Abstract 51631

Non Invasive Measurement Of Respiratory Rate: Comparison Between The Embletta® (GOLD) Respiband Device and Thora3Di, PneumaCare Ltd.

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Abstract Body

Aim:
To compare two devices that non-invasively measure respiratory rate.

Introduction:
The Thora3Di™ captures, the movement of the rib cage and abdominal wall, non- invasively, and with no contact. A grid of light is projected onto the subject's chest and abdomen, the movement of the grid allows the analysis of compartment volume change and assessment of the surface motion. The Embletta (Gold) records respiratory rate from a patient using XactTrace RIP (Respiratory Inductance Plethysmography) belts which are worn around the chest and abdomen.
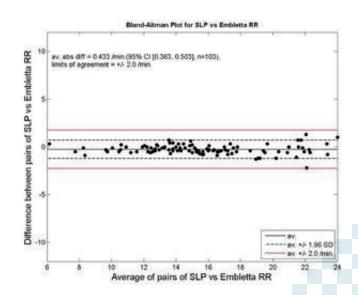
Methodology:
142 subjects (72 female, 67 male, 3 unreported) of ages between 16 – 80. Subjects were a mix of healthy (normal) (n=70), and patients with lung disease (n=73). Average age for normal was 40 (+/- 19.4), and for diseased 60 (+/-18.6) years. The Embletta® (GOLD) respibands were fastened. The subject was asked to sit with their neck in a neutral position and their back straight, wearing a close fitting white sports top. The Thora3Di was aligned so the grid of light covered the subject's chest and abdomen. The participant breathed "normally" for 5 minutes of tidal breathing. Data was collected simultaneously by the two devices.

Pearson correlation coefficients, and significance tests were performed for average RR, and the RR generated from chest and abdominal signals respectively. A Bland-Altman plot compared agreement between the two devices. The limits of agreement were set to +/- 2 breaths/min.

Results:
102 measurement pairs were used for data analysis. 40 data sets were lost due to respiband slippage. No data sets were lost by the Thora3Di™. Correlation plots: For the full body test, the Pearson correlation coefficient was R=0.9918 (p<0.001). The correlation coefficient for RC and AB are R=0.9814 (p<0.001) and R=0.9838 (p<0.001) respectively. The Bland-Altman plots for Full Body, RC and AB signals are given in Figure 1. For the full body test, the Pearson correlation coefficient is R=0.9918 (p<0.001) The correlation coefficient for RC and AB are R=0.9814 (p<0.001) and R=0.9838 (p<0.001)

Bland-Altman Plot for SLP vs Embletta RR

av. abs diff = 0.433 /min (95% CI [0.363, 0.503], n=103), limits of agreement = +/- 2.0 /min

Conclusion:
The respiratory rate output of Thora-3DI is within +/- 2 breaths/min of that reported by the Embletta (Gold) in measurements on 103 healthy and diseased subjects. Thora-3DI can be used as an alternative to the Embletta Gold to measure respiratory rate in healthy and diseased people between the ages of 16 – 80 years. It is not only non-invasive, but also non contact so is not susceptable to slippage of bands.

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