

Use of a cognitive ergonomics approach to compare usability of a multidose dry powder inhaler and a capsule dry powder inhaler: An open-label, randomized, controlled study

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Abstract

Background:

Usability (ease of use) is an important feature of inhalers to ensure optimal dose delivery

Objective:

The aim of this study was to compare the usability of a multidose dry powder inhaler (mDPI) and a capsule dry powder inhaler (cDPI) in older individuals, using a range of qualitative and quantitative techniques from the field of cognitive ergonomics.

Methods:

Participants aged >50 years were enrolled in this 2-visit, open-label, randomized, controlled, parallel group study conducted at Northumbria University, Newcastle upon Tyne, United Kingdom. Participants who had used an inhaler or were inhaler naive were randomized to use the mDPI or cDPI. At visit 1, the inhaler procedure was demonstrated twice by the investigator. Participants then repeated the procedure (although they were not expected to inhale because no drug was to be administered) until they made 3 consecutive correct attempts. They also undertook a range of tests to assess their confidence in using the device, manual dexterity, and self-efficacy. At visit 2 (2 days later), participants made a single inhaler attempt before receiving any demonstrations from the investigator; this was intended to simulate clinical practice, in which the patient may not use an inhaler for a few days after it is prescribed. Participants then completed the inhaler procedure 10

times while undertaking a concurrent distracter task. The number of critical errors (ie, those having a high impact on dose delivery) was recorded for all attempts. To facilitate subsequent correlation analyses, an overall performance measure was derived from a combination of the results of the single inhaler trial and the 10 trials with a distracter.

Results:

Eighty individuals (51 women, 29 men; mean [SD] age, 74.1 [7.5] years) participated in the study (40 participants per device). Forty of the participants (50%) had used an inhaler previously; 40 (50%) were inhaler naive. Based on the overall performance measure, participants testing the mDPI made significantly fewer critical errors than participants testing the cDPI ($P < 0.001$). Participants rated both inhalers as easy to use but were overconfident concerning their ability to use the 2 devices.

Conclusions:

In this study of usability of an mDPI and a cDPI in older participants, participants found both inhalers easy to use, but fewer critical errors were made with the mDPI compared with the cDPI. However, the results suggest a degree of overconfidence and the need for continual monitoring of patients' inhalation technique, especially with the cDPI.