

Supplemental material file 4**Weaning of supplemental oxygen and respiratory support**Continuous positive airway pressure (CPAP)

The available methods of weaning CPAP are:

1. Withdrawal of CPAP (to room air or nasal cannula/low flow with oxygen)
2. Gradually reduce time on CPAP, i.e. alternating hours without CPAP with hours on CPAP
3. Gradually reduce pressure on CPAP, for example from 6 cm H₂O to 5, to 4 cm H₂O.

A systematic review [1] shows that none of these methods leads to better outcomes.

Gradual reduction may be preferable.

The optimal FiO₂ from which weaning can be performed with CPAP has not been defined. Successful weaning is unlikely in children who need >40% oxygen [2].

Step 1	Weaning from CPAP based on local protocol.
Step 2	<p>If there is no local protocol to wean from CPAP, then the following is advised:</p> <ul style="list-style-type: none"> - If FiO₂ > 30%, first decrease FiO₂ in steps of 5%, maximal 1 step per 12 hours. - If increase in desaturations, then increase FiO₂ until child is stable at/above saturation limit. - If FiO₂ is stable during 24 hours and ≤ 30%, then proceed to step 3
Step 3	<p>Gradually decrease the pressure of the CPAP to 3-4 cm H₂O and then discontinue.</p> <ul style="list-style-type: none"> - Decrease per step by 1 cm H₂O - A maximum of 1 step per 24 hours is advised <p>After discontinuation of CPAP, there is no additional support required unless there is an increased work of breathing. You can then start with low flow.</p>

Heated Humidified High Flow Nasal Cannula (HHHFNC)

There is no evidence on how to taper off HHHFNC [3]. The following recommendations are based on expert opinion [4]:

- Wean first FiO₂, then flow rate. Weaning is more likely to be successful in children who get less than 30% FiO₂.
- Wean 1 L/min every 12 hours, guided by the child's work of breathing
- Consider discontinuing at flow rates between 2-4 L/min (lowest amount of flow is device dependent). There is no evidence (yet) about the benefits of HHHFNC on flow rates less than 3 L/min.

Step 1	Weaning from HHHFNC based on local protocol.
Step 2	<p>If there is no local protocol to wean from HHHFNC, then the following is advised:</p> <ul style="list-style-type: none"> - First decrease FiO₂ to < 30%. - Decrease flow with 1 L/min, maximal 2 steps per 24 hours. Consider steps of 0.5 L/min if increased work of breathing. - Wean to 2 L/min and 30% FiO₂, then stop HHHFNC. Low flow supplemental oxygen may be considered.

Low flow supplemental oxygen (< 2 L/min)

There are no guidelines or RCTs known regarding the reduction of low flow support in newborns. Some societies do make a cautious recommendation about discontinuation of support, including the British Thoracic Society and the Thoracic Society of Australia and New Zealand [5-8].

With regard to the cessation of oxygen support, it is stated that hypoxia is likely most common during feedings and sleeping. That is why it is recommended first to discontinue O₂ support during waking episodes and expand from there during sleep.

Step 1	Weaning from low flow based on local protocol.
Step 2	If there is no local protocol to wean from low flow O ₂ , then the following is advised: <ul style="list-style-type: none"> - reduce with 0.5 L/min per step till 1 L/min. - If flow 1 L/min, consider to switch to nasal prongs with 100% FiO₂. - If flow ≤ 1 L/min, decrease with 0.1 L/min per step to minimal flow of 0.1 L/min.
Step 3	If on 0.1 L/min 100% O ₂ further steps are: <ul style="list-style-type: none"> - Stop low flow during awake periods for a max of 3 hours. - Increase time without supplemental oxygen when awake - Stop low flow during the day (including sleep periods during the day) - Stop low flow

Increasing supplemental oxygen and respiratory support

If the saturation profile shows that the child is below the SpO₂ target 10% of the time or more, then respiratory support should be intensified.

Also if parents or treating physicians observe frequent desaturations outside a measurement period (saturation profile), then the support should be intensified.

Step 1		Go back to the last step before weaning
Step 2		If insufficient effect, next steps are dependent on the type of respiratory support.
	CPAP	<ul style="list-style-type: none"> - Increase FiO₂ with steps of 5% to max of 40% until a stable situation is reached - If FiO₂ > 40 is needed, increase pressure with 1 cm H₂O
	HHHFNC	<ul style="list-style-type: none"> - Increase FiO₂ with steps of 5% to max of 40% until a stable situation is reached - If FiO₂ > 40 is needed, increase flow with 1 L/min
	Low flow 1-2 L/min, variable FiO ₂	<ul style="list-style-type: none"> - Increase FiO₂ with steps of 5% to max of 40% until a stable situation is reached - If FiO₂ > 40 is needed, increase flow with 0.5 L/min
	Low flow 0.1-1 L/min FiO ₂ 100%	<ul style="list-style-type: none"> - Increase flow with 0.1 L/min until a stable situation is reached

References

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