In the January and February 2011 issues, we are pleased to publish the papers from the 46th RESPIRATORY CARE Journal Conference, on the theme of patient-ventilator interaction. Papers from past Journal Conferences have proven to be some of our readers’ most valued content. The papers from this conference and their associated discussions should be no exception. Anyone who has ever cared for mechanically ventilated patients appreciates the challenges of patient-ventilator asynchrony. We are most grateful to Scott Epstein and Rob Chatburn for their hard work chairing this conference.

Patient-ventilator synchrony is a complex issue affected by ventilator performance, patient characteristics, and the patient-ventilator interface. Most clinicians agree that patient-ventilator synchrony is desirable. In fact, a lot of effort at the bedside is directed towards correcting asynchrony. However, as pointed out by Branson, there is a lack of data to suggest that asynchrony is associated with poor outcome.

Patient-ventilator interaction depends on how the ventilator responds to patient effort and, in turn, how the patient responds to the breath delivered by the ventilator. As nicely described by Epstein, patient-ventilator asynchrony is associated with adverse effects, including a higher work of breathing, greater patient discomfort, increased need for sedation, confusion during the weaning process, prolonged mechanical ventilation, longer stay, and possibly higher mortality. But to follow up on the point made by Branson, whether asynchrony is a marker of poor prognosis or causes these adverse outcomes remains to be determined.

Triggering the ventilator is eloquently covered by Sassoon. Although there have been refinements in ventilator technology over the past 20 years to improve triggering, this does not necessarily allow optimal patient-ventilator interactions. Failure of the patient to trigger often points to a problem in the patient rather than a problem with the ventilator. Failure to trigger can be the result of respiratory muscle weakness, reduced respiratory drive, or intrinsic PEEP. The clinical approach to failed trigger is often not related to ventilator trigger sensitivity, but rather to correction of the underlying pathophysiology or, in the case of intrinsic PEEP, by adding applied PEEP.

In contrast to trigger, which refers to initiation of the inspiratory phase, cycle refers to the initiation of the expiratory phase. During pressure support ventilation, patient-ventilator asynchrony may occur if the flow at which the ventilator cycles to exhalation does not coincide with the termination of neural inspiration. As described by Gentile, most current generation ventilators have embellishments to improve cycling during pressure support ventilation that, when used in conjunction with waveform graphics, can improve patient-ventilator synchrony. The most common of these is adjustable flow termination.

Monitoring of patient-ventilator interactions at the bedside involves evaluation of patient breathing pattern. In current practice, this involves evaluation of waveforms displayed on the ventilator. The types of asynchronies that can be monitored are described by de Wit as trigger asynchrony (ie, breath initiation that may manifest as ineffective triggering, double-triggering, or auto-triggering); flow asynchrony (ie, breath-delivery asynchrony, which may manifest as breath delivery being faster or slower than what patient desires); and cycling asynchrony (ie, termination of assisted inspiration not coinciding with patient breath termination, which may manifest as delayed cycling or premature cycling). In this paper, waveforms are presented to graphically demonstrate various asynchronies.

Most of us use primarily conventional ventilator modes in our practice. MacIntyre describes strategies to optimize patient-ventilator interactions using these modes. Current generation ventilators have a number of features that can be used not only to detect asynchrony, but also to enhance synchrony. The ability to use these monitors and strategies to improve synchrony should be part of the armamentarium of any clinician caring for mechanically ventilated patients.

No one would argue that there has been a dramatic increase in the number and complexity of new ventilation modes over the last 30 years. As correctly identified by Chatburn and Mireles-Cabodevila, the proliferation of names for ventilation modes (ie, different names for a single mode) has made understanding mode capabilities problematic. New ventilator modes are designed to serve 3 primary goals of mechanical ventilation: safety, comfort, and liberation. Some of these modes were designed specifically to address asynchrony. Whether or not any of these modes improve patient outcomes, however, is unknown.

Editor’s Commentary

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