Original Article

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Pediatrics Section

The Use of Metered Dose Inhalers: Where Are We?

NAREN S. DUDYALA, MARINA AMARENDRA, SUBBARAO P.V.

ABSTRACT

The use of inhaled drugs is a basic aspect of the treatment of patients with asthma, in acute episodes as well as in maintenance therapy. For years, conventional nebulizers were the only inhalers available. With the advent of pressurized metered-dose inhalers, the delivery of drugs such as bronchodilators and corticosteroids into the respirtory tract is optimized. Treatment failure in individuals with asthma frequently results from the incorrect use of metered-dose inhalers, which is typically a consequence of a lack of counseling by health professionals, many of whom are unfamiliar with the technique. The Konaseema Institute of Medical sciences, Institute for Children is a tertiary hospital where patients with pulmonary disease states are treated in the emergency room, intensive care unit, outpatient clinic and nurseries. The present prospective study was aimed to evaluate the knowledge regarding the use of pressurized metered-dose inhalers among the professionals working in the hospital. Statistical analysis by chi-square test and p values, observes a significant difference between the correct usage and the prescribing health care professionals of the hospital which was done as per an evaluation chart. Hence the need for periodic training and evaluation.

Key Words: Metered dose inhalers, Health care professionals, Periodic training and Evaluation.

INTRODUCTION

Asthma is a significant public health problem worldwide and it ranges in its prevalence from 1 to 18% [1]. In India, asthma is the one of the leading causes of hospitalization among children and young adults and it greatly increases the costs of the health care system. It results in school absenteeism/inability to perform physical activities and it can interfere with the psychosocial development of children [2] . Drug therapy forms the cornerstone of the treatment in asthma. Various devices are popular among the general public like spacers, nebulizers, metered dose inhalers, drugs and combinations of these. The apt use of the medication which is prescribed, the technique and the compliance to the medication is important for a healthy tomorrow.

The use of inhaled drugs is a basic aspect in the treatment of patients with asthma, in acute episodes as well as in maintenance therapy. Currently, there is a near-unanimous consensus that the use of anti-inflammatory drugs is indicated for the treatment of persistent asthma, since the role of inflammation in the patho physiology of the disease has been well recognized [3]. For years, conventional nebulizers were the only inhalers which were available. With the advent of pressurized metered-dose inhalers, the delivery of drugs such as bronchodilators and corticosteroids into the respiratory tract was optimized, thereby decreasing the local and the systemic side effects [4,5].

Various studies have demonstrated that the metered-dose inhaler is safe and efficacious, which produces particles of 1 to 50 μm in diameter (particles which are 1- to 5-μm in diameter reach the distal portions of the tracheobronchial tree). In addition, it is portable, it does not depend on an air compressor and it uses a standardized dose [6,7].

The treatment failure in individuals with asthma frequently results from the incorrect use of metered-dose inhalers, which is typically a consequence of a lack of counseling by the health professionals, many of whom are unfamiliar with the technique [8].

The Konaseema Institute of Medical sciences, Institute for Children, is a tertiary hospital where patients with pulmonary disease states are treated in the emergency room, intensive care unit, infirmary, outpatient clinic and the nurseries. Therefore, in order to determine the difficulties that might interfere with the appropriate counselling of the patients, we decided to determine the theoretical and the practical knowledge of the health care professionals with respect to the use of metered-dose inhalers, which formed the aim of our study.

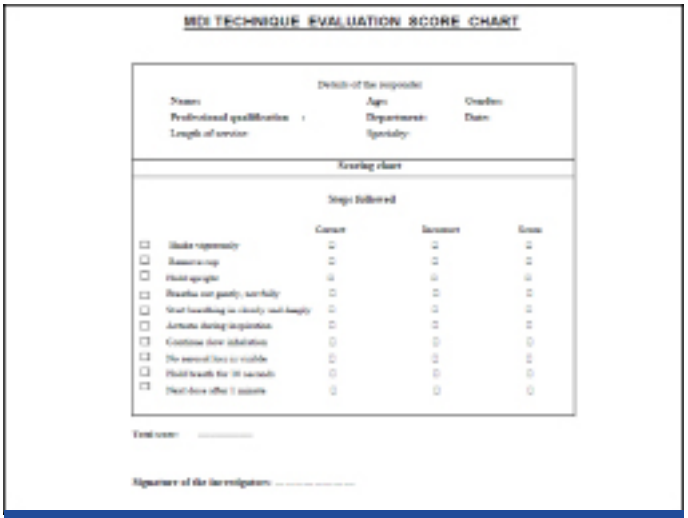
METHODS

Sample size: The prescribing doctors of the hospital (30) and the junior doctors who were involved in the paediatric patient care (80), a total of 110 subjects were included in the study as per the hospital data which was available.

TYPE OF STUDY: Prospective study

Period of study: August 2011 to September 2011.

A prospective study was carried out, which included the junior doctors (interns and post graduates) and the prescribing doctors (practising physicians) of the hospital. An 'MDI use evaluation score chart' [Table/Fig 1] was prepared as per the National Asthma Education and Prevention Program (NAEPP) criteria [9] and it was used in the study. For every correctly carried out step, a score of '1' was given, and for every incorrect step, a score of '0' was given. The healthcare professionals were asked, after obtaining their verbal consent, to demonstrate the use of the placebo inhaler to the care givers of the patients, and the steps were graded as per the NAEPP criteria.



[Table/Fig-1]: MDI Technique Evaluation Score Chart

STATISTICAL ANALYSIS

The statistical analysis was performed by using the SAS 9.1 version and the Chi-Square test and the Fisher's extract test was used to calculate the p-value. The test was done at a 5% significance level and a P value of <=0.05 indicated significance.

RESULTS

The results are depicted in [Table/Fig-2], which shows that both the practising doctors and the junior doctors had an incorrect method of demonstrating the usage of the metered dose inhaler. Steps 1, 2, 8 and 10 were demonstrated correctly, both by the prescribing doctors and the junior doctors. Step 7 was incorrectly demonstrated by a majority of the junior doctors and step 4 was demonstrated incorrectly by a majority of the practising doctors. Also, there was a significant difference between the prescribing doctors and the junior doctors, a majority of the latter were incorrect. Only 12 of the 110 professionals could actually get all the steps corect.

S. No.	Question	Wrong demonstration by Junior Doctors	Wrong demonstration by Practicing Doctors	P value
1	Shake vigorously	0	0	
2	Remove cap	0	0	
3	Hold upright	12	0	0.0340^^
4	Breathe out gently	42	7	0.0061**
5	Start breathing in slowly & deeply	24	3	0.0299**
6	Actuate during inspiration	39	6	0.0063**
7	Continue slow inhalation	56	4	<0.0001**
8	No aerosol loss is visible	0	0	
9	Hold breath for 10 seconds	32	0	<0.0001**
10	Next dose after 1 minute	0	0	

[Table/Fig-2]: The MDI score chart used for evaluation. Chi-Square / ^^ Fisher's extraJct test to calculate the p-value. Test done at 5% Significance level and P<=0.05 indicates Significance

DISCUSSION

In a study which was conducted by Hira HS, at the Maulana Azad Medical College, New Delhi, a questionnaire regarding the use of metered dose inhalers (MDI) was administered to 38 physicians,[9] faculty members and 29 residents. Fifty-five percent of the faculty members answered at least three or more of the seven steps of

Sl No.	Steps	Validity	Junior Doctors	Practicing Doctors	P value
1	Shake vigorously	correct	80(100.0%)	30(100.0%)	
		Wrong	0	0	
2	Remove cap	correct	80(100.0%)	30(100.0%)	
		Wrong	0	0	
3	Hold upright	Wrong	12(15.0%)	0	0.0340^^
		correct	68(85.0%)	30(100.0%)	
4	Breathe out gently	Wrong	42(52.5%)	7(23.3%)	0.0061**
		correct	38(47.5%)	23(76.7%)	
5	Start breathing in slowly & deeply	Wrong	24(30.0%)	3(10.0%)	0.0299**
		correct	56(70.0%)	27(90.0%)	
6	Actuate during inspiration	Wrong	39(48.8%)	6(20.0%)	0.0063**
		correct	41(51.3%)	24(80.0%)	
7	Continue slow inhalation	Wrong	56(70.0%)	4(13.3%)	<0.0001**
		correct	24(30.0%)	26(86.7%)	
8	No aerosol loss is visible	correct	80(100.0%)	30(100.0%)	
		Wrong	0	0	
9	Hold breath for 10 seconds	Wrong	32(40.0%)	0	<0.0001**
		correct	48(60.0%)	30(100.0%)	
10	Next dose after 1 minute	correct	80(100.0%)	30(100.0%)	
		Wrong	0	0	

[Table/Fig-3]: Statistical analysis, each step detailed Chi-Square /^^ Fisher's extract test to calculate the p-value. Test done at 5% Significance level and P<=0.05 indicates Significance

the inhalation technique correctly, as compared to 86% of the residents and this was statistically significant (p value < 0.01). All the participants used to prescribe MDI to their patients. 80% of them responded that they followed the package insert instructions to educate their patients. It was concluded that the doctors who are involved with the MDI use, should learn and become familiar with the proper recommendations for its optimal aerosol delivery [10]. Our present study showed that only 10.9% of the health care professionals were correct, which was of serious concern. In a study from Iran, which included physicians and nurses, only 6.93% could demonstrate MDIs correctly [11]. In another study from Oman, only 15% of the respondents performed all the steps correctly [12].

The training and the evaluation of the health care professionals is absolutely essential for the effective management of childhood asthma. The morbidity and the mortality could thus be reduced.

The limitations of the present study were, that it was not carried among the nursing personnel who form a vital link and that few healthcare personnel were on leave during the period of the study.

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AUTHOR(S):

1. Dr. Naren S. Dudyala
2. Dr. Marina Amarendra
3. Dr. Subbarao P.V.

PARTICULARS OF CONTRIBUTORS:

1. corresponding author,
2. Asst. Professor Dept of Pediatrics
3 Prof and HOD Dept of Pediatrics Pediatrics , Konaseema Institute of Medical Sciences, Amalapuram Andhra Pradesh 533201, India.

NAME, ADDRESS, TELEPHONE, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Naren S Dudyala,
Asst Prof, Pediatrics,
Konaseema Institute of Medical Sciences,
Amalapuram Andhra Pradesh 533201, India.
Phone: 09491130738
E-mail: dudyalanaren@gmail.com
dudyalanaren@rediffmail.com

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