

Impact of real time feedback from inhalation devices on patient satisfaction and adherence

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Summary

Inhaler use errors and poor compliance are the most common reasons for failures in inhalation treatments. Correct inhaler technique is key for effective treatment with inhalation devices, but many patients fail to use inhalation devices correctly even after training and education. Inhalation devices, which guide patients on correct inhalation technique by design may reduce inhalation errors resulting in a higher patient satisfaction, better adherence and improved treatment outcomes. Smart nebulisers such as Breelib™ and AKITA® JET improve inhalation technique by providing real-time feedback to patients on correct inhalation steps. Both inhalers guide patients to an optimum inhalation inspiratory flow rate and volume and help them to avoid errors to achieve an effective delivery of aerosols to periphery of the lungs. This analysis assesses patient satisfaction and treatment compliance from two different studies. Patient satisfaction and ease of use of the device was assessed in a study in PAH patients inhaling Iloprost via Breelib™, a novel smart nebuliser. The study showed that patients were highly satisfied with the use of Breelib™. Patients found that the device was easy to use and the treatment time per treatment session was reduced by 8.3 min when using Breelib compared to a standard device. In a second study treatment compliance was assessed in patients with severe asthma being treated with budesonide inhalation suspension via AKITA JET. Total dose compliance over all patients was 82%. Together, these findings suggest that smart nebulisers that guide patients on correct inhalation technique and monitor treatment adherence, can improve patient satisfaction, which may result in better adherence and improved clinical outcomes in patients.

Key Message

Inhalation devices such as AKITA® JET and Breelib™ guide patients on correct inhalation technique, improve drug delivery to peripheral airways [1-6], and monitor treatment compliance. Observed ratings in relation to the inhalation feedback from the device indicate that patients positively perceived guidance on flow rate and inhalation volume. Particularly in indications such as severe asthma and PAH, the smart nebulisers studied herein provide meaningful advantages for patients in their daily therapy, which might result in higher patient satisfaction, better adherence, and more favourable treatment outcomes.

Introduction

Incorrect inhaler use and poor compliance are the most common reasons for failure to achieve good asthma control.^[7] Recent studies show that critical use errors are very common with inhalation devices and have negative effects on outcomes and economic burden. Achieving correct inhalation technique is key for effective asthma therapy.^[8] Inhalation devices which guide the patients on inhalation technique during the dosing, may play a significant role in improving inhalation technique and patient satisfaction. Such new sensing inhalation devices can also help patients and healthcare professionals monitor compliance and manage the disease.^[9] This analysis assesses patient satisfaction and treatment compliance collected in two studies. Patient satisfaction including ease of use was assessed in a study^[6] with PAH patients inhaling Iloprost with the Breelib® device and compliance data was assessed in a study that evaluated the sparing of oral steroids by inhalation of budesonide suspension administered using the AKITA® JET system in adult patients with severe asthma.^[10]

Experimental Methods

Patient satisfaction was analysed through patient questionnaires from a crossover design study including 27 patients with PAH receiving 2 weeks of iloprost 5µg via Breelib™ (Vectura plc, Chippenham, UK), (Figure 1), and I-Neb® (Philips-Respironics Ltd.), two breath-actuated, vibrating mesh smart nebulisers.^[6] Breelib™ is breath-actuated and guides the patient's inhalation flow rate and volume using coloured lights to illuminate the mouthpiece of the device to provide direct feedback to the patient on their inhalation. The device incorporates a air control valves to further guide patient inhalation flow rate and volume. This allows the patient to take a slow deep inhalation manoeuvre during which the aerosol is delivered. After assessing patient satisfaction questionnaires after initial treatment patients were offered to enter into a 30 month long-term extension study, in which they assessed patients satisfaction after two weeks of treatment.

Compliance data was analysed from a randomised, double-blind, placebo-controlled, parallel-group study^[10] conducted in 200 patients aged 18–65 years with severe asthma. The AKITA[®] JET (Vectura plc, Chippenham, UK), (Figure 1) guides the patient to inhale with a slow inspiratory flow rate and a deep inhalation. Aerosol delivery is controlled via a programmable Smart Card that allows the therapy to be tailored to specific drugs and indications, by managing drug dose, breathing pattern, and the point at which the aerosol bolus is delivered during inhalation. For targeting the aerosol to the small airways of the lungs, an air bolus is inhaled after the aerosol. The AKITA[®] JET provides feedback to the patient via an LCD display that helps guide the patient through the inhalation. During the study period, patients were allowed to adjust inhalation volume after consulting the healthcare professional at the study site. Inhalation volume selection was recorded on the Smart Card. Daily use of the inhalation device was recorded, and the steroid-sparing effect of budesonide (1 and 0.5 mg) administered twice daily for 18 weeks was compared with that of placebo. A Smart Card attached to the device recorded each treatment, its duration, and the breathing patterns during inhalation. These data were collected on the Smart Card for review by the treating physician to assess the compliance values Daily Dose Compliance (number of successful treatment days/total number of treatment days) and Total Dose Compliance (number of successful treatments/total number of expected treatments).



Figure 1. Pictures of the smart nebuliser Breelib™ (left) and AKITA[®] JET (right)

Results

In the study in PAH patients, rating of patient satisfaction was assessed after the first inhalation with the Breelib™. 85% of patients rated the operation of the device as easy to use. (Figure 2). The LED-light feedback guiding the inhalation flow rate and providing error feedback was rated as helpful by 88% of patients. The limitation of the inspiration flow was well perceived by 85% of the patients.(Figure 3)

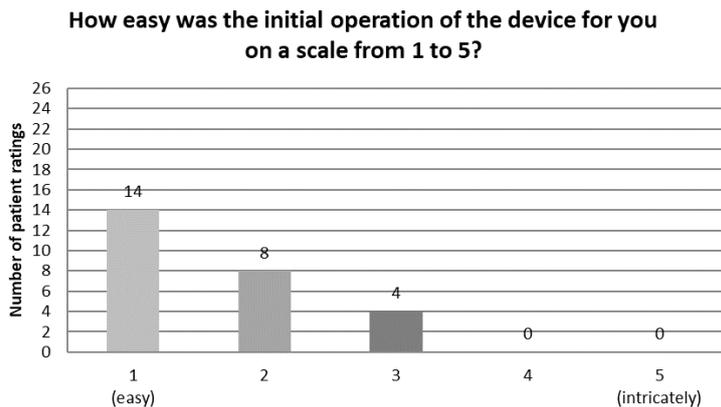


Figure 2. Results from patient satisfaction questionnaire after initial inhalation with Breelib

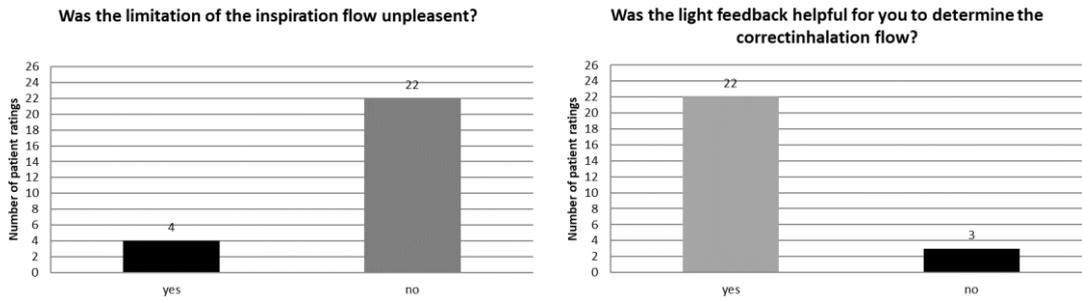


Figure 3. Patient satisfaction in relation to inhalation flow LED-feedback and the interactive inhalation flow limitation of Breelib, which guide the patient on the correct flow rate and inhalation volume

Breelib™ resulted in a reduction of treatment time (Figure 4) vs I-Neb. The treatment time for an inhalation of 5µg Iloprost with Breelib™ was 2.6 min compared with 10.9 min with I-Neb® (26 patients). Daily treatment times calculated for 9 Iloprost treatments per day were 23.4 min and 98.1 min for Breelib™ and I-Neb, respectively. Out of 26 patients 25 decided to enter into the 30 month long-term extension study with the Breelib device. 89% of patients (23 out of 26) in long term use reported that Breelib was easy or adequate to use.

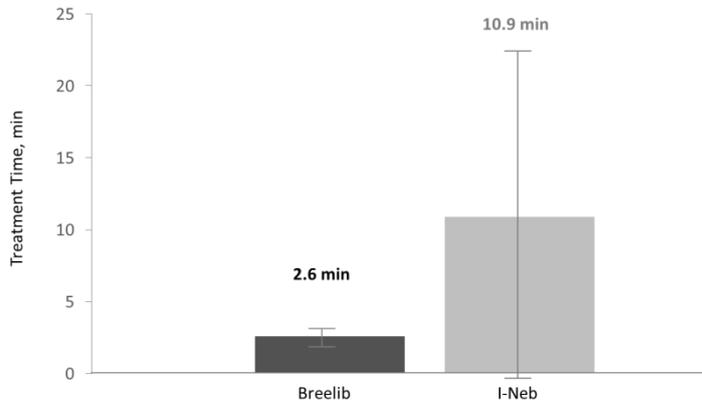


Figure 4. Treatment time from start to end of inhalation

In the study with asthmatic patients, Daily dose compliance (number of successful treatment days/total number of treatment days) was 81% for all patients on AKITA® Jet treatment and 87% for those who completed treatment (Figure 5). Total dose compliance (number of successful treatments/total number of expected treatments) was 82% and 89%, respectively. A treatment was deemed successful when the patient inhaled at least 80% of the prescribed dose.

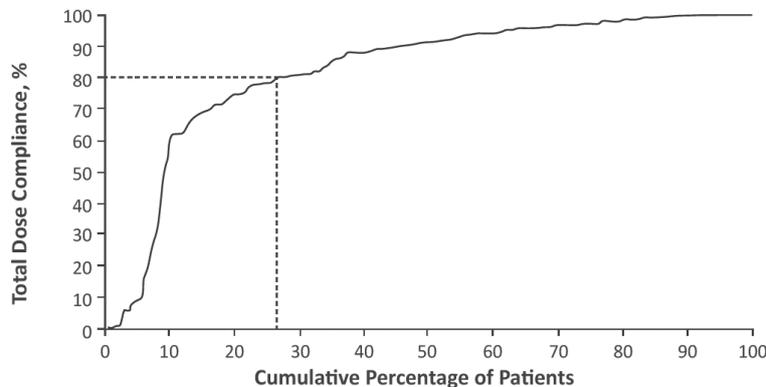


Figure 5. Treatment time from start to end of inhalation

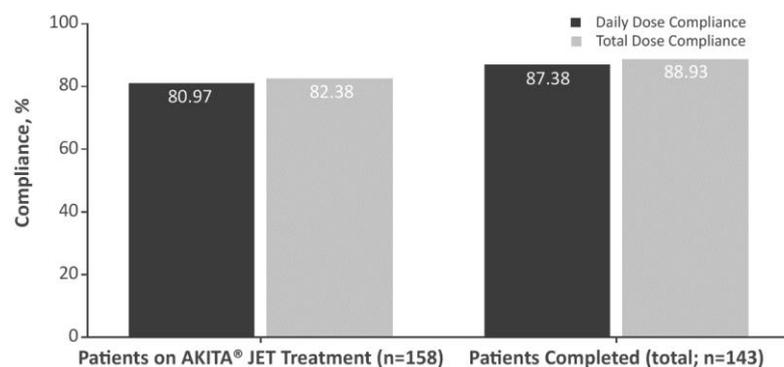


Figure 4. Treatment time from start to end of inhalation

Discussion and Conclusion

Smart nebulisers such as AKITA® JET and Breelib™, which guide patients on correct inhalation technique, can improve patient satisfaction and treatment outcomes [6, 10, 12] and can significantly reduce treatment time for an equivalent delivered dose. Observed ratings in relation to the inhalation feedback from the device indicate that patients positively perceived guidance on flow rate and inhalation volume. Particularly in indications such as severe asthma and PAH, the smart nebulisers studied herein provide meaningful advantages for patients in their daily therapy, which might result in higher patient satisfaction, better adherence, and more favourable treatment outcomes.

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