

Predicting Long-Term Pulmonary Impairment from Five Years of Spirometry Data.

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RATIONALE: The sensitivity (SE) and specificity (SP) of various longitudinal limits of decline applied to serial test results from spirometry monitoring programs for the detection of individuals at high risk of future impairment lack a solid evidence base.

METHODS: We studied annual spirometry data from the Lung Health Study (LHS) of adult smokers with mild COPD and from two monitoring programs for workers. The absolute limit (LLDa) and relative limit (LLDr) (*Occup Environ Med* 2007;64:701–7) were calculated on the first 5 years of data using SPIROLA software and were then tested for their ability to predict development of moderate impairment (FEV1 <60% predicted). The ATS-recommended FEV1 decline threshold of $\geq 15\%/yr$ (LLDats) was also tested. The likelihood ratio statistic, $LR=SE/(1-SP)$, was used to demonstrate potential clinical usefulness of the three limits.

RESULTS: LLDr performed best for predicting impairment among LHS subjects, as demonstrated by a high likelihood ratio (LR). It also performed well for the workers. One-fourth of LHS subjects and one-half of workers who later developed impairment were identified by the LLDr. LLDats performed best for the workers, but had much lower LRs for the LHS subjects.

Table 1	LLDa		LLDr		LLDats	
	SE	LR	SE	LR	SE	LR
LHS Males	0.24	7.2	0.24	13.5	0.51	4.3
LHS Females	0.27	6.3	0.26	12.2	0.61	4.4
Workers	0.41	6.1	0.52	9.8	0.41	16.0

CONCLUSIONS: The LLDr, which takes into account program-specific data variability, demonstrated good operating characteristics in different populations. It can be applied using SPIROLA software, freely available at www.cdc.gov/niosh/topics/spirometry/spirola.html.

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