

Longitudinal Analysis Of Lung Function And Spirometry Patterns In A Diverse Population With World Trade Center Dust/fume Exposure After 9/11

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Introduction: The destruction of the World Trade Center (WTC) generated massive amounts of dust and smoke, posing health hazards to large numbers of people. The WTC Environmental Health Center (WTCEHC) at Bellevue Hospital treats local workers, residents, and clean-up workers with presumed WTC-related illness. At baseline visit, patients undergo spirometry and subsequent standardized treatment. We hypothesized that baseline spirometry pattern would influence lung function improvement in WTCEHC patients.

Methods: Between 10/2005 and 7/2010, 3050 patients were enrolled in the WTCEHC, and 2406 had spirometry (study population). Baseline spirometry patterns were classified as "Normal," "Obstruction," "Low VC," or "Obstruction and Low VC" (NHANES). Linear mixed-effects model with random intercept was used to examine the temporal patterns of repeated measurements on two spirometry parameters, Pre-bronchodilator FEV₁ % of predicted (FEV₁) and preFVC% of predicted (FVC). Age, gender, BMI and other potential baseline confounders were included in the model. All data analyses were conducted with SAS.

Results: Most patients (N = 1591, 69.8%) had Normal spirometry pattern at baseline. Low VC was noted in 379 (16.6%), Obstruction in 238 (10.4%) and Obstruction and Low VC in 73 (3.2%). Repeated spirometry was available for 27% of Normal, 36% of Obstruction, 45% of Low VC and 54% of Obstruction and Low VC. After adjusting for potential confounders, FEV₁ increased over time for all subgroups (p<0.0001).

The estimated slope with respect to time was largest for Obstruction and Low VC group (2.9% of predicted/year), followed by 1.4% for Obstruction, 0.6% for low VC, and 0.5% for Normal group. For FVC, the estimated slope with respect to time was significant for all groups (p<0.0001) except for Obstruction. The estimated slope with respect to time was largest for the Obstruction and Low VC group (3.0% of predicted/year), compared to other groups (Normal: 1.9, Low VC: 1.7).

Conclusions: Longitudinal assessment of lung function in patients in the WTC EHC suggested mild improvement in lung function including patients with "Normal" lung function at baseline. , The largest improvement in both FEV₁ and FVC was observed in the "Obstruction and Low VC" group. These data suggest that heterogeneity in baseline lung function pattern was associated with different response over time.

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