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REMOTE EARLY IDENTIFICATION OF DISEASE PROGRESSION IN CONNECTIVE TISSUE DISEASE RELATED INTERSTITIAL LUNG DISEASE

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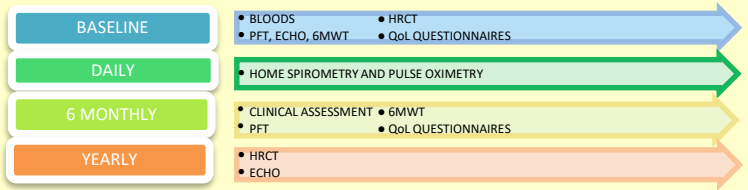
BACKGROUND

Interstitial lung disease (ILD) is an increasingly recognised complication in connective tissue diseases (CTD). Early detection of progressive ILD amongst patients with CTD is essential for administration of treatment in a timely manner.

We aim to determine if **domiciliary smartphone app-based spirometer monitoring** can detect **early progressive fibrosing ILD in CTD-ILD** resulting in earlier treatment ultimately leading to reduced mortality and morbidity.

METHODS

- Patients with CTD-ILD, idiopathic pulmonary fibrosis (IPF) and familial pulmonary fibrosis (FPF) were recruited and will be followed prospectively for 12 months.
- At baseline, participants underwent pulmonary function testing (PFT), high resolution CT thorax (HRCT), blood sampling for laboratory testing and genotyping, 6-minute walk test (6MWT), echocardiogram and Quality of Life (QoL) Questionnaires.
- 6-monthly PFTs, 6MWT and QoL Questionnaires will be performed.
- Participants use a handheld MIR Spirobank spirometer and pulse oximeter linked to a real-time electronic health journal generated via a smart-phone patientMpower app.
- The participants are asked to perform three spirometry manoeuvres at approximately the same time daily to improve compliance and reduce variability, with the best value for each day used for analysis.

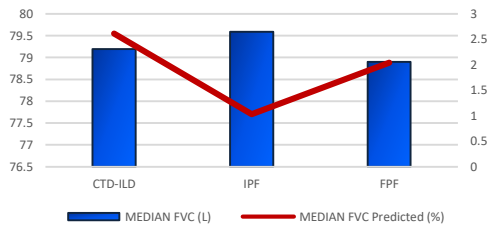


- Disease progression is defined as ≥10% FVC decline over 12 months.
- Inflection points in disease progression will be identified by deep learning algorithms using daily FVC readings thereby generating a novel early predictor of deterioration.
- Genotyping will be performed to allow further stratification according to clinical phenotype and underlying immunologic antibody profile.

RESULTS

- To date, data on 51 patients with CTD-ILD, 25 with IPF and 17 with FPF were available.
- Median ages were 66, 71 and 69 years respectively.
- 45.1% were males in CTD-ILD group, 68.0% in IPF group and 41.2% in the FPF group.
- 12 patients are on home oxygen therapy and 1 patient is awaiting lung transplant.
- A total of 5498 forced vital capacity (FVC) and 5574 oxygen saturation (SpO2) readings have been captured.

Figure 1: Forced Vital Capacity (FVC) and SpO2 readings in patients with CTD-ILD, IPF and FPF



	CTD-ILD	IPF	FPF
Number of Patients	51	25	17
Median Age (years)	66	71	69
Number of FVC readings	2743	1928	827
Median FVC (L)	2.31	2.65	2.06
Median FVC Predicted (%)	79.55	77.70	78.88
Number of SpO2 readings	2736	1966	872
Median SpO2 (%)	96	95	96

Figure 2: Distribution of FVC and SpO2 readings between males and females in patients with interstitial lung disease

	CTD-ILD		IPF		FPF	
	Male	Female	Male	Female	Male	Female
Number of Patients	23	28	17	8	7	10
Median Age (years)	71	63	73	65	62	69
Median FVC (L)	3.00	2.05	2.76	2.32	3.00	1.61
Median FVC Predicted (%)	74.66	84.17	72.67	91.08	72.52	79.29
Median SpO2 (%)	96	96	95	96	96	96

CONCLUSION

- Patients with CTD were younger and tended to have a higher percentage predicted FVC than those with IPF but higher in those with FPF.
- There were distinct differences in the FVC between men and women with ILD in all categories.
- Monitoring FVC remotely is feasible and acceptable to patients with CTD-ILD and could be a novel approach in the early detection of patients with rapidly progressive ILD thereby allowing early intervention and treatment .

ACKNOWLEDGEMENT OF SUPPORT

❖ RCSI StAR MD Scholarship
❖ ISR Rheumatology Patient Initiative Fund