

PORTABLE SPIROMETER FOR OCCUPATIONAL RESPIRATORY

EPIDEMIOLOGY Milton DK¹, Sama SR¹, Henneberger PK², Derk SJ², Masiello J³, Wetzell A³, Buess C³, Preusse P⁴, Enright P², Stemple K². ¹Harvard School of Public Health, Boston, MA, USA; ²CDC-National Institute for Occupational Safety and Health, Morgantown, WV USA; ³3M Medical Technologies, Chelmsford, MA, USA; ⁴Fallon Clinic Research Department, Worcester, MA USA

Introduction: Workplace challenge tests are a gold standard for diagnosis of work-related asthma. A highly accurate portable electronic spirometer is needed to facilitate research and clinical diagnosis.

Methods: Detailed specifications were developed, including adherence to ATS spirometry recommendations, an algorithm to collect basic data on workers' activities regardless of shift, and incorporation of an investigator defined questionnaire. The instrument passed all ATS wave forms when tested at NIOSH. Features include: user feedback on maneuver quality; stores flow volume loops and parameters for the three best blows within session; pre- and post-bronchodilator test capability; and award of incentive points. The data can be downloaded via modem. The algorithms were tested with simulated work schedules and by workers with asthma. The algorithm collects activity information necessary for analysis in the OASYS-2 software package. Data is stored in Microsoft Access format.

Results: Standard diagnostic software was successfully modified to adapt a lightweight highly accurate portable spirometer for use in occupational respiratory epidemiology. The final software is accurate, user-friendly, and customizable to various research settings.

Conclusion: Use of the small lightweight portable hand-held spirometer enables researchers and health care professionals to observe workers, in their workplace and home environments over a period of weeks, to establish work-related asthma status.