

Metered Dose Inhaler among Patients with Respiratory Disorders

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ABSTRACT

Background: Metered dose inhaler is the most recommended and efficient therapy for management of respiratory disorders but incorrect inhaler use has critical to get significant impact of medication. The study aimed to assess the knowledge and practice on Metered dose inhaler among patients with respiratory disorders.

Methods: Cross-sectional study was conducted among 126 patients with respiratory conditions in 2021 in a teaching hospital. A structured questionnaire was used to assess knowledge on using Metered dose inhaler whereas checklist created by the WHO Guide to Good Prescribing was used to evaluate patient's practice on inhalation technique.

Results: The results showed that 74 (58.7%) of the patients were female and belonged to age group 66-80 years (mean/SD 63.35±11.803). Over half of the patients i.e., 66 (52%) had a satisfactory level of knowledge whereas, only 2 (1.6%) patients were aware on the waiting time between each puff of Metered dose inhaler. The results showed that only 3 (2.4%) patients had practiced correct technique on Metered dose inhaler.

Conclusion: Though the higher proportion of the patients had satisfactory level of knowledge on Metered dose inhaler use but critical gap was seen in essential steps for using Metered dose inhaler. Healthcare providers should consider appropriate measure to increase the knowledge and correct use of Metered dose inhaler. That ultimately improves the quality of respiratory health of patients with respiratory disorders.

Keywords: Knowledge; metered dose inhaler; patients; practice; respiratory disorders.

INTRODUCTION

Metered Dose Inhalers (MDI) is a standard inhalation technique in achieving adequate drug levels resulted in control of respiratory problems of the patients.¹ The proper delivery of drug depends on the patient's knowledge and inhaler technique.²⁻⁴ However, research-based evidence showed that substantial absence of knowledge on MDI use and improper technique was directly associated with an increased risk of respiratory disease exacerbation and consequences⁵⁻⁷ quality of life of people as well as placed a significant financial burden on countries' healthcare system.

An Indian study showed only 8.64% of the patients performed proper technique of inhaler use,⁷ and another study showed 53.39% (Asthma) and 58.35% (COPD) patients used inhaler incorrectly.⁸ As MDI is

commonly used, it is important that health professionals should re-evaluate the patient knowledge and practice on inhalation technique.^{9,10} Hence, this study was aimed to assess the knowledge and practice on the use of MDI among patients using it.

METHODS

This descriptive cross-sectional study was conducted among purposively selected 126 patients with respiratory problems in out-patient department (OPD) of Tribhuvan University Teaching Hospital (TUTH), Kathmandu. The study has been reported in line of STROBE criteria. The inclusion criteria of the population was consisted of (a) both male and female patients aged 20-80 years (b) diagnosed with respiratory diseases and used at least one metered-dose inhaler, (c) willingness to participate in the study and. The exclusion criteria consisted of (a)

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patients who were critically ill, (b) patients who were dependent on their caretakers, and (c) patients who is unable to communicate.

Data were collected using structured questionnaire on demographic characteristics, level of knowledge and practice on use of MDI. Knowledge on MDI was that was assessed using nine structured questionnaire which was prepared in the English language and further translated into the Nepali language. The knowledge scored was grouped into three levels obtained as follows (a) score >70% is good knowledge, (b) score between 50-70% was satisfactory and (c) score <50% was poor knowledge.⁸

The practice on MDI was measured using a 10 steps checklist-Guide to Guide to Good Prescribing-a practice manual developed by WHO. It was rater proper and improper inhaler practice. Improper inhaler practice means that the patient made a mistake in one or more of the essential steps or made the essential and/or general steps incompletely. Whereas proper inhaler practice means the patient performed all the essential and general steps wholly and correctly.³

The approval was obtained from Institutional Review Committee of Institute of Medicine, Tribhuvan University [Ref. no.198 (6-11) C-2/078/079]. All the ethical principles were maintained throughout the study. Before collecting data, informed verbal and written consent was acquired and data were collected in a separate room nearby OPD. The participants were assured of the confidentiality by keeping the responses safe and used for research purposes only. The anonymity of respondents was held by keeping code numbers instead of the name of the respondents in the instrument.

After obtaining the ethical approval from Institutional review committee and permission letter from the study hospital, the researcher visited the out-patient's department with the help of nursing in-charge. The persons with respiratory disorders were identified through the examination of OPD card. Afterward, an exit interview technique was adopted using structured questionnaire from patients who had exited from

the OPD. Data were collected among those who met the inclusion criteria of the study in a separate room nearby the OPD within in OPD time of 9am to 2pm. The researcher tried to clarify any queries during the time of data collection. The researcher took 15-20 minutes to complete the interview to get the information on demographic and knowledge related information. Afterward, the researcher assessed the practice technique of MDI with placebo Rota caps in the same room using 10 stepped checklist- Guide to Good Prescribing (A Practice Manual) developed by World Health Organization. The assessment of the inhaler technique was made according to the requisite steps of correct usage of MDI which took around 10 minutes to observe the inhalation technique. The data was collected within 12 weeks from November 2021 to January 2022.

All collected data was reviewed and checked for completeness, consistency, and accuracy. Data was then organized, coded and entered into SPSS (Statistical Package for Social Science) version 16 based on research objectives. Next, descriptive statistics such as frequency, percentage, mean and standard deviation was used to assess the demographic information, knowledge and competency on MDI technique. Finally, the findings of the study were presented in tabular form.

RESULTS

The 68 (54.0%) respondents were between the ages of 65-80 years with a mean age of 63.35 ± 11.803 SD. Females made up more than half of the responses (58.7%). More than half i.e., 55 (43.7 %) could not read and write. Similarly, the majority of the respondents (75.4%) were unemployed. Majority of the respondents 87 (66.7%) were diagnosed with COPD, followed by Asthma 25 (19.8%), and Post COVID 17 (13.5%), who visited the out-patients department. A considerable number of respondents (70.6 %) had been using their MDI for 1-5 years. The large percentage of respondents (86.5%) got both verbal and visual instructions on how to utilize MDIs from health care providers (Table 1).

Table 1. Background information of the respondents. (n = 126)

Variables	Number	Percent
Age in completed years		
20-40 years	9	7.1
41-65 years	49	38.9
66-80 years	68	54.0
Mean age: 63.35 ± 11.803 SD		
Gender		
Male	52	41.3
Female	74	58.7
Educational status	55	43.7
Cannot read and write	31	24.6
Primary Secondary	7	5.6
High School Bachelor	31	24.6
	2	1.6
Occupational status		
Employed	31	24.6
Unemployed	95	75.4
Disease condition		
COPD	84	66.7
Asthma	25	19.8
Post COVID19	17	13.5
Years of MDI use		
Less than 1 year	24	19.0
1-5 years	89	70.6
More than 5 years	13	10.3
Obtained instruction to use MDI		
No instruction	12	9.5
Verbal instruction	5	4.0
Verbal and demonstration	109	86.5

Regarding the knowledge on MDI use, cent percent of the respondents had correct knowledge about the meaning of MDI and body position to take MDI during its inhalation (100%). Most of them 125 (99.2%) were aware on the position of the inhaler's mouthpiece, followed by breath holding for 10 seconds after deep inhalation 89 (70.6%). Similarly, majority of the MDI user 115 (91.3%) had correct knowledge on storage of MDI. More than half of them 66 (52.4%) had knowledge on head position during inhalation. Less than one third of the respondents 36 (28.6%) were aware on shaking the MDI before using. However, only 2 (1.6%) respondents were aware on waiting time between each puff of MDI use (Table 2).

Table 2. Respondents' knowledge on MDI use. (n = 126)

Variables	No. of correct Response	Percent
Meaning of MDI	126	100
Shake the MDI before using it	36	28.6
Body position during inhalation	126	100
Head position during inhalation	66	52.4
Inhaler's mouthpiece position during inhalation	125	99.2
Breath holds after inhalation	89	70.6
Waiting time between each puff	2	1.6
Storage of MDI	115	91.3
Cleaning of MDI	75	59.5

Regarding the stepwise practice of using MDI technique, majority of the respondents followed essential steps of MDI technique. The items most correctly performed step was placing the lips tightly around the mouthpiece (98.4%), followed by the shaking the aerosol before use and holding the aerosol as indicated in the manufacturer's instruction (94.4%). Similarly, around two third of the respondents (60.0%) hold the breath for 10 -15 seconds correctly and more than half of the respondents (54.0%) followed the steps on breath out slowly, emptying the lungs as much air as possible. However, around one fifth respondents (19.0%) followed the essential steps correctly on coughing up as much sputum as possible. (Table 3)

Regarding the level of knowledge on MDI use, half of the respondents (52.4%) had satisfactory level of knowledge, followed by good level of knowledge (35.7 %) and (poor level of knowledge (11.9 %) on MDI use. Similarly, regarding the level of practice on technique on using MDI, almost all the respondents (97.6%) had improper inhaler technique on MDI whereas only a few respondents (2.4%) had proper inhaler technique on MDI use (Table 4).

Table 3. Stepwise practice of MDI among the patients. (n = 126)

Steps	No. of correct responses	Percent
Cough up as much sputum as possible	23	18.2
Shake the aerosol before use*	119	94.4
Hold the aerosol as indicated in manufacturer's instruction (this is usually upside down)	119	94.4
Place the lips tightly around the mouth piece *	124	98.4
Tilt the head backward slightly.	67	53.2
Breathe out slowly, emptying the lungs of as much air as possible*	68	54.0
Breathe deeply and activate the aerosol, keeping the tongue down.	95	75.4
Hold the breath for ten to fifteen seconds*	76	60.3
Breathe out through the nose*	24	19.0
Rinse the mouth with warm water	36	28.6

Note: * indicates essential steps

Table 4. Respondents' level of knowledge and practice on MDI use. (n = 126)

Levels	Number	Percent
Level of Knowledge		
Good knowledge (>70%)	45	35.7
Satisfactory (50-70%)	66	52.4
Poor knowledge (<50%)	15	11.9
Level of practice technique		
Proper inhaler technique	3	2.4
Improper inhaler technique	123	97.6

DISCUSSION

This study assessed the knowledge and practice on MDI among patients with respiratory disorders. Majority of the respondents (52.4%) possessed satisfactory level of knowledge about using MDI and its application, which included positioning, cleaning, and storing whereas 35.7% of the respondents had a high level of knowledge. In contrast, only 11.9% had poor level of knowledge regarding MDI use. This finding was similar with previous study conducted in a hospital of Nepal⁵ where majority of respondents possessed satisfactory level of knowledge on MDI use. This might be because of nature of respondent as majority of them were illiterate, elderly and poorly instructed for MDI use by health care providers.¹¹ Therefore, the level of knowledge among respondents on MDI use was an alarming finding in this study.

The results of this study with regard to practice is incredibly concerning, given that 97.6% of the respondents performed the inhalation technique incorrectly which is similar with the previous two studies.^{5,6} This could be because MDI users did not receive appropriate teaching and reinforcement on how to perform the inhalation technique, and a lack of return demonstration could also have possibly played a role. Coughing up as much sputum as possible (18.2%) and breathing out through the nose 24 (19.0%) were the least practiced step which corresponds with the study done by Chauhan et al.¹²

In the practice steps, breathe out slowly, emptying the lungs of as much air as possible is done properly by only 54% of the patients, which corresponds with past studies.^{13,14} Similarly, hold the breath for ten to fifteen seconds was done by 60.3%, and a study in Africa had found only 46% of the patients did this step properly.¹⁵ Another step that is breathe out through the nose was

done properly by just 19% of the patient and this finding is almost similar to the past studies.¹⁵ Thus, the similar to the findings of this study, the commonest mistake in using the inhaler was not holding breath for 10 seconds and not breathing out gently.¹⁶ It is even reported in a meta-analysis that more than three-fourths of U.S. adults with obstructive lung diseases used MDIs incorrectly.¹⁷ Hence, the problem in practice is not the area and context specific and there is great need for the interventions with focus to improve the proper practice in using MDI.

The results could be related to MDI users simply forgetting to cough and breathe out of their nose, or it could be because they consider these steps to be less significant in comparison to the subsequent steps as well as inability to read the instructions as given in leaflet. Persons who used MDI for a shorter period of time were more likely to follow the steps, which could be attributed to newly given instructions on MDI use in their mind. This study did not find any association of inhalation technique with age, sex, literacy, occupation, disease condition, and years of MDI use. This is most likely owing to the fact that the number of MDI users who used the inhaler incorrectly was significantly greater than those who used it correctly, making an association impossible.

CONCLUSIONS

Almost all of the patients could not perform all of the steps of MDI correctly, with several crucial steps missed or not performed. The level of knowledge and level of practice did not correspond depicting a critical gap, i.e., compared to proportion of good knowledge level, the proper practice was very low. The correct method of MDI use should be taught and demonstrated by a health provider, followed by a return demonstration. Study can be done to examine health providers' competence of teaching MDI technique as well.

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CONFLICT OF INTEREST

There is no any potential conflict of interest concerning this paper.

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