

Incorrect use of pressurised metered dose inhaler by asthmatic patients

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Summary

The use of pressurised metered dose inhalers was assessed among 93 asthmatic patients attending the respiratory out patient clinic between January to October 1989. They were regular users of the inhalers prior to the assessment. 62.4% of the patients were found to use the inhalers incorrectly. Forty three percent made more than one error. The commonest error observed was the failure to actuate and inhale the aerosol together in 41.9%. There was no difference in the occurrence of incorrect performance between different sexes, age groups, duration of inhaler used and previous supervision or no supervision by the doctors.

Key words: incorrect inhaler technique — asthmatic patients.

Introduction

Pressurised metered dose inhalers are used widely to deliver aerosolised drugs to the lower respiratory tract. It is a convenient and safe way of administering drug, requiring a smaller dose of bronchodilator or corticosteroid as compared to the oral route.¹⁻³ However, a proportion of patients may not benefit from this method of therapy because of the inability to use the inhaler correctly.⁴⁻⁶ We believe this problem of incorrect use of inhaler does occur in our local asthmatic patients, prompting us to carry out a study to assess the magnitude of the problem.

Patients and Methods

The technique of using pressurised metered dose inhalers was assessed in 93 asthmatic patients (29 males, 64 females) who attended our respiratory out patient clinic. They were all regular users of pressurised metered dose inhaler for varying period of time. They were referred to our clinic recently from general medical wards, nonmedical wards, general out patient clinics and private clinics. They were assessed by the two principal investigators assisted by medical officers posted to the respiratory clinic between January 1989 and October 1989. Each of them was asked to inhale two puffs of pressurised placebo aerosol from a conventional metered dose inhaler, while the investigator observed closely. Eight manoeuvres were assessed and recorded on a check list. The manoeuvres were recommended by most manufacturers and had been proposed by Epstein et al⁵ with slight modifications. These were:—

- (1) Remove the actuator cap
- (2) Shake the inhaler

- (3) Hold the inhaler upright
- (4) Tilt the head back
- (5) Begin to breathe in and immediately actuate the inhaler
- (6) Inhale slowly and deeply
- (7) Hold the breath for 10 seconds or as long as patient can possibly hold
- (8) One actuation with each inhalation.

The results of incorrect manoeuvres were expressed in percentages. The comparison between subjects performing incorrectly were made for different sexes, age groups, duration of inhaler used and the absence or presence of previous supervision by doctors, using chi-square tests.

Results

Fifty eight of the 93 patients observed (62.4%) used their inhalers incorrectly. The type of manoeuvres performed incorrectly are summarised in Table 1. The commonest error was the failure to actuate and inhale the aerosol together (41.9%). Forty of them (43%) made more than one error.

Table 1
Type and percentage of manoeuvres performed incorrectly by patients.

Type of manoeuvre	Percentage
1. Did not remove the cap	0
2. Did not shake the inhaler	6.5
3. Did not hold the inhaler upright	1.1
4. Did not tilt the head	23.7
5. Did not actuate and inhale together	41.9
6. Did not inhale slowly and deeply	34.4
7. Did not hold the breath for 10 seconds or long enough	29.0
8. Multiple actuations with single inhalation	11.8

The number and the percentages of patients who performed incorrectly by age groups, duration of inhaler used and the presence or absence of previous supervision by doctors are shown in Table 2. There was no significant difference between the variables compared ($p > 0.05$).

Discussion

Pressurised metered dose inhaler deposits only a small fraction of the dose within the lungs. Most studies estimate around 10% lung deposition.⁷⁻⁹ This fraction may be further reduced if the inhaler technique is poor resulting in lower bronchodilatation.⁶ Our study has shown that more than half of the patients fail to use their inhalers correctly. Many of them have used the inhalers for more than a year. Other workers have also observed substantial proportion of their asthmatic patients with faulty inhaler techniques. Crompton⁴ found 14% of his patients with this problem whereas Epstein et al⁵ observed 90% faulty rate!

Table 2
Relationship between percentage of subjects with incorrect manoeuvres and several variables

Variables	percentage incorrect	p value
Sex		
Male, n = 29	62.1	0.85
Female, n = 64	62.5	
Age (year)		
< 50, n = 73	60.3	0.34
≥ 50, n = 20	75.0	
Duration of inhaler used (year)		
< 1, n = 47	68.1	0.47
≥ 1, n = 46	58.7	
Previous supervision by doctors		
Yes, n = 87	59.8	0.48
No, n = 6	83.3	

Although a substantial proportion of our patients had previous supervision on the use of the inhaler by their doctors, the overall failure rate is still high. This may imply inadequate supervision or possibly wrong supervision. Most patients indicated to us that they were only theoretically told the way to use their inhalers without actually being demonstrated the technique. Repeated assessments and supervisions are necessary so that most of the patients will benefit from the pressurised inhaler therapy. However, a small proportion of patients may not be able to master the technique despite close supervision, thus needing alternative methods. Spacer attachment to the metered dose inhaler has been shown to be a good alternative. It does not require coordination between actuation and inhalation and the bronchodilation may even be greater than a conventional inhaler alone.¹⁰⁻¹³ It can also overcome the problem of oropharyngeal candidiasis in some patients on high dose of inhaled corticosteroid.¹⁴ The only disadvantage with spacer is its bulky size, which is apparent with some designs. Alternatively, dry powder inhaler can be used. It is a breath-actuated inhaler system, as such dose not require coordination between the actuation and inhalation. Most studies have shown comparable bronchodilation between dry powder and pressurised aerosol bronchodilators.¹⁵⁻¹⁶

The controversy between close or open mouth technique of inhalation with pressurised metered dose inhaler will still remain. Some investigators favour the open mouth technique which results in better lung deposition;¹⁷ other workers however show no such superiority.¹⁸⁻¹⁹ We advocate the close mouth technique in all our patients as it is easier to perform an undoubtedly effective. The open mouth technique is a more difficult method and if not properly directed may result in the spray missing the mouth completely or hitting the roof or side of the mouth. We believe the inhalation route will continue to be the preferred method of drug administration for the treatment of asthma. However, in order to achieve maximal efficiency, the mode of aerosol delivery system must be tailored to suit patient's ability to use the various types of inhaler.

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