the children's hospital at Westmead
Part of the Sydney Children's Hospitals Network

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Dear Webmasters,

Comparing Spirohome and Laboratory Equipment in Children

As a result of the SARs Cov 2 pandemic, face to face clinics and patients coming to our service for pulmonary function tests were significantly reduced. The cost of switching to telehealth platforms reduced the ability for objective lung function measurements. We were incredibly fortunate to secure government funding for Home spirometers, but the quality assurance around these devices was unknown.

We sort to assess the agreement between our laboratory equipment and the Home spirometers we secured. Our laboratory equipment consists of Vyaire Spirometers (Vyaire Body Box™, Ultrasonic flow meter-based, or Vyaire Pneumotachograh™, Pneumotach flow meter-based; Germany). The portable device we acquired was a Spirohome personal (Spirohome Personal, Infolab, Ultrasonic flow meter-based, Turkey) an ultrasonic spirometer which connects to an app and uploads results to a cloud. To assess the agreement we measured 43 children on both our laboratory spirometers and the spirohome, the order was randomised. The same scientist did tests with the patients on both devices.

43 children had Spirometry on both devices.

- Agreement was assessed using paired t-tests and Bland-Altman as an entire cohort, and as separate Cystic Fibrosis (CF) and Asthma subgroups.
- Mean (SD) difference [defined as Vyaire-Spirohome] in FEV1 was -0.025(0.077)L (p=0.041) and FVC -0.034(0.097)L(p=0.025).
- On examining the subgroups, differences were statistically significant for CF but not asthmatic subjects:
- CF subgroup -FEV1 difference 0.040(0.069)L (p=0.005) and FVC difference 0.052(0.097)L (p=0.01);
- Asthma subgroup -, FEV1 difference 0.001(0.086)L (p=0.98) and FVC difference 0.005L (0.092) (p=0.83).

To further review the differences we utilised Bland Altman plots to look at the litre difference and percentage differences between each subject. For both the asthma and CF groups most patients fell within the level of agreements when looking at litre difference. The absolute difference was very small falling with most subjects falling within the ATS 2019 standards[1], intra test session variation of 150mls. When expressing these differences as percentage we also saw very small differences with nearly all patients falling within the level of agreement

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In conclusion we did see significant differences between the entire group and the asthma group, however these differences were within the individual repeatability criteria for acceptable tests (150ml) and were consistent through a range of volumes[1].

References : 1.Graham, B.L. et al., 2019. Standardization of Spirometry 2019 Update. An Official American Thoracic Society and European Respiratory Society Technical Statement. American journal of respiratory and critical care medicine, 200(8), pp.e70–e88.

With Kind Regards,

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