



## Identifying asynchronies: Ineffective effort

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### Abstract

Mechanical ventilation is a common issue in critically ill patients. It is a lifesaving treatment but also can cause some complications.

Patient-ventilator asynchronies are frequent but are often underdiagnosed and they are a serious problem that is associated with worse clinical outcomes.

Asynchrony occurs when there is a mismatch between the ventilator setting and the patient's demand or breath delivery timing.

There are a variety of asynchronies between the patient's respiratory efforts and the programmed ventilatory setting. Ineffective effort is a kind of asynchrony of the trigger variable. It occurs when the patient's inspiratory effort fails to trigger a ventilator breath.

Ineffective inspiratory efforts are a great problem in patient-ventilator interaction, and they are the most common type of asynchrony.

**Keywords:** asynchrony, ventilator, demand, timing, trigger, ineffective effort.

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Mechanical ventilation is a supportive treatment for improving oxygenation, unloading the respiratory muscles, and gaining time until the patient's condition improves.<sup>1</sup>

Asynchronies are produced by a mismatch between the patient and the ventilator in terms of breath delivery timing.<sup>2</sup>

A high incidence of asynchronies is associated with prolonged mechanical ventilation, ICU length of stay<sup>3,4</sup> and with mortality.<sup>5</sup>

Asynchronies are classified according to the phase of the respiratory cycle. Trigger asynchronies include reverse trigger, delay trigger, auto trigger and ineffective effort (failed trigger).<sup>6</sup>

Some authors have described gross asynchronies as those where the mismatch between the breath delivery and the patient effort is large, such as auto triggering or ineffective effort.<sup>2</sup>

The ventilator is triggered when a given drop in airway pressure (or a given diversion of airway flow)<sup>1</sup> generated by the patient is achieved.

Also called missed trigger, ineffective trigger or trigger asynchrony, it refers to the efforts of the patient that are not detected by the ventilator.<sup>7,8</sup> It is the most common type of asynchrony.<sup>1</sup>

Thus, ineffective effort is an asynchrony between respiratory drive and inspiratory trigger.<sup>9</sup> It can be the result of improper trigger sensitivity adjustment, respiratory muscle weakness, decreased central respiratory drive, high tidal volume, high assist levels, dynamic hyperinflation, or a combination of these factors.<sup>10</sup>

The gold standard for its detection is the esophageal monitoring or measurement of the electrical activity of the diaphragm.<sup>7,8</sup>

To resolve it, attempt to correct auto PEEP, decrease the level of sedation, ventilatory support or adjust the sensitivity of the breaths trigger.<sup>9</sup>

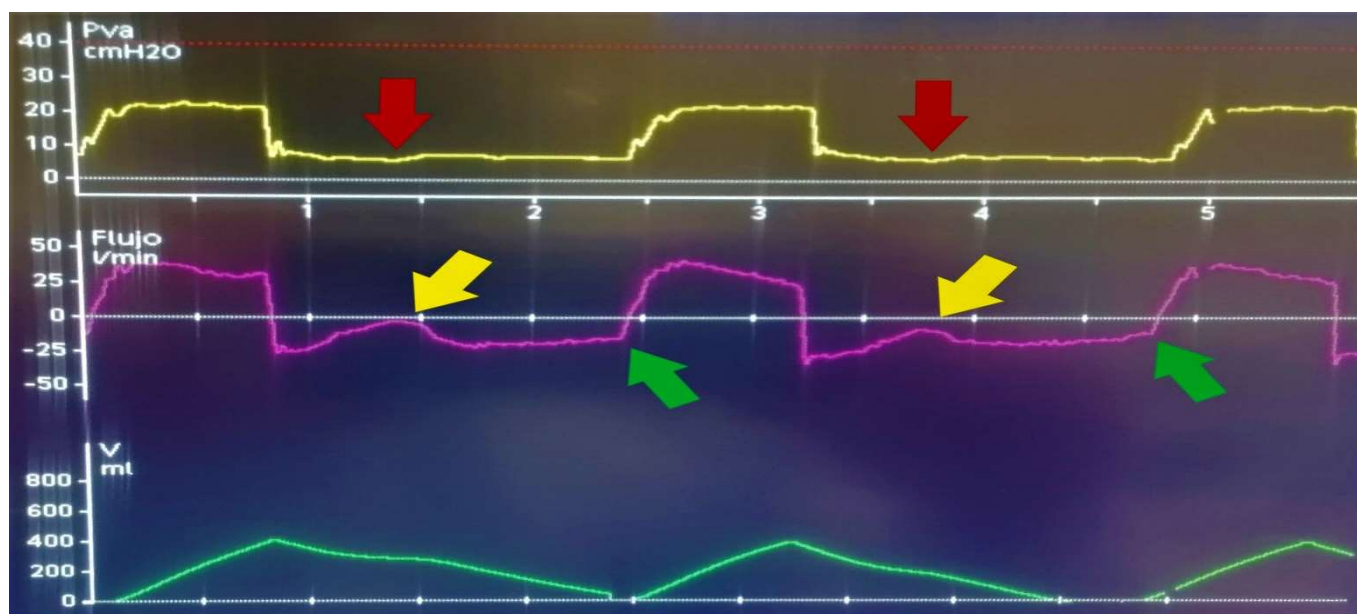


Figure 1: Ineffective effort in a patient ventilated with pressure control mode. From top to bottom: pressure-time, flow-time and volume-time curves. There is a positive inflection in the flow-time curve (yellow arrows) and a slight negative deflection in the pressure-time curve (red arrows) not followed by mechanical insufflation. We can also note the presence of air trapping (expiratory flow does not return to zero) in the flow-time curve (green arrows)

### References

1. Murias G, Lucangelo U, Blanch L. Patient-ventilator asynchrony. *Curr Opin Crit Care* 2016; 22(1):53–59.
2. Dres M, Rittayamai, Brochard L. Monitoring patient–ventilator asynchrony. *Curr Opin Crit Care* 2016; 22(3):.246–253.
3. de Wit M, Miller KB, Green DA, et al. Ineffective triggering predicts increased duration of mechanical ventilation. *Crit Care Med* 2009; 37(10): 2740 –2745.
4. Thille AW, Rodriguez P, Cabello B, et al. Patient-ventilator asynchrony during assisted mechanical ventilation. *Intensive Care Med* 2006; 32(10):1515-1522.
5. Blanch L, Villagra A, Sales B, et al. Asynchronies during mechanical ventilation are associated with mortality. *Intensive Care Med* 2015; 41(4):633–641.
6. Nilsestuen JO, Hargett KD. Using ventilator graphics to identify patient-ventilator asynchrony. *Respir Care* 2005; 50(2):202-234.
7. Gurevitch MJ, Gelmont D. Importance of trigger sensitivity to ventilator response delay in advanced chronic obstructive pulmonary disease with respiratory failure. *Crit Care Med* 1989; 17(4):354-359.
8. Ashutosh K, Gilbert R, Auchincloss JHJ, et al. Asynchronous breathing movements in patients with chronic obstructive pulmonary disease. *Chest* 1975; 67(5):553-557.
9. Mirabella L, Cinnella G, Costa R, et al. Patient-ventilator asynchronies: clinical implications and practical. *Respir Care* 2020; 65(11):1751-1766.
10. Branson RD, Blakeman TC, Robinson BR. Asynchrony and dyspnea. *Respir Care* 2013; 58(6):973–986.



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