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An Investigation on the Consciousness of Patients and Pharmacists Regarding Inhaler Education

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Few studies have focused on the awareness of inhaler education in patients and pharmacists who have crucial roles in inhaler education. The aim of this study was to investigate the difference in awareness of inhaler education between patients and pharmacists. We conducted questionnaire-based surveys involving 270 patients with asthma and chronic obstructive pulmonary disease and 139 pharmacists of 13 pharmacies belonging to the same chain dispensing pharmacy in Hyogo prefecture of Japan in July 2011. We obtained valid responses from 230 patients (85.2%) and 139 pharmacists (100%). Although 75% of pharmacists provided inhaler education about the importance of continuation, only 16% of patients felt that they had learned the importance of continuation. Similarly, 95% of pharmacists provided inhaler education about the importance of gargling, however, only 57% of patients felt that they had learned the importance of gargling. This survey clarified the difference in awareness between pharmacists and patients on inhaler education. It proved to be difficult to educate patients on the importance of compliance and gargling.

INTRODUCTION

Inhaled corticosteroids (ICSs) have a crucial role in achieving long-term control of bronchial asthma (BA) and chronic obstructive pulmonary disease (COPD). It is important to ensure adherence to asthma therapy to maximize therapeutic benefits and avoid exacerbations (1). Indeed, the regular use of ICSs was associated with a reduction of 31% in the rate of hospital admissions compared to that with irregular use of ICSs (95% confidence interval (CI) 17–43) (2). However, the mean levels of adherence were found to be only between 22% and 63% (3). Another systematic review of 29 randomized trials of > 2,000 subjects with asthma using ICSs also reported that adherence ranged only from 47% to 57% (4). Therefore, clinicians should understand the reasons for low adherence and work to increase adherence to reduce asthma-related deaths.

Non-adherence is divided into two types: intentional non-adherence and unintentional non-adherence (5). Intentional non-adherence is caused by negative beliefs about ICSs, a lack of motivation, distrust in healthcare professionals, feelings of being disenfranchised from the decision-making process, and fears for tolerance or addiction (5, 6). If clinicians expect that patients share their positive views about ICSs, they might be less likely to elicit and address patients' doubts and concerns about them (7). Unintentional non-adherence is caused by forgetfulness, disrupted routines, a lack of routines, the complexity of the regimen, a lack of understanding of the disease or the duration of the required treatment, a lack of understanding of treatment use, and an inaccurate administration technique for inhaled therapies (5). Patient education is effective in improving unintentional non-adherence. Since inhalation drugs do not necessarily have simple inhalation procedures, adequate inhaler education is necessary to master the proper inhalation technique (8, 9). Although the pharmacist plays a central role in inhaler education, there are few reports focusing on pharmacists. To determine the problems in inhaler education and enhance its effectiveness, we conducted an awareness survey on inhaler education in pharmacists and patients.

MATERIALS AND METHODS

Participants

Two hundred patients with BA or COPD and 139 pharmacists belonging to 13 Hanshin dispensing pharmacies Co., Ltd. were included in this study. In July 2011, we distributed questionnaires to each dispensing pharmacy. The questionnaires were filled anonymously. This survey was approved by the Review Board of the

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Hyogo Prefecture Medical Association (R3-001). The study received ethical approval for the use of an opt-out methodology. As long as the rights of participants' willingness or refusal are guaranteed in non-invasive and non-interventional surveys, Japanese ethical guidelines have provisions for a waiver for the requirement of informed consent for research (https://www.mhlw.go.jp/english/).

Questionnaires

Our questionnaire was designed specifically for this project and consisted of two sections: a patient questionnaire (Table I) and a pharmacist questionnaire (Table II). Managing pharmacists mainly perform quality control and inventory management of pharmaceuticals and perform instruction and management of pharmacists in the pharmacy. 'Engaged pharmacists' refers to general pharmacists.

Table I. The patients' questionnaire.

Questions about patient characteristics
1. How old are you?
2. Are you male or female?
3. What is your smoking history?
4. What is your illness?
5. How long have you been inhaling? The first time <1 month 1 month≤, <6 months 6 months≤, <1 year 1 year≤, <5 years 5 years≤
Questions about inhaled drugs
1. Have you ever received an explanation of the inhaled drug from the pharmacist?
2. What kind of explanation have you received from the pharmacist?
3. Have you ever asked a pharmacist about any inhaled drugs?
4. If so, what kind of question did you ask?
5. What kind of explanation do you want to receive from your pharmacist about inhaled drugs in the future?
Questions about inhaler education
6. How often have you received explanations from pharmacists about inhaler usage and precautions?
7. What kind of explanations have you received from the pharmacist about how to use the inhaler device and precautions?
8. How often do you want to receive explanations from pharmacists about how to use the inhaler device and precautions in the future?

Table II. The pharmacists' questionnaire.

Questions about pharmacists' characteristics
1. Are you a managing pharmacist or a hired pharmacist?
2. How many prescriptions do your pharmacy deal with in a month?
3. How many prescriptions for asthma do your pharmacy deal with in a month?
4. How many prescriptions of ICS do your pharmacy deal with in a month?
5. How many prescriptions of ICS/LABA do your pharmacy deal with in a month?
6. Do you know the presence of asthma prevention and management guideline?
7. Have you ever read the asthma prevention and management guideline?
8. Does your clinic or hospital have a department of internal medicine?
Questions about inhaler education
9. How long does it take to provide drug education to one patient at a pharmacy?
10. What do you teach as drug education?
11. How often do you give inhaler educations per patient? (Corresponds to Q11 in Table 1)
12. What do you teach as inhaler education the first time? (Corresponds to Q12 in Table 1)
13. What do you teach as inhaler education after the 2nd time? (Corresponds to Q12 in Table 1)

ICS, inhaled corticosteroid; LABA, long-acting beta-agonist

Data analysis

All data were entered into a pre-constructed Microsoft Excel sheet by the investigator. The entered data were checked by two authors and by a plausibility test during descriptive data analysis.

RESULTS

Study participants (from Questions about patient and pharmacist characteristics)

The characteristics of patients are summarized in Table III. The mean age of the study participants was 58 years (range, 17–90).

Approximately 70% of patients suffered from chronic respiratory illnesses such as BA and COPD and required continuous inhalation therapy. Seventy-seven percent of patients had been at the clinic for more than 6 months. The characteristics of pharmacists are summarized in Table IV. Approximately half of the pharmacists had read the asthma prevention and management guideline in Japan.

Table III. Characteristics of the patients

Characteristics (corresponds to Q1 to Q5 in Table 1)	Value
Age (percentage)	
< 10 years	6 (2)
10 years≤, <20 years	10 (4)
20 years≤, <30 years	8 (3)
30 years≤, <40 years	24 (9)
40 years≤, <50 years	36 (13)
50 years≤, <60 years	28 (10)
60 years≤, <70 years	56 (21)
70 years≤	102 (38)
Sex, number (percentage)	
Male	118 (44)
Female	152 (56)
Smoking status, number (percentage)	
Never	149 (57)
Ever	83 (32)
Current	31 (11)
Diagnosis, number (percentage)	
Bronchial asthma	129 (53)
Cough-variant asthma	31 (13)
Chronic obstructive pulmonary disease	47 (19)
Others	37 (15)
Inhaling duration, number (percentage)	
The first time	8 (3)
<1 month	16 (6)
1 month≤, <6 months	36 (14)
6 months≤, <1 year	33 (13)
1 year≤, <5 years	88 (33)
5 years≤	80 (31)

Table IV. Characteristics of the pharmacists

Characteristics (corresponds to Q1 to Q9 in Table 2)	Value
Type of pharmacist, number (percentage)	
Managing pharmacist	35 (25)
Engaged pharmacist	104 (75)
Number of prescriptions, mean (range)	2413 (150–8000)
Number of prescriptions for asthma, mean (range)	62 (0–500)
Number of prescriptions of ICS, mean (range)	13 (0–200)
Number of prescriptions of ICS/LABA, mean (range)	18 (0–200)
Number of pharmacists knowing asthma guideline, number (percentage)	107 (77)
Number of pharmacists reading asthma guideline, number (percentage)	72 (52)
Number of pharmacists collaborating with internal medicine, number (percentage)	108 (78)

ICS, inhaled corticosteroid; LABA, long-acting beta-agonist

Patients' awareness (from Questions about inhaled drugs and devices)

Patients' awareness about inhaled drugs and devices is summarized in Tables V and VI. Most patients received inhaler education on how to handle the device. Only 23% of patients asked about drugs, which may reflect the modest nature of the Japanese; however, most patients wanted to learn several aspects such as drug effects, inhalation procedures, drug safety, side effects of drugs, and the underlying disease.

Patients received inhaler education on the first visit and/or when they asked questions. This was almost consistent with the frequency desired by the patient. Most patients felt that they received inhaler education through verbal description. The patients who felt that they learned the importance of gargling and continuation

were only 57% and 16%, respectively. Patients under the age of 20 and over the age of 70 tended not to ask questions or receive explanations about the contents of the drug.

Table V. Patients' awareness of inhaled drugs.

Item (corresponds to Q6 to Q10 in Table 1)	Value
Inhaler education, number (percentage)	
Received	230 (91)
Not received	22 (8)
Content of inhaler education, number* (percentage of total respondents [n = 252])	
Effect	97 (38)
How to use	211 (84)
Safety	34 (13)
Side effect	64 (25
Underlying disease	39 (15)
Query about inhaled drugs, number (percentage)	
Yes	55 (23)
No	185 (77)
Content of query about inhaled drugs, number* (percentage of total respondents [n = 55])	
Effect	17 (31)
How to use	36 (65)
Safety	11 (20)
Period	8 (15)
Possibility of dose change	4 (7)
Other	8 (15)
Expected explanation about inhaled drugs, number* (percentage of total respondents [n = 270])	
Effect	65 (24)
Inhalation procedure	70 (26)
Safety	70 (26)
Side effect	85 (32)
Underlying disease	30 (11)

*, Duplicate allowed.

Table VI. Patients' awareness of inhaler devices.

Item (corresponds to Q11 to Q13 in Table 1)	Value
Frequency of explanation about inhaler devices, number (percentage)	
Never	14 (6)
First visit	106 (44)
First visit and when you ask questions	56 (23)
First visit and several times per year	34 (14)
Every visit	33 (13)
Content of explanation about inhaler devices, number* (percentage of total respondents [n = 228])	
Importance of continuation	36 (16)
Verbal description	177 (77)
Demonstration	66 (29)
Importance of gargle	130 (57)
How to prevent forgetting	8 (4)
Expected frequency of explanation about inhaler devices, number (percentage)	
First visit	85 (36)
First visit and when you ask questions	107 (46)
First visit and several times per year	26 (11)
Every visit	15 (7)

*, Duplicate allowed.

Pharmacists' awareness

Pharmacists' awareness about inhaled drugs and devices is summarized in Table VII. Most of the pharmacists gave inhaler education within 6 minutes. Most of the pharmacists focused on drug effects, inhalation procedures, and the side effects of drugs, and tended not to explain drug safety and underlying illnesses. Most of the pharmacists gave inhaler education on the first patient visit and/or several times per year. Intriguingly, most of the pharmacists felt that they educated patients on the importance of continuation and the importance of gargling by verbal descriptions or demonstrations.

Table VII. Pharmacists' awareness

Item (corresponds to Q10 to Q14 in Table 2)	Value
Inhaler education time (percentage)	
< 1 minute	8 (6)
1 minutes≦, <6 minutes	127 (92)
6 minutes≦, <10 minutes	3 (2)
10 minutes≦	0 (0)
Content of inhaler education, number* (percentage of total respondents [n = 139])	
Effect	116 (84)
Inhalation procedure	131 (94)
Safety	31 (22)
Side effect	108 (78)
Underlying disease	22 (16)
Frequency of explanation about inhaler devices, number (percentage)	
Never	8 (6)
First visit	79 (56)
First visit and when you are asked	11 (8)
First visit and several times per year	34 (24)
Every visit	9 (6)
Content of 1st inhaler education about inhalation procedure, number* (percentage of total respondents [n = 133])	
Importance of continuation	100 (75)
Verbal description	122 (92)
Demonstration	94 (71)
Importance of gargling	126 (95)
How to prevent forgetting	16 (12)
Content of inhaler education about inhalation procedure after the 2nd time, number* (percentage of total respondents [n = 133])	
Confirmation of inhaler procedure	55 (41)
Confirm by answer	55 (41)
Confirm by action	12 (9)
Check for side effects	56 (42)
Check for frequency of inhalations	56 (42)

*, Duplicate allowed.

DISCUSSION

The current study focused on pharmacists and patients, who are the main actors in inhaler education, revealing a gap between the two. Indeed, most pharmacists provided inhaler educations about the importance of continuation and gargling; however, many patients did not feel that they had learned the importance of continuation and gargling. Unfortunately, demonstrations and ingenuity to prevent patients from forgetting to take medications are not often remembered by patients. The current study is important to point out the problems of inhalation education and what needs to be improved.

The current study showed that approximately 94% of pharmacists provided inhaler procedures to patients, and 71% of those could demonstrate the correct usage of inhalers, including metered-dose inhalers, dry powder inhalers, turbuhalers, and respimats. This is more than that found by a previous survey of healthcare professionals, which reported that 75% provided inhaler procedures to patients, and only 7% could demonstrate the correct usage of an inhaler and assessment of inspiratory flow (10).

Almost all pharmacists focused on gargling in inhaler education; however, only 57% of patients understood the importance of gargling. Another questionnaire-based survey on gargling after ICSs of 19 inpatients at the University of Tokyo Hospital revealed that the percentage of patients performing appropriate gargling was only 11% (11). These results suggest that it is difficult for patients to understand the importance of gargling and to acquire the appropriate gargling methods, although gargling is important in preventing the local adverse effects of ICSs.

Since physicians often explain drug safety and underlying illnesses in Japan, many pharmacists tended to focus on how to use the device in inhaler education. Few studies have been reported on inhalation guidance for pharmacists and patients. The lacks of communications between physicians and pharmacists can lead to patient education failure. Therefore, physician should tell the pharmacist what kind of explanation he/she wants. And, the pharmacist should also know what the physician explained to the patient. The imitations of this study include the fact that it was carried out in a relatively small area and that the pharmacists involved in the study belonged to the same pharmacy company. However, epidemiological trends, such as asthma deaths in Japan, are similar to

global trends (12, 13). Therefore, the current findings may be applicable to asthma treatment in developed countries.

In conclusion, the current study revealed that it is difficult to educate patients regarding the importance of compliance and gargling. Therefore, clinicians need to work hard to increase patients' compliance and educate them on the importance of gargling to maximize the efficacy of inhaled drugs.

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CONFLICT OF INTEREST

One of authors belongs to I&H Co. Ltd., which is a company managing the HANSIN Dispensing Pharmacy.

REFERENCES

1. **Sims, E.J., Price, D., Haughney, J., Ryan, D. and Thomas, M.** 2011. Current control and future risk in asthma management. Allergy Asthma Immunol Res **3:** 217-225.
2. **Suissa, S., Ernst, P. and Kezouh, A.** 2002. Regular use of inhaled corticosteroids and the long term prevention of hospitalisation for asthma. Thorax **57:** 880-884.
3. **Bårnes, C.B. and Ulrik, C.S.** 2015. Asthma and adherence to inhaled corticosteroids: Current status and future perspectives. Respir Care **60:** 455-468.
4. **Normansell, R., Kew, K.M. and Stovold, E.** 2017. Interventions to improve adherence to inhaled steroids for asthma. Cochrane Database Syst Rev **4:** CD012226.
5. **George, M.** 2018. Adherence in asthma and copd: New strategies for an old problem. Respir Care **63:**818-831.
6. **George, M., Topaz, M., Rand, C., Sommers, M.L.S., Glanz, K., Pantalon, M.V., et al.** 2014. Inhaled corticosteroid beliefs, complementary and alternative medicine, and uncontrolled asthma in urban minority adults. J Allergy Clin Immunol **134:** 1252-1259.
7. **Driesenaar, J.A., De Smet, P.A., van Hulten, R., Horne, R., Zwikker, H., van den Bemt, B. and van Dulmen, S.** 2016. Beliefs about inhaled corticosteroids: Comparison of community pharmacists, pharmacy technicians and patients with asthma. J Asthma **53:** 1051-1058.
8. **Gibson, P.G., Powell, H., Coughlan, J., Wilson, A.J., Abramson, M., Haywood, P., et al.** 2003. Self-management education and regular practitioner review for adults with asthma. Cochrane Database Syst Rev **1:** CD001117.
9. **Bateman, E.D. Hurd, S.S. Barnes, P.J. Bousquet, J. Drazen, J.M. Fitzgerald, J.M. et al.** 2018. Global strategy for asthma management and prevention: Gina executive summary. Eur Respir J **51:** 0751387.
10. **Scullion, J.** 2018. The nurse practitioners' perspective on inhaler education in asthma and chronic obstructive pulmonary disease. Can Respir J **2018:** 2525319.
11. **Yokoyama, H., Nakajima, Y., Yamamura, Y., Iga, T. and Yamada, Y.** 2005. Investigation of mouth washing by patients after inhaling corticosteroids. Yakugaku Zasshi **125:** 455-461.
12. **Wijesinghe, M., Weatherall, M., Perrin, K., Crane, J. and Beasley, R.** 2009. International trends in asthma mortality rates in the 5- to 34-year age group: A call for closer surveillance. Chest **135:**1045-1049.
13. **Lozano, R., Naghavi, M., Foreman, K., Lim, S., Shibuya, K., Aboyans, V., et al.** 2012. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: A systematic analysis for the global burden of disease study 2010. Lancet **380:** 2095-2128.