

The effect of modification of inhaler spacer's visual user guideline on the correct use of the inhaler spacer

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Abstract

Aim: To determine the effect of modification of visual user guideline of inhaler spacer device on the skill of correct usage.

Material and Method: The medical faculty intern students at İnönü University were enrolled in the study. The participants were interviewed face-to-face and requested to fill out questionnaires for modified and non-modified visual user guideline.

Result: A total of 172 students were included in the study; 104 (60.5%) of the students were male. The study group included 90 students who were evaluated with the modified visual user guidelines; the other group included 82 students who were evaluated with the non-modified visual user guidelines. 76 (84%) out of 90 participants in the group who was given modified visual user guideline performed the inhaler spacer device technique correctly. In contrast, only 12 (15%) of 82 participants in the group who was given non-modified visual user guideline carried out the inhaler spacer device technique correctly ($p=0.001$). The most common mistakes made in non-modified visual user guideline group were; taking 5-6 deep and slow breaths; 28 (34.1%), shaking MDI and removing cap; 45 (54.9%), and placing mouthpiece between teeth and lips or placing facemask; 57 (69.5%), respectively. Having compared the both groups for the steps of inhaler spacer device use, the modified visual user guideline group fulfilled all the steps more correctly.

Conclusion: The visual user guideline of the inhaler devices in our country are insufficient. We are of the opinion that especially visual improvements on user guideline will increase the correct usage of the device by parents.

Keywords: Inhaler Spacer; Modified; MDI; Visual User Guideline.

INTRODUCTION

Asthma disease is still an important health problem although recent developments in diagnosis and treatment. Mortality from asthma is reported to be approximately 0.25-0.50 in 100000 (1). Inhalation of bronchodilator and anti-inflammatory treatments in asthma is recommended for treatment efficacy (1,2). The inhaler route is the most preferred route for asthma treatment and is expected to continue to be the first choice in the future (2). The most important advantage of using medication by inhalation is that it can provide more optimal treatment with fewer medications, more effective medication can be given to the airways, and especially systemic side effects of steroids can be reduced (3,4). Despite highly effective asthma therapies, the most important reasons for not being able to control the disease, incompatibility due to

the use of inhalers, and poor compliance with doctors' recommended asthma treatments (2,5).

Previous studies have shown that many asthmatic children and their parents are unable to perform inhalation techniques even after they receive instructions (5-7). Not being able to use the inhaler device completely and correctly, not having complete control of the disease, using more medication, experiencing more side effects, and having frequent attacks results in too many hospitalizations and waste of medication. These outcomes in turn shake confidence in therapy and increase national health costs (8,9).

Childhood asthma is more prevalent in the preschool years. In this age group, treatment is given mostly as metered-dose inhaler (MDI) treatment with the help of a spacer device. For this purpose, in regular follow-ups it

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is emphasized that the use of inhalation drugs and the inhalation techniques, at an importance point in asthma guidelines (3,6). Previous studies have shown that many asthmatic children and their parents are unable to perform inhalation techniques even after they receive instructions (7-9). Not being able to use the inhaler device completely and correctly, not having complete control of the disease, using more medication, experiencing more side effects, and having frequent attacks results in too many hospitalizations and waste of medication. These outcomes in turn shake confidence in therapy and increase national health costs. In these studies, factors that influence correct use have been reported as the education level and socioeconomic condition of the patient's relative, going to follow-ups regularly and having a written user's guideline.

The objective of current study is to determine the effect of modification of visual user guideline of inhaler spacer device on the skill of correct usage.

MATERIAL and METHODS

The medical faculty intern students at İnönü University were enrolled in the study. The students were included in the study on a voluntary basis. Our study was performed between September 2017 and November 2017. The students were divided into two groups. One group was evaluated with modified visual user guideline for inhaler device, and other group was evaluated with non-modified visual user guideline (Figure 1 and Figure 2).

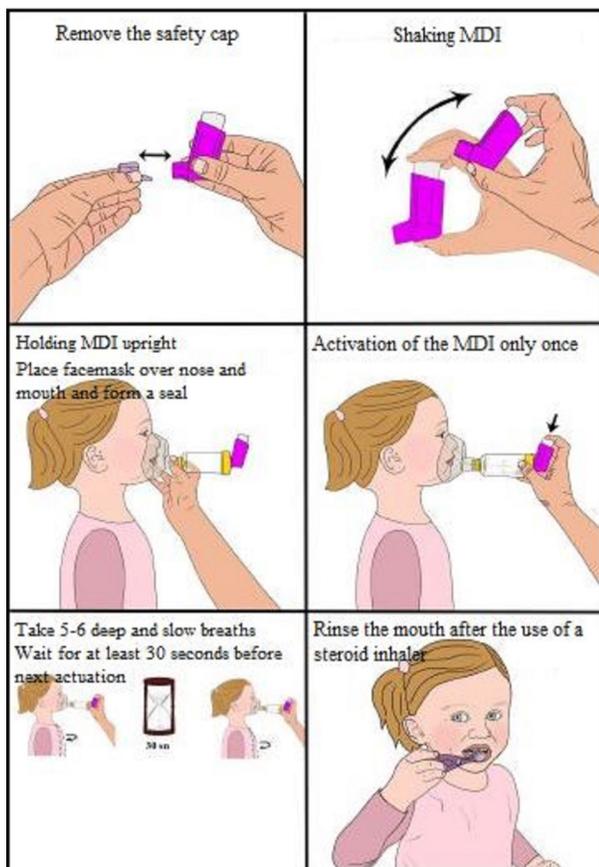


Figure 1. The modified visual user guideline for MDI

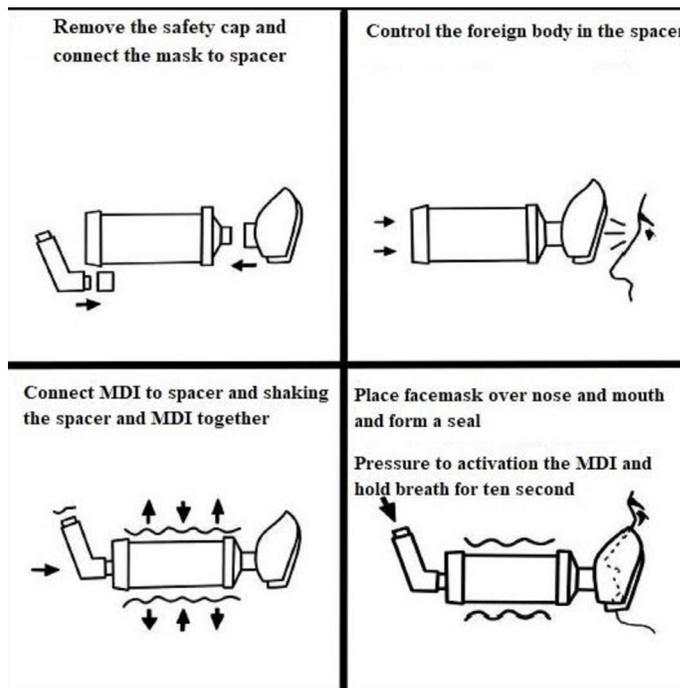


Figure 2. The non-modified visual user guideline for MDI

The participants were randomly given modified and non-modified visual user guideline for inhaler device. Subsequently, asked to show how to use proper inhalation technique. The clinical trainers interviewed face-to-face and filled out questionnaires. The questionnaire was included demographic information such as the age and gender of the participant and checklist question for the correct use of inhaler technique.

Assessment of spacer device use and technique

To assess spacer device use, trainer asked the participant to verbally describe and demonstrate (with a placebo) how they used it (one group for modified visual user guideline for inhaler device, the other group for non-modified visual user guideline). The inhalation technique was evaluated by a trainer who recorded the findings on a standardized checklist. The checklist was based on the recommendations of the National Institute of Health (NIH) (6) for the use of the MDI and the spacer device (table 1). The inhalation technique was considered correct when all essential steps were properly performed. The research protocol was approved by the ethics committee of İnönü University Faculty of Medicine. All the participants provided written informed consent.

Statistical Analysis

Statistical analysis was performed with the Statistical Package for Social Sciences (SPSS) 17.0 software (SPSS Inc. Chicago, IL). Descriptive statistics were expressed as the frequency and percentage for categorical variables, whereas quantitative data were expressed as the median for non-normally distributed data. Categorical variables were compared by using the chi square test, and quantitative variables were compared with the Mann-Whitney U test. A 2-sided $p < 0.05$ was considered statistically significant.

Table 1. Steps required for proper MDI-spacer device uses

Steps of MDI-spacer device uses	
1	Shaking MDI and removing cap*
2	Connect MDI to spacer*
3	Holding MDI upright
4	Place mouthpiece between teeth and lips or place facemask over nose and mouth and form a seal*
5	Activation of the MDI only once*
6	Take 5-6 deep and slow breaths*
7	Wait for at least 30 seconds before next actuation*
8	Rinse the mouth after the use of a steroid inhaler
*Essential step	

RESULTS

A total of 172 students were included in the study; 104 (60.5%) of the students were male. The mean age of the

students was 25.3 ± 12.6 years. The study group included 90 students who were evaluated with the modified visual user guidelines; the other group included 82 students who were evaluated with the non-modified visual user guidelines. The 76 (84%) of 90 participants in the group who was given modified visual user guideline demonstrate the inhaler spacer device technique correctly. In contrast, only 12 (15%) of 82 participants in the group who was given non-modified visual user guideline demonstrate the inhaler spacer device technique correctly ($p=0.001$). The most commonly mistakes were done in non-modified visual user guideline group were; the take 5-6 deep and slow breaths; 28 (34.1%), shaking MDI and removing cap; 45 (54.9%), and place mouthpiece between teeth and lips or place facemask; 57 (69.5%), respectively (table 2). When compare the both group for the steps of inhaler spacer device use, the modified visual user guideline group demonstrate the all steps more correctly (table 2).

Table 2. Comparison of assessment steps of inhaler spacer devices

Assessment steps	Non-modified inhaler spacer device n=82	Modified inhaler spacer device n=90	p-value
Shaking MDI and removing cap*, n (%)	45 (54.9)	89 (98.9)	<0.001
Connect MDI to spacer*	62 (75.6)	86 (95.6)	<0.001
Holding MDI upright	44 (53.7)	84 (93.3)	<0.001
Place mouthpiece between teeth and lips or place facemask*	57 (69.5)	89 (98.9)	<0.001
Activation of the MDI only once*	60 (73.2)	88 (97.8)	<0.001
Take 5-6 deep and slow breaths*	28 (34.1)	88 (97.8)	<0.001
Wait for at least 30 seconds before next actuation*	-	90 (100)	<0.001
Rinse the mouth after the use of a steroid inhaler	-	90 (100)	<0.001
*Essential step			

DISCUSSION

Regular follow-ups of patients who are diagnosed with asthma and who are started inhaler therapy and increasing the steps of the therapy based on the patient's complaints is recommended according to GINA guidelines. According to this guideline, it is recommended to ask patients in the follow-up about compliance with the therapy and whether the medications are taken with correct techniques (3). According to GINA guidelines, it is recommended to give the medication through inhaler spacer in the treatment of asthma in preschool age group. For this reason, using the inhaler spacer with correct technique will increase the success of treatment. Limited numbers of previously conducted studies have shown that children diagnosed with asthma and their families are not sufficient about using MDI spacer and other instrumental devices with a correct technique (9-12). Insufficiency on this issue has been thought to result from factors such as the number of trainings given, the family's educational level and socio economic level. Despite the improvements in these factors, it has been shown that the ability for correct usage of the inhaler spacer is still in low levels. Considering that

the visual user guideline for existing inhaler spacers in our country are not sufficient, we thought that improvements in these visual user guideline will increase the ability of proper use. Based on this thought, we showed in our study that the visual improvement on the user guideline of the inhaler spacer increased the rate of proper use significantly.

In a study by Topal E et al. (12), the factors which positively influenced proper use of MDI spacer device were found as patients' being satisfied with the spacer device, having been trained by a clinical trainer and caregiver's being a university graduate. Based on these results, it was recommended that patients' satisfaction with the device should be questioned, more intense device training should be provided to caregivers who have low levels of education, and the training should be conducted by clinical trainers. In parallel with the result of Topal E et al.'s study that patient satisfaction will increase proper use, in our study the visual improvement in the visual user guideline makes it easier for the patient to understand and increases satisfaction. Thus, it was shown in our study that the visual improvement on user guideline will have a positive effect on correct use skills.

The correct use of inhaler device contained 8 steps, 6 of which were considered essential for adequate drug delivery (Table 1). In most of the inhaler spacers in our country, two of the steps are not included visually. These steps are "wait for at least 30 seconds before next actuation" and "Rinse the mouth after the use of a steroid inhaler". For this reason, visual user guideline for most of the inhaler devices in our country are insufficient. The inhalation technique was considered correct when all essential steps were properly performed. In Topal E et al.'s study, the most common incorrect essential steps of the patients were "wait for at least 30 seconds before next actuation", "take 5 to 6 deep and slow breaths", "shaking MDI and removing cap". In our study, while less than half of the group on whose visual user guideline changes were not made could demonstrate these steps correctly, almost all of the group on whose visual user guideline improvements were made could demonstrate the steps correctly.

The limitation of our study was including medicine faculty last year students instead of patient. It may be caused the high rate of demonstrating the steps of inhaler device correctly, because the fact that the participants of the study were candidate of future doctors. For this reason, conducting studies on patients will be better in terms of generalizing the results.

CONCLUSIONS

As a conclusion, visual user guideline of the inhaler devices in our country are insufficient. We are of the opinion that especially visual improvements on user guideline will increase the correct usage of the device by parents.

Competing interests: The authors declare that they have no competing interest.

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Ethical approval: The research protocol was approved by the ethics committee of Inonu University Faculty of Medicine.

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