

# VOLUME GUARANTEE (VG) / VOLUME TARGETED VENTILATION (VTV)

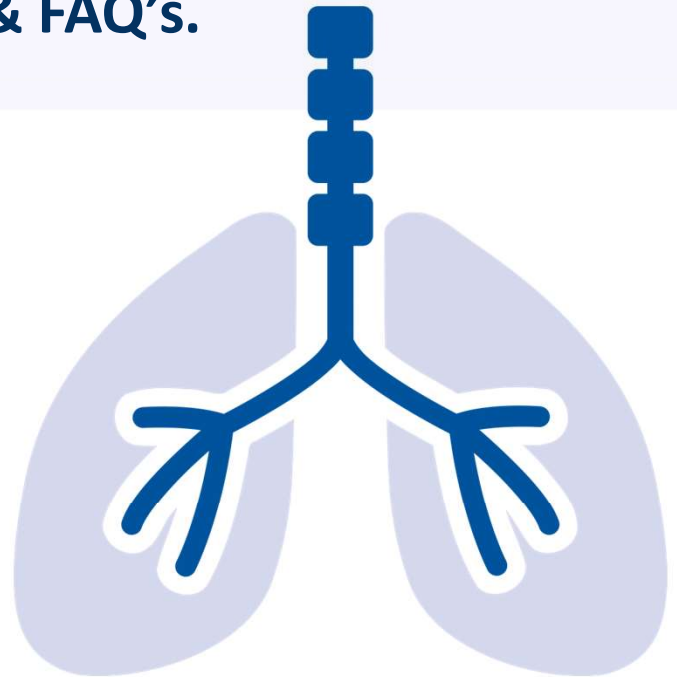
– A useful PERIPrem guide & FAQ's.



Volume-Targeted-Ventilation (VTV) is synonymous with Volume Guarantee (VG)

Using Volume-guarantee protects premature lungs from volutrauma and potentially barotrauma from unnecessary pressure being used to achieve ventilation.

Triggered VG is preferred as infant-initiated breaths require less pressure to achieve the targeted volumes and therefore are likely to cause less lung injury through barotrauma.



- VTV/VG decreases the risk of Severe IVH by (typical RR 0.53, 95% CI 0.37 to 0.77; typical NNTB 11, 95% CI 7 to 25).
- Decreases the risk of Pneumothorax by (typical RR 0.52, 95% CI 0.31 to 0.87; typical NNTB 20, 95% CI 11 to 100).
- Decreases Hypocarbia by (typical RR 0.49, 95% CI 0.33 to 0.72; typical NNTB 3, 95% CI 2 to 5).<sup>1</sup>

Typical  
starting tidal  
volume:  
4-6ml/kg

## What do I set it to?

NB: It is Important to set the PEEP to an optimal level (typically 5-6cmH<sub>2</sub>O) to enable ventilating on an open (not partially atelectatic) lung.

## How does it work?

VTV/VG is calculated from the expiratory volume of the previous VTV/VG breaths (to compensate for ETT leak).

In response to this expiratory volume the ventilator will adjust the pressure it applies to the next breath with the aim that this will adjust the VTV/VG this time around.

<sup>1</sup> Klingenberg C et al. Volume-targeted versus pressure-limited ventilation in neonates. Cochrane Database Syst Rev. 2017;10(10):CD003666



# How does VG correlate with CO2 clearance?

$$\text{Minute volume} = \text{tidal volume/VG} \times \text{respiratory rate}$$

Increasing the Minute Volume increases ventilation and therefore CO2 clearance.

You should adjust your VG to achieve chest wall movement and adequate ventilation as per blood gas.

You could increase the rate (if on SIMV) to improve CO2 clearance instead of the volume if your VG is already >6ml/kg and requiring high inspiratory pressure.

## What if there's a leak on the Endotracheal tube?

ETT leak can typically only be compensated for up to 60-70%, if a leak is beyond this the VG/VTV will be inaccurate and a potentially better choice of ventilation would be pressure-control or you should consider up-sizing the ETT if continued ventilation is required.

## Ventilation mode variations

**SIPPV/PC-AC + VG** – will volume guarantee every breath that the baby takes

**SIMV + VG** – will volume guarantee only the number of breaths that you have set the rate at. The additional breaths will have the set PEEP (Peak End Expiratory Pressure), but the infant's effort of inspiration *on top of* the set rate will be unsupported unless you have set PS (Pressure Support) but this is of course a form of pressure ventilation, not VTV.

## The machine is alarming saying “VTV/VG not reached”, what do I do?

### Troubleshoot:

- Is the baby requiring pressures higher than the set Peak Inspiratory Pressure (PIP) and so not achieving VG? If so, consider increasing the set Peak Inspiratory Pressure (PIP). Do just double check with the DOPE checklist as well to make sure that nothing else is going on to cause this.
- Is the baby upset/unsettled and tensing their muscles, therefore resisting ventilation?
- Is there such a large leak on the ETT that VG is no longer achievable?

### D.O.P.E.

- **Displaced** – is your ETT displaced either too long and down the right main bronchus so that you are only ventilating one lung and therefore trying to achieve VTV from only one lung, or has the baby extubated?
- **Obstructed** – are there secretions blocking the ETT or main bronchi, effecting breath delivery?
- **Pneumothorax** – If there is a pneumothorax, air that might otherwise be expired may well be leaking into the thoracic cavity, resulting in a lower expiratory volume.
- **Equipment failure** – most commonly: does your flow meter need recalibrating? Has it got wet and need replacing?