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**Body:** Background Chronic obstructive lung disease (COPD) is a common respiratory condition and in its severe form can lead to hypercapnic respiratory failure, with the need for non-invasive ventilation (NIV). Obesity is increasingly prevalent in society, so that some COPD patients also suffer from obesity. Both COPD and obesity can lead to sleep related hypoventilation, before manifest chronic (daytime) hypercapnic failure. A diagnosis of obesity-hypoventilation syndrome (OHS) cannot formally be made in the presence of COPD. However a subgroup of obese COPD patients exist, in whom COPD severity alone cannot explain the presence of respiratory failure. Aims and objectives To evaluate the characteristics of patients with COPD in our domiciliary non-invasive ventilation program in order to study the relationship between obesity and COPD. Methods A retrospective data analysis of all patients with COPD started on a NIV therapy between 2009-2010 in our hospital. Lung function, blood gas analysis and body mass index (BMI) were recorded at the initial presentation and at the 6 week and 6 month check. Results The mean pCO<sub>2</sub> upon therapy initiation was 60 mmHg, falling overall to a mean of 43.8 mmHg at 6 weeks and remained at 42.3 mmHg at 6-12 months. The initial FEV<sub>1</sub> was lower in COPD patients with a low (<20) or normal BMI (20-30) and significantly higher in those with a raised BMI (>30). Discussion Obesity and a likely associated hypoventilation contributes to the development of hypercapnic respiratory failure in some patients with COPD. Obese COPD patients have a FEV<sub>1</sub> which is higher than expected upon the onset of hypercapnic respiratory failure and require NIV at an earlier stage. The overlap between OHS and COPD needs to be further researched.