Opinion of pneumologists on the importance of inhalers in patients with asthma or COPD

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Abstact

Background: Medications for asthma and COPD are mainly used in the form of inhalations. A survey was performed to obtain the opinion of experts about the importance of inhalers in inhaled drug therapy.

Methods: All pulmonologists–members of the Slovenian Respiratory Society were invited to participate in the survey using a two-stage Delphi method. The results of each response were shown by the median and interquartile range, whereby we calculated the level of consensus.

Results: 176 doctors were invited. Most questions were answered by 49 (27.8 %) participants. In the second round 42 doctors responded. As many as 33 out of 41 respondents (80.5 %) felt that in the treatment of asthma and COPD the selection of medicines and inhalers are equally important. When choosing an inhaler it is crucial that it is simple to instruct the patients about its use. Respondents highly agreed with the statement that patients receive a prescription for inhaler only after they have been trained on how to use it. As appropriate persons for the training of the patient on the use of inhalers the respondents recognized (from most to least suitable) a pulmonologist, a nurse, a general practitioner or a pharmacist. 53.8 % of respondents considered that the the patient's skill of the use of inhaler should be checked on every visit to the doctor. Respondents believed that replacing inhaler without consulting the treating doctor may result in incorrect use of inhaler, poor patient compliance, more exacerbations and poorer disease control. Some consensus with an indifferent median of 4.5 was reached with regard to the argument that the doctor should prescribe the inhaler that is the cheapest for society.

Conclusions: Slovenian pulmonologists believe that any change of inhaler is a critical event that must be coordinated with the patient and the doctor.

Key words: asthma, COPD, health education, disease exacerbation, generic substitution

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Introduction

Inhalation therapy is the mainstay of *treatment* in patients with asthma or COPD, with inhalers being the most efficient way of delivering the highest drug concentration to the respiratory pathways, while avoiding the adverse effects of systemic treatment (1,2). Both, the active substance as well as the inhaler, are important in order to obtain the highest drug efficacy. The deposition of the drug, particle size and drug delivery efficiency depend on the type of inhaler

and its correct use. Inhaler devices can be divided into two groups: metered dose inhalers (MDIs) and dry powder inhalers (DPI). With the MDI a good coordination between activation of the inhaler and the start of inspiration is required. With the DPI it is important that the patient is able to produce a sufficient inspiratory flow, to achieve the drugs deposition in the lungs. Good inhaler technique is of course important as well.

The manufacturers of related original drugs produce different inhalers. The companies producing generic drugs offer the same active ingredients in different inhalers. This widens the market choice, but also poses the risk of a patient acquiring the same active ingredient in an inhaler that he is not used to, thus increasing the chance of inefficient treatment.

There has been little research done on the influence of the inhaler on the treatment efficacy. Furthermore, the guidelines about treating COPD, barely address the topic of inhalers. In order to record the opinion of the experts about the importance of the inhalers in inhalation therapy, a study using the Delphi method was conducted in Belgium in 2012, asking about the importance of the inhalers in treating a patient with asthma/COPD. A similar study was done in 2015 among Slovenian pulmologists.

Methods

Selection of participants

All members of the Slovenian Respiratory Society were invited to participate.

Delphi method

The *Delphi technique* is well suited as a *method* for *consensus*-building.

Two different types of closed-ended questions were used. The first type of questions asked participants to specify their level of agreement or disagreement using an 11-point Likert Scale. Respondents were offered a choice of eleven responses (0–10), with "0" expressing a strong disagreement with the statement and "10" indicating a strong agreement with the statement. (Appendix 1)

In the second type of questions participants were asked to choose the answer they agreed with the most among a few possible options. (Appendix 1, questions 11, 21, 26).

The questionnaire was anonymous. The experts answered questionnaires in two rounds.

After the first round an analysis of answers was made and sent to all respondents. They were then asked whether they would stick with their original answers or reconsider them after they were given an insight into how other participants answered the questions. Each participant also received his/her answers from the first round. The survey was conducted using an online application. All potential participants first received two email invitations to take part in the survey. The non-responders were additionally called by phone. In the second round of the survey only the experts that answered the first round were asked to participate.

Analysis and evaluation of answers

Results were analysed using descriptive statistics. The results of each question were expressed using the median and interquartile range. The strength of the consensus was then calculated. Consensus on a questionnaire item was considered "Perfect" when all respondents chose the same answer. "Very high" consensus on an individual item

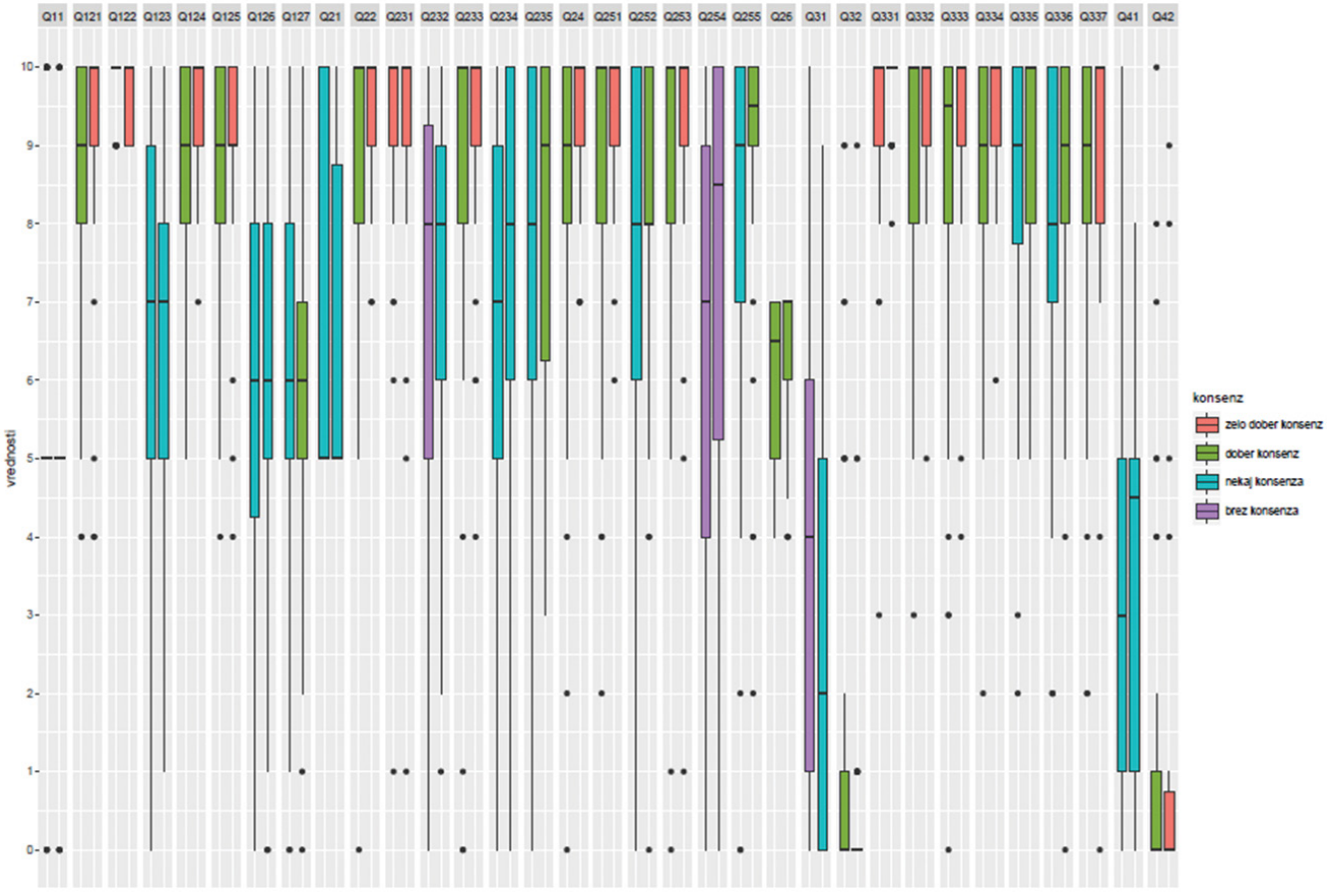

Figure 1: Consensograph showing the consensus about a particular question in the first (left) and the second (right) round of questions. Questions in which the consensus achieved was very high are colored red, high consensus green and some consensus blue. Questions in which there was no consensus are violet. The box in the boxplot represents an IQR with the median value being the horizontal line between the borders of a box. The whiskers represent the values up to 1.5-times the IQR distance. Outfitters distanced more than 1.5-times the IQR distance from the box border are drawn as individual units.

required 45 % to 55 % of the answers to be the same as the median value or 75 % to 85 % of answers to be in the range of median value ± 1. "High" consensus on an individual question required 45 % to 55 % of answers to be in the range of median value ± 1 or 75 % to 85 % of answers to be in the range of median value ± 2. "Some" consensus required 45 % to 55 % of answers to be in the range of median value ± 2 or 75 % to 85 % of answers to be in the range of median value ± 3. Absence of consensus on an individual item was determined in all other cases.

Results

In the first round, 176 practicing pneumologists, were invited to participate in the survey; 62 invited persons (35.2 %) accessed the online survey which they received via email; 59 of them took part in the survey with 49 (27.8 %) answering most of the questions. From the 49 doctors that were invited for the second round of the survey, 39 to 42 responded (depending on the question) (79.6 %–85.7 %). The results of the survey are shown in Figure 1.

Table 1: Showing the number of doctors who changed/did not change the reply to a particular question; if the reply changed, the number of doctors that changed the answer form "agree" to "disagree" or vice versa is written in a separate column.

Question	Unchanged reply	Changed reply	Reply changed over neutral point (%)
Q121	26	14	0
Q122	31	9	0
Q123	24	16	1 (2,5)
Q124	22	18	0
Q125	20	19	2 (5,1)
Q126	28	11	0
Q127	23	16	1 (2,6)
Q22	22	20	1 (2,4)
Q231	26	15	0
Q232	20	21	1 (2,4)
Q233	27	14	2 (4,9)
Q234	22	19	5 (12,2)
Q235	20	21	2 (4,9)
Q24	24	18	3 (7,1)
Q251	27	15	2 (4,8)
Q252	24	18	1 (2,4)
Q253	27	15	1 (2,4)
Q254	22	20	5 (11,9)
Q255	22	20	2 (4,8)
Q31	25	17	3 (7,1)
Q32	29	12	2 (4,9)
Q331	24	17	1 (2,4)
Q332	23	18	1 (2,4)
Q333	27	14	3 (7,3)
Q334	24	17	1 (2,4)
Q335	24	17	1 (2,4)
Q336	23	18	3 (7,3)
Q337	22	18	3 (7,5)
Q41	22	20	1 (2,4)
Q42	29	10	2 (5,1)

22.5 % to 51.2 % of participants changed their answers in the second round of the survey, with the majority of changes being minor. Only 7.5 % of doctors changed their stance on an item from agreeing to disagreeing or vice versa. (Table 1)

33 out of 41 doctors (80.5 %) stated that the choice of the drug is of the same importance as the choice of the inhaler, when treating a patient with asthma or COPD.

When choosing an inhaler, participants expressed the importance of education about the proper inhaler technique being simple (median value 10, very high consensus), of the patient ability to use the inhaler correctly (median value 10, very high consensus), of simplicity of the inhaler use (median value 10, very high consensus), of how well the physician is familiar with the inhaler (median value 9, very high consensus). The participants thought the patient's preference of the inhaler was less important (median value 7, some consensus). Furthermore, the price (median value 6, some consensus) and the option of using different substances in the same inhaler (median value 6, high consensus) were not considered to be very important when choosing the inhaler.

Most (73.8 %) of the participants were of the opinion that verbal instructions and a practical demonstration are more important than written instructions when educating a patient on proper use of the inhaler (some consensus). The rest thought that both options are equally appropriate. The doctors agreed that inhalers should be prescribed only after the patient had been instructed on the correct use by a professional (median value 10, very good consensus).

Professions deemed most suitable by doctors for instructing patients on the use of inhalers (arranged by professions deemed most to least suitable): pulmologist (median value 10, very high consensus), nurse (median value 10, very high consensus), family medicine practitioner (median value 8, some consensus), pharmacist (median value 8, some consensus).

The doctors also agreed that inhalers should be prescribed only after the patients can demonstrate proper inhaler technique (median value 10, very good consensus). Professions deemed most suitable by doctors for evaluating the technique are (arranged by professions deemed most to least suitable): pulmologist (median value 10, very high consensus), nurse (median value 10, very high consensus), general practitioner (median value 8, some consensus), pharmacist (median value 8, some consensus).

53.8 % of doctors expressed that the inhaler technique should be evaluated every time a patient visits a doctor; 26.9 % would evaluate it when there is disease exacerbation or the patient expresses concern; the rest believe that the technique should only be evaluated on the first few control examinations.

Most of the participants did not agree with the statement that an inhaler could easily be replaced with another, even if the active substances and the doses remain unchanged (median value 2, some consensus), although 35,7 % of the participants were undecided (answers 5–7 on a 0–10 scale).

The participants disagreed strongly (median value 0) with the statement that a pharmacist can swap the originally prescribed drug with a generic drug, meaning that the active ingredient and the dosage would stay the same, while the inhaler would be different. They expressed a concern that replacing an inhaler without consenting a doctor could lead to poor inhaler technique (median value 10, very high consensus), poor patient compliance (median value 10, very high consensus), decrease in the amount of drug deposited in the lungs (median value 10, very high consensus), more disease exacerbations and poorer disease control (median value 10, high consensus), non-optimal use of medical sources (median value 10, very high consensus), patient doubting the treatment and the diagnosis (median value 9, high consensus), and patient doubting the usefulness of the new inhaler in the case troubles arise (median value 10, very high consensus).

Some consensus with an indifferent median value of 4.5 was reached on a statement whether the doctors should prescribe the inhalers that were the cheapest for society. There was however no agreement with the statement that the pharmacist should be obliged to dispense the cheapest inhaler, that contains the active ingredient the doctor prescribed (median value 0, very good consensus).

The consensus in the second round of questioning increased in 18 out of the 33 questions (54,5 %), while in the rest the consensus stayed the same.

Discussion

In the survey pulmologists, the members of the Slovenian Respiratory Society, expressed the opinion that the choice of the drug is equally important as the choice of the inhaler when treating a patient with asthma or COPD. It is vital that the patient learns proper inhaler technique. Similar to the opinion of Spanish and Belgian doctors (5,6), the Slovenian pulmologists thought that inhalers should be prescribed only after the patient had been instructed on

the correct use. The act of switching to a different inhaler should therefore be done with caution. Some consensus was reached on a statement that the patient should be prescribed the drug and inhaler that is the cheapest for society. The majority of doctors do not agree with the idea of a pharmacist dispensing a generic drug with a different inhaler instead of the doctor prescribed drug.

Older meta-analyses showed that with proper inhaler technique there are no significant differences in clinical efficacy of the drugs no matter the form of inhaler used (7). Only a small proportion of patients, however, exhibit a proper inhaler technique. A study conducted in Brazil included 60 patients with asthma and COPD after they were consulted in a tertiary care setting (8). Almost all patients claimed to be using a proper inhaler technique. When asked to demonstrate the procedure of using the inhaler, 94.2 % made at least one mistake. More mistakes were made by patients with COPD.

Furthermore, a meta-analysis analyzing 144 studies found that 26–33 % of patients have a proper inhaler technique, 36–47 % use inhalers in a satisfactory manner and 27–36 % have a poor inhaler technique (9). The most common mistakes when using a metered dose inhaler were poor coordination between activation of the inhaler and the start of inspiration (45 %), low inspiration flow and depth of the breath taken (44 %) and not holding breath after inhaling (46 %). With dry powder inhalers, the most common mistakes were not achieving the lung residual volume before starting the inhalation (46 %), not holding breath after inhalation (37 %) and an incorrect preparation of the inhaler (29 %).

It is important to realize that not all the mistakes made when using an inhaler are critical. A critical mistake means that the patient receives little to no active ingredient. In a multicenter study of 1664 patients conducted in Italy, it was found that critical mistakes were made by 12 % of patients using a metered dose inhaler and 35–44 % of patients using dry powder inhalers (10). Older patients and patients that did not receive education on the use of inhalers were more likely to make critical mistakes. The incorrect usage was associated with more frequent hospitalizations, more visits of the emergency room, the need to use systemic corticosteroids and antibiotics and worse disease control. Similarly, patients with asthma, who were using metered dose inhalers and had poor inhaler technique, had significantly less stable disease with more exacerbations and showed a greater need of relievers (11).

An important conclusion from all these studies is that just asking the patient whether they have proper inhaler technique is not enough. Instead, the proper technique has to be confirmed by patient demonstration on control visits. As established by our study, that was also the position of Slovenian pulmologists. More than a half of doctors expressed the need to have the inhaler technique checked on each patient visit. Doctors believe a nurse is an appropriate person to educate patients on the proper use of inhalers and to evaluate the proper technique.

Of course, the suboptimal inhaler technique does not mean that the patient receives no drug. In a study, where healthy subjects inhaled salbutamol using a metered dose inhaler, it was concluded that the only possibility of no drug being deposited in the lungs is when the patient does not inhale or even exhales after activating the inhaler (12). Other mistakes lead to lower deposition of the active substance in the lung. For example, the deposition of the drug is lower by approximately a quarter when

starting the inspiration from functional residual volume instead from the residual volume. Rapid inspiration decreases the drug deposition by 25 %. Furthermore, immediate exhalation after inhaling the drug decreases its deposition by approximately 10 %.

A similar study using radioactive beclomethasone looked at the amount of the drug deposited in the lung in patients with stable asthma who used metered dose inhalers or dry powder inhalers. They concluded that with proper inhaler technique around 60 % of the drug was deposited in the lung with both inhaler types. If the users of a metered dose inhaler activated the inhaler before they started with the inspiration, only 37 % of the drug was deposited in the lungs. If the inhaler was activated in the middle of the inspiration, 50 % of the drug was deposited in the lung.

Therefore, poor inhaler technique can, to some extent, be compensated by increasing the drug dosage. This can, however, increase the probability and severity of adverse effects.

One of the main reasons for poor inhalation technique is the inhaler being replaced without the patient being given a proper training on using the new one. A study conducted in Great Britain on the consequences of corticosteroid inhaler replacement in 824 patients who were not consulted by their doctors about the replacement nor did they receive proper instructions on the use of their new inhalers (14). 53 % of the patients had dry powder inhalers switched to metered dose inhalers. The study showed that the patients who were not consulted by their doctors when having their inhalers switched, had less stable asthma and needed to use more relievers.

In Slovenia, the conditions for educating the patients on proper inhaler technique are favourable. Most of the doctors practicing family medicine work with a registered nurse, who is qualified to educate patients with asthma or COPD (15) A broad availability of pulmonary care practices means that a substantial part of patients with asthma or COPD can be treated by a specialist (16). There is room for improvement in obtaining better care by giving the community pharmacists a bigger role. Good practice from Japan shows that the education on proper inhaler technique provided by community pharmacists decreased the number of hospitalizations due to COPD (17).

Conclusion

Slovenian pulmologists regard the choice of the inhaler to be of the same importance as the choice of the active substance, when treating patients with asthma or COPD.

Any change of inhaler is a critical event that must be coordinated with the patient and the doctor. Before replacing an inhaler a patient has to be educated on the proper inhaler technique.

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Appendix 1

Survey questions

Q11. If you could choose the inhalation device independently of the active substance in the treatment of asthma / COPD, how would you then compare the respective importance of both choices? Answers: The choice of an inhaler is the most important; Both are equally important; The choice of the active substance is the most important

Q12. How important is each of the following criteria to you in the selection of an inhalation device, when prescribing a drug treatment for asthma/COPD? (0 = not at all important / 10 = very important)

1. The patient can be easily instructed on the proper inhaler technique
2. Patients ability to use the inhaler correctly
3. What inhaler the patient would choose
4. Simplicity of use of the inhaler
5. Your personal familarity with the inhaler
6. Reasnoble price
7. can be used with any active substance Q21 can be used with any active substance
8. Answers: Written instructions (manual); Verbal instructions and a practical demonstration; Both options are equally important

Q22 How strongly do you agree with the following statement: »The patient should be prescribed an inhaler only after he/she has been instructed on the correct use by a professional.«? (0 – strongly disagree, 10 – strongly agree)

Q23 How suitable do you find the following persons for instructing the patients on the use of inhalers for the treatment of asthma and COPD? (0 – completely unsuitable, 10 – completely suitable)

1. pulmologist
2. family medicine practitioner
3. nurse
4. pharmacist
5. parents (underage patient)

Q24 How strongly do you agree with the following statement: »The patient should be prescribed an inhaler only after he/she can demonstrate proper inhaler technique.«? (0 – strongly disagree, 10 – strongly agree)

Q25 How suitable do you find the following persons for monitoring the patients inhaler technique used for the treatment of asthma and COPD? (0 – completely unsuitable, 10 – completely suitable)

1. pulmologist
2. family medicine practitioner
3. nurse
4. pharmacist
5. parents (underage patient)

Q26 How often should the patient's inhaler technique be evaluated? Answers: Never, it is not necessary to check correct use of the inhalation device; only once, when starting the treatment; during the first 2 visits; during the first 3 visits; on regular basis, every month after the start of treatment; in case of disease exacerbation or when patient expresses concern; at every patient visit

Q31 To what extent do you agree with the following statement: »An inhaler can easily be replaced with another if the active substances and the doses are kept the same.«? (0 – strongly disagree, 10 – strongly agree)

Q32 How strongly do you agree with the following statement: »A pharmacist can switch to another device than the one prescribed, provided that the active substances and the doses are kept the same.«? (0 – strongly disagree, 10 – strongly agree)

Q33 How strongly do you agree with the following statements: »Switching inhalation devices without a medical consultation can lead to (0 – strongly disagree, 10 – strongly agree):

1. poor inhaler technique
2. poor patient compliance
3. decrease in the amount of drug deposited in the lungs
4. more disease exacerbations and poorer disease control
5. non-optimal use of medical resources (doctors will need to take time to explain how to use the new inhaler, the reasons for the replacement...)
6. patient's doubt about treatment and/or diagnosis, patient doubting the usefulness of the new inhaler in case problems arise

Q41 How strongly do you agree with the following statement: »The doctor should prescribe an inhaler that is the cheapest for the community.«? (0 – strongly disagree, 10 – strongly agree)

Q42 How strongly do you agree with the following statement: »the pharmacist should deliver the least costly inhalation device that contains the active substance prescribed by the physician.« (0 – strongly disagree, 10 – strongly agree)

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