

JULY NEWSLETTER

Saskatchewan Respiratory Therapy Education Committee Inc.



Ventilator Triggers

- The trigger on a mechanical ventilator is the mechanism that initiates a breath and may be time, pressure, or flow triggered. Time triggering delivers breaths at preset intervals based on the set respiratory rate, regardless of patient effort. Pressure triggering initiates a breath when the ventilator detects a drop in airway pressure caused by the patient's inspiratory effort. Flow triggering uses a continuous bias flow, and a patient's inspiratory effort diverts part of this flow, creating a detectable change that triggers the breath. Compared with pressure triggering, flow triggering is generally more sensitive, requiring less patient effort and often improving comfort, reducing work of breathing, and enhancing patient-ventilator synchrony.
- Delayed triggering is a delay between the onset of a patient's inspiratory effort and the delivery of a ventilator-assisted breath. It commonly occurs when the trigger sensitivity is set too low, requiring greater inspiratory effort before the ventilator initiates a breath. Patients who are over-sedated or deconditioned may also have insufficient inspiratory strength to trigger the ventilator promptly. Another common cause is intrinsic PEEP (auto-PEEP), which requires the patient to first overcome the intrinsic positive pressure before reaching the ventilator's trigger threshold, increasing the work of breathing.
- In severe cases, delayed triggering can progress to ineffective triggering, where the patient's inspiratory effort fails to trigger the ventilator, resulting in no assisted breath. This increases the work of breathing, causes patient discomfort, and worsens patient-ventilator asynchrony.
- Continued on the next page...

**THE RESPIRATORY THERAPIST
WAS VERY ANGRY, BUT
EVENTUALLY CALMED DOWN.**

**I THINK THEY JUST NEEDED
TO VENT**

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Ventilator Triggers - continued

- Auto-triggering occurs when the ventilator delivers a breath in response to a non-respiratory signal rather than a true patient inspiratory effort. It most commonly occurs when the trigger sensitivity is set too high, allowing small pressure or flow changes within the circuit to trigger a breath. Common causes include circuit leaks, condensation or secretions in the ventilator tubing, and cardiogenic oscillations.
- Double-triggering occurs when two consecutive ventilator breaths are delivered in response to a single patient inspiratory effort, with little or no expiration between breaths. It commonly results from an inspiratory time that is too short, causing the ventilator to cycle to expiration before the patient's inspiratory effort has ended. The continued inspiratory effort then immediately triggers a second breath.
- More recently, experts have distinguished double-triggering as a waveform pattern rather than a single type of patient-ventilator asynchrony. Similar two-breath patterns can arise from different mechanisms, including premature cycling, insufficient inspiratory flow, and reverse triggering. Premature cycling occurs when the ventilator ends inspiration before the patient's neural inspiratory effort has ceased, commonly due to a T_i that is too short. Insufficient inspiratory flow occurs when delivered flow fails to meet the patient's inspiratory demand, causing the patient to continue generating inspiratory effort throughout inspiration.
- Reverse triggering occurs when a mandatory ventilator breath induces a reflex diaphragmatic contraction, resulting in a neural inspiratory effort after the ventilator breath has begun. It's commonly seen during controlled ventilation in deeply sedated patients with preserved respiratory reflexes.

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Educational Resources

VENTILATOR TRIGGERS

ARTICLE RESOURCES

- [Patient-Ventilator Dyssynchrony in Critically Ill Patients](#)
- [Patient-ventilator asynchronies during mechanical ventilation: current knowledge and research priorities](#)
- [Flow trigger setting in mechanically ventilated neonates, children and adults: a scoping review](#)

If you're having difficulty accessing the articles SHA Library Services is a great resource available to all SHA employees. Feel free to contact them to setup a library card number to obtain off site access.

WEBINARS

- [Mechanical Ventilation Advanced - Double Triggering Versus Reverse Triggering_| Clinical Medicine](#)
- [Dyssynchrony and the patient-ventilator interaction - Dr. Elias Baedorf Kassis](#)
- [The Art of Mechanical ventilation Patient Ventilator Interaction](#)

VIDEO RESOURCES

- [Reverse Triggering - PulmToilet](#)
- [Dysynchrony Part 1: Trigger](#)
- [Dysynchrony Part 2: Cycle](#)
- [A Case of Reverse Trigger: with Melody Bishop, RT](#)

PODCASTS

- [SCCM Pod-438 Patient-Ventilator Dyssynchronies and Their Mechanisms](#)
- [The Gas Exchange Podcast, Reverse Triggering and Patient-Ventilator Asynchrony with Dr. Felipe Damiani](#)
- [PedCrit - Patient-Ventilator Asynchrony with Dr. Kyle Rehder](#)

APPS

- [VenTrainer App from Hamilton Medical](#)



Thank you to those who attended our Lunch and Learns in Regina and Saskatoon.

Thank you to Air Liquide for sponsoring the lunch and learn.

Finally a big thank you to Eddie Saade, RRT. We received great feedback on the quality of the presentation.

