Fibrosis Patients in the Dallas-Fort Worth Area

Martin S. Holmes¹, Colin Edwards¹, Bill Vick², Eamonn Costello¹ ¹patientMpower Ltd., Dublin, Ireland. ²PF Warriors, Plano, Texas, USA.

RATIONALE

Idiopathic pulmonary fibrosis (IPF) is a chronic, progressive, and incurable lung disease that affects middle-aged and older adults.

Previous studies have reported that air pollution exposure is associated with acute exacerbation, disease progression, and mortality in patients with IPF.^{1,2,3} In particular, ozone exposure is associated with increased risk of acute exacerbation of IPF¹.

Historically, the Dallas-Fort Worth area has experienced unhealthy levels of ozone pollution, putting people who live with IPF at risk of poor health. Dallas-Fort Worth currently ranks as the 17th most ozone polluted metropolitan area in the United States (out of 227 metropolitan areas).⁴

Ozone production is strongly influenced by meteorological variables, such as temperature, and consequently results in high summertime ozone concentrations in the Dallas-Fort Worth area.

OBJECTIVES

The objective of this study was to investigate longitudinal trends in air quality and home-recorded spirometry in pulmonary fibrosis patients in the Dallas-Fort Worth area.

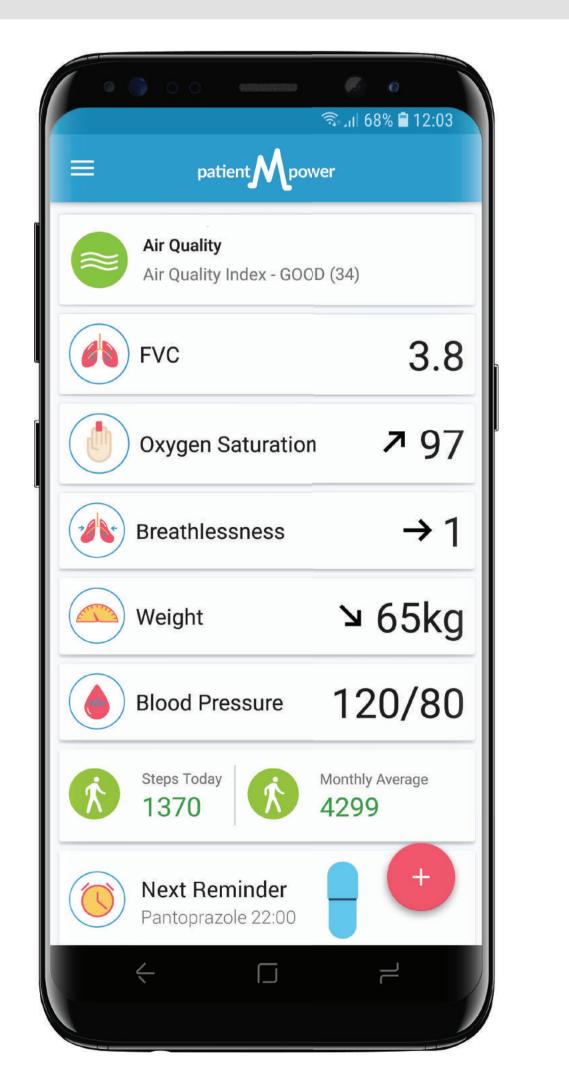




Figure 1: The patientMpower mobile application and MIR Spirobank Smart spirometer used in this study.

METHODS

Study participants were recruited via the PF Warriors patient support group based in Dallas-Fort Worth, Texas, USA.

Participants were provided with the patientMpower mobile application for IPF and a portable Bluetooth spirometer (Spirobank Smart, MIR Inc., Italy).

Participants were free to use the patientMpower app and MIR spirometer as often as they wished.

Historical ground level ozone (O₃) and particulate matter < 2.5 μ m (PM_{2.5}) data were obtained from the AirNow database for the Dallas-Fort Worth area⁵.

For every lung function measurement recorded via the patient-Mpower app, corresponding O₃ and PM_{2.5} data were obtained from the AirNow database.

RESULTS

Between July 2017 and October 2018, 17 people living with IPF in the Dallas-Fort Worth area used the patientMpower app and Spirobank Smart spirometer. Table 1 details the characteristics of the participants.

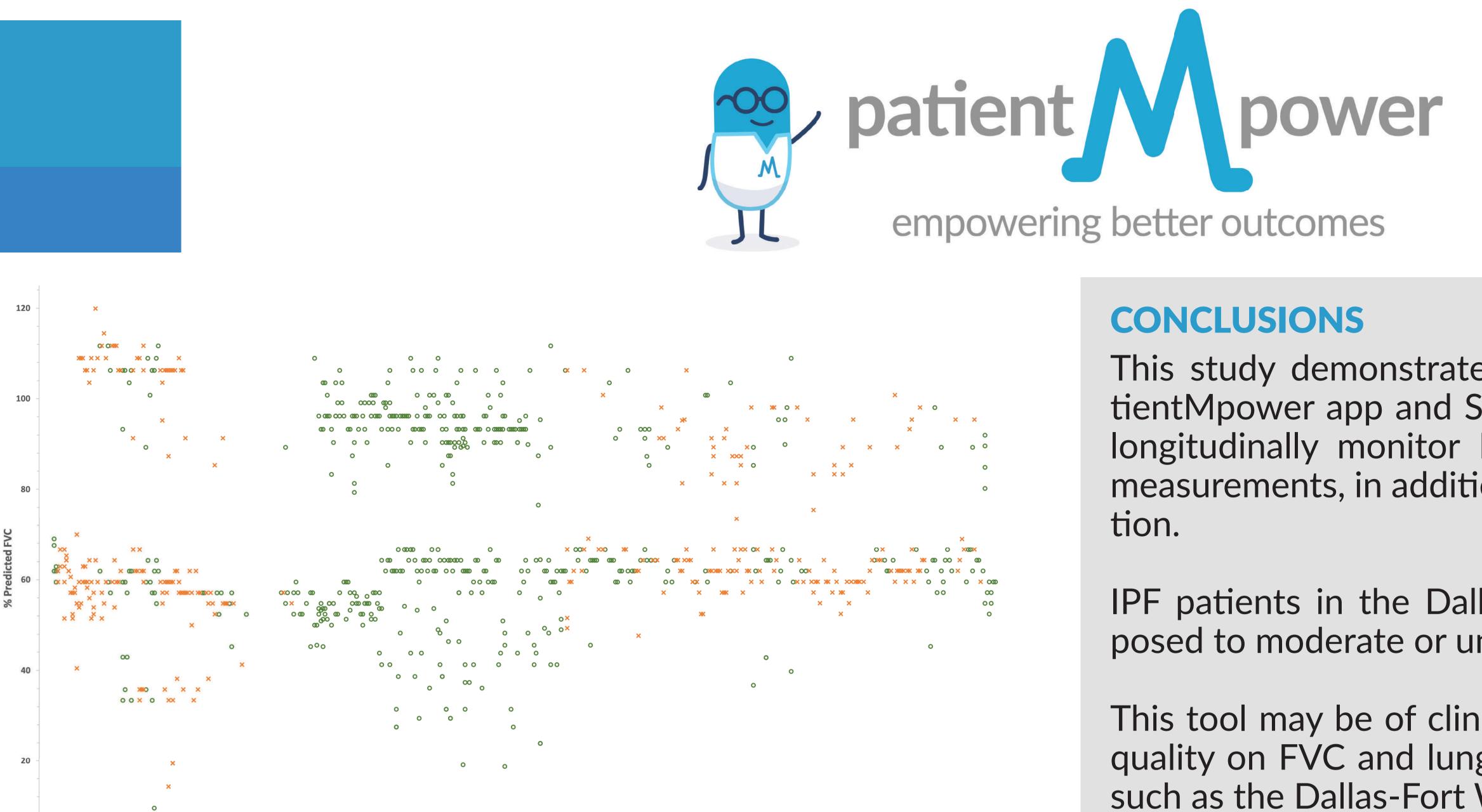
 Table 1: Cohort Characteristics (N=17)

Variable	Value
Age, y	64.3 ± 8.4
Sex - male	13 (76%)
Ethnicity - white	15 (88%)
Height, cm	174.3 ± 7.4
FVC absolute, L	2.46 ± 1.12
FVC % predicted	59.3 ± 26.9

Data are presented as mean \pm SD or No. (%). FVC absolute values are from available home spirometry.

The 17 participants recorded 837 home spirometry readings (average: 49, median: 13, range: 1-418).

Figure 1 shows the percentage of predicted Forced Vital Capacity (FVC) and the O₃ category level for the 17 participants, while Figure 2 shows the percentage of predicted FVC versus PM_{2.5}.



• O3 Category = "Good" × O3 Category = "Moderate or Unhealthy"

Figure 2: Percent predicted FVC and O₃ category level ("good" versus "moderate/unhealthy") in the 17 partici-



Figure 3: Percent predicted FVC and PM_{2.5} category level ("good" versus "moderate/unhealthy") in the 17 participants.

It was observed that this group of IPF patients were exposed to higher levels of O₃ in the summer months compared to winter months.

80% of patients used the patientMpower app and Spirobank Smart spirometer on days with unhealthy levels of O_3 .



This study demonstrated the feasibility of employing the patientMpower app and Spirobank Smart spirometer as a tool to longitudinally monitor IPF patients' real-world lung function measurements, in addition to corresponding air quality informa-

IPF patients in the Dallas-Fort Worth area are frequently exposed to moderate or unhealthy levels of air pollution.

This tool may be of clinical value in analyzing the impact of air quality on FVC and lung health in a specific geographic region such as the Dallas-Fort Worth area.

More research is needed to evaluate the sensitivity of the system in predicting lung function decline and exacerbations in **IPF** patients.

REFERENCES

¹ Johannson KA, Vittinghoff E, Lee K, et al. Acute exacerbation of idiopathic pulmonary fibrosis associated with air pollution exposure. Eur Respir J. 2014;43(4):1124-1131.

² Sesé L, Nunes H, Cottin V, et al. Role of atmospheric pollution on the natural history of idiopathic pulmonary fibrosis. Thorax. 2018;73(2): 145-150.

³ Winterbottom CJ, Shah RJ, Patterson KC, et al. Exposure to ambient particulate matter is associated with accelerated functional decline in idiopathic pulmonary fibrosis. Chest. 2018;153(5):1221-1228.

⁴ State of the Air 2018 Report - American Lung Association

⁵ AirNow API - https://docs.airnowapi.org/

We would like to thank all of the PF Warriors who took part in this study.

Commercial support & relevant financial interests:

Study funded by patientMpower Ltd. M. Holmes, C. Edwards & E. Costello are employees and shareholders of patientMpower Ltd. B. Vick is an advisor to patientMpower Ltd. (reimbursed).

