

MECHANICAL VENTILATION IN A NEW KEY: IN DEFENSE OF THE CHATBURN CLASSIFICATION *by David Wheeler RRT, NPS*



The language that we use, the manner and framework of our speaking while on rounds or at the bedside has a direct impact on patient care. Therefore, I am issuing this call to action; the charge of which is to establish a standardized language of mechanical ventilation. This language must function as both a descriptive narrative of physical process and a clarifying mechanism that augments effective communication whilst enhancing patient care.

Perhaps the most significant motive for a clear and concise language of mechanical ventilation lies in the implications for patient safety. The Orwellian labyrinth that is the current lexicon is appalling from the standpoint of patient safety. Clarity of thought and language; clarity of meaning and description; clarity of clinical intent and therapeutic need; all suffer when there is no common language among caregivers.

The intent of this column is to make note of and briefly defend the Chatburn classification paradigm. This system creates a framework from which we can communicate effectively about mechanical ventilation in terms of physical reality and mechanical characteristics rather than marketers jargon and salesman's dialect. Robert L. Chatburn's paper updating the classification of ventilation modes will appear in a future issue of *Respiratory Care*. Obviously, I think it is essential reading. It is also my intention to add my own editorial consciousness to R. L. Chatburn's categories so as to make them familiar if only in a brief fashion.

A Mode of Ventilation is the manner in which the mechanical ventilator interacts with the patient to achieve the mechani-

cal ventilation of the patient. The mode refers to a specific combination of breathing pattern, control type and operational algorithm. The mode should be an accurate depiction of the total interaction of the patient-ventilator system.

Chatburn states, "Intuitively, a mode of ventilation must refer to a predefined pattern of interaction between the patient and the ventilator... Thus, a mode description reduces to a specification of how the ventilator controls pressure, volume, and flow within a breath along with the variables that are controlled between breaths in sequence."

Indeed, the term or acronym used to identify a mode of mechanical ventilation should be accurate, descriptive and convey the meaning of the patient-ventilator interaction. When we speak of the mode of ventilation we are talking about the primary set of behaviors or actions that the ventilator must perform in response to patient need. In many cases we are requiring the ventilator system not only to respond to patient need but to anticipate patient need. An effective system for describing ventilator behavior would describe the pattern, control variables, control type and adjunctive control algorithms used within and between breaths. The system proposed by Chatburn is direct, rather intuitive and very descriptive. It provides a common tongue; a collective dialect from which intelligent, well reasoned; evidenced based clinical decisions *continued on page 74*



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Mechanical Ventilation... Continued from page 24

can be discussed. This language will help to clarify and frame our clinical decision matrix.

The system categorizes all possible ventilator modes into one of nine possible patterns. Ventilator-patient interaction is categorized by ventilator-patient behavioral relationships. The categorization begins with the control relationship. Control variables are the variables the ventilator regulates to cause inspiration. Specifically; pressure, time, flow, volume. Frequently the clinical setting dictates that a dual control scheme be utilized. A dual control changes within a single inspiratory sequence from one primary control mechanism to another. In classifying modes of ventilation the three primary controlling mechanisms are Volume, Pressure and Dual. Breathing pattern describes the control variable, (pressure or volume), and breath sequence. Control type describes the feedback control design and the operational algorithm defines the phase variables, conditional variables and programmed performance functions.

Given that there are three primary categories of breath control variable. One can examine the three major categories of breath sequence variable within the contexts of the breath control variable described in the previous paragraph. One can demonstrate in the most generic and fundamental characterization there are only three possible breath sequences; Continuous Mandatory Ventilation, (CMV), where all breaths are mandatory; Intermittent Mandatory Ventilation, (IMV) where breaths can be either mandatory or spontaneous and Continuous Spontaneous Ventilation, (CSV), where all breaths are spontaneous.

Examining the behavior of the patient-ventilator system this method of observational / evidence based categorization gives us nine modes of mechanical ventilation. Within these nine categories one can classify the interactions of every current method of mechanical ventilation. First determine the Breath Control Variable and within the context of the volume, pressure or dual

control schemata examine the behavior of the interphase between mechanical ventilator and patient. This will yield nine possible methods of prescribing ventilator behavior for our patients. Clarity of language will yield clarity of thought and that will produce safer more beneficial outcomes for our patients.

If we prescribe a Volume Control variable as our primary mechanism then a clinician targeted volume threshold is the dominating influence in the behavior of the ventilator. Within this framework there can exist one of three primary Breath Sequences; Continuous Mandatory, Intermittent Mandatory or Continuous Spontaneous. If we prescribe a Pressure Control variable as our primary mechanism then a clinician targeted pressure threshold is the dominating influence in the behavior of the ventilator. Within this framework there can exist one of three primary Breath Sequences; Continuous Mandatory, Intermittent Mandatory or Continuous Spontaneous. If we prescribe a Dual Control variable as our primary mechanism then a clinician targeted (pressure / volume) threshold is the dominating influence in the behavior of the ventilator. Within this framework there can exist one of three primary Breath Sequences; Continuous Mandatory, Intermittent Mandatory or Continuous Spontaneous.

One can become enthusiastic about this system because it makes so much sense on a pragmatic level, yet there is more than enough latitude within the available classifications to describe even the most esoteric of ventilator behaviors. Chatburn's stated intention is simply, "To develop a standard nomenclature (of mechanical ventilation), based on a valid theoretical model..." Clearly, this intention has been met.

Understanding the practice of the mechanical ventilation of the human is a body of knowledge that is reducible to the actions of the patient-ventilator system throughout the cycle of the mechanical breath. This knowledge must be reducible to narrative depictions of the actions and reactions of the patient-ventilator system throughout the mechanical breath. The terms must be clear, concise and explicit depictions of the interactions of the patient ventilator system.

Chatburn states, "it is time to purge the vocabulary of dross and seek a unifying theoretical framework."

It *is* time and this proposal is one worth consideration and implementation. The lack of a common language or nomenclature often precedes a lack of common understanding. The mystification of and misapplication of the essential concepts of mechanical ventilation at the bedside is often predicated on the misunderstanding of the fundamental terms, concepts and principles of mechanical ventilation in the mind of the practitioner.

The time is clearly past when we as a profession can relinquish the task of clarifying the language of mechanical ventilation to competing forces in the market. I find it disquieting that the clinician is plagued on an all too frequent basis with a new label or acronym that further muddles the clarity of thought necessary for effective patient care.

George Orwell said, "The first duty of intelligent men is to restate the obvious." This sentiment is the lynchpin of the editorial sensibility found in the Chatburn proposal. His framework provides the clarifying language and the common tongue necessary to create a narrative depiction of the bio-physical, engineering and mechanical process of mechanical ventilation.

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