Detecting early markers of CF-related pulmonary exacerbations using home telemetry and sputum biomarkers

E.F. Uko1, J. Ryan1, K. Brown1,2, C.S. Haworth1, K. Auton1, R.A. Floto1,2
1Cambridge Centre for Lung Infection, Papworth Hospital, Cambridge, United Kingdom; 2Cambridge Institute for Medical Research, Cambridge, United Kingdom; 3Aseptika Ltd, Huntingdon, United Kingdom

Objectives: Acute pulmonary exacerbations (APE) are the greatest cause of morbidity in patients with cystic fibrosis (CF). Home based detection and monitoring of APE might ensure prompt initiation of therapy and rapid switching of ineffective antibiotic regimens that could potentially result in reduced hospital clinic appointments and admission and better long-term lung health. We therefore sought to assess whether daily home monitoring of sputum bacterial biomarkers and clinical parameters might provide advanced warning of infective exacerbations and/or treatment failure.

Methods: On a daily basis for a 6 month period, 15 adults with CF were asked to collect sputum samples, undertake home-based telemetric physiological monitoring (of FEV1, PEF, heart rate, saturations, weight, activity) and complete wellness and cough diaries. Sputum samples were retrospectively analyzed for levels of Pseudomonas exotoxin A (PEA) and complete data sets were examined to evaluate which parameters best predicted APE.

Results: Patient compliance with home monitoring was excellent. A number of combinations of physiological parameters may allow early, pre-symptomatic detection of APE. In a subgroup of patients, relative changes in PEA may also help predict APE.

Conclusion: Home monitoring was acceptable to patients, provided unprecedented temporal resolution of clinical parameters and allowed analysis of sputum biomarker changes preceding an APE and during antibiotic therapy. PEA may prove an effective biomarker, when combined with other parameters, for early detection of APEs and treatment failure in patients with CF.

Teledicine videoconferencing – breaking down the barriers for cystic fibrosis (CF) patients living in rural and remote areas

L. Mitchell1, K. Schults2, D. Clark3, J.W. Wilson1,3 1The Alfred Hospital, Allergy Immunology and Respiratory Medicine, Melbourne, Australia; 2LaTrobe University, Melbourne, Australia; 3Monash University, Melbourne, Australia

Objectives: To use teledicine to improve access to care for CF patients in rural settings. We examined 40 patients who have commenced clinic review using teledicine videoconferencing (TMVC). Patients living in rural areas were targeted for participation.

Methods: The TMVC cohort was compared to the non-TMVC CF population at our institution. A standardised remote area classification grading system (Australian Standard Geographical Classification) was used to determine remoteness, classified as R1: Major Cities, R2: Inner Cities, R3: Outer Regional and R4/5: Remote/Very Remote. The Socio-Economic Indexes for Areas (SEIFA) data from the 2011 national census was examined to determine degree of advantage/disadvantage (mean national value 1000).

Results: 73% of patients receiving TMVC lived >100 km from specialist centre (mean 197, SD 151), compared to 23% for the general CF population (mean 75km, SD 151). 15% of TMVC patients were from R3, compared to 4% for the comparison group. Mean Index of Relative Socio-Economic Advantage and Disadvantage (IRSAID), and Index of Education and Occupation (IEO) were significantly lower for the TMVC patients than the general CF population; 966 versus 1017 (p < 0.001), and 968 versus 1037 (p < 0.001), indicating greater socioeconomic disadvantage.

Conclusion: TMVC represents an additional means of outpatient assessment and review. Our institution utilised this technology primarily for patients from rural and remote areas as an alternative means of medical and allied health assessment. Access to healthcare for a group of patients from socially disadvantaged areas has been improved by facilitating specialised outreach using TMVC.