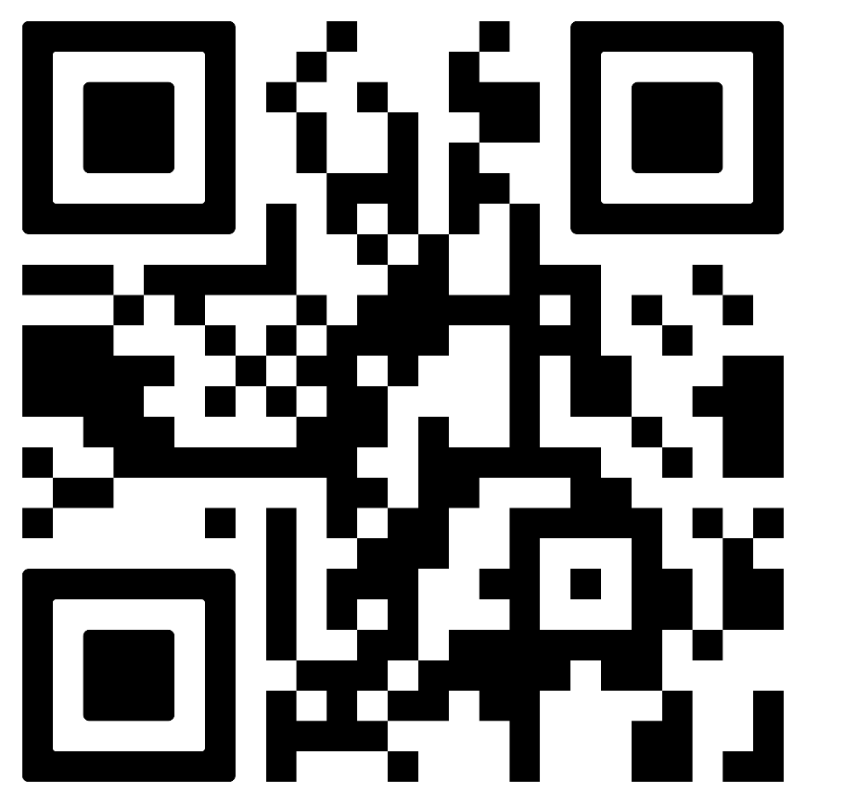


Evaluating Patient Preferences for COPD Maintenance Treatment Delivery Devices: a Discrete Choice Experiment

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INTRODUCTION

- Chronic obstructive pulmonary disease (COPD) management includes lifestyle interventions and maintenance therapy with bronchodilators and anti-inflammatory medications, typically delivered via:
 - Handheld inhalers:** handheld portable devices that deliver a quick, premeasured dose of medication and require proper user technique including timing inhalation with device actuation, and/or inhalation of significant strength.¹
 - Nebulizers:** devices that convert liquid medication into a fine mist, which is inhaled by the user breathing naturally through a mouthpiece or mask for several minutes and typically requiring a power source and regular maintenance/cleaning.¹
- Understanding patient preferences for maintenance treatments delivered by inhalers or nebulizers may help support more personalized COPD management and provide valuable insights for clinicians and decision-makers.²

OBJECTIVES

- To assess preferences for attributes of COPD maintenance treatment devices among people living with COPD.
- To examine how preferences for device features vary by key clinical and demographic participant characteristics.

METHODS

Study Population and Informed Consent

- Study was approved by WCG IRB on 7/11/2025.
- Study sample were adults in the United States with self-reported COPD ≥2 years and experience using inhaled and nebulized maintenance medications outside a hospital setting.
- Recruited via the COPD Foundation through social media, email, and newsletters.
- Interested individuals completed an online screening questionnaire to confirm eligibility criteria (e.g. COPD diagnosis, experience with nebulized and inhaled therapies), and to capture demographics (recruitment was tracked against target quotas to ensure sample representativeness).

Discrete Choice Experiment (DCE) and Participant Questionnaires

- Eligible participants completed an online survey containing a discrete choice experiment (DCE), consisting of four blocks with 11 choice sets each; each participant completed one block, comparing hypothetical COPD treatment device profiles across six attributes (Figure 1).
- Additional questions collected clinical and demographic information to characterize the sample and support subgroup analyses.
- Questions on disease severity were designed based on the modified Medical Research Council Dyspnea scale [mMRC] and Global Initiative for Chronic Obstructive Lung Disease [GOLD] categories.³

Figure 1. DCE: Example Choice Set with Description

Question 1 out of 13	Levels	Example choice set	
		Device A	Device B
<p>Device effectiveness</p> <p>Device effectiveness refers to how well the device delivers medication to your lungs and airways when it is used properly. When medication is delivered more effectively, it can lead to:</p> <ul style="list-style-type: none"> Better symptom relief making it easier to breathe by reducing symptoms (shortness of breath, cough, increased mucus, wheezing, chest tightness) Making it easier to carry out daily activities like walking, cooking, or socializing with less disruption from symptoms <p>Risk of ineffective use: some devices require good hand control or finger strength, which can be hard for people with hand weakness or trouble with hand control. Others may require strong, deep breaths to get the full dose of medication. If the device is too hard to handle or breathe in from, it may not be used correctly, which can reduce how well it works and lead to poor symptom control</p>	Low, moderate, and high effectiveness	Low effectiveness	High effectiveness
<p>Administration time</p> <p>Administration time is the total time it takes to take a dose of maintenance treatment, including all the steps involved before, during, and after use. Some treatments can be taken quickly and easily, while others may require multiple steps or detailed instructions. Certain treatments also require extra time for cleaning or care after use. If these steps are not followed properly, there may be an increased risk of infection</p>	30 seconds, 10 minutes, 30 minutes and 60 minutes	Thirty seconds	Sixty minutes
<p>Dosing frequency/ duration of effect</p> <p>Dosing frequency is how often you need to use the device (i.e., once a day, twice a day). It is directly related to duration of effect, or how long the treatment continues to relieve symptoms like shortness of breath, coughing, or chest tightness between doses</p>	0, 2x, 4x and 6x/day	Once per day	Six times per day
<p>Out-of-pocket costs</p> <p>This cost includes what you pay out-of-pocket monthly to take your maintenance treatment with this device</p>	\$0, \$25, \$50, \$100, \$300	\$0/month	\$300/month
<p>Portability</p> <p>Portability refers to how easy it is to carry and use the treatment when you are away from home. This includes factors like the size and weight of the device, how easy it fits in a bag or pocket, and whether it needs a power source to use</p>	Pocket portable/no power, bag portable/no power, bag portable/power, not portable	Pocket-portable, no power needed	Not portable
<p>Environmental impact</p> <p>The environmental impact of the treatment includes the carbon footprint (amount of greenhouse gases it creates including when it's produced), whether it contains a propellant, and whether the device can be reused or creates a lot of landfill waste</p>	Low, moderate and eco-friendly	Eco-friendly	Low eco-friendliness

Analysis

- Participants who failed the dominance (i.e., did not select the clearly superior option) or engagement (e.g., demonstrated side bias across the choice sets) checks were removed from analyses.
- Conditional logistic regression models were used to estimate preference weights of levels within each attribute, relative to the least desirable level of each attribute; reported as odds ratios (ORs) with 95% confidence intervals (CIs) and p-values (<0.05 considered statistically significant).
- Relative importance of each attribute was calculated as a percentage contribution to overall decision-making, based on the coefficients within each attribute.
- Stratified analyses explored variation by symptom severity, age, arthritis status, geographic region, insurance status and median neighborhood household income.⁴

RESULTS

- The analytic dataset included 269 participants (mean [standard deviation] age 63 [15] years; 43% women).
- Daily symptom severity (mMRC definition) was reported as mild by 34% and as moderate or severe by 66% of participants.

Overall DCE Results

- Device effectiveness (28%) and cost (24%) were found to be most important in hypothetical treatment decision making. Portability (15%), eco-friendliness (14%), and dose frequency (13%) were of moderate importance; administration time (6%) ranked lowest (Figure 2).

Figure 2. Relative Importance of DCE Attributes

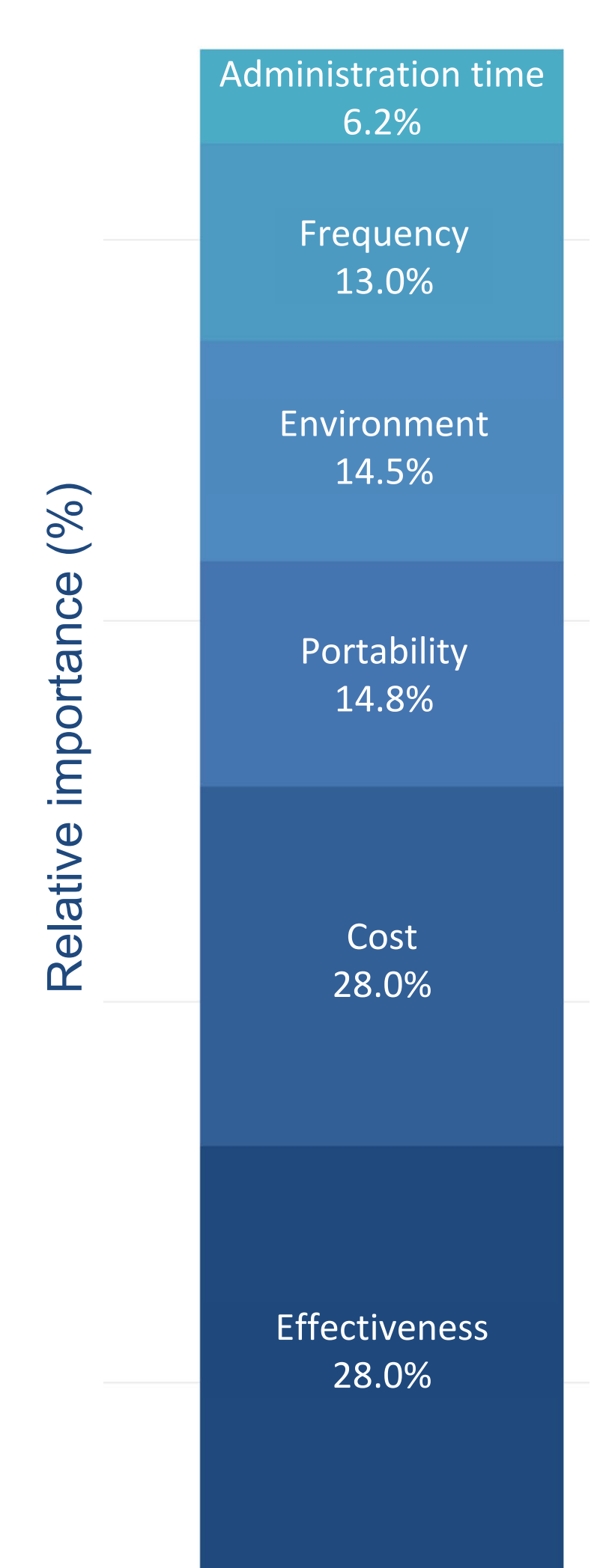
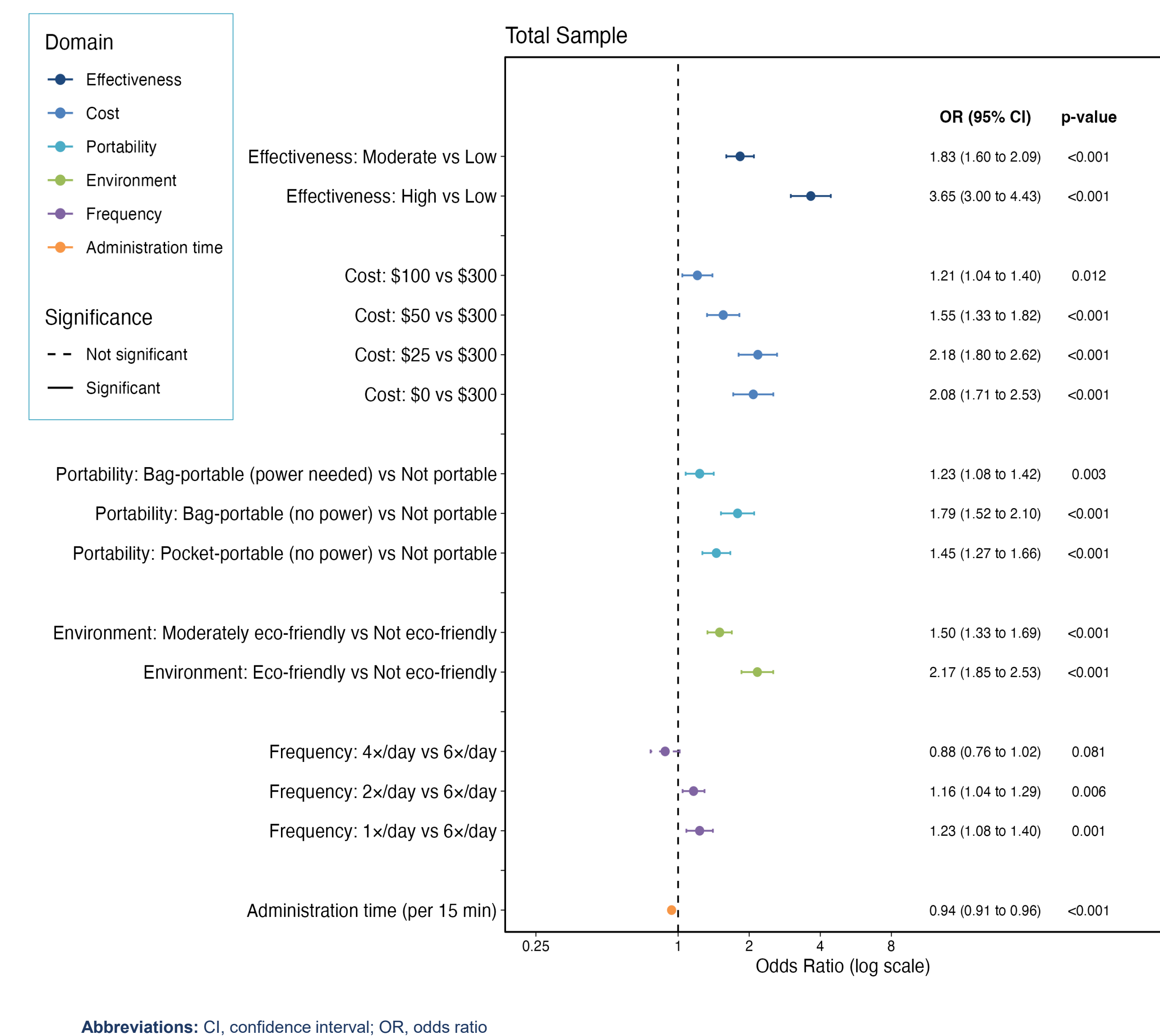


Figure 3. DCE Results: Forest Plot



- All comparisons (Figure 3) were significantly different from the reference level at $\alpha=0.05$, indicating a greater odds of preferring that level, except preference for 4x vs. 6x frequency of administration, which was not significantly different.
- Descriptive trends in the data included:
 - Device effectiveness:** Participants were 3.6X more likely to prefer a device with high effectiveness over one with low effectiveness, roughly double the likelihood of preferring a device with moderate vs. low effectiveness. Participants strongly favored the most effective treatment device options.
 - OOP costs:** From \$300/month to \$25/month participants showed greater preference as the device had decreasing monthly cost, except that there was no preference for \$25 vs \$300 compared to \$0 vs \$300.
 - Portability:** Participants were generally more likely to prefer more portable devices; however, they showed no difference in preference for bag-portable devices vs pocket-portable devices.

Stratified DCE Results

- Stratification by participant clinical and demographic characteristics resulted in statistically significant differences in the strength of preferences for device effectiveness, monthly costs, portability, eco-friendliness, administration time (Figure 4); see supplementary data for detailed results.

Figure 4. Discrete Choice Experiment: Stratified Results

DEVICE EFFECTIVENESS
Participants:

- With moderate or severe daily symptoms (based on mMRC grade ≥2)
- With arthritis
- From higher income neighborhoods (>\$160,000 median per household)
- Whose COPD treatments were fully or mostly covered by insurance

Preferred more effective devices more than those without these traits

COST
Participants:

- Who were older (>65 years)
- With multiple annual exacerbations and/or hospitalizations (based on GOLD category E)
- Living in Northeastern US

Preferred devices with lower monthly costs more than those without these traits

PORTABILITY
Participants with:

- Multiple annual exacerbations and/or hospitalizations (based on GOLD category E)

Preferred more portable devices more than those with less severe (GOLD category A or B)

ECO-FRIENDLINESS
Participants with:

- With mild disease (based on mMRC grade 0-1)
- 1 or 0 exacerbations and no hospitalizations (based on GOLD category A or B)

Preferred eco-friendly devices more than those with more severe COPD symptoms

ADMINISTRATION TIME
Participants with:

- Arthritis

Preferred to use devices with shorter administration times more than those without arthritis

CONCLUSIONS

LIMITATIONS

- Comparability with other DCEs that used different attributes or levels may be limited.
- Relative attribute importance depends on study design including attribute and level selection, and analytic methods and should be interpreted with caution.
- As choice sets are hypothetical, findings may not reflect real-world behavior.
- Online surveys carry a risk of fraudulent responses; mitigation strategies included CAPTCHA verification and extensive data quality checks.

CONCLUSIONS

- Device preferences were driven strongly by effectiveness and monthly OOP costs, while administration time was least important.
- Preferences for treatments with \$0 versus \$25 monthly OOP costs were similar, suggesting minimal sensitivity within this lower cost range.
- These results may help clinicians select treatments aligned with patient preferences.

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