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Title: Polysomnographic criteria to assess the efficacy of noninvasive ventilation in chronic respiratory failure

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Body: Aim: We performed successive polysomnographies (PSG) under spontaneous breathing (SB) and under noninvasive ventilation (NIV) in order to assess the improvements of ventilation and sleep in patients with severe chronic respiratory failure. Methods: 12 patients indicated to domiciliary NIV because of chronic respiratory failure (neuromuscular disease (n=4), obesity-hypoventilation syndrome (n=6) or thoracic deformation (n=2)) have performed a PSG under SB at day 1, another PSG with the newly implemented NIV at day 2 and therefore a third PSG under NIV two weeks after (day 15). NIV titration was performed according to local protocols, based on nocturnal oxymetries and morning arterial blood gas assessments. Results: As compared to SB, the oxymetric parameters significantly improved during the first night under NIV. PtcCO2 values, early-morning and diurnal arterial blood gases slightly improved during the first night under NIV but the differences were statistically significant only at day 15. We observed a rapid increase of time spent in REM sleep (9.1±2.1 vs 15.2±2.4% of total sleep time, p=0.0148), a reduction of obstructive apnea index, (28.4±8.6 vs 9.7±4.2, p=0.0175) and the micro-arousal index (40.1±8.5 vs 25.7±1.9, p=0.0258). Heart rate and cardiac variability were significantly reduced under NIV. Patient-ventilator asynchronisms were low in all patients except two and did not significantly vary between day 2 and day 15. Conclusion: NIV efficacy is associated with a rapid and objective improvement of sleep quality, in parallel with a slower improvement of diurnal and nocturnal hypercapnia. Cardiac variability may be also a pertinent parameter to evaluate these patients.