Adherence and Asthma Control in Patients Using FF/VI With and Without an Inhaler Sensor

Richard H Stanford, PharmD, MSc, Carleigh M Arnett, MS, PhD, Phefela T Johnson, MSc, Erin Buysman, MS*, Maureen Carlyle, MPH

At a glance

- Asthma is a major cause of mortality in the U.S. and imposes a substantial burden on patients and payers. As such, understanding patients’ adherence to prescribed therapies is essential to determining whether they are receiving the full clinical benefit of their medication.

- New advances in technology, such as remote inhaler sensors, are providing much needed insight into patients’ actual use of prescribed therapies in real-time, using data tests that are unobtrusive, accurate, and have minimal patient burden.

- The objective of this study was to examine descriptively the effect of sensor technology on adherence, usability, and asthma control among adult patients on twice-daily Ellipta inhaler-based fluticasone furoate/viomepaone (FF/VI).

Methods

- A prospective administrative claims-linked, 6-month observational study

- Patients who met the following criteria were identified in the Optum Research Database in July 2017 using medical and pharmacy claims data from June 1, 2016 to May 31, 2017:
  - ≥18 years of age
  - ≥1 FF/VI and ablator metered dose inhaler (MDI) dispensing in the prior 6 months of the identification period
  - Continuous and current enrollment in Optum affiliated health plans during the 12-month identification period

- Had no COPD-related diagnosis code during the identification period

- Subjects were asked to complete a baseline mailed survey; followed by web surveys at 3, and 6 month follow-up to collect patient reported measures, including the Asthma Control Test (ACT).

- Subjects were asked to utilize Propeller Health sensors with their ablator MDI and FF/VI Ellipta devices for the 6-month follow-up period, to capture the date, time, and number of FF/VI and ablator MDI actuations in real-time.

- Specialty pharmacy dispensing data for the 6-month follow-up period were examined to assess inhaler treatment patterns, including mean number of dispensations, proportion of days covered (PDC), and the percent with asthma medication ratio (AMR) ≥ 0.50.

- Study Arms:
  - Sensor Arm: Subjects who received and used the propelled Propeller Health sensors and data hub for ablator MDI and FF/VI Ellipta devices over the 6-month period and were asked to complete the surveys at baseline, 3 months, and 6 months
  - No-Sensor Arm: Subjects who opted-out of sensor use but were asked to complete the surveys at baseline, 3 months, and 6 months

Results

- Subjects enrolled in the Sensor arm and 61 enrolled in the No-Sensor arm.

- Baseline characteristics were similar between the Sensor and No-Sensor arms:
  - mean age 47.1 vs 46.0 years, percent female 64.8% vs. 70.5%, baseline mean ACT scores (SD) 19.1 (3.90) vs. 19.6 (4.26), and ACT ≥ 20 was 54.3% vs. 63.9%, respectively (Table 1).

- Type 2 Diabetes Comparison

<table>
<thead>
<tr>
<th>Type 2 Diabetes</th>
<th>No Sensor</th>
<th>Sensor</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Mean (SD) Years)</td>
<td>64.57 (12.09)</td>
<td>64.18 (12.09)</td>
<td>0.863</td>
</tr>
<tr>
<td>Black</td>
<td>9.90</td>
<td>10.2</td>
<td>0.828</td>
</tr>
<tr>
<td>Native Hawaiian/Pacific Islander</td>
<td>4.92</td>
<td>5.79</td>
<td>0.995</td>
</tr>
<tr>
<td>Other</td>
<td>45.69</td>
<td>37.34</td>
<td>0.240</td>
</tr>
</tbody>
</table>

- Sensitivity analysis: Subjects monitored in the Sensor arm and 61 enrolled in the No-Sensor arm.

- Baseline characteristics were similar between the Sensor and No-Sensor arms:
  - mean age 47.1 vs 46.0 years, percent female 64.8% vs. 70.5%, baseline mean ACT scores (SD) 19.1 (3.90) vs. 19.6 (4.26), and ACT ≥ 20 was 54.3% vs. 63.9%, respectively (Table 1).

- Type 2 Diabetes Comparison

<table>
<thead>
<tr>
<th>Type 2 Diabetes</th>
<th>No Sensor</th>
<th>Sensor</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Mean (SD) Years)</td>
<td>64.57 (12.09)</td>
<td>64.18 (12.09)</td>
<td>0.863</td>
</tr>
<tr>
<td>Black</td>
<td>9.90</td>
<td>10.2</td>
<td>0.828</td>
</tr>
<tr>
<td>Native Hawaiian/Pacific Islander</td>
<td>4.92</td>
<td>5.79</td>
<td>0.995</td>
</tr>
<tr>
<td>Other</td>
<td>45.69</td>
<td>37.34</td>
<td>0.240</td>
</tr>
</tbody>
</table>

- Claims Identified Treatment Patterns during a 6-Month Follow-Up Period:

- Mean FF/VI Ellipta pharmacy dispensings were significantly higher in the Ellipta Sensor arm vs. the No Sensor arm. In comparison, mean ablator MDI canister dispensings were higher in the No Sensor arm vs. the Ellipta Sensor arm. This difference was not statistically significant (Figure 1).

- Figure 1. Pharmacy claim dispensings over 6-month follow-up period

- Individual significant measures in the Ellipta Sensor arm had an AMR ≥ 0.5. (Figure 2)

- The mean PDC was also significantly higher in the Ellipta Sensor arm than the No Sensor arm. (Figure 2).

- Figure 2. Pharmacy claims AMR and PDC data over 6-month follow-up period

- Survey-Based Outcomes during a 6-Month Follow-Up Period:

- Mean ACT score change from baseline and percent of patients with improvement in ACT score ≥ 3 points or change in ACT to ≥ 20 points overall were not statistically different between the two groups but higher in the Sensor arm (Figure 3)

- Figure 3. Survey response data over 6-month follow-up period

- Sensor-derived control over adherence was significantly less than claims-derived PDC (0.61 and 0.69 respectively, p = 0.001). Similarly, Sensor-derived mean controller dose count adherence was significantly less than claims-derived PDC (0.58 and 0.69, p = 0.001).

- As shown in Figure 4, approximately 60% of Ellipta Sensor patients acted their controller medication and received a sufficient controller dose for at least 50% of the follow-up period. Over 30% of patients were adherent to their controller medication for at least 80% of the follow-up period.

- Figure 4. FF/VI Ellipta Sensor data over 6-month follow-up period (N = 127)

Conclusions

- This exploratory study shows that patients using a sensor that monitors their medication-taking behavior may be more likely to use their controller therapy, which could further improve asthma control and reduce ablator use.

- Limitations of this study are rooted in the survey design, as all surveys may be subject to sampling error, coverage error, and measurement error. Participants in this study were selected from among those with commercial coverage in a national health plan, which may not be representative of a sample of all asthmatic patients.

Acknowledgments

- The authors acknowledge their research associates, image authors, and funders. RJH, MAA, and MR are employees of Optum, a consulting company. SJ has received research funds from GSK.

- This study was funded by GSK (2091419-0001).

Presented at the American Thoracic Society 2019 Meeting, Dallas, TX, USA, May 17-22, 2019

Post No. 1012A5930

GSK, Research Triangle Park, NC, USA, “Optum”