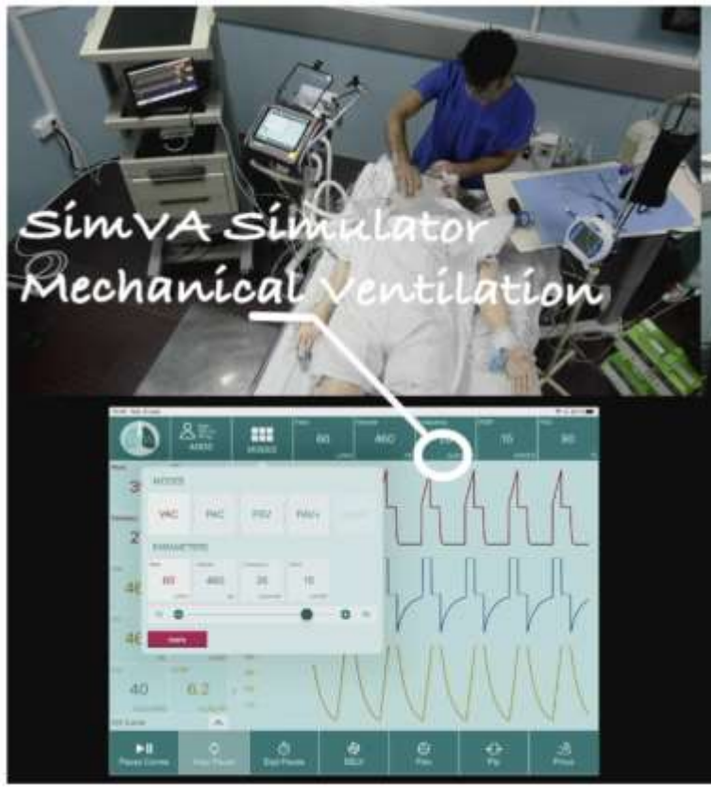
Simulation immersive

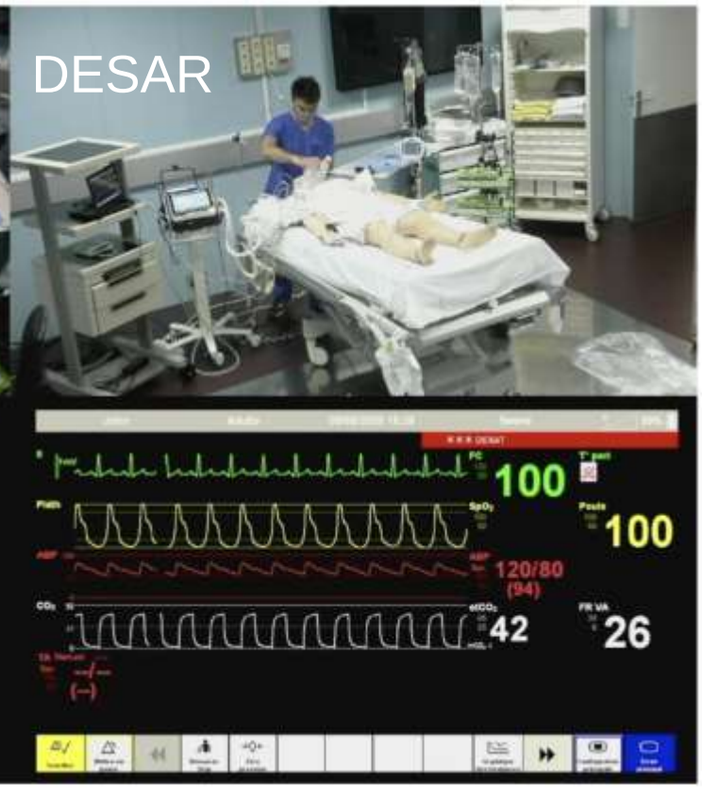


Salle des commandes simulation immersion ventilation artificielle

Plateforme de simulation SimBA du CHU et de l'université de Bordeaux

Simulation à Bordeaux





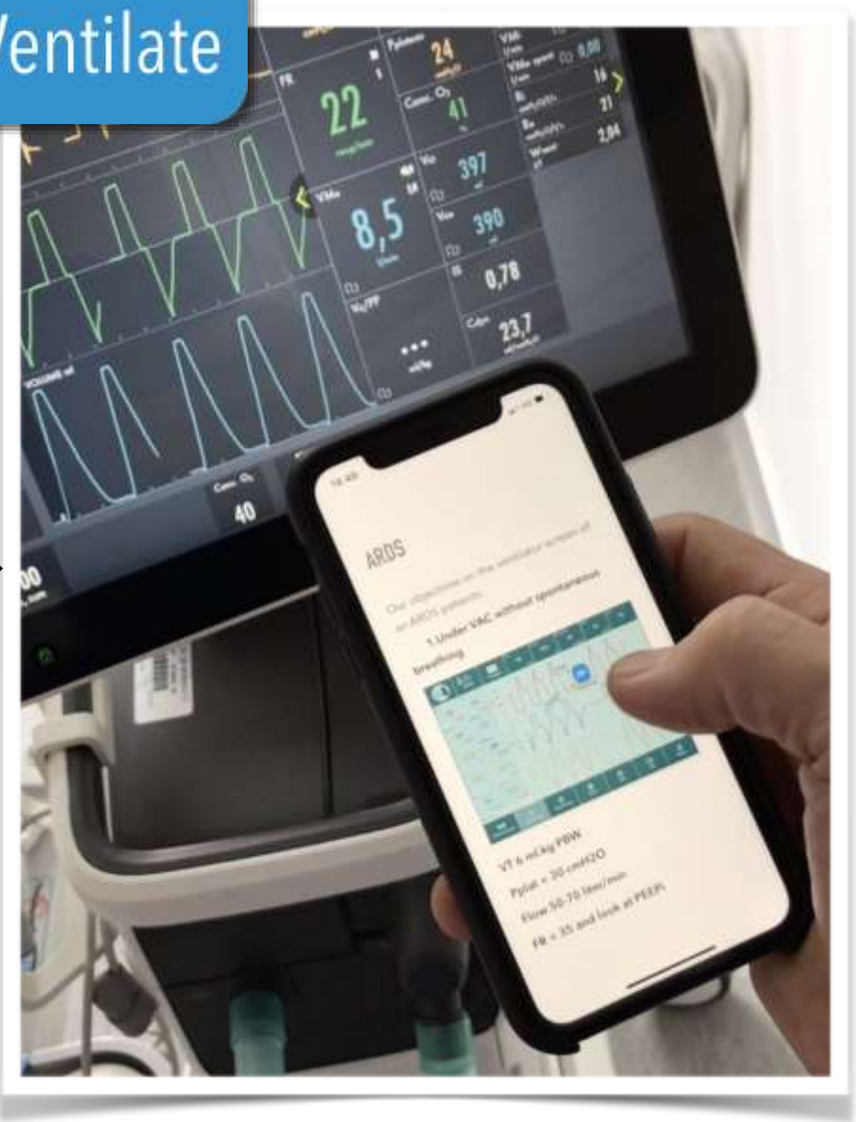
Plateforme de simulation SimBA-S du CHU et de l’université de Bordeaux

Idée n°2

Aquitaine Science Transfert®
Accélérateur des innovations d'avenir

2 brevets

iVentilate



Aperçu **App Store**

Ouvrez le Mac App Store pour acheter et télécharger des apps.

iVentilate 17+

Hadrien Roze

Conçu pour iPad

N° 171 en Médecine

★★★★★ 5,0 • 8 notes

9,99 €

Afficher dans le Mac App Store ↗

Available on the App Store

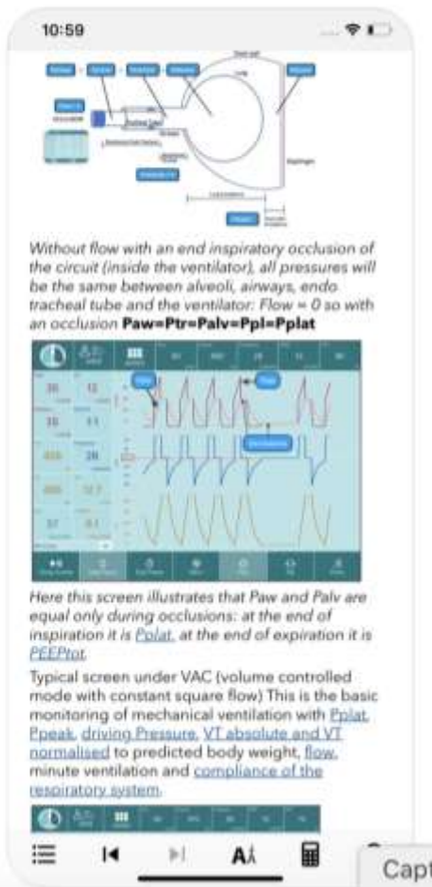
GET IT ON Google Play

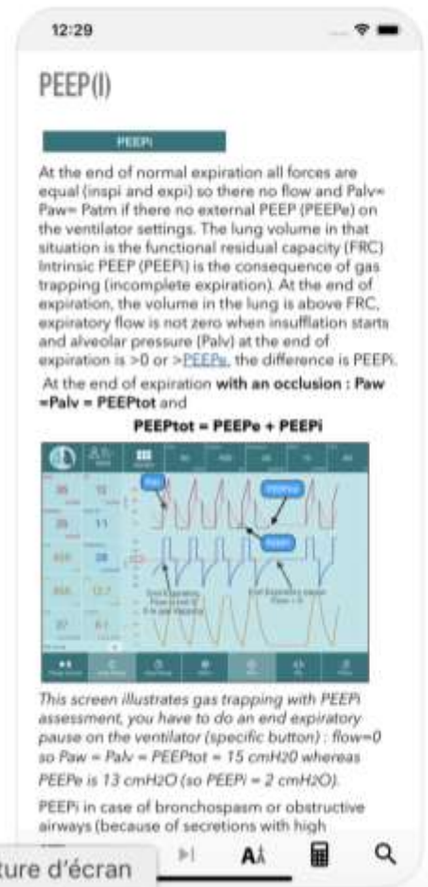
Application **iVentilate** pour l'utilisation des ventilateurs au bloc et en réanimation

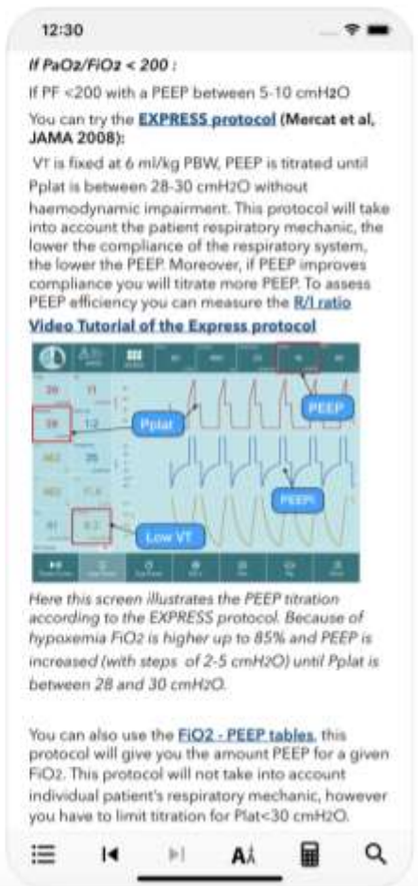
Now in 35 countries !

Captures d'écran

iPhone iPad







Capture d'écran

www.sim-va.com

Instagram

Rechercher

Se connecter S'inscrire

simvasimulator

S'abonner

74 publications **518** abonnés **52** abonnements

SimVA & iVentilate

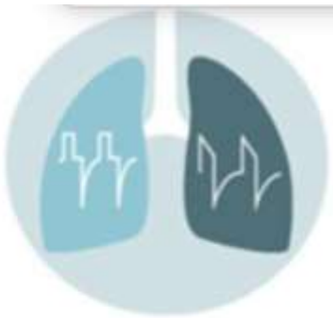
With SimVA we created iVentilate an App for patient-ventilator interaction.Improve your skills and knowledge on ventilation or Teach ! Website :

www.sim-va.com

PUBLICATIONS IDENTIFIÉ(E)

SimVA

Ventilation Artificielle Virtuelle



SimVA App*

Healthcare simulation is an innovative method to improve safety within patient's care. Our field of interest in simulation is Mechanical Ventilation management in daily practice, for everyone in charge of ventilated patients.

The reason is that millions of patients are ventilated artificially every year in critical care unit, in operating rooms or at home. Experimental and clinical research have demonstrated that improper artificial ventilation settings are responsible for morbidity and mortality.

The goal of SimVA is to reduce it through training.

We created a tool in order to train everyone involved in mechanical ventilation and improve Patient Ventilator Interaction in various respiratory functions (normal, ARDS, COPD...) under controlled modes, pressure support or proportional assist modes. We developed many physiological monitoring tools with an educational point of view, driving and alveolar pressures, end expiratory lung volume, Diaphragm Electrical Activity, muscular inspiratory and trans pulmonary pressures, pressure volume curves...

This tool is a virtual simulator called SimVA, it is a tablet with a software and a learning program with video tutorials from basic to advance level.

Our statement is that mechanical ventilation can be tough through an easier safe unique innovative and interactive way, for everyone from basics to advance levels.

Visit our website

Login Status

Username or Email

Password

log in Forgot? Register

Instagram

simvasimulator

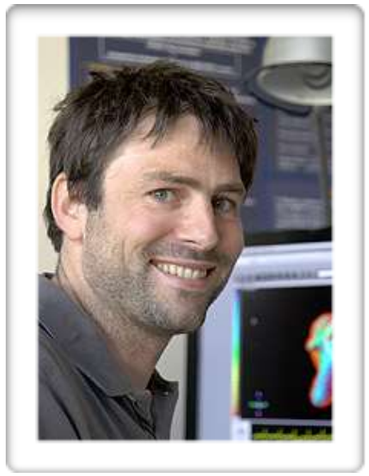
Propriété

CHU Hôpitaux de Bordeaux

L'INSTITUT DE RYTHMOLOGIE ET MODÉLISATION CARDIAQUE BORDEAUX

université de BORDEAUX

Conception



Valorisation

Brevet

Aquitaine Science Transfert®
Accélérateur des innovations d'avenir

Financement

INITIATIVE D'EXCELLENCE université de Bordeaux

bpifrance

19e CONCONCOURS NATIONAL D'AIDE À LA CRÉATION D'ENTREPRISES DE TECHNOLOGIES INNOVANTES