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EFFECT OF LARGE BORE TUBING ON PEAK PRESSURE DURING INTRAPULMONARY PERCUSSIVE VENTILATION

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Introduction: Intrapulmonary percussive ventilation (IPV) is an airway clearance technique that uses a pneumatic device called a Phasitron® to deliver bursts of pressurized gas at rates of 100-225 cycles per minute to the airway1. In our community, some therapists add large bore corrugated tubing between the Phasitron and the mask or mouthpiece allowing them to place the Phasitron in the holder instead of manually holding it at the patient's airway. We sought to determine if this method caused a change in pressure delivered to the patient. We hypothesize that the additional tubing will cause the peak pressure to decrease during an IPV treatment. Method: We connected a TSI Certifier FA Plus ventilator tester (TSI Inc., Shoreview, MN) to the outlet of an IPV 1C Phasitron (Percussionaire Corporation, Sandpoint, ID) and placed varying lengths of large bore corrugated tubing between the Phasitron and another Certifier FA Plus, which was connected to a calibrated Michigan 5601i Test Lung (Michigan Instruments, Grand Rapids, MI). The test lung's compliance was set for 40 ml/cmH2O and resistance was set for 5 cmH2O/L/second. The length of tubing ranged from 6 to 72 inches. After setting the working pressure for approximately 40 psi, we recorded the highest peak pressure observed at three different settings: completely clockwise (percussive), completely counterclockwise (diffusive), and one with the control arrow in the 12:00 position (middle). During our bench test, the tubing was kept on a horizontal plane between the Phasitron and Michigan Test Lung. Results: The peak pressure decreased from the Phasitron to the test lung on all three settings and all lengths of tubing. The peak pressure measured at the test lung was also found to reduce every time we added longer tubing. The greatest pressure change occurred on the percussive setting with a mean pressure drop of 12 cmH2O. The mean change in pressure for the diffusive setting was 6.1 cmH2O and 6.6 cmH2O for the middle setting. Conclusion: Based on the data we collected, we caution against adding large bore tubing to the IPV circuit between the Phasitron and mask or mouthpiece due to the reduction of peak pressure supplied to the airway. If the practice of adding tubing is performed, the clinician should consider increasing the working pressure of the IPV unit to compensate for this reduction. 1.Wilkins, R., Stoller, J., & Kacmarek, R. (2009). Egan's Fundamentals of Respiratory Care. Mosby. Sponsored Research - None

Tubing (6 inch links)	Phasitron Ppeak diffusive setting	Test Lung Ppeak diffusive setting	Diffusive change in pressure (cmH2O)	Phasitron Ppeak percussive setting	Test Lung Ppeak percussive setting	Percussive change in pressure (cmH2O)	Phasitron Ppeak middle setting	Test Lung Ppeak middle setting	Middle setting change in pressure (cmH2O)
1	41.6	37.0	4.6	41.6	31.6	10.0	41.1	37.1	4.0
2	41.8	36.8	5.0	42.3	31.4	10.9	41.2	36.1	5.1
4	41.7	36.1	5.6	41.8	30.4	11.4	40.8	35.1	5.7
6	42.1	35.9	6.2	42.0	29.7	12.3	40.6	34.0	6.6
8	41.5	35.1	6.4	41.8	29.4	12.4	40.5	33.7	6.8
10	41.6	34.9	6.7	41.6	28.8	12.8	41.0	32.8	8.2
12	41.4	33.3	8.1	41.8	28.4	13.4	40.8	31.3	9.5

Pressure in cmH2O