DO CHANGES IN THE INTEGRATED PULMONARY INDEX (IPI) REFLECT PATIENT/VENTILATOR INTERACTION? PRELIMINARY DATA

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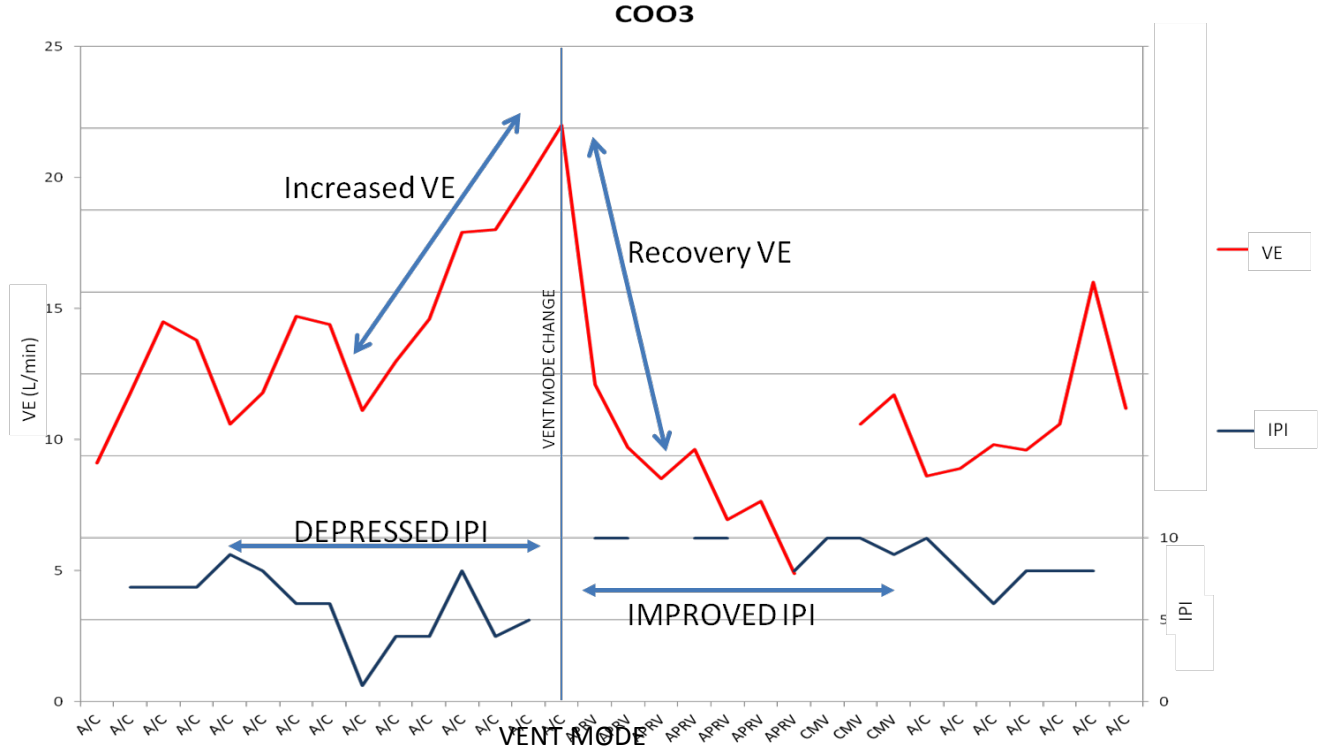
Introduction: The IPI is a novel method of reporting ventilation and oxygenation status. IPI incorporates pulse rate, respiratory rate, end-tidal carbon dioxide and pulse oximetry into a scale where 1 indicates poor conditions and 10 indicates better conditions. The scale is broken into one-point increments. Mechanical ventilators (MV) ventilate and oxygenate. Studies have suggested that IPI can alert clinicians to the need to extubate[1,2] as well as intubate[3]. If IPI accurately reflects real time patient ventilation/oxygenation status, IPI may be useful monitoring MV changes and changes in the MV patient status. We proposed that IPI correlates with MV/patient changes.

Method: We recorded IPI on our ventilation flow sheet and compared the IPI to MV setting and patient status during an IRB approved study. No changes or clinical decisions were made based on IPI. Data from four patients has been analyzed to date. Data was reviewed throughout the entire MV experience and placed into an Excel spreadsheet for analysis. For ease of reporting we present here IPI and minute volume (VE) during MV.

Results: Four patients including diagnoses of respiratory failure/HIV, EtOH abuse/aspiration, Class 4 CA terminal ventilation, and MV for an unspecified reason were evaluated. 267 measures of IPI and VE were collected over a total of 44.87 MV days. IPI was observed to decrease in association with ventilator-induced VE deviation, and increase with patient/MV interface improvement. See example below.



Example 1. 5.49 days of MV in a single subject. Annotation during major vent-associated change in VE. Similarly less pronounced event occurs toward the end of MV after return to A/C mode.

Discussion: In all four patients the IPI correlates with the changes in patient/MV interface. When a patient experiences a "ventilation sweet spot" (i.e., a good interface of the patient / MV settings) the patient's IPI remained high. When poor interface or change in status (e.g., respiratory acidosis) occurred the IPI decreased.

Conclusion: The IPI may be a useful tool in establishing and maintaining optimal MV settings. As such, it may be useful to decrease time on a MV or reduce ABG[4]. Further evaluation is needed to assess the utility of IPI during clinical MV.

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3 Einav S, Helvitz Y, Ronen M, et al. The IPI identifies the window of opportunity for treatment before cardio-pulmonary arrest. **Resuscitation** 2010; 815:S42

4 Rowan C, Ahmed S, Hedlund T, et al. Continuous Capnography Decreases the Utilization of Blood Gases. **Critical Care Medicine** 2011; 39:91