# Patient Preference For, And Satisfaction With, Pressurized Metered Dose Inhalers

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**Citation**

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**Abstract**

Patient preference and satisfaction should be considered when prescribing inhaler devices, since these attributes may influence treatment concordance, facilitate correct handling and improve clinical outcomes. The aim of this study was to investigate pressurised metered dose inhaler (pMDI) characteristics important to asthma patients, and to compare a new long-acting 2-agonist/inhaled corticosteroid (LABA/ICS) pMDI with other pMDIs with respect to these characteristics. This was an open-label, cross-sectional, quantitative UK survey of asthma patients prescribed a new LABA/ICS pMDI or other pMDI. Eligible patients completed a survey using computer-assisted web interviewing. The survey was divided into 4 sections: (i) baseline information (ii) most important pMDI attributes, (iii) pMDI satisfaction and (iv) impact on asthma control. Items ii-iv were rated using a Likert scale – attributes: 1 (not important), 10 (very important); satisfaction: 1 (not satisfied), 10 (very satisfied); asthma control: 1 (don't agree), 10 (fully agree)). Results are expressed as % of respondents rating a 9 or 10 on these Likert scales. 81 people with (63% female; mean age: 36.9 (12.3) yrs) completed the survey. Compared to other pMDIs, users found the new LABA/ICS pMDI superior for ease of use (76% vs 58%), mouthpiece size (80% vs 53%), sensitive dose counter (68% vs 50%), and good quality-to-price ratio (55% vs 27%). More users reported that they were very satisfied with the new LABA/ICS pMDI (59%) vs other pMDI users (45%), and perceived that it provided greater asthma control (68% vs 50%). The proportion of patients very satisfied with their device increased from 27% to 59% when switched to the new LABA/ICS pMDI. By contrast, user satisfaction rating remained the same when switching from, and to, other pMDIs (approx. 45%). The new LABA/ICS pMDI was assessed positively and better than other pMDIs for almost all of the characteristics most relevant to users.

## INTRODUCTION

Inhalation is the preferred route for delivering asthma drugs, due to drug targeting directly to the lungs, a more rapid onset of action and a better efficacy to safety ratio compared to systemic options.[1] However, adherence to asthma treatment regimens is notoriously poor, with an estimated 50% of adults and children on long-term asthma therapy failing to adhere to their treatment regimen,[2] rising to 57% for older adults.[3] Non-adherence predicts failure of patients to achieve and maintain their treatment goals and also results in poor quality of life outcomes.[4]

Satisfaction with and/or preference for an inhaler device may predict treatment continuance, appropriate medication use and compliance in asthmatic patients.[5,6] A systematic literature review exploring links between treatment satisfaction and adherence, and/or persistence with prescribed treatments among patients with multiple diseases or disorders suggested that greater treatment satisfaction is associated with improved compliance and persistence with medication.[7] Inhaler satisfaction and ease of use may also facilitate correct handling,[8,9] and improved clinical outcomes.[10] This is important since patients who are able to use pMDIs correctly have better asthma control as defined by the Global Initiative for Asthma.[1] Furthermore, poor inhaler technique is associated with increased healthcare resource use and poor disease control.[11] It is, therefore important to consider usability, preference, confidence and patient satisfaction when prescribing an inhaler device.

A recent analysis revealed that nearly 50% of all inhaler devices prescribed in Europe were for pMDIs.[12] This is certainly the case in the UK, where cost appears to be a major consideration for UK health service managers in directly prescribing by primary care health professionals.[13,14] A new long-acting 2-agonist/inhaled corticosteroid

(LABA/ICS) pMDI (Sirdupla™/Serkep™/ Serzyl™, Mylan Inc., USA) has recently launched in many European countries. It contains the LABA salmeterol and the ICS fluticasone propionate,[15] and is a therapeutically equivalent alternative to the Seretide® Evohaler® at equivalent doses.[16] Sirdupla™ is indicated for the regular treatment of asthma where use of a combination product (i.e. ICS/LABA) is considered appropriate; so for patients NOT adequately controlled with ICS and as needed short-acting 2-agonist OR for patients already adequately controlled on both an ICS and LABA.[15]

The aim of the current survey was to investigate pMDI characteristics important to asthma patients and to compare the new LABA/ICS pMDI with other pMDIs commonly prescribed for asthma treatment with respect to these pMDI characteristics.

## MATERIAL AND METHODS

Survey design

This was an open-label, cross-sectional, quantitative survey conducted among patients with asthma and prescribed a pMDI. It was conducted in the UK between 11th Sept and 31st Oct 2017, with surveys completed on-line at home. The geographical location of respondents is shown in Table 1. Participants were recruited by physicians and pharmacists and also using an online patient panel (Toluna). Eligible patients were informed about the survey and, if interested, contacted Doxa Pharma (Milan, Italy) to obtain the survey link via email, in accordance with privacy and ethical guideline laws governing the conduct of market research in the UK. Eligible patients completed the survey using computer assisted web interviewing. The program allows inclusion of pictures, audio and video clips, and links to different web pages, etc. The website is able to customize the flow of the questionnaire based on the answers provided, as well as information already known about the participant.[17] Informed consent was collected using the computer assisted web interviewing system. Individuals received a fee of £25 for completing the survey, or points according to the patient panel provider scheme. Physicians and pharmacists did not receive remuneration.

Patients

To be eligible for the study, participants were required to be asthmatic (self-reported), aged 18 years old or older and prescribed a new LABA/ICS pMDI (i.e. Sirdupla™) or other pMDI (i.e. Seretide, Fostair, Sereflo or Flutiform pMDI). Participants were also required to understand, provide consent and complete the survey.

Questionnaire development and scoring

The survey questions were developed by Doxa Pharma (in consultation with Mylan Inc.) based on expertise in the asthma segment and on previous qualitative and quantitative studies conducted with both healthcare providers and patients. The full survey is provided in the appendix. Content was sub-divided into the following sections, (i) respondent baseline information and demographics; (ii) assessment of most important pMDI attributes; (iii) satisfaction with pMDI – overall, for individual pMDI attributes as well as for those patients who had switched pMDI and (iv) impact of pMDI on asthma control.

Important pMDI device drivers were scored on a 1-10 Likert scale with 1 = not important at all and 10 = ‘very important’. Overall satisfaction with pMDI and satisfaction with individual pMDI attributes were rated on a 1-10 Likert scale with 1 = not satisfied and 10 = very satisfied. Satisfaction with previous device was also assessed in a sub-set of participants who had switched device. Impact on asthma control was assessed in response to pre-defined statements and scored on a Likert scale from 1 = don’t agree to 10= fully agree.

Endpoints

*The most important device drivers*

The % of respondents (of the total population) who scored ‘9’ or ‘10’ (i.e. very important) on the importance scale for each of 17 pMDI device attributes was recorded.

*Satisfaction*

Device satisfaction was assessed overall and for each of the individual pMDI attributes and compared between groups. Overall satisfaction was also compared to a previous pMDI for those users who had switched. Overall satisfaction was categorized as follows: 9-10: very satisfied; 7-8: somewhat satisfied: 1-6: not at all satisfied, and the proportion of subjects in in each category calculated. The mean satisfaction score was also determined. For individual device attribute satisfaction, the percentage of respondents who scored a ‘9’ or ‘10’ (i.e. very important) on the satisfaction scale for each attribute was recorded.

*Impact on asthma control*

The % of respondents who scored a '9' or '10' indicating strong agreement with asthma control statements was recorded and compared between groups.

*Other endpoints*

The proportion of patients who would recommend the device and would continue to use it was also captured.

## STATISTICAL ANALYSES

Based on previously conducted surveys, a total sample size of 80 asthmatics was considered sufficient to provide a representative sample of pMDI users and to enable statistical comparison. Patient baseline and demographic data were summarized descriptively as mean (standard deviation) or n (%). All statistical comparisons were performed at a 2-sided, 10% alpha level using the Student's t-text. A p-vale of <0.1 was considered statistically significant.

## RESULTS

Baseline characteristics

Baseline demographics are presented in Table 1. Most patients were female (63%). The mean age and duration of asthma was 36.9 (12.3) years and 9.8 (8.9) years, respectively. The current asthma medication used by patients is shown in Figure 1.

Most important pMDI attributes and assessment of pMDIs based on these attributes

The 3 pMDI characteristics considered most important by patients (expressed as % of patients who scored a '9' or a '10' for these characteristics on the Likert importance scale) were that it, (i) is handy to carry; (ii) is easy to use; and (iii) helps to better comply with asthma treatment (Figure 2A, bar chart). Device characteristics which were not so important were, differentiation from other devices, and aesthetic attractiveness (Figure 2B, bar chart). The new LABA/ICS pMDI was assessed positively by patients and better than other pMDIs for almost all of the pMDI characteristics most relevant to users (Figure 2A and 2B line plot). Significantly more respondents assessed the following attributes as very important (i.e. scored a '9' or a '10') for the new LABA/ICS pMDI vs other pMDIs: ease of use (76% vs 58%); mouthpiece is large enough to allow better atomization (80% vs 53%); dose counter moves forward with each dose (68% vs 50%); and doesn't slide out of hand when using it (68% vs 48%) (Figure 2A, line plot).

User satisfaction: currently and after switching

Users of the new LABA/ICS pMDI showed a greater overall satisfaction with the device reporting a mean satisfaction score of 8.7 (1.2) compared to 7.9 (1.8) for users of other pMDIs. 59% of respondents were very satisfied with the new LABA/ICS pMDI, compared with 45% of respondents who used other pMDIs. Only 2% of the new LABA/ICS users were not at all satisfied, significantly less than other pMDI users (15%; Figure 3). Survey respondents also reported a greater satisfaction shift when switched to the new LABA/ICS pMDI from a previous device; increasing from a mean satisfaction score of 6.9 (2.5) with previous pMDI to 8.7 (1.2) with the new LABA/ICS pMDI. The proportion of patients very satisfied with their device increased to 59% when switched to the new LABA/ICS pMDI (27% for previous device (Figure 4). By contrast, the user satisfaction score remained the same when switching from and to other pMDI devices (i.e. 7.9 (2.2), with the same proportion of users (approx. 45%) reporting that they were very satisfied before and after switching pMDI (Figure 4). Furthermore, 53% of new LABA/ICS users considered that it was much better than their previous pMDI, compared to 44% of other pMDI users.

Perceived impact on asthma control

The new LABA/ICS pMDI provided patients with the perception of greater asthma control vs other pMDIs (Figure 5). Significantly more users strongly agreed that using the new LABA/ICS pMDI made them feel like their asthma was under control compared to other pMDI users (68% vs 50%). Relevant differences in favour of the new LABA/ICS pMDI were also noted for handiness in managing asthma (66% of new LABA/ICS pMDI users strongly agreed with that statement vs 53% of other pMDI users); and making patients feel that they were taking care of their asthma properly (new LABA/ICS pMDI: 59%; other pMDI: 48%; Figure 5).

Other endpoints

More users of the new LABA/ICS pMDI (63%) reported they were highly likely to recommend it in the future to a friend who suffers from asthma, compared to other pMDI users (43%). Only 10% of new LABA/ICS pMDI users would be unlikely to recommend it versus 25% of other pMDI users. 97% of new LABA/ICS users reported their intention to continue using the device. 85% of users considered that the new LABA/ICS pMDI improved their everyday life, and 66% considered that it was handy and convenient.

### Table 1

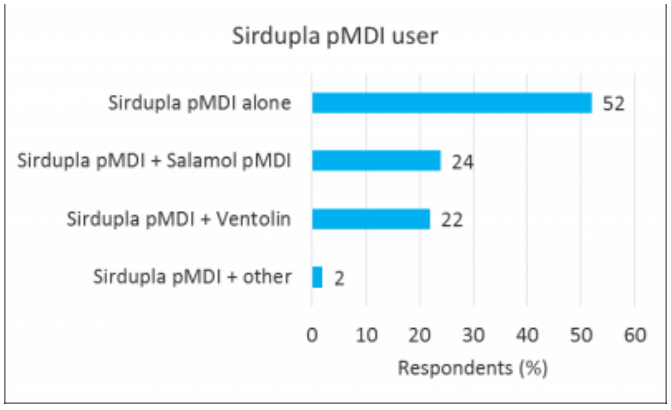
Respondent characteristics

| | NEW PMDI (N=41) | OTHER PMDIS (N=40) |
|---|---|---|
| **GENDER, N (%)** | | |
| FEMALE | 26 (63.4) | 25 (62.5) |
| **AGE, YRS** | | |
| MEAN (SD) | 37.2 (13.8) | 36.9 (12.3) |
| 18-34, N (%) | 21 (51.2) | 20 (50.0) |
| 35-49, N (%) | 14 (34.2) | 14 (35.0) |
| 50-65, N (%) | 4 (9.8) | 4 (10.0) |
| >65, N (%) | 2 (4.8) | 2 (5.0) |
| **EDUCATION LEVEL, N (%)** | | |
| DEGREE OR HIGHER | 19 (46.4) | 18 (45.0) |
| A-LEVEL | 9 (22.0) | 11 (27.5) |
| GSCE OR O-LEVEL | 9 (22.0) | 11 (27.5) |
| NONE | 2 (4.8) | - |
| PREFER NOT TO SAY | 2 (4.8) | - |
| **COUNTRY, N (%)** | | |
| ENGLAND | 30 (73.2) | 29 (72.5) |
| WALES | 2 (4.9) | 4 (10.0) |
| N. IRELAND | 9 (21.9) | 7 (17.5) |
| **DURATION OF ASTHMA, YRS** | | |
| MEAN (SD) | 10.0 (9.2) | 9.6 (8.8) |
| ≤5, N (%) | 20 (48.8) | 15 (37.5) |
| >5-10, N (%) | 9 (22.0) | 9 (22.5) |
| >10-20, N (%) | 6 (14.6) | 12 (30.0) |
| >20, N (%) | 6 (14.6) | 4 (10.0) |
| **DURATION OF DEVICE USE** | | |
| MEAN YEARS (SD) | 1.6 (0.9) | 4.4 (3.5) |
| ≤ 6 MONTHS | 8 (19.5) | 4 (10.0) |
| 7-12 MONTHS | 11 (26.8) | 4 (10.0) |
| >1-2 YRS | 12 (29.3) | 9 (22.5) |
| >2 YRS | 10 (24.4) | 23 (57.5) |

**Abbreviations:** pMDI: pressurized metered dose inhaler; SD: standard deviation
New pMDI: fluticasone propionate/salmeterol (Sirdupla™, Mylan Inc)

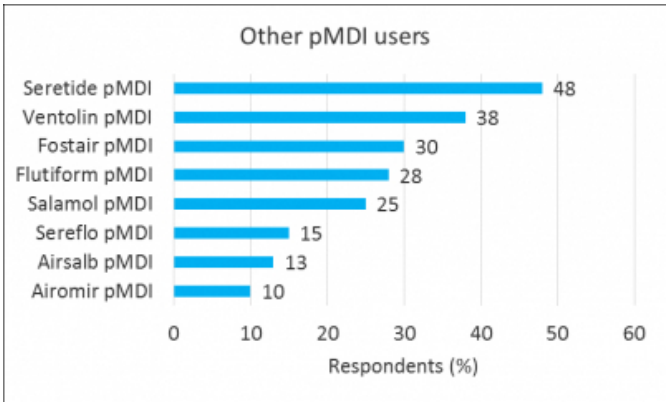
### Figure 1

Asthma pMDI(s) used by respondents in the (A) new pMDI (n=41) and (B) other pMDI groups (n=40). Results are expressed as % of respondents in each group. Sirdupla, Seretide and Sereflo: salmeterol/fluticasone propionate; Fostair: formoterol + beclomethasone dipropionate; Flutiform: formoterol + fluticasone propionate; Salamol, Ventolin, Airsalb and Airomir: salbutamol. pMDI: pressurised metered dose inhaler.

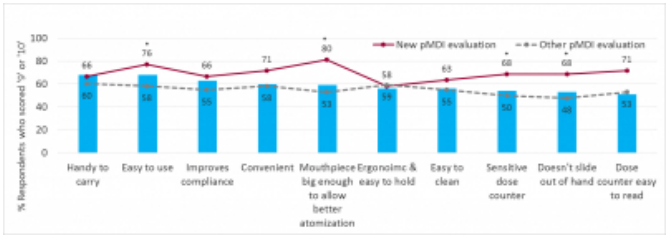



### Figure 2

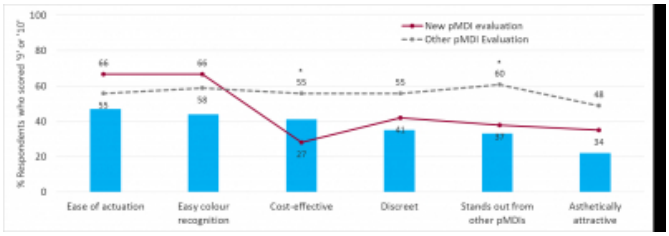
pMDI characteristics considered by patients to be most important (bars; n=81) and patient assessment of their pMDI for each of these characteristics (line plot: new pMDI (n=41); other pMDIs (n=40)). A: most important pMDI characteristics; B: less important pMDI characteristics. Data point labelling is for line plots. Importance of pMDI attributes was rated from 1 (not important) to 10 (very important). Patient satisfaction for each of these attributes was rated from 1 (not satisfied) to 10 (very satisfied). All results are presented as % of respondents who selected 9 or 10 on these scales. * p<0.10 vs other pMDI; New pMDI (Sirdupla™, Mylan Inc.).




### Figure 2a

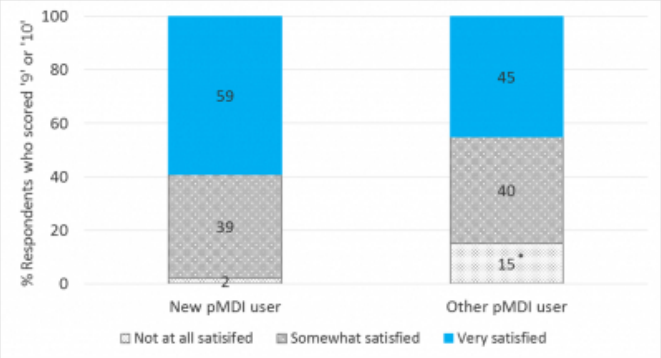



### Figure 2b



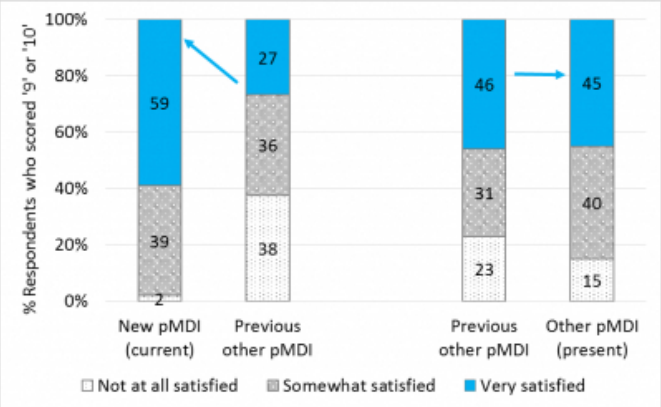
### Figure 3

Overall satisfaction with new pMDI (n=41) and other pMDIs (n=40). Satisfaction was rated from 1 to 10 and categorized as: very satisfied: 9-10; somewhat satisfied: 7-8; Not at all satisfied 1-6; Results are expressed as the % of patients within each of these categories. * p<0.10 vs new pMDI. New pMDI (Sirdupla™, Mylan Inc.)



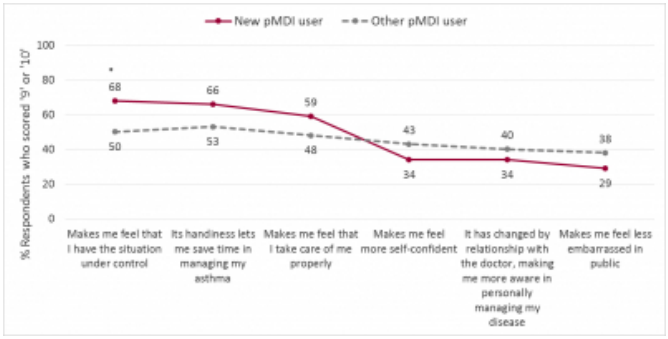

### Figure 4

Satisfaction with new pMDI (n=34) and other pMDIs (n=27) when switched. Satisfaction was rated from 1 to 10 and categorized as: very satisfied: 9-10; somewhat satisfied: 7-8; not at all satisfied: 1-6. Results are expressed as the % of patients within each of these categories. New pMDI (Sirdupla™, Mylan Inc.)




### Figure 5

Impact of new pMDI (n=41) and other pMDIs (n=40) on perception of asthma control and asthma management. These statements are rated from 1 (don't agree) to 10 (fully agree). Results are presented as % of respondents who selected 9 or 10 on this scale. * p<0.10 vs other pMDI. New pMDI (Sirdupla™, Mylan Inc.)




## DISCUSSION

It is important to measure satisfaction and preference for inhaler device features as part of the post-marketing period in a real-world context. This study is novel as it associates pMDI characteristics which users consider to be important and patient satisfaction with these characteristics for a new LABA/ICS pMDI compared to other pMDI devices. The new LABA/ICS pMDI was assessed positively and better than other pMDIs for almost all of the characteristics most relevant to pMDI users, particularly ease of use, mouthpiece size, and sensitivity of dose counter. More users of the new LABA/ICS pMDI reported that they were very satisfied with the device vs other pMDI users, and felt that it provided greater asthma control. More patients switched to the new LABA/ICS were very satisfied with this switch than those switched to other pMDIs. Finally, more patients would recommend the new LABA/ICS pMDI to a fellow asthma sufferer, and reported that they intended to continue using it, considering it to be a handy and convenient device.

Patient preference and satisfaction are important determinants when considering which inhaler device to prescribe. Other surveys agree with our findings, reporting that inhaler attributes which patients consider important are ease of use, consistent drug delivery, presence of a dose counter and provision of feedback of performance, dose delivered and number of remaining doses.10, 18, 19 Ease of use is important when one considers that preventers are used daily and relievers need to be easy to use during an emergency.1 Patients also report that smaller sized inhalers are important for convenience, and this is linked to improved adherence due to their portability.18 Here, pMDI devices

have the advantage over dry powder inhalers (DPIs). Also, whereas patients using DPIs report that loading the dose is a troublesome step for them, followed by concerns about the difficulty of inhaling a dose during an attack, pMDI users perceive that their device is easy to use.18

Satisfaction with and preference for inhaler devices also has implications in terms of improved adherence, improved device handing and improved treatment outcomes. 7, 10 20 Indeed, reporting of patient inhaler satisfaction is becoming more common and is frequently included as a patient-reported outcome in clinical trials involving patients with asthma. Barbosa and colleagues7 conducted a systematic literature review (Jan 2005 to Nov 2010) assessing compliance, adherence or persistence and treatment satisfaction, and identified 20 articles which fulfilled inclusion criteria. All these studies showed a positive association between treatment satisfaction and adherence, compliance or persistence. Furthermore, a cross-sectional study of consulting patients from five European counties 20 showed that for the majority of patients the higher the level device satisfaction the more likely the patient was observed to be compliant. This is an important finding since medication adherence is predictive of clinical outcomes,21 with nonadherence to asthma medications associated with poor control, exacerbations, hospitalizations, and declines in lung function.22 Device satisfaction has also been associated with improved handling and less inhaler errors.23, 24 Indeed the Global Initiative for Asthma (GINA) guidelines highlight the importance of correct inhaler technique, the need for regular re-training and recommend use of the same device across asthma medication classes when possible.1

Patients who are satisfied with their inhaler device also tend to have better disease outcomes. 10 20 For example, a prospective, cross-sectional survey of 243 patients revealed that more favourable clinical outcomes, including better asthma control, improved sleep quality, better overall health status and lower frequency of asthma exacerbations, were associated with greater patient satisfaction with drug delivery. Attributes associated with device satisfaction included patient perceptions of consistency in the amount of drug delivery to the lungs, ease of use and feedback about the number or remaining doses.10 Small et al20 also reported that the higher the level of satisfaction that patients report for their device the higher the likelihood of experiencing better outcomes including quality of life, fewer exacerbations ($P<0.001$), fewer hospital visits ($P=0.011$), fewer healthcare visits ($P=0.001$), fewer primary care physician visits ($P=0.001$), and fewer sleep disturbances ($P<0.001$). Therefore, healthcare providers should ensure that patients are satisfied with their asthma inhaler device in order to achieve optimal clinical outcomes.

Limitations of this study include the fact that the sample was a convenience sample intended to represent asthma patients using the new LABA/ICS pMDI. Furthermore, patients were self-selected into the study, asthma was not physician-diagnosed, and neither disease severity nor presence of co-morbid conditions were accounted for. The use of a web-based survey may also have introduced bias in patient selection. However, although the use of the internet by certain groups has been traditionally low (e.g. elderly, low socioeconomic background), the number of internet users in general terms has increased steadily25. Furthermore, internet surveys are generally accepted as an appropriate method of participant identification and survey administration.26 Although the sample size was small, there was good representation according to age, educational level and duration of asthma, such that the findings presented here may be generalizable to pMDI users in routine clinical practice. The key strength of the study derives from the fact it identified key pMDI attributes considered important to patients and contextualised these findings with patient satisfaction with these same attributes for a new LABA/ICS pMDI as well as for other pMDIs.

In conclusion, the new LABA/ICS pMDI was assessed positively and better than other pMDIs for almost all of the characteristics most relevant to users. Among treatments with similar effectiveness, it is inhaler preference and satisfaction which may make the difference in terms of improved handling, concordance with treatment regimens and ultimately clinical outcomes.

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Author contributions

LM and CF made substantial contributions to the work; LM and CF (conception and design), BC and AP (data acquisition and analysis) and AP (data interpretation). Furthermore, all authors were involved in drafting the work and revising it critically, provided final approval for it to be published and agreed to be accountable for all aspects of the work.

Disclosure

Carlos Fernandez Sàez: an employee of Mylan, Spain

Barbera Cervella: an employee of Doxapharma, Italy

Andrea Parachini: an employee of Doxapharma, Italy

Leopoldo Masserini: an employee of Mylan, Italy

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