

VAPOTHERM: A SIMPLE DEVICE BECOMES A SIMPLE SOLUTION IN THE PICU Jennifer Frick, BS, RRT, Katie Sabato, MS, RRT, and Heidi Flori, MD, Children's Hospital and Research Center of Oakland, CA. **Introduction:** Routinely when patients present in respiratory distress, time is limited and many non-invasive therapies are attempted to treat their symptoms. If these non-invasive techniques are unsuccessful then clinicians must choose the more invasive therapy, intubation. We recently began using a new device called Vapotherm that has provided an alternative useful noninvasive therapy. We present 4 different case studies that represent a variety of patients where Vapotherm was used successfully to treat their level of respiratory distress. In each case, all other forms of traditional non-invasive respiratory therapies had been exhausted and or ruled out. **Methods:** All 4 patients had distinctively dissimilar diagnoses that lead to respiratory distress. Respiratory distress was defined by clinical assessments and objective physiologic values. Baseline assessments (recorded by PICU nurses) were made, and then all patients were placed on the Vapotherm. Once placed on the Vapotherm flows and FiO₂ were adjusted to address specific respiratory symptoms and oxygenation needs. Post-assessments were completed 60-90 minutes following the application. **Case Summaries: Pt A.** 16 months: Primary pneumonia per CXR, presented with tachypnea and frequent oxygen desaturations -would not tolerate an oxygen mask. **Pt B.** 14 years: severe chronic asthmatic presenting with nasal flaring, severe dyspnea and CO₂ retention. Baseline therapies were continuous Albuterol via the Circulaire driven by Helium. **Pt C.** 3 months: Post-op, post extubation cardiac patient with severe atelectasis on CXR. Baseline therapies included nasal cannula and Q2 hour CPT. **Pt D.** 2 1/2 years: 36 wk ex preemie, RSV, bronchiolitis, presents in mod. respiratory distress that has been waxing and waning since the admission, prod cough but unable to expectorate freely due to the presence of the mask from the non-invasive bi-level positive pressure device Results: All case studies were approved by IRB

Results		Patient A		Patient B		Patient C		Patient D		
		Baseline	After Vapotherm	Baseline	After Vapotherm	Baseline	After Vapotherm	Baseline	After Vapotherm	
Objective	HR	166	137	168	150	125	137	140	115	
	RR	70's	45	58	32	50-70	30	30-50	24	
	CXR	mild hyperinflation patchy areas of opacification	mild hyperinflation w/peribronchial thickening, lungs well aerated	mild hyperinflation	No subsequent CXR was taken	increased atelectasis/infiltrate r/o RL patchy infiltrate in the l. perihilar region	atelectasis is markedly improved	mildly hyperinflated w/ bilat infiltrates	atelectasis in all lobes	no subsequent CXR was taken
	Support	2L NC	20L VT at 21%	10L mask at 100%	25L VT at 33%	1L NC	10L VT at 35%	BiPap at 100%	15L Vt at 60%	
	Sats	89%	99%	90%	95%	97%	100%	desats to 70's	98%	
Subjective	Comfort/Agitation	Not able to take bottle very agitated	sleeping and eating well	Unable to speak a full sentence	Able to talk and watching TV	Comfort level was not charted	Appears comfortable and able to tolerate feeds	Not tolerating BiPap, need tylenol for comfort	Allowed to cough more freely, playing with toys	
	Resp. Assessment	tachypneic nasal flaring, retractions	no retractions, no flaring	nasal flaring, retractions, severe dyspnea	Min. diffused wheezes, less labored breathing	Tachypnea and nasal flaring	Such an improvement on CXR that MD d/c's CPT order	Tachypnea, prod cough, crackles in LL	No nasal flaring, mild dry cough good air exchange	
	WOB	Severe	Mild	Severe	Mild	Moderate	Mild	Moderate	Mild	

Discussion: In all patients, intubation was avoided and no side effects associated with the use of high flow therapy where reported. Many clinicians, however, are not used to or comfortable with the high flows that are recommended with Vapotherm These patients showed improved markers of respiratory distress as indicated by improvement in heart rate, respiratory rate, and oxygen saturation. In addition, patients all showed subjective improvement in overall comfort and work of breathing. The Vapotherm with its high-flow well-saturated humidity seems to be a comfortable, well-accepted therapy. While we continue to utilize Vapotherm when warranted, we admit that there remains to be a lot to learn about this device including the potential level of peep generated by such high flows. Further research is necessary to evaluate safety and identify optimal patient populations and applications for this exciting new and simple device.

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