

EDUCATION

Investigation of knowledge of asthma and inhaler devices in pharmacy workers

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Objective: Effective management of asthma requires the development of a partnership between the patient and his or her health care professionals. In a number of countries, including Turkey, pharmacy workers are the last link in the asthma therapy chain and usually give information to their patients about the use of these drugs and asthma. As a result, we investigated knowledge of asthma and the use of inhaler devices in pharmacy workers in Istanbul pharmacies. **Methods:** The study was performed with 266 pharmacists and 261 pharmacist assistants selected from 4221 pharmacies in Istanbul by random sampling, with a 90% confidence interval. Each patient was asked to fill out a questionnaire that measured their knowledge of asthma. They were also asked to demonstrate how to use the inhaler devices. **Results:** The high number of incorrect answers to the 11th question, that “the majority of upper respiratory tract infections triggering asthma are viral”, may be a contributor to the unnecessary use of antibiotics in Turkey (incorrect answers from 41.2% of pharmacists and 34.5% of pharmacist assistants). Scores for inhalation device techniques for the pharmacists were as follows: metered-dose inhaler (MDI), 4.9 ± 3.9 ; discus, 4.4 ± 3.7 ; aerolizer, 4 ± 3.1 ; and turbuhaler, 3.8 ± 2.9 . **Conclusions:** Istanbul pharmacy workers have limited knowledge about asthma and inhaler devices and need further education, which may contribute to improved asthma control in Turkey.

Keywords

Asthma, education, inhaler devices, inhaler technique, pharmacist

History

Received 9 April 2014

Revised 16 May 2014

Accepted 21 May 2014

Published online 10 June 2014

Introduction

Global asthma guidelines highlight that the effective management of asthma requires the development of a partnership between the patient and his or her health care professional [1]. The aim of this partnership is guided self-management; that is, giving asthma patients the ability to control their own condition with guidance from health care professionals. The health care professional is generally the physician and/or, in some countries, the asthma nurse. In a number of countries, including Turkey, pharmacies sell asthma inhalation drugs that have been prescribed by a physician and, although physicians are the primary informants, pharmacists or their assistants give information to patients about both asthma and asthma drugs.

Despite inhalers being cornerstone devices for effective asthma therapy, poor inhaler technique is a major problem in asthma management and control [2,3]. Throughout the world, whatever be the chosen inhaler, education from physicians in

collaboration with other health care professionals such as nurses, social workers and pharmacists is a critical component of disease management [4–10]. Present day pharmacists have greater responsibility for the education of patients than ever before, since they are the last link in the therapy chain before a patient's self-administration of inhalation therapy [3,11]. There are a substantial number of published studies examining pharmacists' knowledge and impact on the management of asthma and other chronic diseases [6,12–16]. There is only one published national survey of pharmacists' perception of asthma in Turkey [6]; however, this survey did not assess knowledge about the usage of inhaler devices. To address this important subject, we investigated knowledge of asthma and the use of inhaler devices in pharmacists and their assistants in pharmacies in Istanbul.

Materials and methods

This descriptive epidemiological study was done with approval of the Ethics Committee of our Faculty of Medicine (approval number: 24655).

Pharmacies

A list of all private pharmacies in Istanbul (total number: 4221) was given by the Istanbul Chamber of Pharmacists.

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All private pharmacies with their pharmacists were included in the study. There were no inclusion or exclusion criteria for both pharmacists and pharmacies. By random sampling (with applying random integer generator), 275 pharmacies were selected (with 90% confidence interval, 50% prevalence, the share of 10% error), out of which 266 accepted the invitation to join the study. From the pharmacies chosen, 266 pharmacists and 261 pharmacist assistants were included in the study. Each pharmacy was visited by appointment. In every pharmacy, the senior pharmacist and pharmacy assistant were asked to fill out a questionnaire after signing a consent form. The questionnaire was administered by an independent pollster. Before the questionnaire was given, the demographic parameters (the history of having asthma and use of inhaler devices by pharmacists and pharmacist assistants and the level of education of pharmacists and pharmacist assistants) were recorded. The pharmacists and pharmacist assistants separately filled out the questionnaire that rated their knowledge of asthma. They showed how to demonstrate inhaler devices (metered-dose inhaler (MDI), discus, turbuhaler and aerolizer) use for patients, independently, in separate environments, and were scored according to their proper use.

Questionnaire and inhaler devices

The Department of Pulmonary Diseases of our Faculty of Medicine hosts an annual educational activity on World Asthma Day. During this activity, patients interacted with the physicians in regard to asthma-related knowledge. The questionnaire used in the study was created based on dialogue with asthma patients in this educational activity. The questionnaire contained 20 questions, with answers in a simple right-wrong format. The correct responses to the questionnaire were taken from the Asthma Patients Education Booklet of the Turkish Thoracic Society (www.toraks.org.tr). The English translation of this questionnaire is shown in Appendix 1. The validity of the questions was determined by Cronbach's α test and the internal consistency was determined by factor analysis.

The forms for evaluation of inhaler devices (MDI, turbuhaler, aerolizer and discus) were prepared with 10 steps for each device (Appendices 2–5). All inhalers usage steps are taken and modified for 10 steps from the patient information leaflet (drug syllabus). For the each incorrect step, 1 point was deducted from the total of 10 points. The devices used were for demonstration or placebos and did not contain active materials.

Pollsters

The pollsters were fifth-year students selected from our faculty. Students applied to the recruitment announcement voluntarily and 24 successful students were trained as pollsters by the researchers. The number of interviews conducted was similar for each pollster. The pollsters finished all their interviews during a 4-month period during 2012.

Statistical analysis

Survey forms and device applications were analysed using SPSS version 10.0 (SPSS Inc. Chicago, IL). Chi-square test or

Mann–Whitney U test were used for comparison of data. Data were expressed as mean $\pm$ standard deviation (SD) and percent (%) where appropriate. The value of $p < 0.05$ was considered statistically significant.

Results

The study included 266 of the total 275 pharmacies selected at the beginning of the study. The nine pharmacies that were not included comprised five that had closed and four that did not want to participate in the study. The study consisted of 266 pharmacists and 261 pharmacist assistants, with a 90% confidence interval. Only 15.7% of the pharmacies were not located close to a health care provider (hospital, primary health care, private clinic or consulting room). As their patients cannot go to their proper physician easily their demonstrations can affect the patient's use.

All the pharmacists and pharmacist assistants said that they were faced with asthma patients and they displayed and showed inhaler devices to these patients. Two-hundred and thirteen pharmacists (80%) stated that they were asked questions about asthma or treatment of asthma. One hundred six (40%) pharmacists and 114 (44%) pharmacist assistants stated that they tell patients, "You should also consult your physician about how to use inhaler devices", while others stated that they demonstrated how to use the devices.

There was no significant difference between pharmacists and pharmacist assistants in the history of having asthma and use of inhaler devices by pharmacists and pharmacist assistants (Table 1).

All pharmacists in Turkey are educated at university level. For pharmacist assistants, the level of education was as follows: 22.6% primary school, 18.4% secondary school, 46.7% high school, and 12.3% university. The percentage of pharmacist assistants who graduated from university was significantly lower (<0.001).

The distribution of correct answers to the 20 questions about asthma (Appendix 1) is shown in Table 2. The correct answer ratio for 10 of the questions was significantly lower in pharmacist assistants than pharmacists. In pharmacists, the correct answer ratio for eight of the 20 questions was below 75%.

For the use of each device, accuracy rates for the 10 defined steps are shown in Tables 3–6. The most common mistakes for all devices were not applying the step described as "hold breathing for 10 seconds and wait 30–60 seconds for the second use".

Table 1. History of having asthma and use of inhaler devices by pharmacists and pharmacist assistants.

	Pharmacist, <i>n</i> (%)	Pharmacist assistant, <i>n</i> (%)	Total, <i>n</i> (%)	<i>p</i> Value
Asthmatic	8 (3.0)	5 (1.9)	13 (2.5)	0.419
Asthmatic family member	33 (12.4)	32 (12.3)	65 (12.3)	0.960
Uses inhaler device	6 (2.3)	6 (2.3)	12 (6.3)	0.973
Family member uses inhaler device	20 (7.5)	21 (8.0)	41 (7.8)	0.821

Table 2. Distribution of correct answers to questions about asthma knowledge: the following definitions are right (R) or wrong (W).

Questions	Pharmacist, n (%)	Pharmacist assistant, n (%)	Total, n (%)	p Value
1- Asthma is a chronic, inflammatory disease of the airways. (R)	177 (72.0)	174 (73.7)	351 (72.8)	0.661
2- Asthma is an infectious disease of the airways. (W)	240 (94.1)	172 (71.4)	412 (83.1)	0.000***
3- In asthma, the airways are extremely sensitive. (R)	235 (91.1)	196 (79.4)	431 (85.3)	0.000***
4- In asthma, narrowing of airways is irreversible. (W)	161 (67.6)	98 (43.4)	259 (55.8)	0.000***
5- Asthma is usually seen in the form of attacks. (R)	255 (97.3)	220 (90.0)	475 (93.9)	0.000***
6- Asthma incidence in Istanbul is between 7 and 10%. (R)	240 (94.1)	172 (71.4)	412 (83.1)	0.000***
7- Each asthma patient is allergic. (W)	148 (58.0)	118 (49.8)	266 (54.1)	0.067
8- The most important cause of allergic asthma is genetic. (R)	168 (66.7)	134 (56.1)	302 (61.5)	0.016*
9- Air pollution may trigger asthma. (R)	249 (95.0)	220 (89.1)	469 (92.1)	0.012*
10- Employment in certain occupations may reveal asthma. (R)	244 (95.3)	197 (81.4)	441 (88.6)	0.000***
11- The majority of upper respiratory tract infections triggering asthma are viral. (R)	141 (58.8)	144 (65.5)	285 (62.0)	0.139
12- Excessive sputum is the one of the most important complaints of an asthma patient. (W)	154 (62.6)	111 (46.8)	265 (54.9)	0.000***
13- PEF-meter is a device used for asthma patients' follow-up. (R)	135 (77.1)	125 (68.7)	260 (72.8)	0.072
14- A patient who is having an acute attack should be given theophylline immediately. (W)	91 (38.7)	74 (32.9)	165 (35.9)	0.192
15- The best medicine to control asthma is inhaled steroids. (R)	228 (91.2)	193 (83.5)	421 (87.5)	0.011*
16- If sprays containing cortisone are used for a long time, they dry the lungs. (W)	95 (41.7)	75 (34.7)	170 (38.3)	0.132
17- Use of inhalers for a long time can be habit forming. (W)	118 (58.1)	103 (48.1)	220 (53.0)	0.041*
18- The majority of patients with asthma use cigarettes. (W)	242 (93.1)	221 (88.8)	463 (91.0)	0.089
19- Adult asthmatic patients can take their medication throughout their lives, under the control of a physician. (R)	234 (90.3)	221 (89.8)	455 (90.1)	0.848
20- If inhaler drugs are used for a long time, they can cause cancer. (W)	195 (86.3)	189 (84.8)	384 (85.5)	0.645

Bold values indicate significant *p* values.

p* < 0.05; *p* < 0.01; ****p* < 0.001.

Table 3. Accuracy of metered-dose inhaler (MDI) usage in 10 steps.

MDI steps	Pharmacist, n (%)	Pharmacist assistant, n (%)	Total, n (%)	p Value
1- Remove the cap from the MDI and shake well	140 (52.6)	117 (44.8)	257 (48.8)	0.073
2- MDI and the head should be upright, with the head tilted slightly backwards	141 (53.0)	108 (41.4)	249 (47.2)	0.008**
3- Take a deep breath, and then breathe out slowly until full expiration	138 (51.9)	88 (33.7)	226 (42.9)	0.001***
4- Place the mouthpiece of the MDI between the teeth and seal lips tightly around it	184 (69.2)	148 (56.7)	332 (63.0)	0.003**
5- Start to breathe in slowly, pressing down once on the canister	174 (65.4)	140 (53.6)	314 (59.6)	0.006**
6- Continue to breathe slowly and deeply	150 (56.4)	112 (42.9)	262 (49.7)	0.002**
7- Hold breath for 10 seconds	82 (30.8)	67 (25.7)	149 (28.3)	0.189
8- Remove device from the mouth	160 (60.2)	143 (54.8)	303 (57.5)	0.213
9- Breathe slowly and calmly through the nose	87 (32.7)	55 (21.1)	142 (26.9)	0.003**
10- After waiting 30–60 seconds, repeat the same process. After use, close the cap and remove the MDI	57 (21.4)	35 (13.4)	92 (17.5)	0.015*

Bold values indicate significant *p* values.

p* < 0.05; *p* < 0.01; ****p* < 0.001.

The mean numbers of correct steps performed for each device (the highest point is 10) for pharmacists and pharmacist assistants are shown in Table 7. For all devices, the mean number of correct steps performed was below 5.00. Among all the devices, the highest number of correct steps performed was with the MDI.

Being asthmatic, use of the device, or having an asthmatic patient in the family was associated with a slight increase in score; however, this was not significant.

Discussion

Istanbul, with a population of 13.9 million, is the largest city in Turkey and among the largest cities in the world by population within city limits. The prevalence of asthma in Istanbul is 8–9% [17].

In Turkey, pharmacists and their assistants usually give information to patients about inhaler devices and asthma because they are the last link in the asthma therapy chain before

Table 4. Accuracy rates of turbuhaler usage in 10 steps.

Turbuhaler steps	Pharmacist, <i>n</i> (%)	Pharmacist assistant, <i>n</i> (%)	Total, <i>n</i> (%)	<i>p</i> Value
1- Unscrew and remove the cap	163 (61.3)	135 (51.7)	298 (56.5)	0.027*
2- Hold the inhaler upright	122 (55.5)	99 (45.4)	221 (50.5)	0.036*
3- Twist the coloured grip as far as it will go. Then twist it all the way back. It is done correctly when a click is heard	135 (50.8)	128 (39.1)	237 (45.0)	0.007**
4- Breathe out to full expiration	96 (36.1)	62 (23.8)	158 (30.0)	0.002**
5- Put the mouthpiece between the teeth and close the lips around it	151 (56.8)	123 (47.1)	274 (52.0)	0.027*
6- Breathe in forcefully and deeply through mouth	138 (51.9)	111 (42.5)	249 (47.2)	0.032*
7- Remove device from mouth before breathing out	133 (50.0)	115 (44.1)	248 (47.1)	0.172
8- Hold the breath for 10 seconds	71 (26.7)	53 (20.3)	124 (23.5)	0.084
9- Breathe out through the nose	74 (27.8)	42 (16.1)	116 (22.0)	0.001***
10- Wait 30–60 seconds for the second use and then repeat the same process or close the cap and remove the device	58 (21.8)	28 (10.7)	86 (16.3)	0.001***

Bold values indicate significant *p* values.

p* < 0.05; *p* < 0.01; ****p* < 0.001.

Table 5. Accuracy of aerolizer usage in 10 steps.

Aerolizer steps	Pharmacist, <i>n</i> (%)	Pharmacist assistant, <i>n</i> (%)	Total, <i>n</i> (%)	<i>p</i> Value
1- Pull off mouthpiece cover. Twist mouthpiece open in the direction of the arrow.	146 (54.9)	121 (46.4)	267 (50.7)	0.050*
2- Put capsule into the device. The capsule should fit into the base of the device.	141 (53.0)	120 (46.0)	261 (49.5)	0.107
3- Close the mouthpiece, which will click when properly closed.	141 (53.0)	120 (46.0)	261 (49.5)	0.107
4- Hold the device with mouthpiece straight up. Squeeze the two buttons and then let go.	128 (48.1)	104 (39.8)	232 (44.0)	0.056
5- Breathe out all the way.	91 (34.2)	57 (21.8)	148 (28.1)	0.002**
6- *Place the Aerolizer between lips, and breathe in quickly and deeply. (The Aerolizer should vibrate due to rotation of the capsule in the chamber and dissolution of the powder).	111 (41.7)	85 (32.6)	196 (37.2)	0.030*
7- Remove device from mouth.	128 (48.1)	98 (37.5)	226 (42.9)	0.014*
8- Hold breath for as long as you can, up to 10 seconds.	55 (20.7)	34 (13.0)	89 (16.9)	0.019*
9- To confirm that all of the medicine was delivered, open the mouthpiece of the aerolizer and look at the capsule. Do not touch it. If you still see powder in the capsule, repeat steps from (*).	63 (23.7)	33 (12.6)	96 (18.2)	0.001***
10- Wait 30–60 seconds for the second use, and then repeat the same process or close the cap and remove the device.	51 (19.2)	30 (11.5)	81 (15.4)	0.015*

Bold values indicate significant *p* values.

p* < 0.05; *p* < 0.01; ****p* < 0.001.

Table 6. Accuracy of discus usage in 10 steps.

Discus steps	Pharmacist, <i>n</i> (%)	Pharmacist assistant, <i>n</i> (%)	Total, <i>n</i> (%)	<i>p</i> Value
1- Hold device in one hand and put the thumb of your other hand on the thumb grip. Push your thumb away from you as far as it will go until the mouthpiece appears and snaps into position.	162 (60.9)	147 (56.3)	309 (58.6)	0.286
2- Hold the device in a level, flat position with the mouthpiece toward you.	141 (53.0)	124 (47.5)	265 (50.3)	0.207
3- Slide the lever away from you as far as it will go, until it clicks. The device is now ready to use.	142 (53.4)	123 (47.1)	265 (50.3)	0.151
4- Breathe out fully.	105 (39.5)	69 (26.4)	174 (33.0)	0.001***
5- Put the mouthpiece to your lips. Breathe in quickly and deeply through the device.	152 (57.1)	127 (48.7)	279 (52.9)	0.051
6- Remove device from mouth.	146 (54.9)	132 (50.6)	278 (52.8)	0.321
7- Hold breath for about 10 seconds.	71 (26.7)	55 (21.1)	126 (23.9)	0.131
8- Breathe out slowly through the nose.	74 (27.8)	54 (20.7)	128 (24.3)	0.056
9- Put your thumb on the thumb grip and slide the thumb grip back toward you as far as it will go. The device will click shut.	122 (45.9)	105 (40.2)	227 (43.1)	0.192
10- Wait 60 seconds for the second use, and then repeat the same process.	57 (21.4)	36 (13.8)	93 (17.6)	0.022*

Bold values indicate significant *p* values.

p* < 0.05; **p* < 0.001.

Table 7. The number of correct steps performed for each device.

	Pharmacist (mean $\pm$ SD)	Pharmacist assistant (mean $\pm$ SD)	<i>p</i> Value
MDI score	4.94 $\pm$ 3.88	3.65 $\pm$ 3.57	0.001***
Turbuhaler score	3.83 $\pm$ 2.95	3.51 $\pm$ 3.19	0.003**
Aerolizer score	3.97 $\pm$ 3.07	3.89 $\pm$ 3.55	0.008**
Discus score	4.41 $\pm$ 3.72	3.86 $\pm$ 3.66	0.063

** $p < 0.01$; *** $p < 0.001$.

self-administration by the patients. In our study, 80% of all pharmacists stated that they were faced with questions about asthma or the treatment of asthma. Sixty percent of pharmacists stated that they demonstrate to patients how to use inhaler devices, despite 84.3% of them being in close proximity to a health care provider where a physician was present. In this case, collaboration between the physician and the pharmacist may provide benefits to the patients. A number of studies mention the importance of this issue [4–10], and there are a substantial number of published studies examining pharmacists' knowledge and impact on management of asthma and other chronic diseases [6,12–16]. All these studies show that “Pharmaceutical care programs improved therapeutic outcomes, and clinical pharmacy services complemented the clinical activities of other health care providers in managing chronic diseases and resolving drug-related problems” [6,12–16,18,19]. Dizdar et al. found that, “In Turkey, between 20 and 40% of the pharmacists did not find that they were sufficiently qualified for the handling of inhalers nor the inhalation technique” [6]. In our study, for all the devices, the mean number of correct steps performed was below 5.00 (the highest point being 10), which indicates that the knowledge of pharmacists and their assistants about inhalers is not sufficient to communicate effectively to the patients.

As the questions were developed by us, rather than taking the form of a standardised questionnaire for pharmacists, this may lead to difficulties in comparing our study with others. Although this could be a limitation, our approach enabled us to focus on questions that were asked mostly frequently and were problematic for asthma patients in Istanbul.

Less than 50% of the pharmacists and less than 40% of the pharmacist assistants recorded correct answers to the 14th and 16th questions, which related to acute and chronic treatment of asthma. The 7th, 11th and 17th questions also resulted in less than 60% of the pharmacists and less than 50% of the pharmacist assistants giving correct answers. The incorrect answer to the 7th question, that each asthma patient is usually allergic, is a mistaken view commonly held by patients also. The high number of incorrect answers to the 11th question, that “the majority of upper respiratory tract infections triggering asthma are viral”, may be a contributor to the unnecessary use of antibiotics in Turkey. Also, the high number of incorrect answers to the 17th question, that “using inhalers for a long time can be habit forming”, could lead to fear of using inhaled drugs in patients who receive advice on this subject from pharmacists or pharmacist assistants. To avoid giving incorrect treatment approaches to patients, the knowledge of pharmacists and pharmacist assistants about asthma and its treatment needs to be further examined, with educational methods focused on correcting misconceptions.

Evidence-based literature consistently reports that no single inhaler device is superior to another. Drug and device selection should be based on a patient's ability to use the device properly [20]. This is an important consideration because Al-Jahdali et al. demonstrated that improper inhaler technique is associated with poor asthma control and frequent emergency department visits [21]. Thus, teaching patients the correct use of inhaler devices by educated health care workers is of vital importance. This would help to minimise inadequate asthma control, as demonstrated by Sekerel et al. [8] and Turktas et al. [22].

With regard to inhaler techniques among pharmacists and pharmacist assistants, the technique for MDI was better than for other inhalers. This may be because MDIs have been on the market for long time. In general, the most common errors were forgetting to hold their breath for 10 seconds after breathing in and not waiting 30–60 seconds before the second use. Yildiz et al. found that the most common basic error of Turkish patients associated with inhalation techniques was failure to exhale before inhaling through the device (18.9%) [23]. This error was also relatively common in pharmacists in our study: 48.1% for pMDI, 63.9% for turbuhaler, 65.8% for aerolizer and 60.5% for discus. These results were not different if the pharmacist personally used an inhaler or had an asthmatic family member who used the device. Thus, personal knowledge of the use of an inhaler device was not sufficient for a pharmacist or assistant to successfully demonstrate the device and teach its use to patients.

Yildiz et al. demonstrated that repeated checking of patients' inhaler techniques, with correction of the errors, was associated with a significant decrease in the number of patients with basic errors in inhalation techniques [23]. Education of pharmacists may help to support physicians and asthma patients and may lead to an increase in asthma control worldwide.

In conclusion, pharmacy workers in Istanbul have limited and often incorrect knowledge about asthma and inhaler devices. These groups have face-to-face contact with asthma patients and need further education to most effectively support asthma patients. Further education could help reduce the provision of incorrect knowledge about asthma and inhaler devices to patients and may help to control asthma and ease the economic burden of this disease.

Declaration of interest

Gemicioglu reports conflict of interest with Abdi Ibrahim, AstraZeneca, Boehringer Ingelheim, Chiesi, GSK, Novartis, Pfizer Pharmaceutical Companies. Can and Borekci report no conflicts of interest regarding this study. The authors thank Astra-Zeneca Turkey, Novartis, Turkey, and GSK-Turkey for the unrestricted educational grant for the demonstration or placebo inhaler devices kindly provided for this study.

The authors alone are responsible for the content and writing of this article.

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Appendix 1

Asthma Knowledge Assessment Survey

The following definitions are right (R) or wrong (W):

- (1) Asthma is a chronic, inflammatory disease of the airways. (R)
- (2) Asthma is an infectious disease of the airways. (W)
- (3) In asthma, the airways are extremely sensitive. (R)
- (4) In asthma, narrowing of airways is irreversible. (W)
- (5) Asthma is usually seen in the form of attacks. (R)
- (6) Asthma incidence in Istanbul is between 7 and 10%. (R)
- (7) Each asthma patient is allergic. (W)
- (8) The most important cause of allergic asthma is genetic. (R)
- (9) Air pollution may trigger asthma. (R)
- (10) Employment in certain occupations may reveal asthma. (R)
- (11) The majority of upper respiratory tract infections triggering asthma are viral. (R)
- (12) Excessive sputum is the one of the most important complaints of an asthma patient. (W)
- (13) PEF- meter is a device used for asthma patients' follow-up. (R)
- (14) A patient who is having an acute attack should be given theophylline immediately. (W)
- (15) The best medicine to control asthma is inhaled steroids. (R)
- (16) If sprays containing cortisone are used for a long time, they dry the lungs. (W)

- (17) Use of inhalers for a long time can be habit forming. (W)
- (18) The majority of patients with asthma use cigarettes. (W)
- (19) Adult asthmatic patients can take their medication throughout their lives, under the control of a physician. (R)
- (20) If inhaler drugs are used for a long time, they can cause cancer. (W)

Appendix 2

Evaluation Form for Use of Metered-Dose Inhaler (MDI)

(The most-used inhaler is salbutamol in Turkey. It must be shaken before all procedures.)

- (1) Remove the cap from the MDI and shake well.
- (2) MDI and the head should be upright, with the head tilted slightly backwards.
- (3) Take a deep breath, and then breathe out slowly until full expiration.
- (4) Place the mouthpiece of the MDI between the teeth and seal lips tightly around it.
- (5) Start to breathe in slowly, pressing down once on the canister.
- (6) Continue to breathe slowly and deeply.
- (7) Hold breath for 10 seconds.
- (8) Remove device from the mouth.
- (9) Breathe slowly and calmly through the nose.

- (10) After waiting 30–60 seconds, repeat the same process. After use, close the cap and remove the MDI.

Appendix 3

Evaluation Form for Use of Turbuhaler

- (1) Unscrew and remove the cap.
- (2) Hold the inhaler upright.
- (3) Twist the coloured grip as far as it will go. Then twist it all the way back. It is done correctly when a click is heard.
- (4) Breathe out to full expiration.
- (5) Put the mouthpiece between the teeth and close the lips around it.
- (6) Breathe in forcefully and deeply through mouth.
- (7) Remove device from mouth before breathing out.
- (8) Hold the breath for 10 seconds.
- (9) Breathe out through the nose.
- (10) Wait 30–60 seconds for the second use and then repeat the same process or close the cap and remove the device.

Appendix 4

Evaluation Form for Use of Aerolizer

- (1) Pull off mouthpiece cover. Twist mouthpiece open in the direction of the arrow.
- (2) Put capsule into the device. The capsule should fit into the base of the device.
- (3) Close the mouthpiece, which will click when properly closed.
- (4) Hold the device with mouthpiece straight up. Squeeze the two buttons and then let go.
- (5) Breathe out all the way.
- (6) *Place the Aerolizer between lips, and breathe in quickly and deeply. (The Aerolizer should vibrate due

to rotation of the capsule in the chamber and dissolution of the powder).

- (7) Remove device from mouth.
- (8) Hold breath for as long as you can, up to 10 seconds.
- (9) To confirm that all of the medicine was delivered, open the mouthpiece of the aerolizer and look at the capsule. Do not touch it. If you still see powder in the capsule, repeat steps from (*).
- (10) Wait 30–60 seconds for the second use, and then repeat the same process or close the cap and remove the device.
- (11) Note: Since capsule is for demonstration purposes and does not contain powder, evaluation will be done accordingly to that.

Appendix 5

Evaluation Form for Use of Discus

- (1) Hold device in one hand and put the thumb of your other hand on the thumb grip. Push your thumb away from you as far as it will go until the mouthpiece appears and snaps into position.
- (2) Hold the device in a level, flat position with the mouthpiece toward you.
- (3) Slide the lever away from you as far as it will go, until it clicks. The device is now ready to use.
- (4) Breathe out fully.
- (5) Put the mouthpiece to your lips. Breathe in quickly and deeply through the device.
- (6) Remove device from mouth.
- (7) Hold breath for about 10 seconds.
- (8) Breathe out slowly through the nose.
- (9) Put your thumb on the thumb grip and slide the thumb grip back toward you as far as it will go. The device will click shut.
- (10) Wait 60 seconds for the second use, and then repeat the same process.