P1898
ACCP-94

The Effects of the ThermoFlo Filter Hygroscopic Condensing Humidifier on Sputum Characteristics

KK Stout, MW Blatt, Wheeling, WV

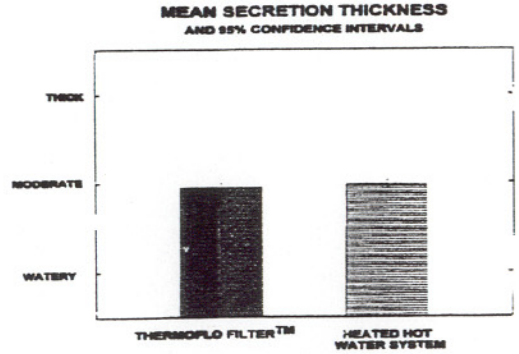
ABSTRACT

The purpose of this study was to evaluate the effectiveness of the ThermoFlo™ Filter Hygroscopic Condensing Humidifier (HCH) for providing adequate heat and humidity to mechanically ventilated patients by focusing on the change in the consistency of the patients secretions. Sputum characteristics were evaluated on 31 mechanically ventilated patients in the ICU; 10 patients using the Hudson Concha Pack and 21 using the ThermoFlo™ Filter. The age, gender, and admitting diagnosis for patients were similar in both groups. Sputum characteristics were evaluated by visual inspection using the definitions published by Suzukawa *et al* for watery, moderate and tenacious secretions. The ThermoFlo™ Filter was changed every 24 hours while the circuit was changed every 7 days. Circuits using the Hudson Concha system were changed every 48 hrs. Cultures were taken on the ThermoFlo™ Filter circuits after 7 days of use with no bacterial growth, while cultures taken after 48 hours of use with the Concha System showed noted bacterial growth. There were no tube occlusions during this study and secretions appeared to remain within the moderate range. The ThermoFlo™ Filter appears to provide adequate heat and humidity to mechanically ventilated patients, and has potential for significant cost savings.

METHODS

Patients in the intensive care unit requiring mechanical ventilation were assigned either the ThermoFlo™ Filter or the Concha HHWS as per their admitting physician. The ThermoFlo™ Filter was placed between the "Y" connector and the endotracheal tube and was changed every 24 hours. The Concha HHWS was set to achieve a temperature no less than 26° C, and traps were put in the circuit for water collection. The Concha circuits were changed every 48 hours. Bacterial cultures were taken at two points in the circuit; the patient "Y" and the end exhalation port. These cultures were analyzed by the hospital lab. Sputum characteristics were evaluated by Respiratory Therapists. A semi-quantitative method was used to assess the viscosity of the secretions, from the two groups, based on the definitions and specifications published by Suzukawa *et al*, in the November 1989 issue of Respiratory Care for watery, moderate and tenacious secretions. The students T-test was used to evaluate the consistency of the patients secretions in the ThermoFlo™ Filter group compared to the secretions in the Concha HHWS group. Patients that were taking nebulized breathing treatments were either changed to a metered dose inhaler (MDIs) or the ThermoFlo™ Filter was taken off during the aerosol treatment.

	ThermoFlo™ Filter	Concha HHWS
Number of Patients	21	10
Age (mean)	57.5	51.2
Sex (%male)	54%	55%
Smokers	50%	55%
History of COPD	38%	33%
Admitting Diagnosis to ICU		
Pneumonia	1	1
Post-Op/ Resp. Failure	3	1
Cardiac Arrest	2	1
Respiratory Failure	9	3
Trauma	4	2
CVA	2	2



Bacterial culture results on ThermoFlo™ Filter circuits after 7 days of use
and
Concha HHWS circuits after 48 hours of use

	"Y" Connector		End Exhalation	
	Filter	HHWS	Filter	HHWS
Pseudomonous	0/5 (0%)	2/4 (50%)	0/5 (0%)	0/4 (0%)
Staphylococcus	0/5 (0%)	1/4 (25%)	0/5 (0%)	0/4 (0%)
Corynebacterium	0/5 (0%)	3/4 (75%)	0/5 (0%)	0/4 (0%)
Alphahemolytic Strep.	0/5 (0%)	1/4 (25%)	0/5 (0%)	0/4 (0%)
Lactobacillus	0/5 (0%)	1/4 (25%)	0/5 (0%)	0/4 (0%)

The "Y" is the point in the ventilator circuit where the ThermoFlo™ Filter is connected to the patients endotracheal tube

RESULTS

Thirty-one patients entered this study and were assigned to either the ThermoFlo™ Filter group or the Concha Heated Hot Water System (HHWS) group, as per their admitting physician. Both groups were similar in respect to admitting diagnosis, age and sex. Total duration of mechanical ventilation ranged from 3 days to 30 days. Patients mechanically ventilated less than 3 days were excluded from the study. Patient's secretions from both groups remained in the moderate or normal range for secretion thickness. In no case did we have any endotracheal tube occlusions, and only once did we have to change a patient to a Concha HHWS due to excessive secretions. The bacterial cultures showed no growth after 7 days of use with the same circuit using the ThermoFlo™ Filter and positive growth after 48 hours of use with the Concha HHWS circuits. There is a significant reduction in equipment cost when using the ThermoFlo™ Filter.

Patients charts were reviewed for indications of nosocomial infection. Indicator variables included the presence of infiltrates on chest x-rays, body temperature, white blood cell count, and sputum characteristics. Nine patients using the ThermoFlo™ Filter and 4 patients using the HHWS showed no evidence of nosocomial infection.