THE INSPIWAVE (TM) TRIAL ON ADULT HEALTHY VOLUNTEERS – INSIGHTS GLEANED FROM POSTURAL STUDIES

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Introduction Current techniques used to monitor Functional Residual Capacity (FRC) present significant clinical limitations which often restrict patients to those who are conscious, cooperative and mobile. There is a clinical need for an operator – independent device that is able to simultaneously and continuously monitor FRC in mechanically ventilated patients, the morbidly obese and infants. The InspiWave™ is one such device which utilises a sinusoidal Nitrous Oxide (N_2O) tracer gas technique to non – invasively monitor various parameters of cardiopulmonary function, including end tidal alveolar volume (V_A) and Bohr
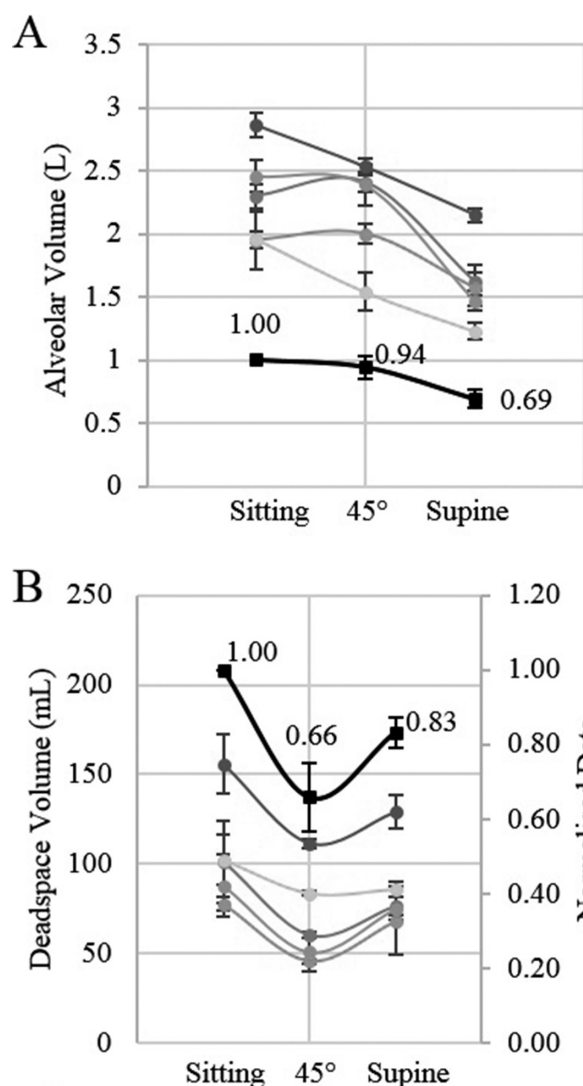
Abstract P84 Figure 1 Alveolar Volume (A) and Deadspace Volume (B) estimated by the device at three different postures. *Averaged data of participants (n = 5) shown in traces with circle markers (•), error bars represent standard deviation. Normalised data relative to the upright sitting position plotted with square markers (■), error bars represent 95% confidence interval*

deadspace volume (V_D). This study evaluates the performance of the InspiWave™ in estimating lung volume using two unique postural change protocols in healthy volunteers.

Method 5 subjects were asked to adopt 3 stationary postures (sitting upright, supine, 45° elevation) using a tilt table. 21 subjects adopted a different protocol, with a single transition phase between sitting and supine.

Results In the first protocol (n = 5), V_A estimations were consistently smaller at supine than at sitting (31%). At 45° elevation, V_D estimations were the smallest of all three postures. Comparison of absolute flow signal ($\Delta \int$Flow dt) data at the point of postural transition with V_A estimations by the device (n = 21) yielded a Pearson's correlation (r) of 0.453 ($p < 0.05$).

Conclusion Estimations by the InspiWave™ demonstrated acceptable correlation between absolute flow signal change and device estimation, suggesting good accuracy. FRC changes by approximately 25% from sitting to supine, due to added pressure from abdominal contents on the diaphragm when gravity shifts with postural change.[1] Data from this study closely mirrored this value (31%), demonstrating a good degree of device performance. V_D estimations were smallest at 45° elevation of the three postures which may be due to airways being kept more open, consistent with respiratory benefits of the 45° "beach chair position". Postural studies provide an alternative over conventional comparative studies with reference techniques (such as body plethysmography) in assessing device performance, when comparing variables which are not entirely equivalent.

REFERENCE
1 Ibanez J, Raurich JM. Normal values of functional residual capacity in the sitting and supine positions. *Intensive Care Med*. 1982;**8**(4):173–177

A COMPOSITE INDEX OF SATURATION AND DISTANCE WALKED DURING A 6-MINUTE WALK TEST (6MWT): A RETROSPECTIVE METHODOLOGICAL COMPARISON

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Background The 6MWT is a simple, reproducible test of exercise performance. Lettieri *et al.*[1] proposed a composite index of the product of the lowest oxygen saturation (SpO_2) and distanced walked – the distance–saturation product (DSP). Pimenta *et al.*[2] calculated the differences between actual SpO_2 and 100% every two seconds, and produced the desaturation-distance ratio (DDR-1). Ijiri *et al.*[3] simplified Pimenta's methodology, using the SpO_2 at the end of each minute (DDR-2).

Aim To compare the different methods of calculating the composite index.

Methods We retrospectively analysed 48 6MWT datasets, obtained using standard methodology. SpO_2 was recorded every second using a Minolta 300i pulse oximeter and analysed using Visi-Download (Stowood Scientific, Oxford). The DSP and DDR's was calculated by each method. Additionally, data using Pimenta's method, was calculated using one second data intervals (DDR-3). Data are given as median (IQR).

Results 41/48 patients were male. Group age was 63 (53 to 73) years, FEV_1%pred 68.4% (41.3 to 82.3), distance walked 390 m (321.3 to 477.5), baseline SpO_2 95% (93 to 96) and decline in SpO_2 was -4% (-2 to -8). DSP was 324.6 (278.8 to 419.4) m%, DDR-1 was 8.90 (4.98 to 13.27), DDR-2 was 16.83 (9.14 to 24.8) and DDR-3 was 8.90 (4.99 to 13.66). Bland-Altman