

THE SENSITIVITY AND SPECIFICITY OF FEF75, FEV1 AND PEF COMPARED TO FEV1/FVC RATIO IN DETECTING AIRFLOW OBSTRUCTION IN CHILDREN WITH ASTHMA

Benjamin Francisco PNP, PhD, AE-C; Peter König MD, PhD; Sarah Smitherman, MD; Asthma Ready® Communities - University of Missouri Health Care, Columbia, Missouri

Background: Detection of airflow obstruction is a critical component of childhood asthma care. Expert Panel Report 3 (EPR3) guidelines advocate use of FEV1/FVC ratio (ratio) as a preferred measure of obstruction in the diagnosis and management of childhood asthma. Research question: What is the sensitivity and specificity of forced expiratory flow at 75% (FEF75), forced expiratory volume in one second (FEV1) and peak expiratory flow (PEF) for detecting airflow obstruction by EPR3-defined reductions in ratio?

Methods: This is a retrospective analysis of spirometry results for children ages 6-18 with asthma. A total of 2,307 pre-bronchodilator tests performed on 825 children were included. Tests were analyzed if inclusion criteria were met and the test was acceptable and reproducible by American Thoracic Society criteria.

Results: Pearson correlation coefficients with ratio were as follows: FEF75=0.80, FEV1=0.63 and PEF=0.50. Differences between correlations were highly significant, $p < .0001$. FEF75 detected 33.2% of abnormal tests compared to FEV1=6.6% in mild obstruction (ratio=.81-.85). In more severe obstruction (ratio=.76-.80) FEF75 detected 71% of abnormal tests, while FEV1 detected only 14.4%. Sensitivity of FEV1 for detecting airflow obstruction was significantly better than PEF for all ratios $< .81$. Of 244 tests with supernormal forced vital capacity ($FVC \geq 120\%$ predicted), 189 (77.5%) demonstrated low ratios ($< .86$). Of these 107 (56.6%) had a normal FEF75 ($\geq 70\%$), suggesting a false positive finding of airflow obstruction. These data suggest the need to evaluate FEF75 when ratio is low and FVC is supernormal. For 566 tests demonstrating a ratio $> 85\%$, specificity was: FEF75=97.7%, FEV1=94.9%, PEF=96.5%.

Conclusion: FEV1 is preferred over PEF for detecting airflow obstruction in children and youths with asthma. FEF75 is the most sensitive measure of obstruction compared to ratio. FEF75 should also be evaluated when interpreting reductions in ratio among children and youths with $FVC > 120\%$ of predicted.