# RECURRENT RESPIRATORY DETERIORATION EVENTS DURING INTENSIVE CARE UNIT STAY AND MORTALITY AMONG MECHANICAL VENTILATED PATIENTS

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## Introduction

Difficulties in weaning of mechanical ventilated (MV) patients and prolonged MV are known to be associated with increased morbidity and mortality (1-3). Events of respiratory deteriorations, during the course of MV in ICU patients, are markers for prolonged mechanical ventilation and length of ICU stay (LOS). The knowledge about the association of such events on ICU mortality and LOS is scarce. The aim of our retrospective study is to define the association between such events and ICU mortality and LOS.

## Methods

This is a single center retrospective study performed in the ICU of Tel Aviv Medical Center, Israel, a tertiary academic referral hospital. Using the electronic medical record system and CLEW medical predictive analytics system for analysis, all patients admitted to the ICU between 1.2007 and 12.2014 were assessed, a total of 8,286 admissions. The CLEW medical system detected all patients that underwent MV whilst admitted to the ICU throughout the retrospective cohort. Respiratory deterioration in MV patients was defined as acute adjustment of FiO2 increase >20% or PEEP increase > 5 cmH2O that persisted for at least 2 hours. To calculate an increase, a baseline value of PEEP/FiO2 had to be defined. This was defined as a maximal value prior to the increase that lasted for at least two hours. The primary outcome was ICU mortality. Secondary outcome was length of ICU stay (LOS). A Chi square test for trends was used for the significance of mortality data and a one-way ANOVA test for LOS.

*Figure 1:* ***Single patient FiO2 changes as a function of time. Marked in red is a change in FiO2 that didn't qualify as significant according to the criteria defined.***

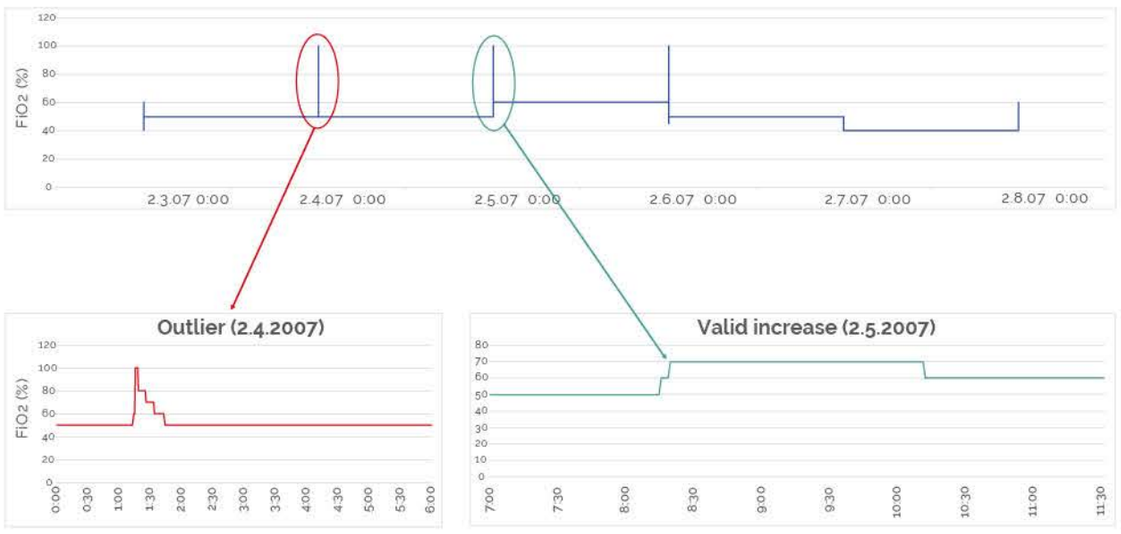
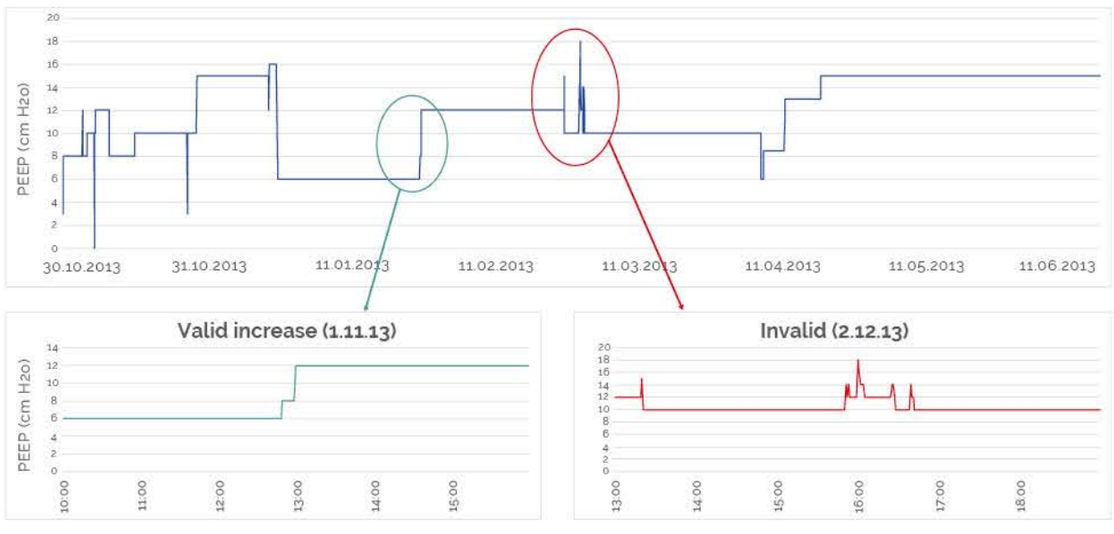



*Figure 2:* ***Single patient PEEP changes as a function of time. Marked in red is a change in PEEP that didn't qualify as significant according to the criteria defined.***




## Results

5376 MV patients were admitted to the ICU with an overall ICU mortality of 16.5%. Mortality and LOS were tripled in patients who experienced at least one respiratory deterioration when compared to no events (33.8% vs. 9.9 %, p<0.0001 and 10.7 vs. 2.2 days, p<0.0001 respectively). Increasing events of respiratory deteriorations showed significant trend of increased mortality (p<0.0001).

*Table 1:* ***Analysis of mortality and LOS relative to the amount of deteriorations events***

| No. of deteriorations | No patients | Age – mean (±SD) | ICU mortality (%) | Median LOS days (interquartile range) |
|---|---|---|---|---|
| 0 | 3890 | 59.4 (20.6) | 385 (9.9) | 2.2 (0.8-5.1) |
| 1 | 764 | 59.2 (19.4) | 226 (29.6) | 7.4 (3.3-13.3) |
| 2 | 328 | 58.6 (19.1) | 122 (37.2) | 10.6 (5.5-16.7) |
| 3 | 166 | 60.1 (17.2) | 60 (36.1) | 15.4 (8.9-22.6) |
| >4 | 228 | 56.4 (19.3) | 94 (41.2) | 21.3 (13.9-30.6) |

*Figure 3:* ***Mortality rate relative to number of deteriorations***

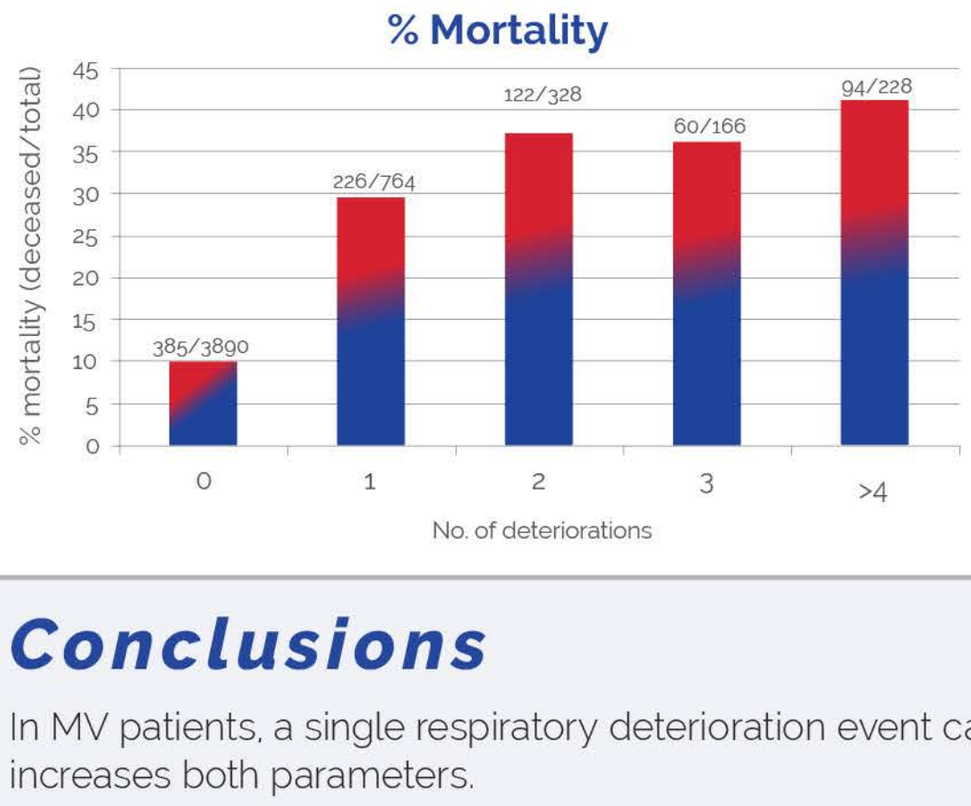



*Figure 4:* ***LOS relative to number of deteriorations***


## Conclusions

In MV patients, a single respiratory deterioration event carries a 3 times higher mortality rate and LOS. Any additional event further increases both parameters.

### References:

1. Funk GC et al. Incidence and outcome of weaning from mechanical ventilation according to new categories. Eur Respir J. 2010 Jan;35(1):88-94
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3. Damuth E et al. Long-term survival of critically ill patients treated with prolonged mechanical ventilation: a systematic review and meta-analysis. Lancet Respir Med. 2015 Jul;3(7):544-53.

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