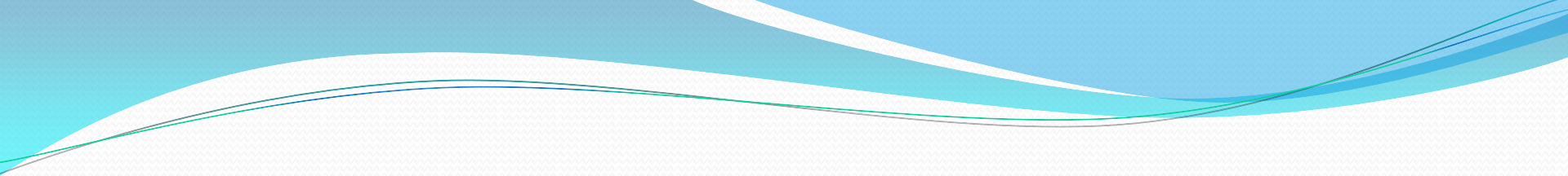# Respiratory Rate as a Predictor of Weaning from Mechanical Ventilation (VM)

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Mortality Increases with the Duration of Mechanical Ventilation and Weaning Failure

Weaning Failure

- The Average Rate is 30%
- Increases Mortality (43%) and Morbidity

The Size of the Problem

- 46% of the Critical Patients Require MV

We need Successfully Weaning Patients

Mechanical Ventilation

Weaning Success

Our Solution

- We Studied 166 Patients
- During Weaning
- Age over 18 y

Inclusion and Weaning Criteria

- Improvement
- Vigil/Calm
- No fever
- Hemodynamic stability
- Metabolic stability

Inclusion and Weaning Criteria

- $PaO_2/FiO_2 > 200$
- Tidal Volume (VT) > 5 ml/Kg
- Respiratory Rate (RR) ≤ 35 bpm
- RR/VT < 105 b.m.L

Additional Measures

- Static Compliance (Cst)
- Maximum Inspiratory Pressure (MIP < 20 cmH_2O)

Spontaneous Breathing Trial (SBT)

- 30 Minutes
- PSV 7 cmH_2O
- $FiO_2 \leq 40\%$
- PEEP 5 cmH_2O

Weaning Success = SBT success, extubation and Spontaneous Breathing > 48 hours

MV

Weaning Success

Weaning Failure = SBT Failure

- RR > 35 bpm
- RR/VT > 105
- SaO_2 < 90%
- Arrhythmias
- Dyspnea
- Psychomotor Agitation

Extubation Failure:

Reintubation within 48 h after Extubation

Results:

- 166 Patients
- Mean Age 53 y
- 94 Males
- Mean Duration of MV 4 days

Causes of MV:

- Postoperative 25.9%
- Pneumonia 13.8%
- Coma 10.2%
- Pulmonary Edema 9.6%
- Sepsis 7.8%
- Exogenous Intoxication 7.2%
- Aspiration 4.8%
- Seizures 4.2%

166 Patients:

- Mortality 29 Patients (17.5%)
- Survival 137 Patients (82.5%)
- Weaning Success 127 Patients (76.5%)

Weaning Success

SBT   **Weaning Success**

166 Patients

- Weaning Failure (SBT Failure) 29 Patients (17.5%)
- Extubation Failure 10 Patients (6%)

Extubation Failure Causes:

- Pulmonary Edema 50%
- Bronchospasm 30%
- Laryngeal Edema 10%
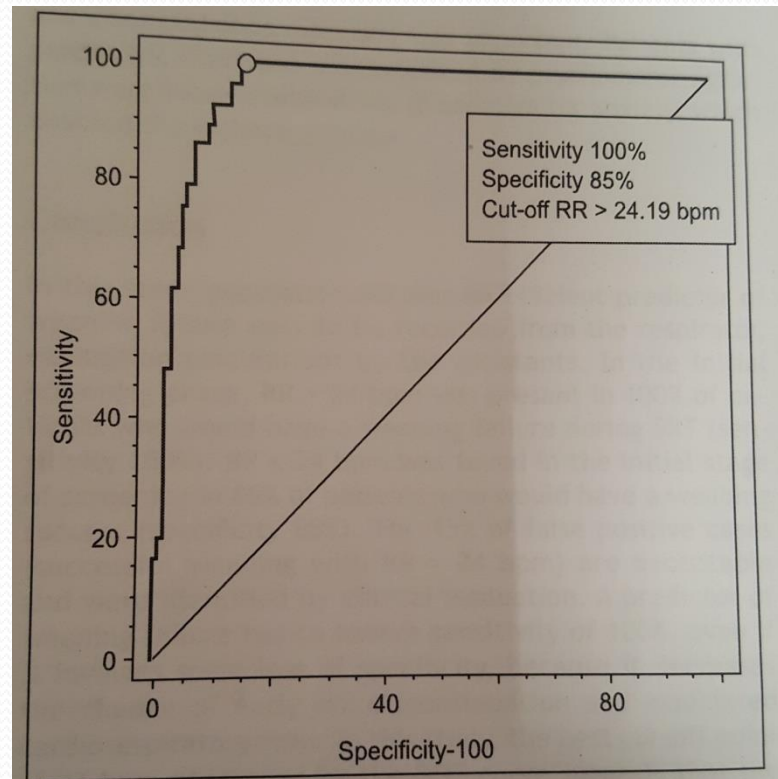- Respiratory Infection 10%

Mortalities:

- 12.6% in Weaning Success
- 20.7% in Weaning Failure
- 70% in Extubation Failure

Patients with Extubation Failure had the Highest Mortality

$$(p = 0.0001)$$

# Respiratory Rate, > 24 bpm, as a Predictor of Weaning Failure

Graphic 1 ROC Curve of Respiratory Rate and Best Cut-off Point in 156 patients (127 weaning successes and 29 failures). RR: respiratory rate; bpm: breaths per minute.

Respiratory Rate > 24 bpm

- Sensitivity 100%
- Specificity 85%
- NPV 100%
- PPV 60%
- LR+ 6.68
- LR- 0.0

Respiratory Rate in Weaning Failure and Success: Accuracy 88%, p < 0.0001

Graphic 2 Respiratory Rate in 29 Failures

Graphic 3 Respiratory Rate in 127 Weaning Successes
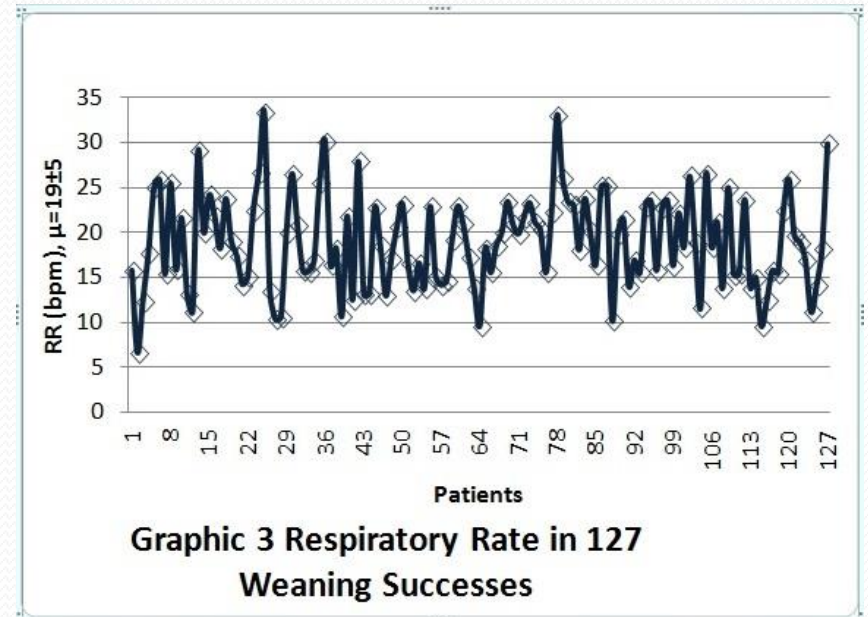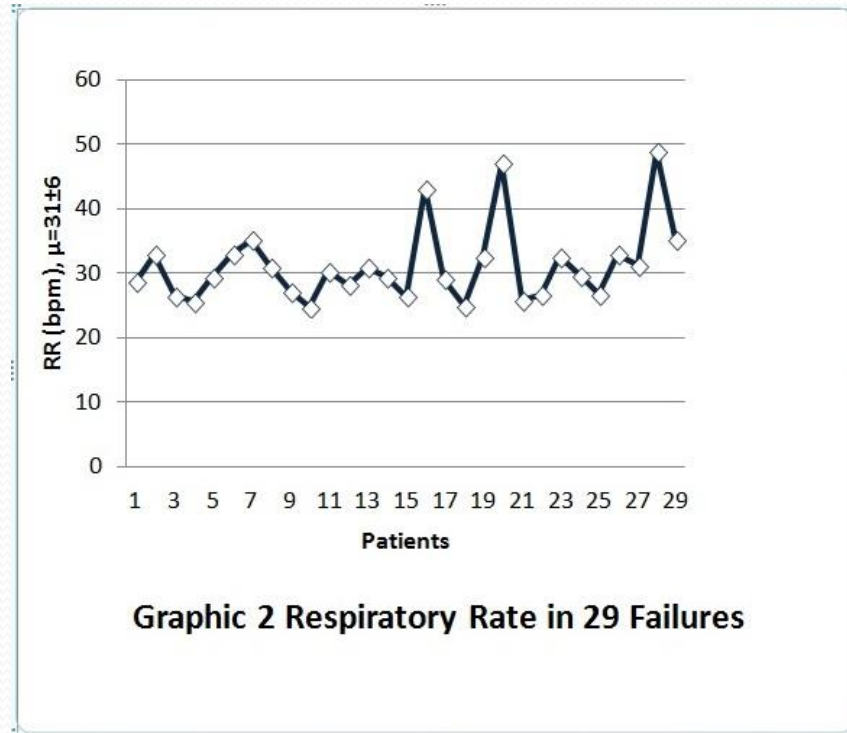
No Difference in RR Behavior among Extubation Failures Compared to the Successes

$$p = 0.7313$$

Conclusion: RR an Efficient, Practical Predictor of Weaning Failure (Cut-off > 24)

MV

Weaning Success

Questions

Thank for Your Attention

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Laureate International Universities