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Title: The inter-observer reliability of using a new non-invasive technique to identify patient ventilator asynchrony (PVA) during non-invasive ventilation (NIV)

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Body: Introduction: Poor patient-ventilator interaction reduces respiratory muscle unloading resulting in patient discomfort and reduced adherence. We hypothesised that non-invasive measurements with pre-defined PVA criteria would be reliably correlated between 2 independent observers. Methods: 5 patients initiated on NIV were assessed for PVA using respiratory inductance plethysmography (RIP), 2nd intercostal space parasternal electromyography (EMG_{para}) and mask pressures (P_{mask}). Two independent observers each recorded PVA from the overnight traces examining each breath from a 2 minute period for each 10 minute epoch over an hour.

Results: A total of 1347 breaths were analysed by each observer.

Correlation between two independent observers

Type of Asynchrony	Observer 1	Observer 2	Intraclass correlation coefficient (ICC), 95% CI	Bland- Altman
Ineffective efforts	255 (19%)	219 (16%)	0.90, 0.39-0.99	7.2 (-45.3, 59.7)
Premature cycling	63 (5%)	49 (4%)	0.75, -0.19-0.97	2.8 (-19.9, 25.5)
Extended cycling	4 (<1%)	10 (<1%)	0.36, -0.58-0.90	-1.2 (-6.5, 4.1)
Auto-triggering	103 (8%)	22 (2%)	0.086, -0.29-0.76	16.2 (-15.1, 47.5)
All asynchronies	429 (32%)	312 (23%)	0.87, 0.75-0.94	2.6 (-33.5, 40.7)

Conclusion: PVA can be reliably identified using the above technique. The predominant PVA was ineffective effort. This analysis could be automated to provide a simple approach to assessing PVA.