Efficacy of home respiratory culture kits in people with cystic fibrosis
M. Gulati1, Y. Wang1, K. Hall1, N. Zedro1, V. Downer1, E. Ong1, S. Jia1, T. Sisson1.
1Division of Pulmonary and Critical Care, University of Michigan, Ann Arbor, MI; 2Department of Biostatistics, University of Michigan, Ann Arbor, MI

Background: Respiratory cultures are an important part of clinical care for people with cystic fibrosis (CF). Telemedicine visits during the COVID-19 pandemic have not allowed for routine collection. To address this, the University of Michigan Adult Cystic Fibrosis Program mailed home culture kits to patients. We hypothesized that results from home sputum samples would be consistent with prior cultures obtained in sputum collected in clinic but that self-collected throat swabs would provide false-negative results. We also sought to determine percentage return rate.

Methods: Adults with CF were sent culture kits containing a specimen cup and a throat swab. Patients had the choice to submit either sample for processing. Medical personnel provided written instructions with the culture kits and, on occasion, instructed patients on proper collection techniques via phone. Samples were then refrigerated for up to 24 hours before a delivery service returned the specimen to a University of Michigan laboratory for analysis. Data collected from December 2020 to December 2021 (N = 77) included percentage return rate, result, source, and presence of microorganisms. Pairwise culture data of samples collected in clinic versus home-collected samples within 1 year were included in the analysis.

Results: Of 77 culture kits returned, 46 had corresponding clinic samples collected using the same method, and the remaining 21 were collected using different methods (throat swab vs sputum sample). Overall, approximately 200 kits were mailed to patients, with a return rate of 38.5%. A similar percentage of positive culture results was obtained with the same method of collection: sputum and throat samples (Table 1C, D, E), although the discordance rate between cultures collected in clinic and at home ranged from approximately 10% to 30%. Correlation between clinic and home culture data was generally good throughout, except for clinic versus home throat swabs, probably because of a low event rate in the small sample size.

Conclusions: The data suggest that, overall, clinic and home culture kits provide similar positive results, although discordance in specific culture results was common. This may be due to natural fluctuations from culture to culture in people with CF. A limitation of this study is that the cultures being compared in our study were not completed on the same day. Nevertheless, our data also indicate that collection technique may influence results for certain microorganisms. How these differences might influence antibiotic selection and treatment outcomes in the era of telemedicine requires more investigation. The return rate was found to be relatively low, demonstrating the need for interventions to improve patient outreach and compliance.

Table 1 (abstract 115):

Analysis of respiratory culture results for (A) all cultures, (B) different collection, and (C, D, E) same collection method.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Clinic Positive</th>
<th>Home Positive</th>
<th>Discordant</th>
<th>Correlation Coefficient**</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>65/77 (84.4%)</td>
<td>64/77 (83.1%)</td>
<td>13/77 (16.9%)</td>
<td>0.417</td>
<td>0.0051*</td>
</tr>
<tr>
<td>PsA</td>
<td>31/77 (40.2%)</td>
<td>25/77 (32.4%)</td>
<td>12/77 (15.6%)</td>
<td>0.671</td>
<td>&lt;0.0001*</td>
</tr>
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<td>Staph</td>
<td>36/77 (46.8%)</td>
<td>40/77 (51.9%)</td>
<td>14/77 (18.1%)</td>
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**Correlation coefficient between groups: poor agreement <0.20; fair agreement = 0.21–0.40; moderate agreement = 0.41–0.60; good agreement = 0.61–0.80; very good agreement = 0.81–1.00. PsA = Pseudomonas aeruginosa; Staph = Staphylococcus aureus.

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Descriptive statistics and Cohen κ correlation coefficients were computed for all culture data and subgroups (Table 1A–E).

Results: Of 77 culture kits returned, 46 had corresponding clinic samples collected using the same method, and the remaining 21 were collected using different methods (throat swab vs sputum sample). Overall, approximately 200 kits were mailed to patients, with a return rate of 38.5%. A similar percentage of positive culture results was obtained with the same method of collection: sputum and throat samples (Table 1C, D, E), although the discordance rate between cultures collected in clinic and at home ranged from approximately 10% to 30%. Correlation between clinic and home culture data was generally good throughout, except for clinic versus home throat swabs, probably because of a low event rate in the small sample size.

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Associations between lung T1 magnetic resonance imaging, chest computed tomography, and multiple-breath washout in young children with mild cystic fibrosis lung disease
C. Ren1, J. Slaven1, S. Nars4, K. McBennett5,6, C. Flask4, 1Children’s Hospital of Philadelphia, Philadelphia, PA; 2Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA; 3Department of Biostatistics and Health Data Science, Indiana University School of Medicine, Indianapolis, IN; 4University of Michigan, Ann Arbor, MI; 5Department of Pediatrics, Case Western Reserve University, Cleveland, OH; 6University Hospitals Cleveland Medical Center, Cleveland, OH; 7Case Western Reserve University, Cleveland, OH

Background: Structural and physiologic evidence of lung disease is present in a large proportion of children with cystic fibrosis (CF) even in the setting of normal forced expiratory volume in 1 second. Chest computed tomography (CT) can detect changes in lung structure in children with CF, but it exposes them to ionizing radiation. Multiple-breath washout (MBW) can detect ventilation inhomogeneity in children with mild CF lung disease, but it can be time consuming to perform and requires a high degree of operator expertise. Lung T1-magnetic resonance imaging (MRI) can assess pulmonary perfusion and can be quickly performed on clinical MRI scanners using conventional acquisitions and no inhaled or injectable MRI contrast agent. We hypothesized that lung T1-MRI is a sensitive measure of early and mild lung disease in children with CF. To test this hypothesis, we performed T1-MRI, chest CT, and MBW in a cohort of children with CF aged 6 to 11.

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