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Dry Powder Inhaler (DPI) Resistance: Human Behaviour and Psychology of Patient Inspiratory Effort

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Introduction

DPIs are one the most commonly prescribed inhalers for the maintenance treatment of airway diseases [1]. With >250 DPI devices on the market and many others in the pipeline, it is unsurprising that difficulties for healthcare professionals (HCPs) in selecting an appropriate device for patients have also increased [2]. The predicted expansion of generic DPIs further complicates the issue and poses the question as to how HCPs can be assured to prescribe them inter-changeably and thereby ensure acceptance by the patient. Patient preference for and satisfaction of inhaler devices can impact DPI use and adherence that influence therapeutic outcomes [3]. In practice, it is possible that perceived efficacy of the DPI can impact patient acceptance, and therefore influence their perceptions of the entire inhalation process – including how patients perceive airflow resistance (Af-Rs). However, limited data exist on patient perceptions of the "inhale-ability" of the DPI; that is how patients perceive the process of active inhalation and how this can affect their attitudes towards a particular DPI.

Therefore, this investigation explored the psychological, physiological, and behavioural barriers associated with patient perceptions of DPIs with varying Af-Rs in order to produce a validated measure to assess "inhale-ability".

Methodology

Focus groups (FGs): 2 cohorts (Chronic Obstructive Pulmonary Disease (COPD) n=8, asthma n=8)

Initially, an expert panel was consulted to identify provisional themes for discussion in the two focus groups. These themes formulated the initial prompts used in the semi-structured single-moderator discussion. The focus groups were audio-transcribed verbatim and coded by using the qualitative analysis software Dedoose®. Thematic analysis (TA) of the initial codes produced a thematic map with the main emerging themes (Figures 1 and 2).

<u>Cognitive interviews (CIs):</u> Individual interviews (COPD, n=18, asthma n=18)

A draft 16-item measure produced by the TA was used in six rounds of 1:1 Cls which were also semi-structured and audio-transcribed. Items were refined and reduced at each round once thematic saturation was reached. In result, a qualitative 12-item measure emerged which will undergo validation studies.

Demographics

Table 1: Patient demographics enrolled in the focus groups and cognitive interviews, COPD (n=26) and asthma (n=26).

Category	COPD (n=26)	Asthma (n=26)
Mean age in years (SD)	67.2 (7.1)	54.2 (14.5)
Sex, n (%)		
Male	13 (48)	13 (50)
Female	14 (52)	13 (50)
Disease category, n (%)		
GOLD 1	7 (26)	N/A
GOLD 2	11 (41)	N/A
GOLD 3	9 (33)	N/A
Mild	N/A	3 (12)
Moderate	N/A	13 (50)
Severe	N/A	10 (38)
Spirometry, n (min-max)		
Mean FEV1, L (min-max)	1.63 (0.60-3.61)	2.53 (1.20-4.32
Smoking status, n (%)		
Current user	6 (22)	0 (0)
Ex-smoker	20 (74)	2 (8)
Non-smoker	1 (4)	24 (92)
Mean National Qualifications Level (range)	2 (0-6)	6 (1-8)

Results: Initial Codes

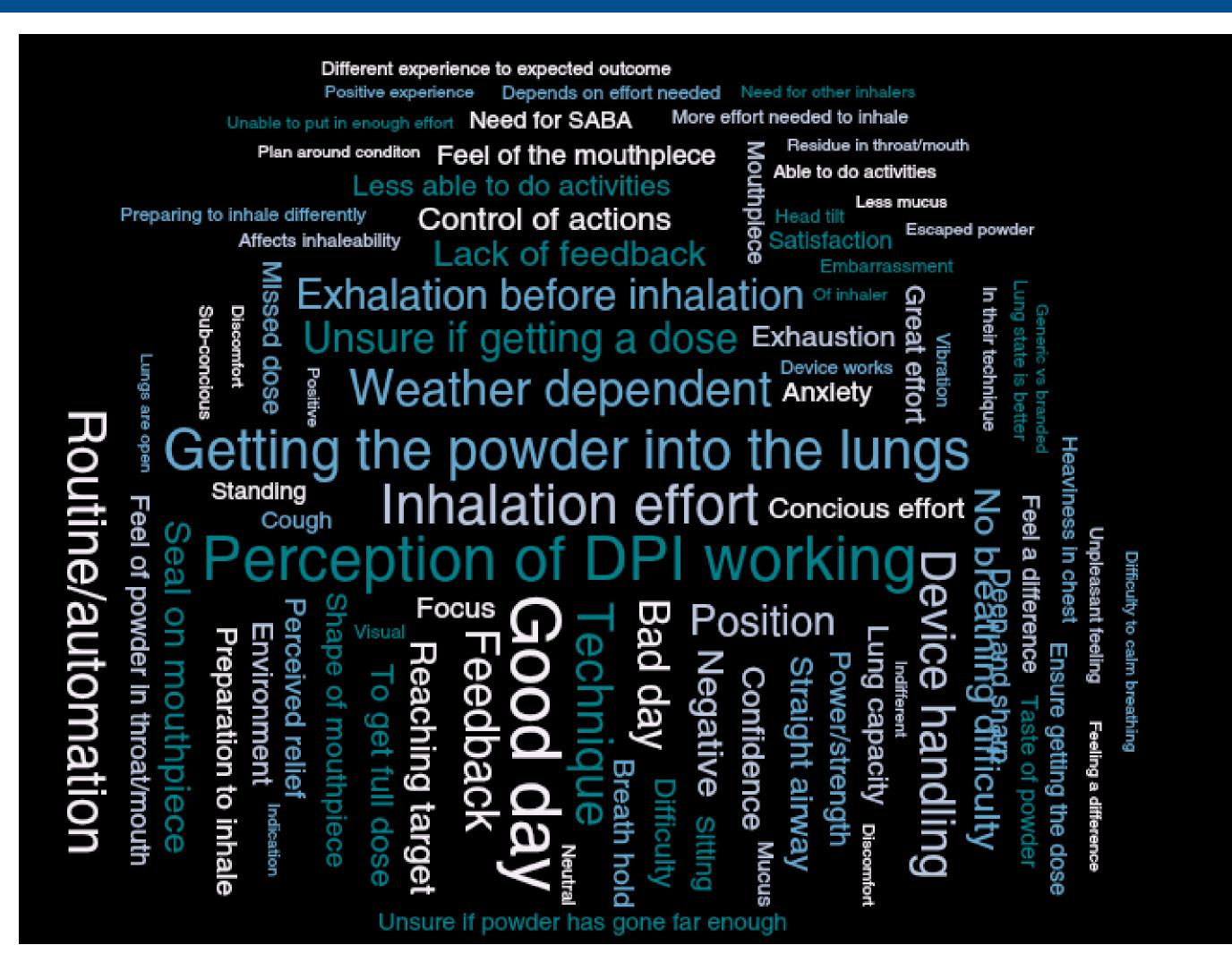


Figure 1: The initial code cloud from the FGs (n=16) wherein patients described factors that relate to their perception of Af-Rs.

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Results: Thematic Map

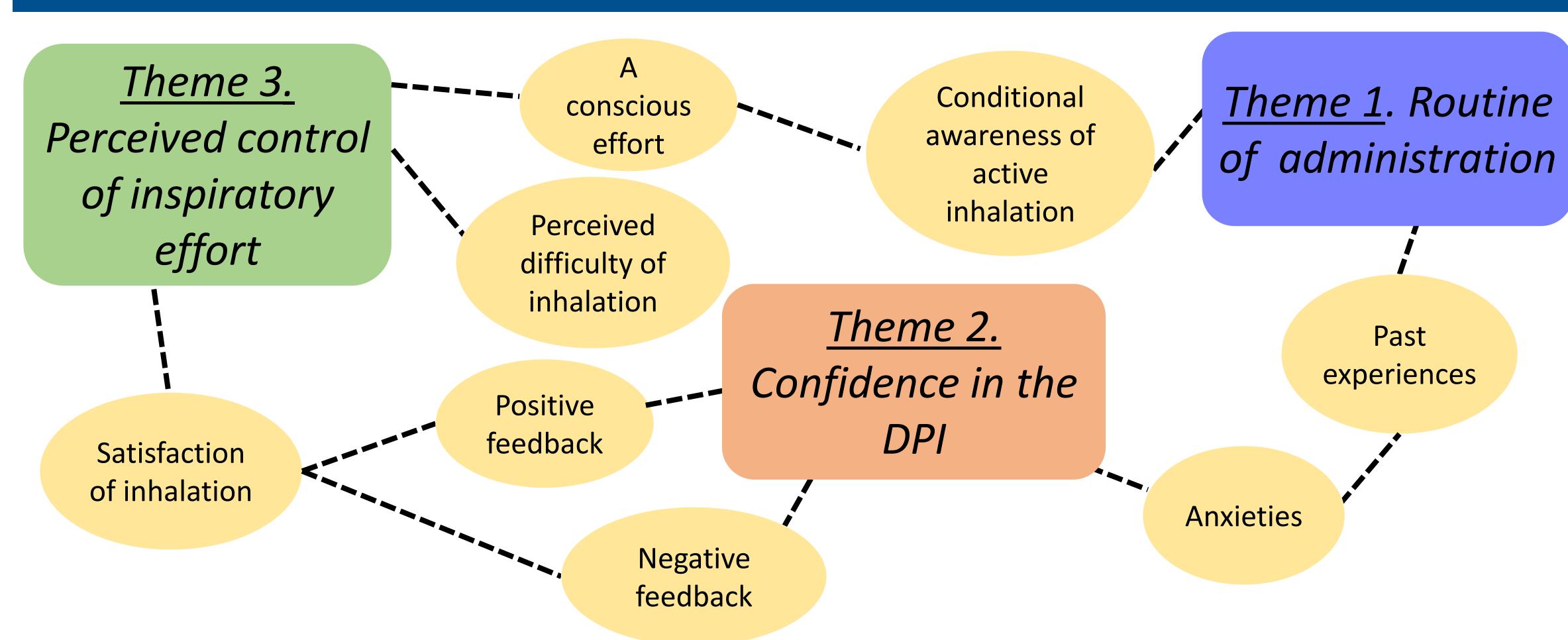


Figure 2: Thematic map showing the 3 main themes and broad connections that result from the FGs (n=16) and CIs (n=36) that may influence the perception to Af-Rs.

Theme 1: Routine of administration:

- The automation and routine of the inhalation process appeared to be the most influential factor in 85% of CI patients when describing their perceptions to Af-Rs
- Automation broadly related to the patient's physical positioning, patient well-being, and other daily routines

Theme 2: Confidence in the DPI:

- The overall performance of the DPI stemmed from the patient confidence in the DPI and was ranked as the 2nd most important factor in the CI cohort (80%)
- The feeling of inhalation and feedback from the DPI was classed either negatively or positively in terms of the perceived reliability of the device by the patient

Theme 3: Perceived control of inspiratory effort:

- Although only 58% of CI patients felt that they could control their inspiratory effort, control was a major theme in both FGs and CIs
- Perceived self-efficacy may explain the relationships between control and the other major themes that affect perceptions to Af-Rs

Conclusion

The thematic analysis results suggest that there are three main themes that may influence patient perception to DPI Af-Rs. The perception of inspiratory effort is variable across asthma and COPD patients. Our 12-item measure addresses these themes and will undergo validation studies to affirm its reliability to measure Af-Rs. Future studies need to evaluate how these themes can gauge patient perception to Af-Rs.