How to set nCPAP on the HAMILTON-G5/S1/C2/C3/C6

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How do I set PEEP and Psupport in nCPAP-PS?

There are many different ways that you can set PEEP and Psupport in nCPAP-PS. The settings will depend on the type of respiratory failure; in addition, the type of interface used and the knowledge level of the device's operator need to be taken into consideration. This article provides you with a short summary of the various possibilities and is based on the use of nCPAP-PS for patients up to ~8 kg.

Type 1 respiratory failure (nCPAP without pressure support)

Type 1 respiratory failure is defined as hypoxemia without hypercapnia, and PaCO2 may indeed be normal or even low. Examples are lung edema, initial hypoxemic failure and pneumonia (1).

Possible initial settings are as follows:

PEEP	5 cmH2O
Psupport	0 cmH2O
Rate	5
Flow trigger	5 l/min

(To prevent cycling, the respiratory rate (RR) will not be measured. If you have an integrated Aerogen nebulizer, remember to switch it to "in/exh" (HAMILTON-G5/S1 only)).

With these settings, you can mimic standard nCPAP without pressure support. This is a simple, but effective way of providing respiratory support in a standard patient with Type 1 respiratory failure. The settings are possible on nearly every interface and can also be adjusted by less experienced operators.

After starting the respiratory support, check whether you can hear the gas flow across the lungs. Titrate PEEP in increments of 1 cmH20 until the flow sound is sufficiently audible. As a guideline, the upper limit for PEEP in patients with nCPAP-PS should be around 10cmH2O.

Reassess RR and fraction of inspired oxygen (FiO2) after 1 hour. If RR has not decreased

sufficiently and FiO2 is still higher than 0.4, the patient is at high risk of failure. An SpO2/FiO2 ratio (O2 saturation divided by FiO2) of lower than 200 after 1 hour is a strong indicator of failure (2). Monitor closely and do not delay intubation if it is necessary.

If standard nCPAP is not sufficient, experienced users may also use pressure support as described below for Type 2 respiratory failure.

Type 2 respiratory failure (nCPAP with pressure support)

Type 2 respiratory failure is defined as hypoxemia with hypercapnia. Examples are increased airway resistance (e.g. RSV bronchiolitis), reduced breathing effort, neuromuscular problems, and deformed rigid or flail chest.

Possible initial settings (e.g., for a 4-kg infant) are as follows:

PEEP	4 cmH2O
Psupport:	3 cmH2O
Rate	5
Flow trigger	1 l/min
ETS	25%
TI	0.35 s
TImax	0.45 s (TI x 1.25)

With these quite low settings, you can start the therapy and then adapt your interface, minimize leakage, etc.

In order to achieve optimal triggering and cycling, try to reduce leakage to less than 40%. Leakage of more than 40% is still acceptable as long as it is constant, however variable leaks rising suddenly to 60-80% make it extremely challenging to synchronize the patient with the ventilator.

If you are using a binasal prong/mask, a gentle chinstrap or a pacifier may be necessary to minimize leakage from the mouth. If you are using an oronasal mask, ensure the skin is well protected by using a hydrocolloid dressing on pressure sites to prevent pressure ulcers.

Subsequently proceed as follows:

PEEP**:** If the patient is tolerating the support well with the initial settings, titrate PEEP as described above.

Psupport: Titrate Psupport in increments of 1 cmH2O based on the patient‘s work of breathing and respiratory rate. The maximal Psupport should be approx.12 cmH20 (3). If you have valid tidal volume readings, you can target an expiratory tidal volume of 6-8 ml/kg.

Flowtrigger: If PEEP and Psupport are set, analyze the flow curve to see if there are any ineffective efforts or autocycling, then adjust the flow trigger accordingly. As the respiratory drive decreases after titrating Psupport, this should only be done as the third step. Normally you should end up at around 0.5 l/min.

Expiratory trigger sensitivity (ETS): Analyze the flow curve for delayed/premature cycling. In the case of delayed cycling, increase ETS in increments of 5%; in the case of premature cycling, decrease ETS in increments of 5%. In some patients it may be best to use TI max as the termination criterion.

TI: Set as for invasive ventilation or slightly longer.

TImax: Set to TI x 1.25.

Rate: Once the other settings have been adjusted, the rate may be set as a backup. This could be somewhere between 20-40 b/min.

Monitoring window with hidden invalid parameters

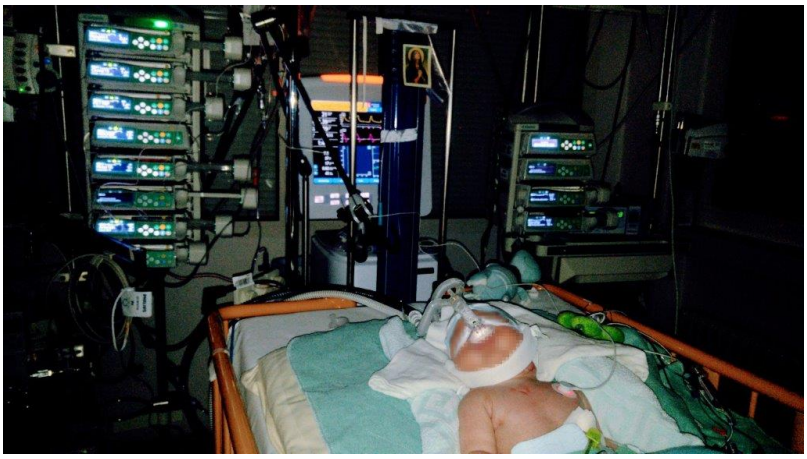
Measuring of respiratory mechanics

- In the case of leaks, certain monitoring values will not be precise and are not shown in the monitoring window
- This applies especially to all values depending on the measurement of expiratory flow and volume

Alarm settings

To reduce the number of audible alarms in the case of large leaks in a sensitive environment, it is possible to switch off the following alarms:

- Low ExpMinVol: This will result in a constant, visual low priority alarm Low ExpMinVol
- VT low
- Apnea time



Binasal mask with chinstrap to reduce leakage

Relevant ventilators:
HAMILTON-G5 (sw v2.6x);
HAMILTON-C6 (sw v1.x.x);
HAMILTON-C3 (sw v2.0.x);
HAMILTON-C2 (sw v2.2.x)

Optimal synchronization with a constant 35% leak

References

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