# COMPARISON OF INHALATION TECHNIQUE OF PRESSURIZED METERED DOSE INHALER BEFORE AND AFTER A SESSION OF INSTRUCTIONS IN MALE PATIENTS OF OBSTRUCTIVE AIRWAY DISEASES

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## Abstract

**Objective:** To assess the inhalation technique of pressurized metered dose inhalers (pMDI) in patients of obstructive air way diseases, to find out common errors and to determine improvement in their inhalation technique after a session of inhaler training.
**Study Design:** Quasi experimental study.
**Place and duration of study:** The study was conducted at outdoor department of Military Hospital Rawalpindi from December 2005 to April 2006.
**Patients and Methods:** A total of 100 male patients, using pMDI on regular basis for their obstructive respiratory symptoms, participated in the study. Patients' inhalation technique of pMDI was recorded against a standardized seven step checklist. Any technique having even a single erroneous step was marked as incorrect. Two weeks later, having given instructions on correct use of the device, the patient's inhalation technique was reassessed. Subsequently, results of both pre and post instruction assessment of inhalation techniques were compared and analyzed.
**Results:** During the 1st visit, only 21 patients (21%) demonstrated correct technique of inhalation. Upon 2nd visit, the number of patients having correct technique rose to 55 (55%) indicating significant improvement in the technique as demonstrated by applying McNemar's test.
**Conclusion:** Erroneous inhalation technique is quite common among patients using pMDI. However, they can improve their technique significantly if they are taught the correct use of inhaler device.

**Keywords :** Asthma, Chronic obstructive pulmonary disease, Inhaler technique.

## Article

### INTRODUCTION

Respiratory diseases share the main burden of our outpatient department. Among these, bronchial asthma and chronic obstructive pulmonary disease (COPD) are the most commonly encountered. The prevalence of asthma is rising in many countries, particularly in second decade of life where this disease affects 10– 15% of the population1. Similarly, COPD is one of the major causes of chronic morbidity and mortality throughout the world. Presently, COPD is the fourth leading cause of death in USA2 and as per Global Initiative for Chronic Obstructive Pulmonary Disease (GOLD) estimates; it will rise from sixth to third most common cause of death in the world by the year 20202.

Local administration of drugs by inhalation devices has become the main stay of treatment in patients of bronchial asthma and COPD owing to rapid onset of action, maximal potency at the level of airways and minimal side effects. The delivery of asthma drugs into the lungs directly through an inhaler was first introduced in 1956 and this undoubtedly was a stepping-stone towards improving the management of asthma3. However, effective-ness of this route depends upon the adequate inhalation technique which requires proper training and skill on part of the patient. Inefficient inhaler technique is a common problem which results in poor drug delivery, decreased disease control and increased inhaler use thus putting a burden on the economy.

Several studies carried out in many countries have revealed that 30 to 60% of patients use their inhalation devices incorrectly4 and proper instruction has resulted in substantial improvement in their technique5. In this study, inhalation techniques of the patients were assessed initially against a

standardized seven step checklist. Subsequently, two weeks after the session of instructions, the techniques were reevaluated to analyze the effect of instructions. The purpose of this whole exercise was to gather local data which could make the health care personals cognizant of magnitude of the problem. Moreover, settings like Armed Forces where health care facilities are free for all, through better inhalation technique, not only effective control of the symptoms but also economization of financial resources can be achieved.

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**MATERIALS AND METHODS**

This was a quasi experimental study conducted at the Military Hospital Rawalpindi from December 2005 to April 2006. One hundred patients were enrolled, based on the following inclusion and exclusion criteria; Male patients between the age of 15-60 year, having asthma or COPD using pressurized metered dose inhalers on regular basis were included in the study.

Patients with acute exacerbation of COPD / acute severe asthma, unwilling / non cooperative and suffering from any disease affecting cognition, with deformity of hand or with loose dentures were excluded.

Having obtained informed consent and enrollment, inhalation techniques of pressurized metered dose inhaler were recorded against a standardized seven step checklist as shown in table.

**Table: Seven step checklist for the use of PMDI**

| | |
|---|---|
| Step1 | Shake the inhaler vigorously before use and uncap the mouthpiece |
| Step2 | Hold the MDI in vertical position and keep the inhaler outlet between the lips |
| Step3 | Breath out normally |
| Step4 | Breath in slowly; activate the MDI at beginning of inspiration |
| Step5 | Continue to inhale to the total lung capacity |
| Step6 | Hold the breath to minimum 4 seconds |
| Step7 | Wait at least 15 seconds between actuations |

Each step was labeled as correct or incorrect based on patient's performance. Any technique having even a single incorrect step was marked as incorrect. Having given necessary verbal instructions followed by practical demonstration on empty canister about the correct use of inhaler, the patients were asked to demonstrate the correct technique on their inhalers. The process was repeated in the same sitting till the time it was ensured that they had mastered the correct technique. Two weeks later, the inhalation technique was reassessed against the same standardized seven step checklist to evaluate the effect of instructions. Results of both pre and post instruction assessment of inhalation technique were compared and all collected data was analyzed using SPSS version 10. Percentage of patients having incorrect technique in each visit was recorded. Percentage of each erroneous step was also noted. In the end, effects of instruction were analyzed by applying McNemar's test.

**RESULTS**

Out of 100 patients, 41 had bronchial asthma and 59 were suffering from COPD. Minimum age of the study group was 19 yrs and the maximum age was 59 yrs with mean age of 40.45 yrs. The duration in months since the patients had been using inhaler devices ranges from 2 to 96 months

with mean of 23.52. During initial visit, only 21 patients (21%) knew correct technique of using pMDI. In second visit, the number of patients knowing correct technique rose to 55 (55%). In order to find the statistical significance of our results, we applied McNemar's test to analyze pre and post training data. Subsequently, McNemar's test calculated value was compared with the chi-square table value. As the calculated value for McNemar's test (i.e 4.3) was found to be greater than the table value (i.e less than 0.005), the null hypothesis was rejected implying that the inhaler training caused significant impact on inhalation technique of the study group.

Two most common errors observed during assessment were not to have normal exhalation of air before activation of inhaler device (step3) and holding the breath for minimum 4 seconds after inhaling the drug to total lung capacity (step6). Other common mistakes were incoordination between activation of the device and initiation of inhalation (step 4) and wait for at least 15 seconds between successive activation of the inhaler (step 7). Less frequent mistakes were inability to inhale to the total lung capacity (step 5), not shaking the device before its use (step 1) and inability to hold the device properly (step 2). Frequency of these erroneous steps during 1st visit along with the effects of instructions observed in 2nd visit is demonstrated in figure.

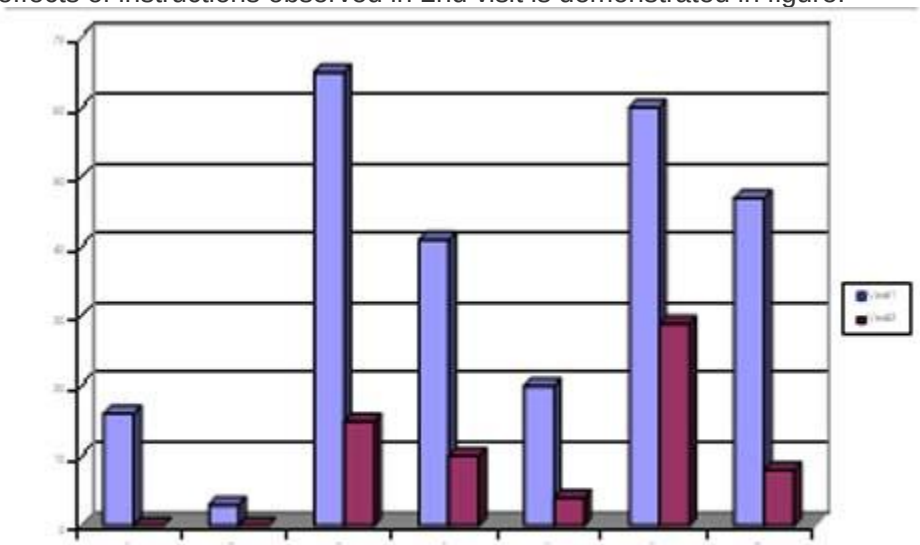

**Figure: Comparison of incorrect steps* of inhalation technique in both visits**

**DISCUSSION**

Inhaled medication has emerged as the main stay of treatment in the management of obstructive respiratory diseases. Inhaler devices, in particular pMDI, are frequently prescribed to the out-door patients owing to convenience of their use and scarcity of the side effects. However, in order to be effective, correct technique should be employed in their use. During the study it was found, as expected, that majority of our patients did not use pMDI properly. Instructions resulted in significant improvement in the technique but still substantial number of patients were unable to master the technique. It prompts not only the repeated sessions of instructions but also shifting over to alternative devices in particular the use of additional device like spacer in order to make the use of pMDI more effective. The fact that most of our patients do not use the inhaler correctly owes partly to clinicians' inability to give adequate time to their patients but also to the fact that some of the health care personals do not even know the correct use themselves. A study6 carried out at King Edward Medical College showed that 75% doctors had flaws in their knowledge of inhalation technique. When the results are compared with contemporary studies, it is revealed that erroneous inhalation technique of inhaler devices is a universal phenomenon. Proper teaching of the technique especially in the language understandable to the patient results in substantial improvement in overall technique. This effect was well demonstrated in a British study7 done on Turkish people with poor English. Global technique, co-ordination and breath-holding were all significantly worse in MDI users with poor English. Only 17% of that group had adequate technique compared to 62% patients with

fluent English. After information in English language, global technique was rated as improved in 28% of Turkish patients with poor English. A further six people (17%) showed improvement after subsequent verbal advice in their own language. Similarly, a study8 carried out in Malaysia disclosed that 42% adult asthmatics did not use MDI correctly. Universality of incorrect use of MDI was also demonstrated in a Saudi study 9 in which inhalation technique of 192 patients was assessed; among these 94% patients had error in at least one of steps of the technique. Our results are comparable with the results of a Spanish study10 which showed that 31% patients were using their inhaler devices incorrectly. Also, the most common errors made by the patients were inability to hold the breath after activation and in coordination between activation and inhalation.

Another intriguing fact, we come across in the study, is that despite inhaler training still 45% patients were unable to demonstrate the correct technique of inhalation. It signifies the importance of repeated sessions of instructions and evaluation of patients' technique on each visit.

**CONCLUSION**

Erroneous inhalation technique is quite common among patients using pMDI for control of their obstructive respiratory symptoms. However, most of them can learn the correct technique quite effectively. Therefore, evaluation of the technique and instructions regarding the correct technique, on each visit, are vital to ensure reliable and consistent performance of the correct technique.

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