

HELIUM/OXYGEN (HEOX) IN THE EMERGENCY ROOM: COMPARISON OF OPEN SYSTEM VIA HIGH FLOW CANNULA VS. CLOSED SYSTEM.

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Background: HeOx is an accepted emergency therapy for severe airway obstruction. However, closed systems in current use are cumbersome and patients are unable to eat, drink or talk. A conventional nasal cannula cannot supply enough flow to provide therapeutic levels of HeOx. The Vapotherm humidification device can be used to provide up to 40 lpm of warmed humidified HeOx by nasal cannula, avoiding many of the drawbacks of closed systems. In this pilot study we compared closed (non-rebreather mask) and open systems (HeOx by nasal cannula) in eight patients presenting to the Emergency Room with acute asthma.

Methods: Patients were between the ages of 17 and 43. All scored between 8 and 10 on the Woods-Down (W-D) asthma scoring system. Scoring includes inspiratory and expiratory sounds, accessory muscle use, SpO₂, and level of consciousness. 4 patients were treated conventionally with 80%/20% He/O₂ at 20 lpm using a non-rebreather mask (NRM) and nebulizer connected via a Y piece and one-way valves. The remaining 4 patients were treated with between 20 and 30 lpm HeOx, warmed and humidified (37°C, 95% R.H.) by Vapotherm, and delivered via high flow nasal cannula (HFNC). Medication was delivered orally from a small volume nebulizer.

Results: All patients showed the expected vocal changes. One patient from each group did not improve SpO₂ or consciousness with treatment, and required intubation, mechanical ventilation and admission for 3 days or more. All the remaining patients showed improved breathing and SpO₂, and were discharged within 24 hrs.

pt #	age, sex	W-D pre/post		hrs.	HR pre/post	RR pre/post	PEFR pre/post	notes
1	47,m	9/1	HFNC	1	120/108	40/20	200/350	
2	17,m	9/1	HFNC	1.5	100/84	40/20	200/450	disch. 4hrs
3	37,m	8/2	HFNC	1	122/119	46/18	200/300	
4	25,f	10/8	HFNC	0.5	140/128	44/28	225	intubated
5	23,f	10/6	NRM	0.5	130/146	40/20	150	intubated
6	40,m	8/2	NRM	2	126/118	37/26	240/450	
7	35,f	8/2	NRM	1.5	142/126	28/18	100/380	
8	25,f	9/2	NRM	1.5	125/98	44/20	150/475	

Conclusions: These results suggest that if HeOx is warmed and humidified, it may be administered as effectively by HFNC as by NRM. If a suitable humidification device is used, the NC method has several advantages. These include: better warming and humidifying of the inspired gases; better tolerance by patients; easier administration by caregivers; patients can drink and take oral medication without interrupting therapy; reduced anxiety. If these results are confirmed in further studies, HFNC may therefore be the preferred route for HeOx administration in acute asthma.

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