

## CTL Mini-Grant

### Conference Narrative

From 12/3/18 to 12/8/18 I had the pleasure of attending the American Association for Respiratory Care 2018 Congress, and Pre-Congress workshop on Challenges in Mechanical Ventilation – A Standardized Education for Ventilatory Assistance. Certificates of attendance are attached. While there were many interesting and informative presentations, the most important to me was the Pre-Congress workshop on the physics and physiology of mechanical ventilation.

The workshop was presented by Prof. Robert Chatburn and Dr. Eduardo Mireles-Cabodevila, both of the Cleveland Clinic. The presenters separated the attendees into groups of 5-6 individuals without considering if we knew the others in our assigned groups. The 7 hour workshop was separated into four parts.

Part 1 – covered the physics and physiology of mechanical ventilation and the various “modes” of ventilation. During this session the presenters reviewed the differences between the various modes and discussed a taxonomy for mechanical ventilation and recommendations for a nomenclature for clearly identifying and classifying the modes of ventilation and eliminating the confusing and often misleading nomenclature that evolved through development and marketing efforts of the equipment manufacturers. The effort was to clarify the “Control Variable,” the “Breath Sequence” and associated “targeting schemes.” A variety of “tags” was proposed to augment the current nomenclature. This was followed by a group discussion, report and consensus regarding 10 different examples demonstrated graphically of modes that we classified using a standard nomenclature and “tags.”

Part 2 – was a discussion of the goals of mechanical ventilation and selection of modes with a rational basis. The groups discussed the goals of mechanical ventilation with respect to “patient safety,” “patient comfort” and “liberation from mechanical ventilation.” Groups discussed, presented and reached consensus on the capabilities of ventilator modes that served each of the goals. Also discussed was the choosing of goals and modes as related to the progression, or regression, of the patient’s clinical status.

Part 3 - presented a methodology for mastering the analysis of graphic displays that are available with most current generation mechanical ventilators. The session utilized real time graphics and the application of Newton’s 3<sup>rd</sup> Law and the equation of motion as applied to spontaneous and mechanical ventilation to analyze graphics as displayed by mechanical ventilator interfaces. Pressure, Flow and volume scalars were used to depict and isolate patient effort from work accomplished by mechanical ventilators during pressure control and volume control.

Part 4 – was an intense discussion of patient-ventilator interactions during synchronous ventilation, asynchronous ventilation and dyssynchronous ventilation. Also discussed where the different types of Asynchronies and dyssynchronies, the causes and methodologies to return the patient and ventilator to synchronous ventilation. A dozen, or so, problems were displayed graphically. The graphics were discussed in the small groups, presented with recommended changes to ventilator settings. The settings were then adjusted to determine if the problems were resolved.

The authors additionally provided a list of references and resources that were utilized for the presentation and available for use in teaching students.

The Key Note Address on Tuesday morning was presented by Zubin Demania, MD. The address was an engaging mix of song, humor and the challenges of delivering compassionate care in a dysfunctional healthcare system. He proposed collaborative ways to revitalize the system and explored how we might work individually and collectively to improve the future of medicine.

There were many other excellent discussions throughout the congress, including a preconference on developing leaders, demonstration on the latest technology, and a focus group on discussing the development of a "realistic" baby manikin for respiratory care simulations.