Carbon dioxide concentration can be plotted against time (time capnogram) or expired volume (SBT-CO$_2$ curve / Volume capnogram / CO$_2$ expirogram / CO$_2$ spirogram) during a respiratory cycle.$^{1-5}$ A volume capnogram has only an expiratory segment. There is no inspiratory segment in a volume capnogram. Whereas, a time capnogram has both
inspiratory (0) as well as expiratory segment. The expiratory segment of a volume capnogram is divided into three phases, phase I, II, and III.\textsuperscript{3,4}

**Advantages of time capnography:**

1. **Simple and convenient:**

2. **Monitor non-intubated patients**

3. **Monitors dynamics of inspiration as well as expiration:**

   **1. Simple and convenient:**

   The time capnogram is convenient and adequate for clinical use; it is the method most commonly used by capnographs. More elaborate equipment is necessary for plotting SBT-CO\textsubscript{2} trace. The CO\textsubscript{2} analyzer should be designed to operate with the ventilator, which provides a flow signal and a timing pulse. A computer relates the instantaneous CO\textsubscript{2} signals to expired volume and an SBT-CO\textsubscript{2} curve is plotted.\textsuperscript{3}

   **2. Monitor non-intubated patients:**

   The CO\textsubscript{2} analyzer used in SBT-CO\textsubscript{2} tracings are mainstream capnometers, where the cuvette containing the CO\textsubscript{2} sensor is inserted between the endotracheal tube and breathing circuit. Hence, endotracheal intubation is required for plotting an SBT-CO\textsubscript{2} curve, whereas a time capnogram does not require a ventilator and can be used to monitor spontaneous ventilation without breathing through the ventilator. This is because time capnographs make use of main-stream sensors or side stream sensors. Time capnographs with side-stream sensors have the sensor located in the main unit itself; the sample of gas is aspirated from the patient’s airway, via a tiny pump, through a 6-ft capillary tube, into the unit. This enables time capnography to monitor non-intubated patients, as the sampling of respired gases is obtained from the nasal cavity using nasal adapters.
3. **Monitors dynamics of inspiration as well as expiration:** Time capnography can be used to monitor the dynamics of expiration as well as inspiration, whereas the SBT-CO2 curve monitors expiration exclusively.

**Disadvantages of time capnography:**

1. **Poor estimation of V/Q status of the lung**

2. **Can not be used to estimate components of physiological deadspace.**

**2. Poor estimation of V/Q status of the lung**

The V/Q status of the lung is more accurately reflected in the slope of phase III in an SBT-CO₂ trace than in that of a time capnogram, in which the gradient of the phase III slope is usually less obvious (see figure above). This may be because a smaller volume of expired gases (approximately the final 15%) occupies half the time available for expiration, so that a similar change in FCO₂ is distributed over a greater length of time in the time capnogram than in the SBT-CO₂ trace.³⁴

2. **Components of physiological deadspace cannot be determined:** Although the time capnogram grossly can be related to a tidal volume and its components, the physiological deadspace, CO₂ output, the components of a tidal volume cannot be determined from a time capnogram as currently recorded, which is further discussed in the following physiology section.

References


5. Breen PH, Bradley PJ. Carbon dioxide spirogram (but not capnogram) detects leaking...