

## Metered Dose Inhaler Technique: Knowledge among the Residents and Nursing Staff

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### ABSTRACT-

**Background:** According to the world health organization (WHO), India has worlds 10% of Asthma patients which is around by fifteen to twenty million and approximate deaths attributed to asthma worldwide are 2,50,000 which is very large number. A metered dose inhaler (MDI) is a device that provides specific amount of medication to the lungs in the form of aerosols that the patient himself administers via inhalation. The aim of the study was to evaluate the knowledge among the resident doctors and the nursing staff of medicine and allied departments about general knowledge required about metered dose inhaler.

**Methods:** The study is a cross sectional study which was done in the tertiary care hospital in central India in Acharya Vinoba Bhave Rural Hospital (AVBRH). The study was done in residents and nursing staffs of medicine and allied departments.

**Results:** A huge level of nursing staff had a helpless comprehension of the strategy utilized with the metered-portion inhaler. The respiratory consideration specialists were the most educated of the medical services suppliers.

**Conclusion:** This investigation affirms that a huge level of nursing staff utilizes metered dose inhalers inappropriately. It likewise exhibits a critical absence of comprehension by occupants in the legitimate information on metered portion inhalers. The respiratory medicine residents were the most knowledgeable and knew the most about the technique, uses, side effects and common drugs used in MDI.

**Keywords:** Inhaler, Asthma, Metered Dose, Student, Healthcare Staff

### INTRODUCTION

According to the WHO, India has worlds 10% of Asthma patients which is around by 15-20 million and approximate deaths attributed to asthma worldwide are 2,50,000<sup>(1)</sup>. Asthma is the condition with inflammation of bronchi which causes increased mucus production and swelling up of the airway. Resulting in restricted airway entry, as we know asthma is of two types first one is atopic and another one is non atopic, the most common symptom with asthma is shortness of breath cough sneeze, difficulty in talking, fatigue and tightness of chest. The asthma can be triggered by many factors like dust, dye, pollen, latex, gases, fumes,

heavy exercises these are all most prevalent thing in the world which is difficult to avoid all the time but the complication of the asthma can be easily preventable just by a mere knowledge for a good management of patients by correctly diagnosing of the situation and taking a bare minimum corrective steps, a number of these could be prevented if the health care personnel were trained enough to be able to teach patients on how to use the metered dose inhaler (MDI). This investigation affirms that an enormous level of nursing staff utilizes metered portion inhalers inappropriately. It additionally exhibits a critical absence of comprehension by occupants in the appropriate information on metered-portion inhalers. It is used in conditions such as asthma, chronic obstructive pulmonary disorder (COPD), cystic fibrosis etc<sup>(2)</sup>. The medication commonly used in a metered dose inhaler (MDI) is salbutamol which is bronchodilator commonly used, corticosteroids such as beclomethasone dipropionate or a combination of both of the drugs for the treatment of asthma and chronic obstructive pulmonary disorder (COPD).<sup>(3)</sup>

### **METERED DRUG INHALER (MDI)-**

MDI is a handheld aerosol device that uses propels a specific amount of medication to the lung, by the help of propellant, which was earlier chlorofluorocarbon (CFC), but now it is switched to hydrofluoro alkanes (HFA)<sup>(4)</sup>. The chlorofluorocarbon was a hazardous gas and it causes the damage to the Ozone layer with net effect of increased the greenhouse effect. However, it very well may be truly difficult to utilize metered dose inhaler accurately. In any event, when utilizing the best procedure then you may just get 25 % of what emerges from the metered dose inhaler into your lungs. This amount of drug is sufficient still to treat your lung conditions; anyways the vast majority have such trouble in utilizing a metered dose inhaler that they get less than 15 % of drug from each puff of metered dose inhaler<sup>(5)</sup>. Also not to be forgetting the feared complication of wrongly using of metered dose inhaler, the fungal infections of mouth such are oral candidiasis, due to the steroid present in the drug used in metered dose inhaler which can easily be deposited in the mouth if the metered dose inhaler is not utilized effectively which not only is a waste of resources but also diminishes the effectiveness of the drug by getting deposited in the mouth and not available in the region where it is most required and could be life saving if used properly, here we aim to know how much the health workers such as the residents and the nursing staff know about the use of metered dose inhaler and how better they teach it to the patients receiving drugs via the metered dose inhaler.

### **PROCEDURE:**

- I. Remove the cap of the metered dose inhaler
- II. Hold the metered dose inhaler in upright position and shake well before use for at least 3 to 5 times.
- III. Breath out away from the inhaler and empty the lung by breathing out as much as possible
- IV. Put the mouth piece between the teeth and close the lips to form a good seal. So, the drug and the air do not leak in the middle of the process.

- V. Now press down the canister and at the same time start to breath in slowly through mouth
- VI. Continue to breath in slowly and deeply, in order to inhale the most of the drug to be delivered at the required site of action.
- VII. Hold breath for 10 seconds or as long as possible
- VIII. Then exhale through nose<sup>(6)</sup>.

Rinse the mouth after use of the metered dose inhaler. Metered dose inhaler can also be used with spacer and mask. The need of spacer is required especially in children<sup>(7)</sup>. While using the spacer, the spacer is connected to the metered dose inhaler and then the spacer is put to the mouth and the button is pressed and patient is allowed to breath from the spacer only for upto 2 to 3 long breaths which ensures the maximum delivery of the drug to the affected area. This method is most effective in children as they are not able to cooperate with the instruction given and won't be able to follow the procedure this results in non-compliance overall resulting in wastage of drug, time, energy, and the resources and sometimes in the need of an acute attack it will be more efficient to use the metered dose inhaler with spacer.

**Cold Freon effect:** It is the underlying response to the drug impact of metered dose inhaler, force on the rear of the throat. It can frequently bring about the patient cutting short the inward breath measure and thus getting conflicting conveyance to lungs.<sup>(8)</sup>

**Parts of metered dose inhaler:** Canister, metering valve, mouth piece, plastic holder.<sup>(9)</sup>

**Drugs used:** example of drugs such as- salbutamol, salmeterol, ipratropium bromide, beclomethasonedipropionate and etc.

**Common side effects:** oral candidiasis, hoarseness of voice but rinsing of mouth and gargling after the use of inhaler this can be prevented.

**Contraindication:** - 1 The use of metered dose inhaler is contraindicated in the patient with the airflow obstruction as seen in cases of inhaled foreign body.

2 The Metered Dose Inhaler is contraindicated in the airflow obstruction with myocardial infarction (acute).

#### **AIM:**

Assessment of the knowledge about the metered dose inhaler (MDI) technique in resident doctors and nursing staff of Medicine and Allied departments of a tertiary care hospital in Central India.

#### **OBJECTIVE:**

1. To assess knowledge about metered dose inhaler and its technique amongst resident doctors and nursing staff of medicine and allied departments of a tertiary care hospital.

#### **METHODOLOGY:**

**STUDY DESIGN-** It is a cross sectional study.

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**STUDY SETTING-**It was done in a tertiary care hospital located in Central India. Acharya Vinoba Bhave Rural Hospital.

**STUDY POPULATION-** In 1st, 2nd, 3rd year residents and nursing staff catering to the patients of Medicine and Allied subjects of a tertiary care hospital.

**SAMPLE SIZE-** In residents of all the 3 years and nursing staff working in Medicine department, Pediatrics department and Respiratory Medicine department.

So total Sample Size was 115

**INCLUSION CRITERIA-**Residents and nursing staff of Medicine department, Respiratory Medicine department and Pediatrics department of Tertiary care hospital.

**EXCLUSION CRITERIA-**Residents and nursing staff not available after 3 consecutive visits to the hospital.

#### **DATA COLLECTION PROCEDURE-**

Permission from Dean, head of the department of the respective department was taken.

Data was collected from 1st February to 29th February 2020 from the tertiary care hospital and 3 visits were done to Medicine department, Respiratory Medicine department and Pediatrics department to collect the data from the Residents and the nursing staff of these departments. Respondents were asked about the knowledge regarding metered dose inhaler.

Total sample size was 130 and we were able to collect the data from 115 resident doctors and nursing staff.

**STASTICAL ANALYSIS-**Data was entered in Microsoft Excel and frequency and percentage was calculated. Chi square was used to find the association.

**CONSENT-** Written and informed consent was taken from the respondents before the start of the study.

#### **OBSEVATION AND RESULTS-**

Table 1- It shows knowledge about use of metered dose inhaler and its procedure amongst the residents and the nursing staff in respective departments.

| knowledge about use of metered dose inhaler and its procedure | Responses in percentage |                   |
|---|-------------------------|-------------------|
|   | Residents (%)           | Nursing staff (%) |
| Cap opening   | 100                     | 90                |
| Shake the inhaler (3-5 times)                                 | 88                      | 70                |
| Breath out  | 70                      | 65                |
| Position of the inhaler                                       | 79                      | 70                |

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|   |    |    |
|---|----|----|
| Breath in slowly and deeply             | 86 | 74 |
| Continue to inhale until lungs are full | 84 | 71 |
| Hold breath while counting till 10      | 86 | 72 |
| Breath out through nose                 | 81 | 78 |

In our study it was found that 100% of the residents and 90% of the nursing staff from the respective departments knew about the cap opening is step in using metered dose inhaler. Only 65% of nurses and 70% of residents from the respective departments knew that we have to breath out before taking the drug while using metered dose inhaler.

Table 2- In this table shows knowledge about the diseases in which metered dose inhaler can be used in the residents and nursing staff of the respective departments.

| About the diseases in which metered dose inhaler can be used | Results in Percentage |               |
|--|-----------------------|---------------|
|  | Residents             | Nursing staff |
| Bronchial asthma (BA)  | 94                    | 80            |
| Chronic obstructive pulmonary disorder (COPD)                | 91                    | 74            |
| Cystic fibrosis  | 83                    | 53            |
| Restrictivelung diseases (RLD)                               | 86                    | 70            |

In our study 94% of residents and 80% of nursing staff of the respective department knew about that a metered dose inhaler is used in bronchial asthma and only 53% of nursing staff and 83% of residents of the respective departments knew that a metered dose inhaler can be used in cystic fibrosis as well.

Table 3- In this table it shows about the knowledge regarding parts of metered dose inhaler in residents and nursing staff.

| knowledge about parts of metered dose inhaler | Results in percentage |               |
|---|-----------------------|---------------|
|   | Residents             | Nursing staff |
| Canister                                      | 87                    | 77            |
| Metering valve                                | 79                    | 68            |
| Plastic holder                                | 86                    | 70            |
| Mouth piece                                   | 88                    | 80            |

In our study 88% of residents and 80% of nursing staff of the respective departments were able to identify mouth piece as a part of metered dose inhaler and only 68% of nursing staff and 79 % of residents of the respective departments were able to identify about metering valve as a part of metered dose inhaler.

Table 4- In this table it shows the knowledge about the drugs used and side effects amongst the residents and nursing staff of the respective departments.

| Knowledge about the drugs used and side effects | Result in percentage |               |
|---|----------------------|---------------|
|   | Residents            | Nursing staff |
| Drugs used                                      | 90                   | 70            |
| Side effects                                    | 86                   | 75            |

In our study it was found that 90% of the residents and 70% of nursing staff of the respective departments knew about the drugs used in metered dose inhalers and only 75% of the nursing staff and 86% residents of the respective departments knew about the side effects of using metered dose inhalers.

## DISCUSSION:

Metered Dose Inhaler if used correctly can be a lifesaving procedure as it plays a vital role in delivering the important bronchodilator as desired and directly to the lungs and help the drug to be deposited in the area for maintenance purpose, sure a great way of delivering the drug, with a great effectiveness but the effectiveness of the drug is not fixed as the inappropriate and mistaken inward breath strategy confuses the administration of the sicknesses wherein the metered portion inhaler is utilized. It is a central point that decides the adequacy of inward breath prescriptions. Numerous asthma instructive projects are created for use in emergency clinics, medical services habitats, workplaces, and schools to improve the efficiency and effectivity of drug by a large margin and to increase strength of patients utilizing metered dose inhaler.

Hardly any investigations have assessed the lacks in the procedure of utilization of metered portion inhaler in the Indian population. In our investigation, we planned to assess the method of utilization of metered portion inhaler and the information dependent on metered portion inhaler. In developing countries like ours where the suffers of asthma is so high, formal and systematic training should be provided to the health care personnel who are directly involved in prescribing and instructing use of a metered dose inhaler techniques to the patients.

In our findings 84.25% of resident doctors and 73.75% of nursing staff of the respective departments knew about the proper use of a metered dose inhaler technique. 88.5% of resident doctors and 69.25% of nursing staff of the respective departments knew about the diseases in which the metered dose inhaler can be used. 85% of resident doctors and 73.75% of nursing staff of the respective departments knew about the parts of metered dose inhaler. 88% of resident doctor and 72.5% of nursing staff of the respective departments knew about the side effects and the drugs used in metered dose inhaler.

In investigation done by Interiano B, Guntupalli KK<sup>(10)</sup> in year 1993 January 11 it was discovered that nursing staff were likewise less capable in the legitimate utilization of the metered portion inhaler. The respiratory consideration specialists were the most learned of the medical services suppliers. In investigation done by E Nadi F Zeraati in 2005 it was discovered that out of the 173 members, 35 (20.2%) were doctors and 138 (79.8%) were medical attendants. Just 12 members (6.93%) played out all means effectively. Doctors performed basic advances essentially in a way that is better than attendants (85.7% versus 63.8%). Most of medical services suppliers liable for educating patients on the right metered portion inhaler strategy couldn't play out this procedure effectively, showing the requirement for customary proper preparing programs on inhaler strategies.

In research study done by Maj Deepa Kumari, V and Lt Col Ajee, K.L<sup>(11)</sup> in 2015 it was found that the information with respect to the metered dose inhaler use was surveyed by utilizing a semi organized meeting poll and practice was noticed utilizing a perception agenda. Result: Majority were experiencing Bronchial asthma (87%, 177) and the greater part had term of illness of less than equal to 10 years. The Mean information score of the example was 33.4 which fall into great class and mean practice score was 8.1. Socio segment factors like age, sexual orientation, instruction, term of utilizing metered dose inhaler had no huge relationship with both information and practice of utilizing metered dose inhaler aside from the spot of home ( $p < 0.05$ ) and length of infection enduring ( $p < 0.005$ ). End: Incorrect inward breath practice is normal among Bronchial Asthma and chronic obstructive pulmonary disorder (COPD) patients in a pneumonic outpatient facility. The consequences of present investigation have indicated that the right utilization of metered dose inhaler was discovered to be poor for most members despite the fact that they had great information.

In a study done by Lt Col Bindu S Mathew, N/Cadet Halima Bano, N/Cadet Rajlakshmi Rathore, N/Cadet Vismaya Sunder A, N/Cadet Varuna Shukla, N/Cadet Aswathi K<sup>(12)</sup> discoveries of the examination uncovered that the mean age from the investigation came out to be from 61 to 75 years of age. Male were less informative than female by 58.5%. The most widely recognized respiratory infection discovered were prohibitive illness (41.7%). It was discovered that larger part of the example 48.3% were having normal information about metered dose inhaler, while 43.3% were having acceptable information and 8.3% were having helpless information. Huge finding with respect to practice of metered dose inhaler was, 61.7% were having normal practice, 30% were having great practice while 8.3% were having helpless practice.

In a research done by Avijit Ganguly et. al. <sup>(13)</sup> it was seen that of absolute 105 patients, 31 were utilizing dry powdered inhalers (DPI), 50 on metered portion inhalers (MDI), and 24 on MDI with spacer gadgets. Among study populace 83.81% were prepared by medical services experts (specialists, nurture, drug specialists, paramedical or agents of Pharmaceutical organizations) and 16.19% are prepared by broad individuals. Among the MDI clients (n=50) just 6%, 16.12% among the DPI clients, 20.8%, among MDI with spacer clients could utilize inhalers effectively. At 95% certainty limit there was essentialness of mistakes submitted among DPI and MDI clients (distinction of SE is 2.56) and among spacer and MDI clients (contrast of SE 2.92). There was no distinction found in respect of recurrence of blunders

submitted in taking various gadgets as indicated by patient's financial, instructive foundation and mentor.

In another study done by SewunetAdmasuet. al. <sup>(14)</sup> on November 27, 2017 Among 70 local area drug store experts drew closer, 62 (32 drug specialists and 30 drug specialists/Pharmacy professionals) finished the review with a reaction pace of 85.6%. Just three (4.8%) respondents were able by exhibiting the imperative advances accurately. Generally, just 13 members got score seven or above, yet a large portion of them had missed the fundamental advances which included stages 1, 2, 5, 6, 7 or 8. There was a huge distinction ( $P = 0.015$ ) in competency of showing satisfactory inhalational strategy among respondents who took preparing on fundamental inhalational methods and who didn't. A number of studies related to different aspects of this study were reviewed<sup>(15-20)</sup>.

## CONCLUSION-

In our study most of the residents knew about the technique of metered dose inhaler and one fourth of the nurses did not know about the proper metered dose inhaler technique. More than 3/4th of the resident doctors knew about the proper knowledge regarding the diseases it is used in, parts of metered dose inhaler, side effects and drugs used in metered dose inhaler. More than 1/4th of the nursing staff did not know about the proper knowledge regarding the diseases metered dose inhaler is used in, parts of metered dose inhaler, side effects and drugs used in metered dose inhaler.

## LIMITATIONS AND RECOMMENDATIONS

The study was done in a small setting in just one rural hospital for further data it can be done in various hospitals.

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