

CORRESPONDENCE

Primary healthcare factors and hospital admission rates for COPD: no association

As the 'observant researchers' who questioned the R^2 value reported by Calderón-Larrañaga *et al* we were disappointed by the correction in *Thorax*, 10 July 2013.^{1 2} Our concerns were raised by the high adjusted R^2 value of 0.75 in the multivariate linear regression of the association of primary care trust (PCT) factors with PCT hospital admission rates and the high bivariate R^2 value attributed to general practitioner (GP) supply.

The authors pointed out to us their misreading of the bivariate 'GP supply' R^2 of 0.14% which led to the error. We were surprised to read in their correction that the R^2 value of 14.4% was for the variable 'GP list size'. In the data they sent to us this variable R^2 had been recorded as 17%. GP list size was not reported in the bivariate or multivariate analyses in the paper. This is worthy of comment. Adjustment for PCT practice list size was already included in the dependent variable which was COPD admissions/100 000 GP registered population. This newly reported finding suggests that a large proportion of the variance (bivariate) in hospital admission rates at PCT level was explained independently by GP list size.

Calderón-Larrañaga *et al* reported PCT GPs/100 000 patients to have had a multivariate regression coefficient of 0.995 (95% CI 0.992 to 1.00) with respect to hospital admissions. While not statistically

significant, even with an upper 95% CI limit of 0.995 the effect size would have been so small that the predictive power of the number of GPs/100 000 would have been irrelevant in practice. In their Poisson regression of GP-based factors on hospital admission count, the effect of practice GPs/100 000 patients had an incidence rate ratio of 0.998 (95% CI 0.998 to 0.999). This is harder to interpret. The dependent variable was the count of COPD admissions/practice in any year of 3 years. The predictor variable, the number of GPs/100 000 population at practice level, is also hard to interpret. Its mean was 60 with an IQR between 10 and 180. This suggests that in the bottom 25% of practices there was less than 1 GP per 10 000 patients, with more than 1 GP per 550 patients in the top 25%. The IQR for GPs/100 000 population derived from data for all general practices in England from the General Medical Services database and based on practice data submitted on 31 March 2007 was 46.94–71.39, a range more in keeping with observed practice.³ The effect size of GPs/100 000 population in the Poisson regression of practice level data, expressed as the incidence rate ratio, was tiny and perhaps statistically significant because the analysis was based on more than 8000 general practices. Our conclusion is that GP supply was not predictive of COPD admission rates.

COPD and COPD admissions are more prevalent in deprived populations because rates of smoking are higher. There is no evidence that GP supply or treatment factors are predictive of rates of COPD admissions at practice or PCT level. All of this suggests that the claim in the editorial published alongside this paper that the

inverse care law is alive and well with respect to hospital admission rates for COPD needs to be reconsidered.⁴

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