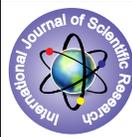


## Assessment of Knowledge on Usage of Metered Dose Inhalers among Interns of Medical College, Mandya



### Medical Science

**KEYWORDS:** Metered Dose Inhaler, Knowledge, Interns.

\* Dr Pankaja R

Department of Pharmacology, Mandya Institute of Medical Sciences, Mandya-571401, Karnataka, India. \* Corresponding Author

Dr Shashi Kumar N S

Department of Pharmacology, Mandya Institute of Medical Sciences, Mandya-571401, Karnataka, India.

Dr Roopadevi H S

Department of Pharmacology, Mandya Institute of Medical Sciences, Mandya-571401, Karnataka, India.

### ABSTRACT

*Objectives:* To assess the retention of knowledge on usage of Metered dose inhalers among interns of Medical College, Mandya, which was taught in their second phase of medical undergraduate course.

*Methods:* An observational study was conducted among the interns of Medical College. 108 Interns participated in the study and were asked to demonstrate the use of Metered Dose Inhaler (MDI) by taking two puffs from a placebo MDI device. Correctness of technique was graded using a checklist of nine steps, based on international clinical guidelines on MDI technique.

*Results:* Out of 108 interns, only one intern performed all the nine steps correctly. 102 interns (94.44%) performed step 3, 4 and 5 correctly and 81 interns (75%) performed step 6 and 7 correctly.

*Conclusion:* Majority of the interns responsible for instructing patients on the correct MDI technique were unable to perform the technique correctly.

### Introduction:

Asthma and Chronic Obstructive Pulmonary Disease (COPD) are respiratory diseases that have high prevalence rates in both developed and developing countries, being recognized as worldwide public health problems.<sup>1</sup>

Treatment of pulmonary disease with inhaled aerosol drugs offers advantages over systemic therapy, including more rapid onset and reduced adverse effects, because of direct targeting of the lungs.<sup>2</sup>

Metered-dose inhalers (MDI) are the devices most commonly used for aerosolized drug delivery.<sup>3</sup> Various studies have demonstrated that the MDI is safe and efficacious, portable, uses a standardized dose and does not depend on air compressor.<sup>4</sup>

Optimal inhaler technique allows maximal drug delivery to the lungs, improving the therapeutic benefit and improved symptom control.<sup>5</sup> A poor inhalation technique reduces drug deposition in the lungs; more the mistakes made in the inhalation technique, lower the beneficial effect on lung function.<sup>6,7</sup>

Incorrect use of the MDI poses the danger of respiratory diseases being under-treated causing persistence or escalation of asthma symptoms, frequent hospitalization and even fatal attacks leading to higher morbidity and mortality.<sup>8</sup>

Even though MDI are widely used among asthma and COPD patients; many patients have difficulty in utilizing this device. Health care providers play a pivotal role in imparting a correct knowledge and use of MDI technique.<sup>9,10</sup>

Few studies on health care professionals depict lack of knowledge in using these devices. To improve the knowledge of the usage, among the health care professionals especially doctors, teaching the skills of usage of inhalers to 2<sup>nd</sup> year medical students is incorporated in the curriculum.

Hence the purpose of this study was to assess the retention of knowledge on usage of metered dose inhalers among interns of Medical College, Mandya, which was taught in their 2<sup>nd</sup> phase of medical undergraduate course.

### Materials and Method:

A prospective, cross sectional and observational study was conducted among the Interns of our medical college, Mandya. The study was initiated after approval from the Institutional Ethics Committee. Written informed consent was taken from all the interns participating in the study. All the interns were asked to demonstrate the use of the MDI by taking two puffs from a placebo MDI device. The correctness of technique was graded using a checklist of nine steps

**Table 1: The nine steps of correct metered-dose inhaler technique**

Steps	Procedure
Step 1	Remove cap and shake the inhaler vigorously
Step 2	Breathe out slowly and completely
Step 3	Hold the inhaler in the upright position
Step 4	Insert the mouthpiece into mouth between closed lips
Step 5	Depress the canister once and...
Step 6	.... at the same time begin slow deep inhalation continue till total lung capacity (co-ordination)
Step 7	Remove the inhaler with closed lips
Step 8	Hold breath for 10-15 seconds
Step 9	Wait for 20-30 seconds before starting the second puff

The nine steps are based on international clinical guidelines on the MDI technique. Steps 1, 4, 5 and 6 were considered essential for proper delivery of the inhaled medications and the remaining steps are classified as recommended for optimal delivery but not essential.

### The acceptability of each step is defined as follows:

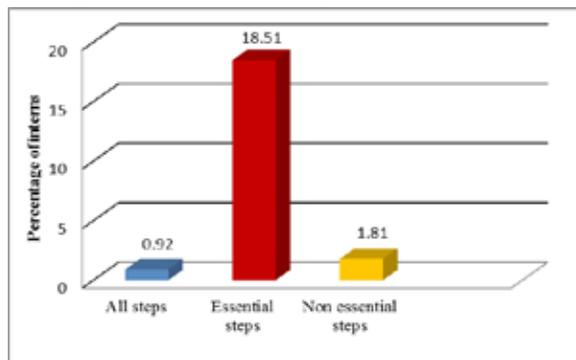
The participant must shake the canister vigorously and breathe out slowly and completely before each puff. Positioning will be considered correct if the canister is held in the upright position and inserted between closed lips. The participant must then begin a slow inhalation just before depressing the canister once

(actuation). The timing of actuation (co-ordination) will be considered correct if it occurs anywhere during the first third of the slow inspiration including simultaneously with the start of inhalation. The slow inspiration must continue to total lung capacity after which the inhaler is removed and the lips kept closed, with breath holding for at least 10 seconds. Finally, the participants must wait at least 30 seconds before starting the second puff.

Statistical Analysis: The data was entered into Microsoft excel version 2007 and analysed. All parameters were expressed in percentage.

**Results:**

Among 108 interns, 107 (99%) interns failed to perform all the nine steps correctly. Frequencies of errors were higher for non-essential (preferable) than essential steps



**Figure 1: Percentage of interns performing the steps correctly**

102 interns (94.44%) performed step 3, 4 and 5 correctly and 81 interns (75%) performed step 6 and 7 correctly. Of the essential steps, shaking the inhaler (steps 1) had the highest frequency of errors (77%). Breathing out before inhalation, inadequate breath-holding and waiting before starting a second puff (steps 2, 8 and 9) were the most frequent error among the steps classified as recommended for optimal delivery (79, 68 and 84% respectively)

**Table 2: The percentage of interns performing each step correctly**

Steps	Yes
Step 1*	23.1
Step 2	21.3
Step 3	92.6
Step 4*	98.1
Step 5*	92.6
Step 6*	75.0
Step 7	76.9
Step 8	32.4
Step 9	15.7

**\*The essential steps**

**Discussion:**

Inhaler therapy is the preferred mode of delivery of many drugs used in the treatment of asthma and chronic obstructive pulmonary disease. It is the preferred mode of delivery for β-agonists and corticosteroids and the only way to deliver some drugs such as anticholinergics and sodium cromoglycate.<sup>11</sup>

Each inhaler device has its own specific sequence of steps for optimal drug delivery and it is therefore necessary to give careful and correct instruction to patients.<sup>12</sup> MDI, the most commonly

used device, requires the patient to co-ordinate inhalation with action of the device (actuation) which can be difficult for some.

Optimum drug treatment and good care can convert asthma from a major handicap to a minor inconvenience, yet it continues to be an important cause of morbidity and mortality.<sup>13</sup> Health care providers and patients have demonstrated an inability to use inhaler devices correctly, which can lead to suboptimal drug delivery and poor symptom relief.<sup>14</sup>

The efficacy of any medication delivered via MDI is highly dependent on proper technique, and health care providers who prescribe these medications should have the basic knowledge of MDI use.<sup>15</sup> It has been well documented from past studies that health care workers have limited knowledge of MDI technique, and that few have received formal training in its proper use.<sup>16</sup>

Clinical guidelines of International Asthma Management emphasises the importance of demonstrating the correct inhaler technique at initial diagnosis and correcting patient performance at each follow-up visit.<sup>17</sup>

The present study identified that the interns had a poor knowledge about the correct use of MDIs. It was surprising to know that only 1 intern could demonstrate the proper use of MDIs. In a study conducted by Lee-Wong M et al on house staff, found that only 5% of the participants could demonstrate all the steps correctly.<sup>18</sup> In another study conducted by Kishore et al on health care professionals (interns, doctors, nurses, pharmacist), none of the professionals could demonstrate all the steps involved in the correct use of MDI.<sup>10</sup>

In our study frequencies of errors were higher for nonessential (preferable) than essential steps which was in accordance to the study conducted by Nadi E et al<sup>11</sup>. Of the essential steps, the greatest number of errors (77%) occurred in step 1 (shaking the inhaler), whereas breathing out before inhalation, inadequate breath-holding and waiting before starting a second puff (steps 2, 8 and 9) were the most frequent error with the non-essential steps.

The poor knowledge of the medical interns reveals the need for regular educational intervention among them. It would be beneficial to have a periodic educational program for the health-care professionals regarding MDI use. Studies have demonstrated a significant improvement in MDI use after a training programme.<sup>10,18</sup>

**Conclusion:** Incorrect inhaler technique is common among asthma/COPD patients. Majority of the interns responsible for instructing patients on the correct MDI technique were unable to perform the technique correctly though they were taught in their 2nd phase of MBBS. Indicating the need for regular formal training programmes on inhaler techniques so as to decipher correct practices in inhalation therapy.

## REFERENCE

1. Souza MLM, Meneghini AC, Ferraz E, Vianna EO, Borges MC. (2009), Knowledge of and technique for using inhalation devices among asthma patients and COPD patients. *J Bras Pneumol*, 35(9), 824-31. | | 2. Rau LJ. (2006), Practical Problems with Aerosol Therapy in COPD. *Respiratory Care*, 51(2), 158-72 | | 3. Muchao FP, Perin SRR, Rodrigues JC, Leone C, Silva Filho LVRF. (2008), Evaluation of the knowledge of health professionals at a pediatric hospital regarding the use of metered-dose inhalers. *J Bras Pneumol*, 34(1), 4-12 | | 4. Dudyala NS, Amarendra M, Subbarao PV. (2012), The Use of Metered Dose Inhalers: Where Are We? *Journal of Clinical and Diagnostic Research*, (Suppl-2);6(4), 612-14 | | 5. Bryant L, Bang C, Chew C, Baik SH, Wiseman D. (2013), Adequacy of inhaler technique used by people with asthma or chronic obstructive pulmonary disease. *J prim health care*, 5(3), 191-98. | | 6. Uijen JH, Uijthoven YJ, Wouden JC, Bindels PJ. (2009), Adequate use of asthma inhalation medication in children: More involvement of parents seems useful. *BMC Research Notes*, 2, 129 | | 7. Lalani NS. (2012), A study of knowledge assessment and competence in asthma and inhaler technique of nurses employed at university teaching hospital. *The Health*, 3(1), 16-18 | | 8. Loh LC, Teng CL, Koh CN, Vijayasingham P, Thayaparan T. (2004), Metered-Dose Inhaler Technique in Asthmatic Patients- A Revisit of the Malaysian Scene. *Med J Malaysia*, 59(3), 335-41 | | 9. Ali HD, Worku GB, Alemayehu AA, Gebrehiwot WH. (2014), Competence in Metered Dose Inhaler Technique Among Dispensers in Mekelle. *Allergy, Asthma and Clinical immunology*, 10, 18 | | 10. Kishore PV, Palaian S, Alam K, Shankar PR, Bajracharya B, Den Ende JV. (2008), A Correct Use of A Metered Dose Inhaler: A Prospective Interventional Study Among Healthcare Professionals In A Nepalese Teaching Hospital. *Journal of Clinical and Diagnostic Research*, 2(2), 720-25. | | 11. Nadi E and Zeraati F. (2005), Evaluation Of The Metered-Dose Inhaler Technique Among Healthcare Providers. *Acta Medica Iranica*, 43(4), 268-72 | | 12. Scheffer AL (Ed). (2002), Global strategy for asthma management and prevention. NHLB/WHO Workshop Report. National Institute of Health, Bethesda MD, Publication No.92, 3659. | | 13. Buston KM, Wood SF. (2000), Non-compliance amongst adolescents with asthma: listening to what they tell us about self management. *Fam Pract*, 17(2), 134-8 | | 14. Scarpaci LT, Tsoukleris MG, McPherson ML. (2007), Assessment of hospice nurses' technique in the use of inhalers and nebulizers. *J Palliat Med*, 10(3), 665-76. | | 15. John RR, Luskin, Michael JK, Irina NK, Robert WD. (2004), Improving Metered Dose Inhaler Technique in the Emergency Department: A Prospective Study. *The California Journal of Emergency Medicine*, (2), 27-33 | | 16. O'Donnell J, Birkinshaw R, Burke V, Driscoll PA. (1997), The ability of A&E personnel to demonstrate inhaler technique. *J Accid Emerg Med*, 14, 163-4. | | 17. Baddar AS, Al-Rawas OA, Al-Riyami KA, Worthing EA, Hanssens YI, Taqi AM, Al-Riyami BM. (2001), Metered-dose inhaler technique among healthcare providers practising in Oman. *SQU journal for scientific research: Medical Sciences*, 1, 39-43 | | 18. Lee-Wong M, Mayo PH. (2003), Results of a programme to improve house staff use of metered dose inhalers and spacers. *Postgrad Med J*, 79, 221-5 |