Segregation practice of CF patients in UK pulmonary function departments

R. Peat1, J. Coulson1, D. Russell1, M.J. Ledson1, M.J. Walsham1, 2Regional Adult CF Unit, The Cardiothoracic Centre, Liverpool, United Kingdom

Introduction: The potential for pathogenic organisms to be transmitted between CF patients is increasingly being recognised, leading to the recommendation of strict segregation of cohorts of infected patients from each other. However, one route of cross infection involves the communal use of equipment, such as the spirometer, as a common method of transmission. As regards segregation of patients when performing pulmonary function testing, 19 (5) used different rooms in the department, 4 (3) performed tests on the ward, 10 (6) separated patients by time of day, and 9 (6) by different days of the week. One adult department did not carry out any segregation or hygiene measures in relation to CF patients, and another only had a segregation policy for MRSA cases.

Conclusions: This audit shows a wide variation in the hygienic use of spirometric equipment for CF patients, and an alarming lack of adequate segregation measures in many pulmonary function departments with a consequent potential for cross infection if transmissible strains are present. An education campaign may be necessary to improve this aspect of patient care.

Volumetric ultra low dose expiratory computed tomography scans could be sufficient to monitor CF lung disease

M. Loeve1,2, M.H. Lequin2, M. de Bruijne2, I. Hartmann2, W.C. Hop4, H.A. Tiddens1,2, 1Pediatric Pulmonology, Erasmus MC Sophia Children’s Hospital, Rotterdam, Netherlands; 2Radiology, Erasmus Medical Center, Rotterdam, Netherlands; 3Computer Science, University of Copenhagen, Copenhagen, Denmark; 4Epidemiology & Statistics, Erasmus Medical Center, Rotterdam, Netherlands

Background: The most sensitive method to monitor progression of CF lung disease is by Computed Tomography (CT) scans. Current CT protocols include low dose (0.6mSv) inspiratory (LDin) and ultra low dose (0.15mSv) expiratory (ULDexp) volumetric scans. It was never investigated whether ULDexp scans alone might suffice.

Purpose: To evaluate whether ULDexp CT scans are sufficient to monitor progression of CF lung disease.

Methods: 20 children with CF contributed one LDin and one ULDexp CT scan. All scans were scored with the Brody-II scoring system which scores bronchiectasis, airway wall thickening, mucus plugging and opacities for pattern and severity. All scans were scored in random order by a single experienced observer.

Results: Median age (range) was 12.6 (6.3–20.3) years, FEV1 100%pred (46–127) and FVC 98.5%pred (61–123). Excellent agreement was found between LDin and ULDexp Brody-II total CT scores (ICC 0.96), bronchiectasis (0.95), airway wall thickening (0.90), mucus plugging (0.88) and opacities (0.84). Intrarater agreement was good (ICC 0.77–0.92). Bland-Altman plots showed that differences in scores were not dependent on the score magnitude.

Conclusions: This study shows that LDin and ULDexp CT scores match. This strongly suggests that ULDexp volumetric scans could be sufficient to monitor progression of CF lung disease. Supported by: The Sophia CF research fund, the Dutch CF foundation (NCF5) and the Italian CF fund (IERFC).

Quantitative cough assessment in cystic fibrosis (CF)

E. Kerem1, M. Wilschanski1, G.L. Elfring2, S. Hirwati2, P. Pagatsch3, A. Reha2, S. Constantine2, S.W. Petri2, L.L. Miller1, 1Hadassah Medical Center, Jerusalem, Israel; 2PTC Therapeutics, South Plainfield, NJ, USA

Chronic cough disturbs daily life and interrupts sleep. Most CF patients note cough as a symptom, yet quantification of cough has seldom been done.

We analyzed cough using the VivosMetRICS Lifeshirt (LS), which collects data from chest wall motion transducers and a throat microphone for computer analysis. FEV1 and FVC were assessed by spirometry, and patients completed a symptom survey.

Patients included 19 adults not in CF exacerbation (M:F=10:9; median [range] age = 26 [19–57] years, median [range] % predicted FEV1 and FVC = 64 [44–106]% and 80 [58–112]%; Pseudomonas airway colonization = 17/19 [89%]; pancreatic insufficiency = 17/19 [89%]). There was occasional neck pressure due to the throat microphone, but compliance was good, with cough data collected for a median [range] of 24 [23–24] hours. Median [range] of cough frequency was 643 [324–1569] coughs/day, or 27 [14–65] coughs/hour, with frequency during daytime (0700–2300 hours) of 21 [9–89] and at nighttime of 24 [8–98] coughs/hour (p = 0.21, paired t test). Median [range] of cough intensity was 1686 [422–2005]mV, with daytime intensity of 834 [332–2562] and nighttime intensity of 886 [386–2213] mV (p = 0.25, paired t-test). Symptom surveys (1: minimal to 4: frequent coughing/wakes from sleep) showed a median [range] score of 2 [1–3] for daytime and 1 [1–3] for nighttime coughing. Cough frequency tended to increase with lower FEV1 and greater age.

CF patients cough frequently, day and night, and underreport cough, perhaps due to acclimation to the chronicity of the symptom. LS quantitation appears superior to subjective cough assessment methods and may offer a clinically meaningful outcome measure of how patients feel and function for use in CF therapeutic trials. Supported by: PTC Therapeutics.

Nocturnal O2 and CO2 status in adult CF patients during an acute admission

S.C. Johnson1, R. Bright-Thomas2, M.E. Dodd2, A.M. Jones2, A.K. Webb2, A.M. Bentley1, 1Long term ventilation service, South Manchester University Hospitals NHS Foundation Trust, Manchester, United Kingdom; 2Adult Cystic Fibrosis Centre, Manchester, United Kingdom

Day or early morning hypercapnia or the inability to oxygenate patients without significant rises in CO2 are indications for non-invasive ventilation (NIV). To investigate potential future NIV requirement, overnight O2 and CO2 status were examined during acute hospital admissions.

Methods: All willing patients admitted over 4 months participated. On admission ear lobe sensors (Tosca™500 system) were applied. On application (late pm) and removal (early am), we recorded the tcPCO2, SpO2 values and measured ear lobe blood gases (ELG).

Results: Data on the 28 (15 male) patients not already on O2 or NIV is presented. Mean (range), age 27.2 (18.4–44) yrs, BMI 20.4kg/m2 (13.8, 25.5), CRP (median) 22.13 [19–57] yrs, 106% [58–112]% and 80 [58–112]%; Pseudomonas airway colonization = 17/19 [89%]; pancreatic insufficiency = 17/19 [89%]). There was occasional neck pressure due to the throat microphone, but compliance was good, with cough data collected for a median [range] of 24 [23–24] hours. Median [range] of cough frequency was 643 [324–1569] coughs/day, or 27 [14–65] coughs/hour, with frequency during daytime (0700–2300 hours) of 21 [9–89] and at nighttime of 24 [8–98] coughs/hour (p = 0.21, paired t test). Median [range] of cough intensity was 1686 [422–2005]mV, with daytime intensity of 834 [332–2562] and nighttime intensity of 886 [386–2213] mV (p = 0.25, paired t-test). Symptom surveys (1: minimal to 4: frequent coughing/wakes from sleep) showed a median [range] score of 2 [1–3] for daytime and 1 [1–3] for nighttime coughing. Cough frequency tended to increase with lower FEV1 and greater age.

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Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>PM</th>
<th>AM</th>
<th>mean difference (95%CI)</th>
<th>p</th>
</tr>
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<tbody>
<tr>
<td>tcPCO2</td>
<td>5.09 (4.85, 5.33)</td>
<td>5.39 (5.00, 5.79)</td>
<td>-0.21 (-0.46, 0.04)</td>
<td>0.498</td>
</tr>
<tr>
<td>PaCO2</td>
<td>4.97 (4.61, 5.32)</td>
<td>5.10 (4.62, 5.66)</td>
<td>-0.24 (-0.45, -0.03)</td>
<td>0.015</td>
</tr>
<tr>
<td>PaO2</td>
<td>9.16 (7.9, 10.3)</td>
<td>9.21 (8.6, 11.7)</td>
<td>-0.07 (-0.42, 0.29)</td>
<td>0.703</td>
</tr>
<tr>
<td>difference mean tcPCO2 and PaCO2</td>
<td>0.12 (0.03, 0.20)</td>
<td>0.09 (-0.06, 0.24)</td>
<td>0.057</td>
<td>0.215</td>
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<td>0.057</td>
<td>0.215</td>
</tr>
</tbody>
</table>

5% limits of agreement -0.31, 0.55; -0.69, 0.88