Comparative study of Trilogy200 and LTV1000 ventilators on a pediatric patient

Clinical report

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Abbreviations	
PC	pressure control
RR	respiratory rate
PS	pressure support
I-Time	inspiratory time
PEEP	positive end expiratory pressure
Vte	tidal volume exhaled
SIMV	synchronized intermittent mandatory ventilation
SpO_2	pulse oximetry
FiO_2	oxygen concentration

LTV1000 and Trilogy200 ventilator settings	
Type	Invasive via tracheostomy
Mode	PC/SIMV
Rate	18
I-Time	0.6 sec
PC	18 H_2O
PS	10 cm H_2O
PEEP	5 cm H_2O
Flow Trigger Sensitivity	3 lpm
Oxygen	32%

Introduction

This clinical report is intended to compare the LTV1000 and the Trilogy200 ventilators in regards to triggering and patient/ventilator synchrony on a pediatric patient.

A 13 month-old female weighing 5.7 kg with a diagnosis of Cornelia de Lange syndrome requiring ventilatory support was observed at the Children's Hospital in New Brunswick, New Jersey. The primary goal of the study was to observe patient/ventilator synchrony and the response to the inspiratory efforts. A noninvasive cardiac output monitor (NICO) was used to collect comparison breath wave form data while the patient was breathing on her current ventilator (LTV1000) and Trilogy200. Additional data collected included exhaled tidal volume, respiratory rate and SpO2 to compare therapy efficacy while the patient was on both the LTV1000 and the Trilogy200 ventilators.

The infant was assisted by her current ventilator, an LTV1000, through a tracheostomy tube. The ventilator settings were: PC-SIMV mode, PC 18, PS 10, PEEP 5, RR 18, I-Time 0.6, and flow trigger sensitivity of 3 lpm.

During the study, the infant was switched from her current ventilator (LTV1000) to a Trilogy200 ventilator set to the same current prescription. Three liters per minute of low-flow oxygen was introduced into the Trilogy200 device to approximate the prescribed FiO_2.

The infant was observed for two hours and spent approximately one hour on each of the ventilators in order to collect comparative data. The results of the study are contained herein.

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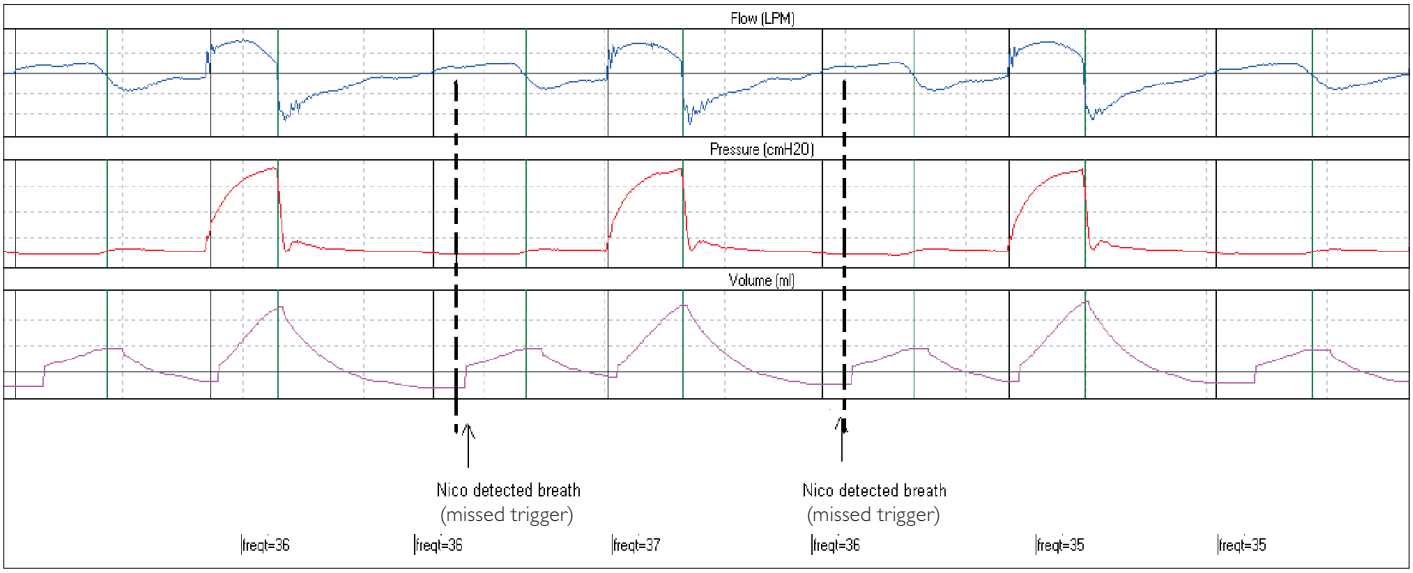
Observations

During the study, the NICO monitor was detecting breaths (see **Figure 1**); however the LTV1000 failed to detect the breath and as a result, did not trigger. The LTV1000 ventilator was not synchronizing with the infant's effort and failed to trigger on every other breath (as shown in **Figure 1**).

Figure 1: Patient triggering while on the LTV1000

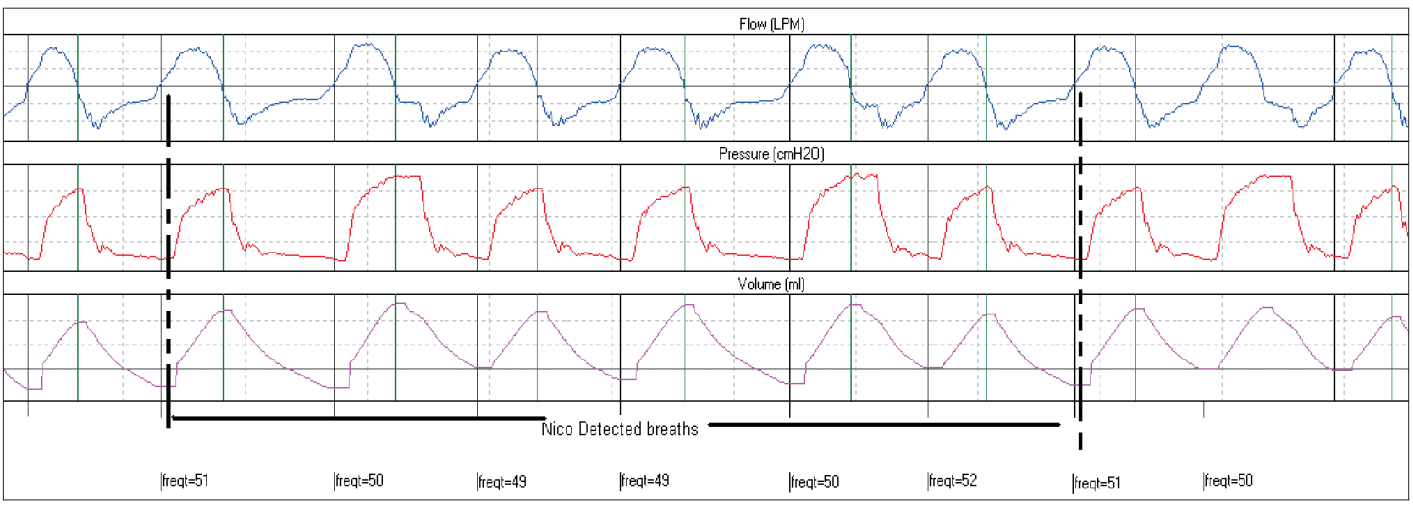


Throughout the study, the infant's SPO_2 level was maintained at 100%. There was no change in SpO_2 even when the ventilators were exchanged. The average Vte measured by the NICO while the infant was on the LTV1000 was 54 and the average breath rate was 45.

After approximately 30 minutes of collecting data from the LTV1000 ventilator, the infant was switched to the Trilogy200 ventilator. The Trilogy200 device was set to the same settings as LTV1000. The Trilogy200 ventilator was able to detect all the breaths that the NICO monitor detected as a breath and the vent was triggering in synchronization with the patient to provide therapy to the child.

Figure 2 demonstrates the triggering efficacy of the Trilogy200 ventilator. Breath delivery is in synchronization with the infant with no missed triggers detected.

Figure 2: Patient triggering on Trilogy200

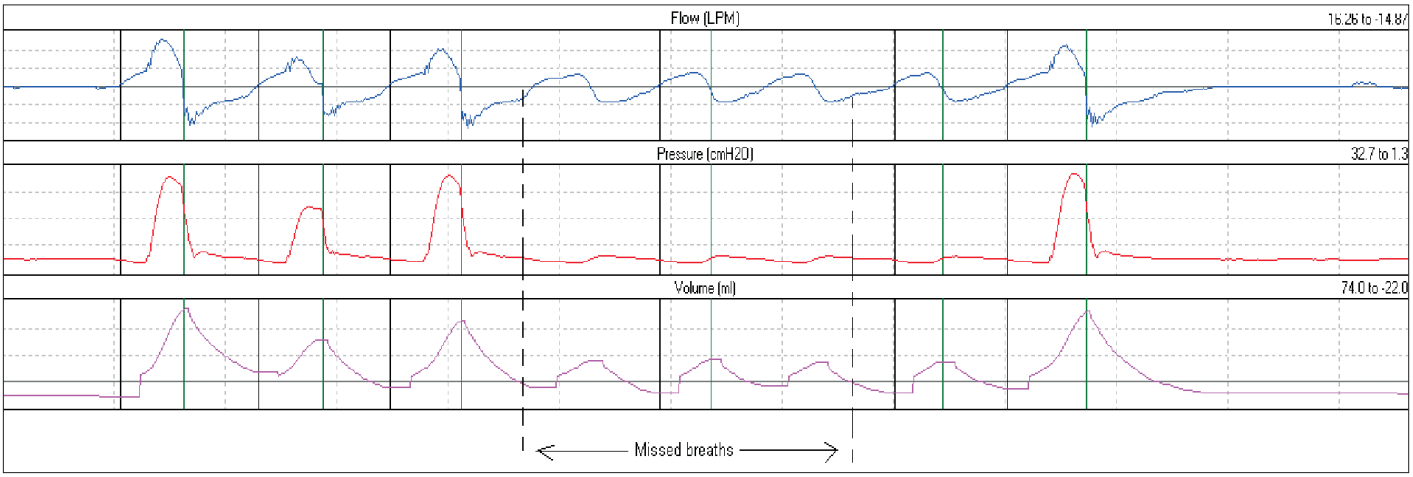


The average Vte while the infant was using the Trilogy200 device was 57 and the average breath rate was 50, similar to that of the LTV1000 ventilator. After one hour on the Trilogy200 ventilator, the infant was switched back to the existing ventilator and data was recorded for another half hour to observe triggering and synchronization with the LTV1000 while the infant was awake. (The infant was asleep on the LTV1000 ventilator during the first part of the study.)

Observations

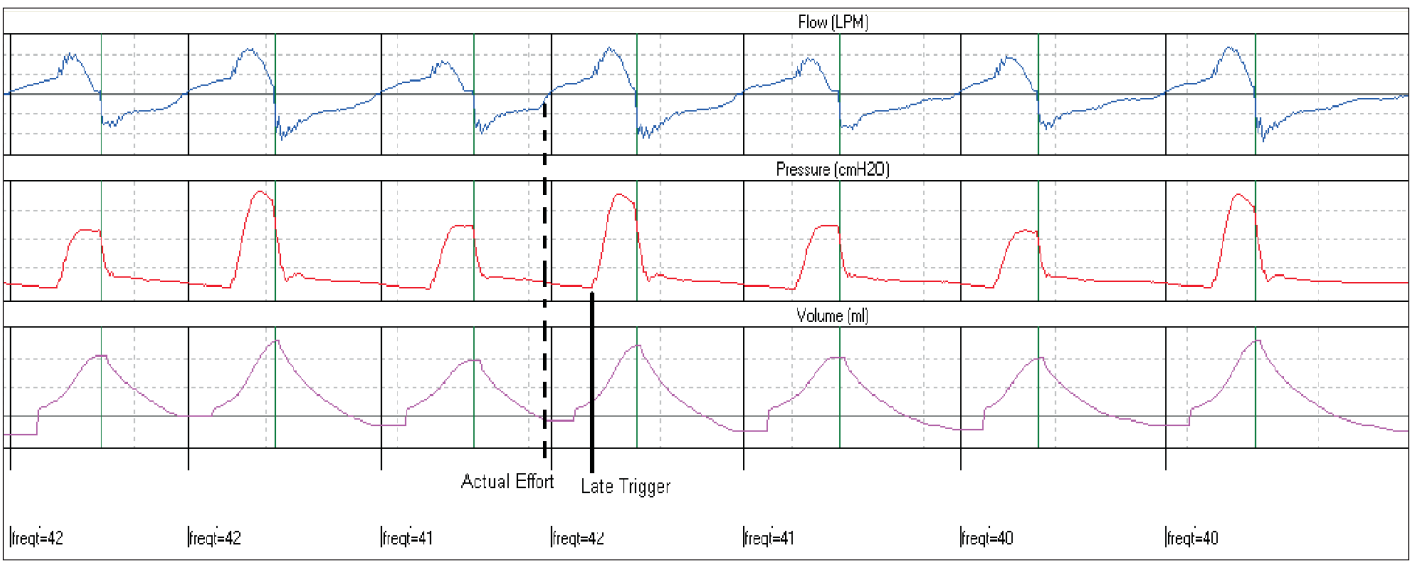
As illustrated in **Figure 3**, the NICO independent monitor detected breaths while the LTV1000 did not. This resulted in frequent missed breaths.

Figure 3: LTV missed triggers while on the LTV1000



When triggering did improve on the LTV1000 device, it was late as illustrated in **Figure 4**. The average Vte while on LTV1000 when the infant was awake was 54 ml.

Figure 4: Late triggering on the LTV1000 ventilator



Conclusion

Comparative data analysis between the two ventilators showed that patient/ventilator synchrony and response to the infant's inspiratory efforts was excellent when using Trilogy200.

Comparison statistics

Parameters	Trilogy200	LTV1000
Vte	57	54*
Respiratory rate	50	45
Triggering	No missed triggers**	Late or missed triggers***
SpO_2	100%	100%

*The Vte measurement on LTV1000 was consistently changing on a breath-by-breath basis with an average value of approximately 54. During the course of the study, the Trilogy200 device maintained a constant Vte of 57. SpO_2 measurements were similar for the two devices as indicated by performance for this parameter.

**No missed triggers and synchronous with patient effort for the T200.

***Late triggering detected and not synchronous with patient effort for the LTV1000.

Please visit http://trilogy200.respironics.com

CAUTION: US federal law restricts these devices to sale by or on the order of a physician.

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