Respiratory mechanic using a simulator of artificial ventilation (SimVA) during weaning with Proportional Assist Ventilation (PAV) mode, comparison between real and virtual patients.

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Simulation in intensive care is an innovative method for teaching. Patient's inspiratory effort during weaning is crucial. For this reason we develop a simulator of artificial ventilation (SimVA) and virtual patients breathing spontaneously. Mathematical model resolved differential equations of chest movements with spontaneous muscle pressure (Pmus) in order to match with a clinical database of patients under PAV. The goal of this study was to evaluate and compare virtual patients respiratory mechanic during PAV gain titration with patients from previous studies: PAV vs SimPAV.

Introduction: With PAV assist is proportional and synchronized to an estimation of Pmus (1). It is estimated with Resistances and Thoracopulmonary compliance measurements. The purpose of this study was to assess SimPAV through respiratory mechanic between real and virtual patients.

Material and methods: Muscular pressure (Pmus) was estimated through the equation of movement of the respiratory system. We compare the simulator to a previous study with a specific PAV gain protocol (2).

**Results:** Results are summarized in the table.

Patients	Compliance	Resistance	Gain (%)	VT (ml.kg^{-1})	Paw-PEP (cmH$_2$0)	PEP (cmH$_2$0)	Vm (L/min)	Pmus peak (cmH$_2$0)
Real PAV n=53	36 [32-44]	14 [9-16]	50 [50-60]	6,9 [6.0-8.9]	10 [8-17]	5 [5-6]	10.4 [8.6-13.7]	10 [NA]
Virtual SimPAV	40	14	50	6,2	8.6	5.0	8.2	10

Results are expressed as median [IQR]

Respiratory mechanics under SimPAV was very close to real patients (figure).

Conclusion: Simulation with the software SimVA and the mode SimPAV is realistic and may help to teach interactively patient-ventilator interaction and effort during PAV gain titration with Pmus within acceptable range.

1. Am Rev Respir Dis 1992; 145:114–120.   2. Crit Care Med. 2013;41:2125-32
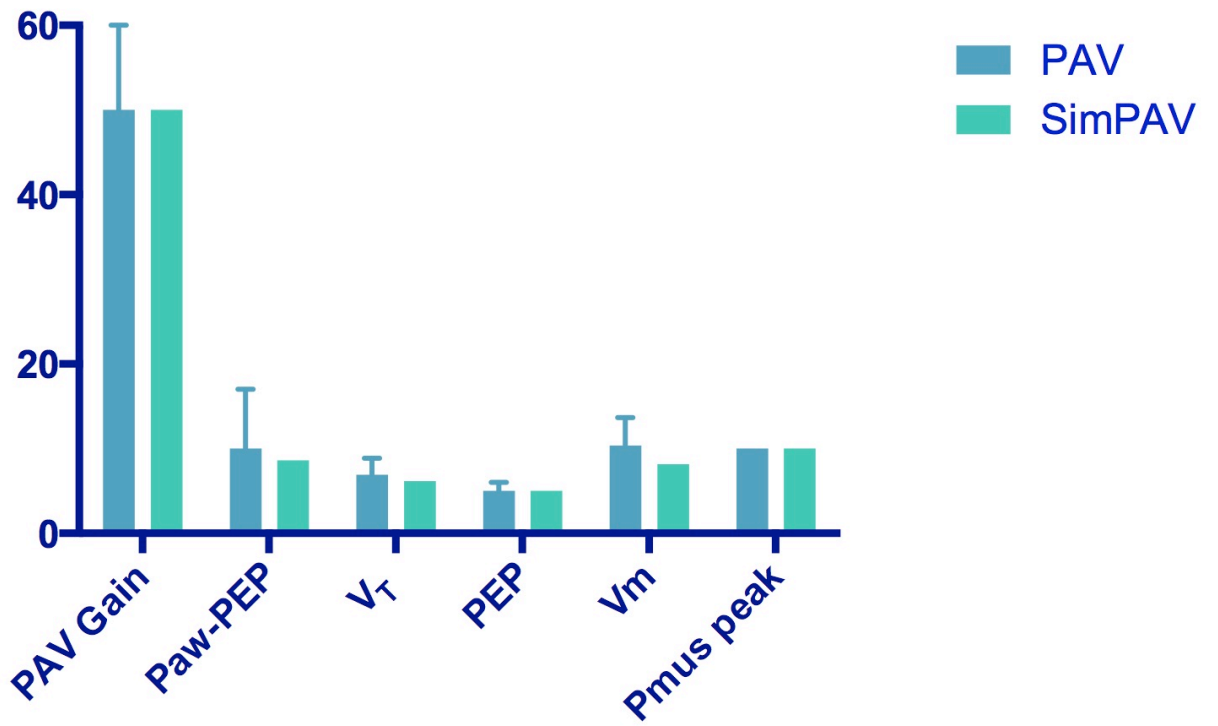
PAV Gain (%) Paw-PEP (cmH$_2$O) VT ml.kg-1 PBW, PEP(cmH$_2$0), Vm Minute ventilation (L/min), Pmus peak (cmH$_2$0)