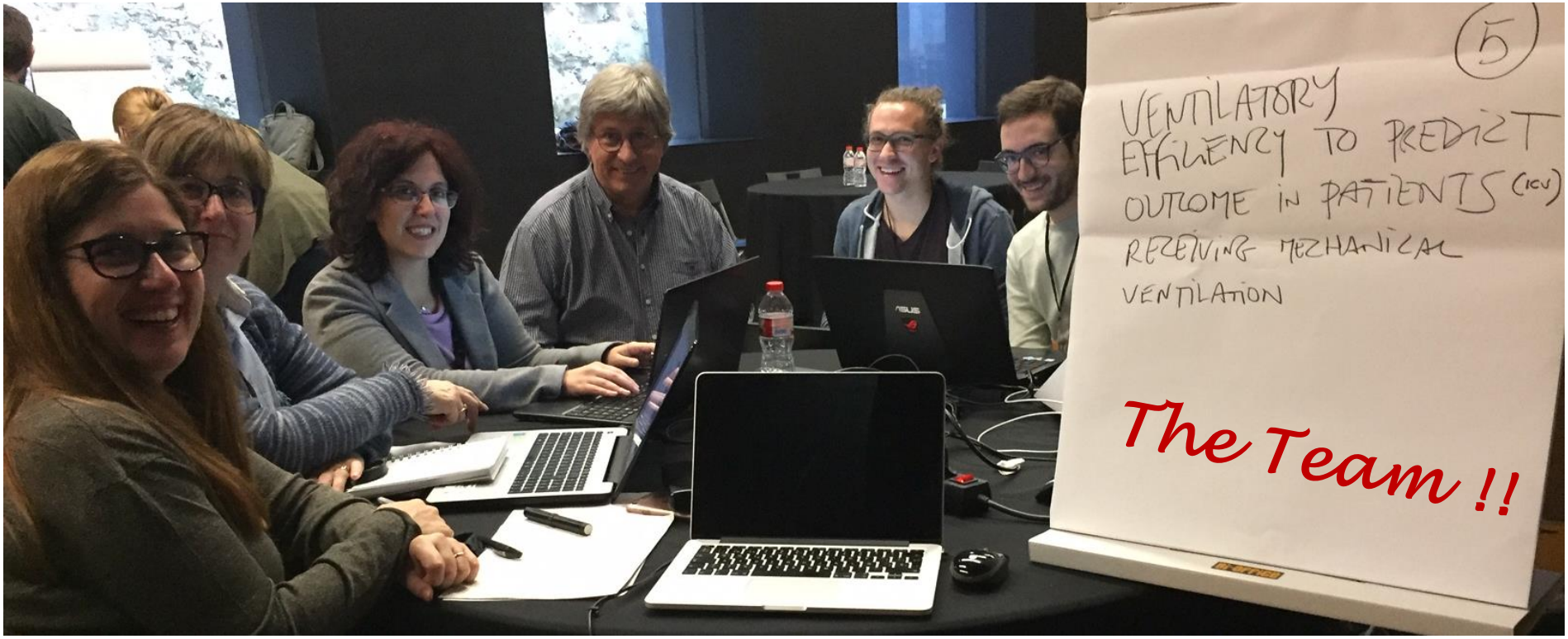
CRITICAL CARE DATA ANALYSIS SUMMIT AND TARRAGONA DATATHON 2018

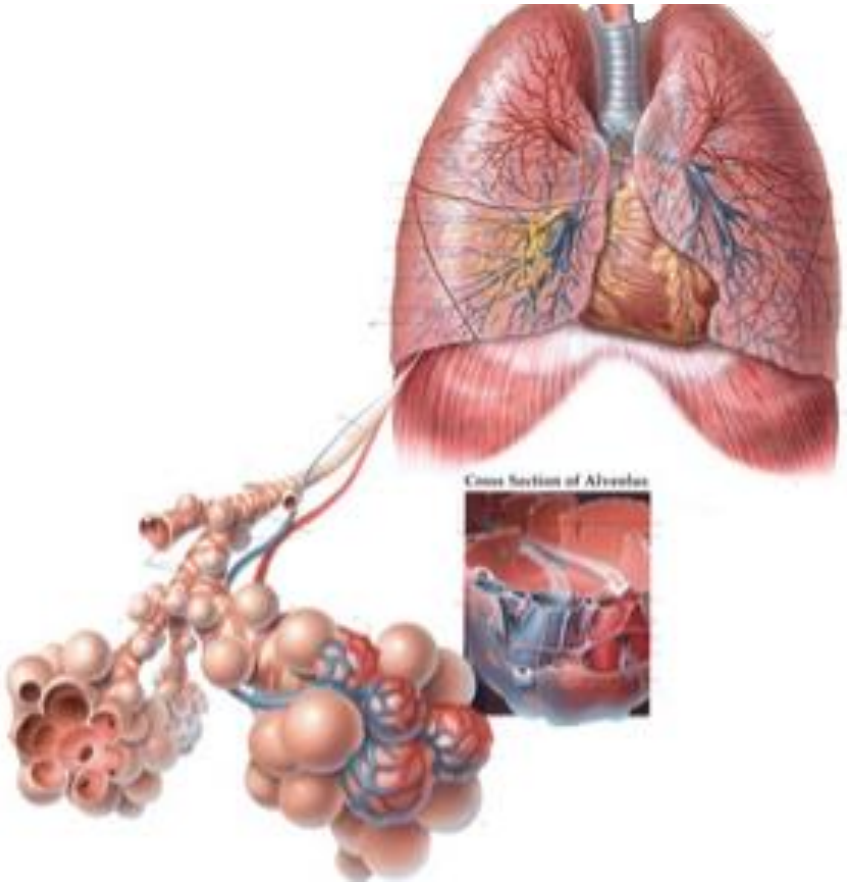
November 8th - 11th 2018



Teresa Rozza[1], Cristina Fortià[1], Lidia Martí Hereu[1], Jordi Escuder[2], Sebastian Karg[3], Lluis Blanch[1], Ana Ochagavia[1]

[1] Clinician Parc Tauli University Hospital. I[3]PT
[2] Data Scientist. University of Barcelona
[3] Data Scientist. University Politecnica of Catalonia

Physiology of respiratory system



Oxigenation

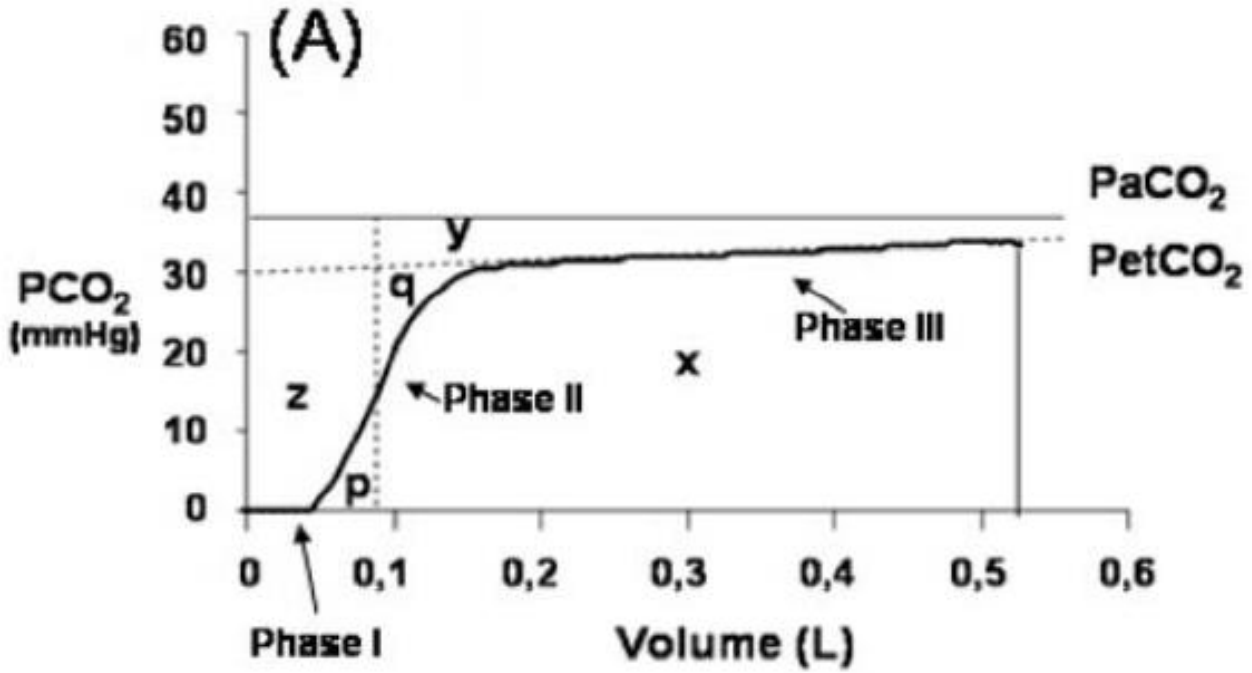
PaO2/FiO2

Ventilation

Vd/Vt

VR

Evaluating dead space



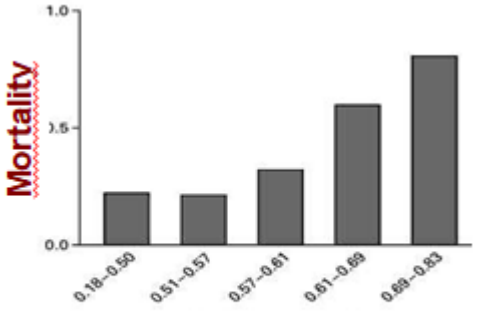
Evaluating ventilatory efficiency (VR)

$$VR = \frac{\dot{V}_{E\ measured}\ X\ Pa_{CO_2\ measured}}{\dot{V}_{E\ predicted}\ X\ Pa_{CO_2\ ideal}} \qquad [1]$$

where $\dot{V}_{E\ measured}$ is the measured minute ventilation (mL/min), $Pa_{CO_2\ measured}$ is the measured arterial pressure of carbon dioxide (mmHg), $\dot{V}_{E\ predicted}$ is the predicted minute ventilation calculated as predicted body weight X 100 (mL/min),(5) and $Pa_{CO_2\ ideal}$ is the expected arterial pressure of carbon dioxide in normal lungs if ventilated with the predicted minute ventilation. $Pa_{CO_2\ ideal}$ is set as 37.5 mmHg (5 kPa) for all patients.(4)

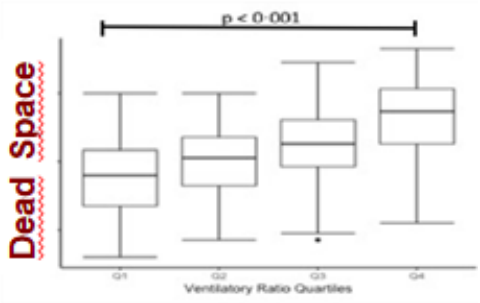
In ARDS

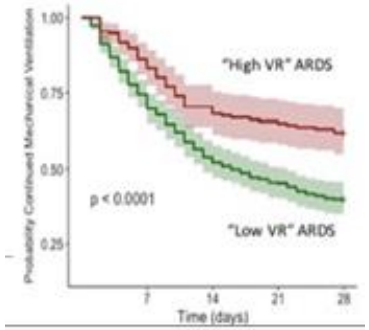
- Pulmonary dead space fraction as an independent predictor of mortality
- Ventilatory Ratio was found to have significantly association with pulmonary dead space fraction and to be independently associated with increased risk of mortality



Dead Space

Nuckton TJ et al. N Engl J Med 2002





Ventilatory Ratio

Sinha P et al. AJRCCM 2018

Study design

- RATIONALE: Critically ill patients under mechanical ventilation may have different functional alterations others than ARDS
- HYPOTESIS: Since lung injury impairs ventilatory efficiency, alterations in ventilatory index might be associated to different prognostic indicators
- OBJECTIVE: To define mortality using a model that includes age, VR, PaFi, SOFA

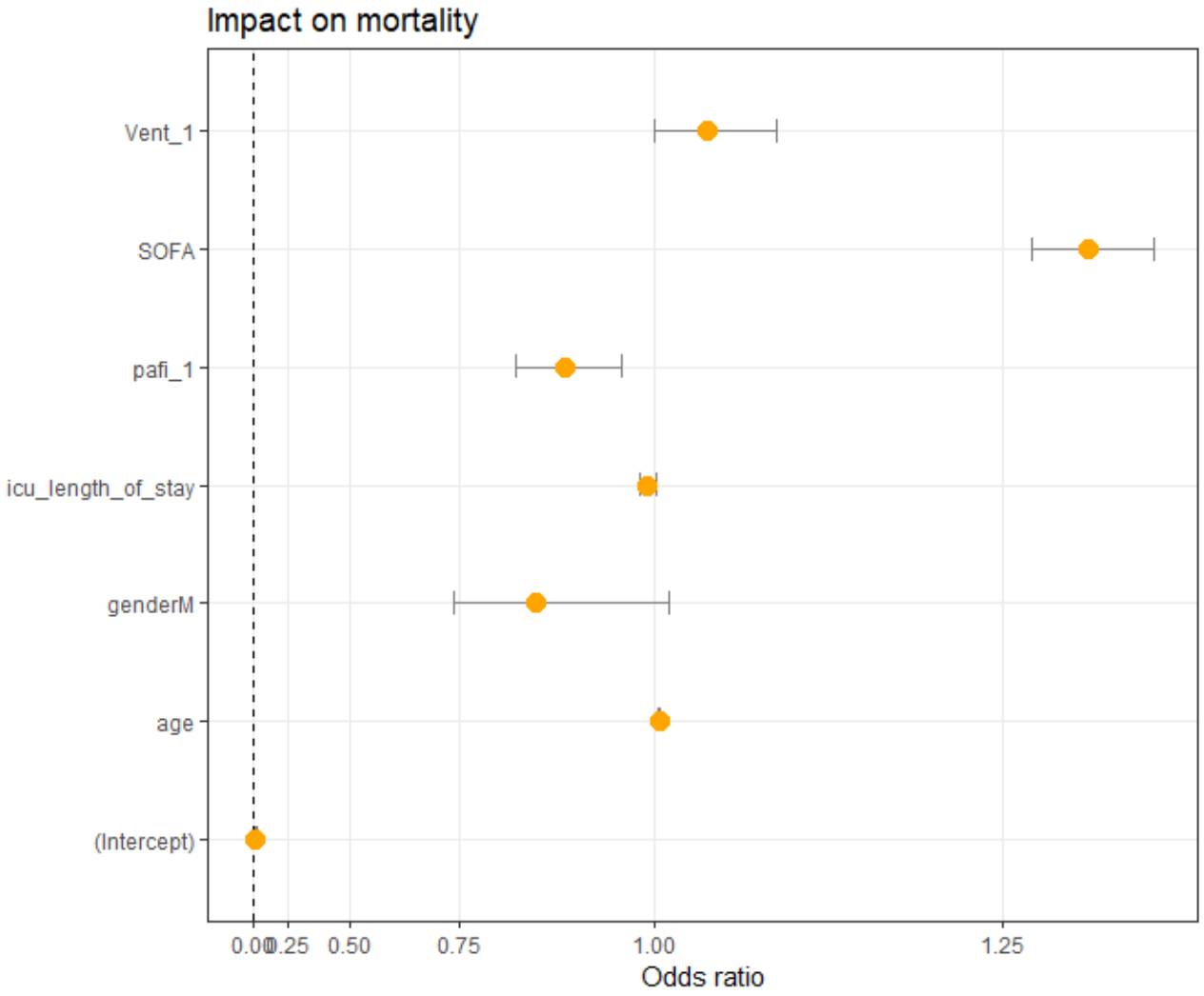
Materials and methods

- Data for this study was extracted from MIMIC-III. We select 8.000 patients older than 18-years-old with mechanical ventilation and we collect demographics, severity score, hemodinamic and respiratory variable at first day.
- We perform a statistical analysis using multivariate analysis, with IC at 95% using R.

Results

	OR		
Age	0,0243	0.0167	0.0351
Gender (M)	0.8658	0.7395	1.0144
ICU stay	0.9932	0.9850	1.0011
PaFi	0.9016	0.8391	0.9670
SOFA	1.2951	1.2657	1.3255
VR	1.0480	1.0003	1.1041

Results II


Impact on mortality
Vent_1
SOFA
pafi_1
icu_length_of_stay
genderM
age
(Intercept)
0.00
0.25
0.50
0.75
1.00
1.25
Odds ratio

Conclusions

- VR is a new physiological marker that predict outcome in all patients under mechanical ventilation

Thank you!!!