



**Supporting Patients through Education & Research**

## **Scientific Summary - Inhaler ease of use and inhalation flow rate in people with rheumatoid arthritis - Yasmin Kafaei Shirmanesh**

Respiratory disease is a common co-morbidity with rheumatoid arthritis (RA). RA affects the hands of 80-90% patients, so guidelines often state that this group may be unable to operate inhaler devices. However, there is no research proving this, or indicating which types of inhaler are most suitable for people with RA.

### **Aims**

- To compare the ease of use of typical inhaler devices in people with and without RA;
- To make recommendations for the selection of inhalers for people with RA.

### **Method**

Ethical approval was obtained via the University of Bath's ethics review process. Adults with RA were recruited via patient groups. Age ( $\pm 2$  years) and sex matched controls were recruited. The current functional ability of the RA group was measured using the Health Assessment Questionnaire Disability Index (HAQ-DI) [1]. General hand function was measured using the first two scales of the Michigan Hand Outcomes Questionnaire (MHQ) [2]. Four commonly prescribed inhalers were selected: pressurised metered dose inhaler (pMDI) (QVAR<sup>®</sup>), breath-actuated pMDI (Easi-Breathe<sup>®</sup>), HandiHaler<sup>®</sup> and Turbohaler<sup>®</sup>. The critical steps for the operation of each device were determined from the patient information leaflet. Use of each placebo device was demonstrated to the participants and their ability to perform each step was observed. Participants were not required to perform an inhalation manoeuvre with each device; an In-Check Dial device was used (Turbohaler setting) to record participants' maximum inhalation flow rate (best of three).

### **Results**

34 people with RA were recruited (26 female, age range: 31-86 years, mean $\pm$ SD age: 60.8 $\pm$ 13.0 years). 34 matched controls were also recruited. The HAQ-DI score of the RA group ranged from 0.125 to 3.0 (mean $\pm$ SD: 1.58 $\pm$ 0.68), representing mild through to very severe disability. The MHQ score of the RA group ranged from 23.4 to 94.6 (median = 55.5). Control group MHQ scores were positively skewed, ranging from 20.0 to 54.4 (median = 20.8). The MHQ scores of the RA group were significantly greater than the control group (Mann-Whitney U-test,  $p < 0.001$ ), demonstrating poorer hand function in people with RA.

For all inhalers, a smaller proportion of the RA group than the control group was able to complete all the steps required to operate the device: pMDI (50.0% vs. 91.2%), Easi-Breathe (76.5% vs. 97.1%), HandiHaler (14.7% vs. 94.1%) and Turbohaler (85.3% vs. 100%). This difference was significant ( $p < 0.05$ ) for the pMDI and HandiHaler (Fisher's exact test with Bonferroni correction). Three steps were completed significantly less often ( $p < 0.05$ ) by the RA group (Fisher's exact test with Bonferroni correction): depressing the canister of the

pMDI (52.9%), removing the HandiHaler capsule from its blister (64.7%) and piercing the HandiHaler capsule (20.6%). Only one participant (RA group) was unable to achieve an inspiratory flow rate >30L/min.

## **Conclusion**

RA significantly reduces the likelihood of being able to operate the pMDI and HandiHaler. These should be avoided as first-line choices for people with RA, who often lacked the hand strength and/or dexterity to depress the canister/button or open the blister for these devices. Inhalers should only be prescribed after a patient has demonstrated the ability to operate the device.

## **References**

1. Fries JF, Spitz P, Kraines RG, Holman HR. Measurement of patient outcomes in arthritis. *Arthritis Rheum* 1980, 23(2), 137-145.
2. Chung KC, Pillsbury MS, Walters MR, Hayward RA. Reliability and validity testing of the Michigan Hand Outcomes Questionnaire. *J Hand Surg Am* 1998, 23(4), 575-587

## **How this project has influenced my future career choice**

This project has made me much more sure that I wish to enter a career in research. I have really enjoyed learning about the process of carrying out a research project, and I have loved being involved in a project with so much patient interaction. Before this project I had not had research experience involving working with patients and this was something I really wanted to explore, this project has confirmed to me that this is something I would really like in my future career. I am incredibly grateful to BIRD for such an amazing opportunity!