

## Multiple Inhaler Devices and Demonstration of Effective Technique – A Respiratory Ward Survey

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### Abstract

The focus of this short survey was to identify the level of knowledge among the junior doctors regarding the types of inhalers and proper inhaler technique.

This single-center survey was undertaken within a busy respiratory ward of Saint James University Hospital Leeds, where junior doctors rotate for four to six months. They were asked to identify the device and demonstrate its usage. The technique was assessed on fifteen different devices, currently licensed in the National Health Services, England. In total we collected 90 responses, six for each inhaler type. We found that only 41% responses demonstrated satisfactory technique. On the contrary, up to 59% responses were erroneous and would have led to ineffective dose delivery. We also observed that a few junior doctors struggled to correctly identify some of the inhaler devices. We believe it is the lack of generic inhaler designs, which can cause confusion amongst some medics.

**Keywords:** Inhaler Technique; Asthma; Respiratory; Junior Doctors

### Abbreviations

COPD: Chronic Obstructive Pulmonary Disease; NHS: National Health Services, England; DPI: Dry Powdered Inhaler; MDI: Metered-Dose Inhaler; pMDI: Pressurised Metered-Dose Inhaler; BA-MDIs: Breath-Actuated Metered-Dose Inhaler

### Introduction

As the pharmaceutical research and development continues, there is an obvious shift towards more effective, convenient and environmentally friendly inhaler devices. This leads to various new inhaler devices entering in an already competitive market. To understand the correct inhaler technique linked to each of these devices is an onerous but important task. The proper use of inhalers has been widely stressed upon in COPD [1,2] and Asthma guidelines [3]. As part of their job and learning, many junior doctors rotate through busy respiratory ward placements in tertiary centers. The majority of patients they encounter will be on inhalers, whether as a treatment of Chronic Obstructive Pulmonary Disease (COPD) or Asthma. Although, specific online learning materials are available to get acquaintance to these inhalers [4], still many junior doctors never actually get familiar to the different types of inhalers available and the associated technique. Hence, it can have an indirect effect on the patient counseling when it comes to assessing and advocating the correct use of these inhaled medications [5]. The focus of this survey was to identify the level of knowledge of the junior doctors and how effectively they can demonstrate the technique to their patients.

**Materials and Methods**

For the purpose of this survey, we grouped the commonly used inhalers into broad categories (Table1). A supply of placebo inhaler devices was obtained from the local pharmacy. Before making an inhaler technique assessment we also asked each participant to correctly identify an inhaler device according to its method of dose delivery.

Metered-dose inhalers(MDI)	Devices Studied (brand names in brackets)
<ul style="list-style-type: none"> <li>• Pressurised metered-dose inhalers (pMDI)</li> <li>• Breath-actuated metered-dose inhalers (BA-MDIs)</li> </ul>	Generic pMDI (Ventoline®) Autohaler®, Easi-Breathe®
Soft mist inhalers (Soft Mist™)	Respimat® (Spiriva®)
Dry Powdered inhaler (DPI)	
<ul style="list-style-type: none"> <li>• Single Dose – Blister</li> <li>• Single Dose – Capsule</li> <li>• Multi Dose – Reservoir</li> </ul>	Ellipta®, Accuhaler®, Forspiro® Breezhaler®, HandiHaler®, Zonda (Braltus®) Easyhaler®, Genuair®, NEXThaler®, Turbohaler®, Spiromax®

**Table 1**

We adopted a simplified version of assessing inhaler technique from inhaler guidelines generated by The Community Pharmacy West Yorkshire [6]. A seven step scoring system was utilized (Table 2). If all important steps were fulfilled then it was marked as optimal technique. When only a minor adjustment was required in the overall technique, and otherwise it would not have affected the dose delivery we called it satisfactory. An unsatisfactory outcome was given where a vital step was missed or inadequately performed.

Steps	Description (only where applied to specific devices)
<ul style="list-style-type: none"> <li>• Preparation</li> </ul>	Checking dose counter or ensuring inhaler is not empty, Removing Cap
<ul style="list-style-type: none"> <li>• Priming</li> </ul>	Shake the inhaler, holding the device properly, inserting capsule (if applicable)
<ul style="list-style-type: none"> <li>• Exhalation</li> </ul>	Exhale fully and away from the mouthpiece
<ul style="list-style-type: none"> <li>• Mouth placement</li> </ul>	Tilt head, so chin slightly lifts upwards. Placing mouthpiece between teeth and lips
<ul style="list-style-type: none"> <li>• Inhalation</li> </ul>	This varies between the inhaler devices, either quick and deep or slow and deep
<ul style="list-style-type: none"> <li>• Breath holding</li> </ul>	Removing inhaler from mouth and holding breath for up to 10 seconds
<ul style="list-style-type: none"> <li>• Repeating or Closing Cap</li> </ul>	If a repeat dose is required, and replacing the cap after taking dose.

**Table 2**

**Results and Discussion**

At least six junior doctors were asked to demonstrate the use of each of the fifteen inhalers studied. In total we obtained ninety responses. To simplify the results, we divided them into optimal/satisfactory technique versus unsatisfactory technique. The results are explained in percentage and the number of responses within the brackets table 3.

	Optimal/Satisfactory	Unsatisfactory
Metered-dose inhalers(MDI)		
• Generic MDi with Spacer	50% (3)	50% (3)
• Autohaler®	33% (2)	66% (4)
• Easi-Breathe®	33% (2)	66% (4)
Soft mist inhalers (Soft Mist™)		
• Respimat®	Nil	100% (6)
Dry Powdered inhaler (DPI)		
- Single Dose Blistered		
• Accuhaler®	50% (3)	50% (3)
• Ellipta®	33% (2)	66% (4)
• Forspiro®	34% (2)	66% (4)
- Single Dose – Capsule		
• Breezhaler®	33% (2)	66% (4)
• HandiHaler®	17% (1)	83% (5)
• Zonda (Braltus®)	17% (1)	83% (5)
- Multi Dose – Reservoir	50% (3)	
• Easyhaler	50% (3)	50% (3)
• Genuair®,	83% (5)	50% (3)
• NEXThaler®		17% (1)
• Spiromax®	83% (5)	
• Turbohaler®	50% (3)	17% (1)
		50% (3)
Total Responses	41% (37)	59% (53)

Table 3

Our survey demonstrated that majority of the junior doctors had unsatisfactory inhaler techniques. It was surprising to see that out of the fifteen devices studied, thirteen devices were linked to fifty percent or more unsatisfactory responses. One inhaler device that particularly stands out is Respimat®, as none of the participants could correctly demonstrate its use and most failed to correctly prime the device. Most commonly observed error across all inhaler devices was the speed and depth of inhalation. Many participants wrongly demonstrated a very quick and deep inspiration technique with metered dosed inhalers (MDI), when in fact it should be inhaled much slowly and deeply. Similar observations were made on dry powdered inhalers, where correct technique should involve inhaling strongly and deeply [7]. Some participants failed to mention post inhaler usage instructions, such as repeating the dose where applicable and thorough rinsing of throat after steroidal inhaler use [8].

There were a few limitations of this survey as well. For instance, some of the inhaler devices resemble in shape and usage, and it was likely that some participants scored better on a similar device as they had already learned during their initial assessment with a prior device.

### Conclusion

This showed that junior doctors that rotated through the respiratory department in our hospital did not have good level of familiarity regarding different types of inhalers and associated technique. We, therefore, made recommendations to provide specific teaching modules and ensure the availability of placebo inhaler devices so that junior doctors could practice and benefit from peer learning.

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### Conflict of Interest

None.

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